A Quantitative Study of Educational Poverty, School Location, and Student Achievement Measured by the Program for International Student Assessment (PISA)

by

Brett Barger

A Dissertation submitted to the Education Faculty of Lindenwood University

in partial fulfillment of the requirements for the

degree of

Doctor of Education

School of Education

ProQuest LLC.
789 East Eisenhower Parkway
P.O. Box 1346
Ann Arbor, MI 48106 - 1346

A Quantitative Study of Educational Poverty, School Location, and Student Achievement Measured by the Program for International Student Assessment (PISA)

by

Brett Barger

This dissertation has been approved in partial fulfillment of the requirements for the degree of

Doctor of Education

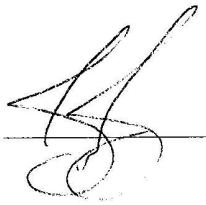
at Lindenwood University by the School of Education

Dr. Lynda Leavitt, Dissertation Chair	Date
Dr. Edward Morris, Committee Member	Date
Dr. Sherrie Wisdom, Committee Member	Date

Declaration of Originality

I do hereby declare and attest to the fact that this is an original study based solely upon my own scholarly work here at Lindenwood University and that I have not submitted it for any other college or university course or degree here or elsewhere.

Full Legal Name: Brett Alan Barger

Signature:  Date: 10-21-21

Acknowledgements

It is my sincere belief that there is no better way to begin this study than by thanking those who supported both me and the work itself. My gratitude begins with my committee members; Dr. Lynda Leavitt (chair), Dr. Sherrie Wisdom, and Dr. Edward Morris. I recall early on in the program being given the advice to surround myself with the most diverse and talented doctoral faculty who would agree to serve on my committee. Thank you all for saying "yes."

Dr. Leavitt, your technical expertise and professionalism may only be surpassed by your passion. These qualities kept me on track from giving shape to my original broad concepts all the way through to the fine -tuning of the final product. Perhaps most importantly, your passion was contagious and that enabled me to push through the challenges.

Dr. Wisdom, the choice to undertake a quantitative study was, in part, due to the enjoyment I derived from your class. The demands of this study certainly pushed the limits of my quantitative ability but your willingness to "lend me" your profound talents throughout was irreplaceable and appreciated.

Dr. Morris, I have admired your leadership for many years and it was an honor to have you serve on my committee. The perspective you offered as a faculty member from outside the School of Education helped give the balance I had hoped to achieve in this study.

Lastly, I want to thank my wife and children. I do this for you and would not have done this without you. It is certainly not fair to have asked all of you to sacrifice so much for what is essentially a solitary pursuit, yet you offered nothing but love and

encouragement. I only hope I can repay you by standing behind you as you pursue your dreams, whatever they may be.

Abstract

The performance of the United States' students on international tests remains an ongoing source of concern, division, and anxiety for government, educational, and business leaders, teachers (and their unions), as well as the general public. These selfsame test results have been used as evidence to support diametrically opposed political and educational strategy and policy for decades. All too often the performance of students is discussed with a single test score number that is used to represent the entirety of the education system's students without accounting for geographical, demographic, or socioeconomic differences among the student test takers. The contributing factors of the national level performance are often summed up simplistically as resulting from underfunded school systems or under qualified teachers. These generalized assessments and underlying national angst are also often based on the mistaken perception that the United States once led the world in international testing and that the declining performance is a grave indicator of the nation's economic and social future.

Researchers have begun to produce studies showing a far more nuanced interpretation of national level scores that point to much different contributing factors; in particular, poverty. Somewhat unexpectedly for the world's largest economy, the United States' poverty level is nearly the highest of all nations taking standardized international tests. These studies show that when international test results are controlled for certain socioeconomic factors that the United States scores are at, or very near, the top of the international tables. This study supported the body of evidence that poverty is the greatest hindrance to the academic achievement of the nation's students and sought to better understand the unique contributors to achievement of the nation's poor on the

mathematics portion of the Program for International Student Assessment test depending upon the socioeconomic composition and geographical location of a student's school.

Table of Contents

List of Tables

Chapter One: Introduction

Background and Purpose of the Study

During the formative years of the United States' educational system, Horace Mann called education the "great equalizer" (Cooke, Ojha, & Rohde, 2012, para. 1). Mann was appointed the first United States Secretary of Education on April 20, 1837, and believed the proliferation of education would eliminate poverty and greatly reduce the levels of crime and moral vices in society (Mann, 2013). Through the efforts of Mann and subsequent educational leaders, compulsory education was established in every state in the United States of America by 1918 ("Compulsory Education," 2013), yet crime rates and poverty continued to rise among the nation's population (Edelman, 2012). The prominent Christian pastor and civil rights leader Martin Luther King, Jr., summarized his thoughts on the education-poverty link stating, "We are likely to find that the problems of housing and education, instead of preceding the elimination of poverty, will themselves be affected if poverty is first abolished" (Thomas, 2011, para. 6). The debate as to whether education eliminates poverty or whether the elimination of poverty promotes education continued into the 21st century (Bernstein, 2007).

The purpose of this study was to investigate the differences in characteristics of schools and their students based on the poverty level and the geographic location of the school. Analysis of specific characteristics was based on student achievement measured by scores on the mathematics portion of the Programme for International Student Assessment (PISA). Poverty levels were determined by the percentage of a school's students participating in the National School Lunch Program (NSLP). At the time this study was designed, the threshold for participation in the NSLP was a family income less

than 185 % of the poverty line, which was approximately $41,000 for a family of four in 2011 (Weissmann, 2013). Schools with 25% or higher concentration of student participation in the NSLP were chosen for the study. That level was chosen because United States (U.S.) students attending schools with a poverty concentration less than 25% were already placed at the upper end of achievement on the PISA when compared to all participating countries (Strauss, 2010). An emphasis on schools with 25% or higher NSLP participation allowed an investigation of the effects of poverty, as related to geographic location, as well as Student and Family Characteristics, School Composition, Socio-Economic Status, and Organization, Staffing and Resources, and Governance. Schools that met this criterion were disaggregated by school location represented by small town, town, city, and urban area, as defined by PISA specifications. More specifically, data were collected from tests given each of three years, for the 2003, 2006, and 2009 testing cycles, to identify possible achievement trends over time.

The PISA utilizes both school and student standardized questionnaires to produce a comprehensive understanding of a variety of characteristics for both participating schools and test takers ("PISA 2003 student questionnaire," 2003b). A senior school administrator, primarily the principal, completed the school questionnaire and each student participant of the test completed his/her own personal questionnaire (Schulz, 2005). The researcher chose the specific categories for this study that were present in the 2003, 2006, and 2009 PISA testing cycles. The main category for examination of characteristics affecting students was Student and Family Characteristics. The main category contained the characteristics of student demographics, language and immigration status, parent's employment and education levels, as well as home

possessions and socioeconomic status ("PISA 2003 student questionnaire," 2003b). The categories for the study of participating schools were school composition, socioeconomic status, and organization, as well as school staffing and resources, and finally, school governance ("PISA 2003 school questionnaire," 2003). The impact of each of the school and student factors on PISA mathematics scores was then studied in depth for each of the four geographic locations to ascertain the differences in the learning and achievement.

The U.S. began participating in international educational assessments during the 1960s (Lemke & Gonzales, 2006). The first international tests in which the U.S. participated were a part of the First International Mathematics Study (FIMS) and the First International Science Study (FISS) (Zhao, 2012). These first tests were created in 1958 after a group of scholars, educational psychologists, sociologists, and psychometricians met in Hamburg, Germany (Loveless, 2009). They discussed their common belief that the world educational system was essentially a laboratory that could be studied to determine which processes and practices produced the best educational results. Subsequently, tests were developed and first administered by the International Association for the Evaluation of Educational Achievement (IEA) (Loveless, 2009). The purpose of the tests was to properly measure the outcomes of educational systems through a series of tests created to administer to students of various ages in the original 12 participating countries ("Brief history of IEA," 2013). The U.S finished 11th out of 12 countries in eighth grade math and 12th out of 12 in 12th grade math during the first tests in 1964 (Zhao, 2012).

These same tests were administered again in the 1980s as the Second International Mathematics Study (SIMS), and the U.S. students continued to perform poorly relative to other countries ("Brief history of IEA," 2013). Specifically, U.S. eighth grade students

were 10th out of 20 in mathematics, 12th out of 20 in Algebra, 16th out of 20 in Geometry, 18th out of 20 in measurement, and eighth out of 20 in statistics (Zhao, 2012). During that same testing cycle, U.S. 12th grade students performed similarly poorly: 12th of 15 in number systems, 14th of 15 in Algebra, 12th of 15 in Geometry, and 12th of 15 in calculus (Zhao, 2012).

The third round of tests was administered in the 1990s as the Third International Mathematics and Science Study (TIMSS), and U.S. student performance improved slightly ("Brief history of IEA," 2013). In eighth grade math, the U.S. was 28th of 41 countries, but only 20 countries had scores that were significantly better (Zhao, 2012). Since that time, the number and variety of international assessments increased (Gonzales, Miller, & Provasnik, 2009).

The TIMSS was given again in 2003 but with the test name now changed to Trends in International Mathematics and Science Study, and the U.S. again saw slightly improved scores for its eighth graders: 15th of 45, with only nine countries scoring significantly better (Zhao, 2012). It should be noted that many of the higher performing European countries that participated in PISA did not participate in TIMSS, which caused the U.S. to rank comparatively higher in TIMSS and comparatively lower in PISA (Cooke, Ginsburg, Leinwand, Noell, & Pollock, 2005). The proportion of participating developed countries to developing countries was greater for the PISA; as the PISA was, and continued to be, a study based on the developed member nations of the Organization for Economic Cooperation and Development (OECD) although developing nations were invited to participate as well (National Center for Education Statistics [NCES], n.d.). The time between testing cycles shortened, and the TIMSS was given four years later in 2007

with U.S. eighth graders finishing ninth of 47, with only five countries scoring significantly better (Zhao, 2012). While other international tests have been given since the 1960s, eighth graders have been the only group tested consistently throughout that period (Zhao, 2012).

The national anxiety in the U.S. resulting from poor testing results made headlines throughout the years and continued to do so at the time of this writing (Loveless, 2013). In March of 1958, *Life* magazine began a series entitled "Crisis in Education" that highlighted a perceived weakness in the U.S. versus the education system of the Soviet Union (Weber, 2011). The 1980s and 1990s international testing deficiencies led to the publication of *The Learning Gap: Why Our Schools Are Failing and What We Can Learn from Japanese and Chinese Education* by Stevenson & Stigler (1994). Stevenson and Stigler's book highlighted the tendency of Americans to attribute academic success to innate abilities, whereas Chinese and Japanese tended to attribute that success to environmental factors and student effort. *Surpassing Shanghai: An Agenda for American Education Built on the World's Leading Systems* was written by Tucker (2013) to help the U.S. understand how to redesign the education system based on what was known from studying the world's best education systems. These were but a few of the books published during the era of international testing that began in the 1960s, which consistently showed U.S. students as rarely above average and often towards the bottom in terms of achievement, especially in mathematics. The researcher observed that the name of the nation posing the threat to the economic welfare and security of the U.S. changed throughout the decades, but the root cause of the national debate, poor academic performance on international standardized tests, did not.

The U.S. also administered its own standardized tests to determine current states of education and learning at various points in time and to provide understanding of trends over time. The National Assessment of Educational Progress (NAEP) was first given to the nation's students in 1969 and continued to be used as a national-level trend comparison of student knowledge in key subject areas over a period of time that extended over four decades (Florida Department of Education, n.d.). The NAEP was referred to as the "nation's report card" (Hanushek, Lastra-Anadon, Peterson, & Woessmann, 2011, p. 4) and included three distinct test types with the sample size for any grade or subject matter a minimum of 7,000 students (Loveless, 2003). The NAEP assessment included three distinct types: one that measured national achievement and accounted for at-the-time-current assessment and curriculum, one that allowed for long-term trend analysis for changes in national achievement, and a state level NAEP that allowed for intra-state comparisons (Florida Department of Education, n.d.). Samples of students and procedures for data collection at the state level were distinct from national level NAEP testing (Loveless, 2003).

The PISA test was first administered in 2000 and implemented every three years thereafter. The number of participating countries and sub-national education systems for each of the three-year cycles included 32 in 2000; 41 in 2003; 57 in 2006; and 65 in 2009 (Bairu et al., 2001; Baldi, Jin, Skemer, Green, & Herget, 2007; Fleischman, Hopstock, Pelczar, & Shelley, 2010; Lemke et al., 2004). The test was designed to be administered to 15-year-old students and measured literacy in mathematics, reading, and science (Hanushek et al., 2011) throughout most of the world's industrialized nations. The PISA chose to test 15-year-olds since 90% or more of young people were still enrolled in

school within participating industrialized nations at this age (Gonzales et al., 2009). Some nations, such as China, only reported scores for specific regions contained within their national borders (Stout, 2013). The PISA was also designed to test literacy with questions developed to emphasize the application of knowledge rather than testing for curricular outcomes (Lemke et al., 2004). Educational leaders defined the PISA as "the world's report card," and it has served as a benchmark by which nations measured their academic progress against their own prior performance, as well as against peer nations (Hanushek et al., 2011, p. 5). The PISA was specifically designed to provide national and sub-national estimates of achievement rather than attempting to provide data for individual student achievement (Lemke et al., 2004).

The findings from international assessments such as PISA influenced educational debates and ensuing policy adoption in the U.S. (Hampden-Thompson & Johnston, 2006). The National Governors Association (NGA), Achieve, Inc., and the Council of Chief State School Officers (CCSSO) proposed, in 2008, the creation of an advisory council that would seek to create benchmarks for U.S. student performance based on the PISA (Loveless, 2009). The co-chair of this group was the governor of Georgia, Sonny Perdue, who stated:

> As governors, we must have consistent, comparable data in order to make informed decisions about our state's education system. Benchmarking will help us identify the qualities and characteristics that make up the education systems that best prepare students for success. Understanding these policies give us the option of incorporating the best of them into our own education structure. (Achieve, 2008, para. 4)

The Organization for Economic Cooperation & Development (OECD) coordinated the benchmark test for participating industrialized nations and ensured consistency in administration, delivery, and reporting since its inception (OECD 2013). The OECD was an intergovernmental organization comprised of industrialized member nations committed to create and promote policies with the intention of advancing the economic and social development of the people of the world (OECD, 2013). The organization responsible for conducting the PISA in the U.S. during the period of this study was the National Center for Education Statistics (NCES, 2013). Each cycle of the PISA selected for study concentrated on one of the three key areas (reading, mathematics, or science) while covering the remaining two as minor topics on that cycle's test (Schneider, 2009). The 2003 PISA cycle had as its area of emphasis mathematics, which left reading and science as the minor topics (Lemke & Gonzales, 2006). Science was the primary topic in the 2006 cycle with reading and mathematics listed as minor topics (Baldi et al., 2007). The 2009 cycle completed the rotation of key topics with reading serving as the primary topic, with mathematics, and science as secondary topics (Fleischman et al., 2010).

The importance of the PISA test results and the implications for the United States' future regularly made national headlines and crossed political divides ("Pisa envy," 2013). The People's Republic of China first joined the PISA cycle in 2009 when 5,100 students in the city of Shanghai were selected to participate (Dillon, 2010), and their performance topped the list in every category. Finn (2010) who served in Reagan's Department of Education compared this news to the moment when the USSR successfully launched a satellite, called Sputnik, into space, which prompted massive

government spending in the sciences to allow the U.S. to 'win the space race' (Finn, 2010). Duncan, Secretary of Education in the Obama administration, responded to the same news calling it a "massive wake-up call" (Horn, 2012, p. 1). President Obama, himself, placed the release of the PISA scores into historical context by saying, "Fifty years later, our generation's Sputnik moment is back [and] America is in danger of falling behind" (Dillon, 2010, p. 2).

America's reaction to the presence of Chinese students at the top of the achievement list came nine years and three testing cycles after PISA results revealed that U.S. students were average, at best, in the international rankings and had not been listed among the top 10 (Schleicher, 2007). Despite this fact, the 2009 PISA cycle prompted discussion about the U.S. results among educators, politicians, and the general public (Sailer, 2010). Cerf, an internet entrepreneur credited as being one of the "fathers of the internet" (Hanushek et al., 2011, p. 5) commented on the U.S. education system noting, "America is simply not producing enough of our own innovators, and the cause is twofold – a deteriorating K-12 education system and a national culture that does not emphasize the importance of education and the value of engineering and science" (Hanushek et al., 2011, p. 13).

Much of the national dialogue focused on the entirety of the U.S. educational system as failing (Clayton, 2013). Similar sentiments were expressed by the former president of Massachusetts Institute of Technology, Vest, when he said:

> America faces many challenges . . . but the enemy I fear most is complacency. We are about to be hit by the full force of global competition. If we continue to

> ignore the obvious task at hand while others beat us at our own game, our children and grandchildren will pay the price." (Hanushek et al., 2011, p. iv)

In recent years previous to this writing, the research and media coverage shifted to include the impact of socioeconomic status on the performance of students on international tests such as the PISA (Cavanagh, 2007). Research revealed that the U.S. was second in reading only to Shanghai on the 2009 PISA for schools identified with less than 10% poverty, as determined by the participation rates in the National School Lunch Program (Riddile, 2010). Ravitch (2013b) stated that the U.S. led the world for each PISA cycle when the results were controlled for poverty. This comparison was significant because the U.S. was second only to Mexico in the percentage of its youth living in poverty, with a total percentage of 22.4 ("Child poverty," 2005). In addition, childhood poverty increased in the U.S. each year since the inception of the PISA testing (U.S. Census Bureau, 2012).

Problem Statement

The purpose of this study was to investigate the possible differences in school and student factors that contributed to the scores on the mathematics PISA among the U.S. students who attended high poverty schools, based upon the geographic location of their schools. The specific focus of this research was on schools with a poverty rate of 25% or more, measured by the percentage of students participating in the National School Lunch Program (NSLP). For the 2009 PISA, the overall NSLP percentage for the U.S. was 35% of test takers (Carnoy & Rothstein, 2013). The researcher chose the 25% level because schools with poverty levels below this threshold already performed at levels comparable to the highest achieving countries participating in the PISA (Riddile, 2010).

The researcher selected the specific area of mathematics for two reasons. Mathematics had been, and remained, an area of particular weakness for the U.S. across all socioeconomic levels (Ripley, 2013). Also, mathematics ability at the secondary school level appeared to be one of the strong indicators of future economic well-being for both the student and the national economy, according to a study completed by the OECD in 2010 (Hanushek, Peterson, Woessmann, & Summers, 2013). An inability to locate these workers within the U.S. had the effect of U.S. firms looking to move jobs to nations with better-skilled workforces ("Offshoring: Welcome home," 2013). Some of these jobs were moving back to the U.S. as foreign labor costs rose and domestic energy costs dropped, but the return of these jobs would only extend as far as the market of skilled and educated labor could absorb them ("Offshoring: Welcome home," 2013). Ripley (2013), author of *The Smartest Kids in the World and How They got that Way*, also categorized mathematics as a "language of logic" that required a disciplined, organized way of thinking that embodied the type of problem-solving skills required in the modern economy where information was easily accessible to all, but knowing how to use it required higher level thought and reasoning (p. 70). These skills were expected to be requirements in jobs as diverse as the factory floor to white-collar jobs. A 2010 *CBS Entertainment* news report quoted one factory owner as saying, "It's hard to fill these jobs because they require people who are good at math, good with their hands, and willing to work on a factory floor" (Bowers, 2010, para. 7). According to research conducted by Carnevale and his colleagues at the Georgetown University Center for Education and the Workforce, by the year 2018 nearly two-thirds of U.S. jobs will require some form of postsecondary education (Rothman, 2013). This projection was an

increase from 1992 estimates, when just over half of U.S. jobs required postsecondary education and a larger increase from 1973 estimates, when one-third required postsecondary education (Rothman, 2013).

This study built upon previous research, which revealed U.S. students' PISA test scores were among the world's best when the scores of those students living in poverty were removed to a level not exceeding 10% (Riddile, 2010). More specifically, if the U.S. social class composition were adjusted to replicate the composition of students in the top ranking nations, the U.S. ranking for the 2009 PISA would change from 25th to 13th in math, and from 14th to sixth in reading (Ravitch, 2013a). In Ravitch's (2013b) December blog, she referenced the disaggregated analysis of the 2012 PISA results which showed that schools with less than 10% participation in the NSLP the U.S. were first in science and reading and fifth in mathematics. This study's intent was to close the gap found within the current literature and research by investigating the U.S. PISA mathematics scores, disaggregated by population-defined geographic regions, for students attending school in a high poverty environment. To gain a deeper understanding of the specific differences impacting achievement in each region, numerous aspects of school structure and governance, as well as student characteristics and background were studied as they related to PISA scores.

The researcher believed that comprehensive, efficient educational reform could only be undertaken when educators have a deep understanding of the contributing factors at the school and student level, where student poverty is most prevalent. Just as school curricula have been designed to 'meet students where they are,' this research sought to investigate possible differences between school location, percentage of students

participating in the National School Lunch Program, and math achievement to provide deeper, research-based conclusions to be used to formulate possible solutions and improvements in the United States' educational policy and strategies.

Professional Significance

The significance of this study was to provide a deeper understanding of how characteristics of poverty may have impacted the PISA mathematics scores of U.S. students by examining it within the context of school location. Previous research found socioeconomic status had a direct impact on achievement and standardized tests scores (Dillon, 2010). Carnoy and Rothstein (2013) revealed that in every nation, students at the bottom end of the socioeconomic spectrum achieved less academically than those at the top. As stated in the National Association of Secondary School Principals (NASSP), "While there is no relationship between poverty and ability, the relationship between poverty and achievement is almost foolproof" (*The School Principal*, 2011, para. 11).

The findings of this study were relevant for gaining a full understanding of the U.S. educational system as the demography; specifically poverty levels, continued to significantly change. For example, from the year 2000 to 2011, the number of states with more than 50% of their public school students living in poverty increased from 4 to 17 (Weismann, 2013).

At the time of this writing, the current literature stopped short, as it only identified a strong correlation between socioeconomic status and achievement on standardized tests such as the PISA (Riddile, 2010) and did not investigate the characteristics of childhood poverty based on the location of an individual school. This study explored the educational characteristics of both school and student for differences and any possible relationship to

PISA scores. In the absence of research noting the many facets of student achievement on the PISA and other standardized tests, the researcher believed the U.S. could risk creating policies, programs, and systems based on the unique characteristics and methods of other high performing nation's educational systems. One example of this risk would be attempting to create a Finland-style system in the U.S., as they have been one of the top performing nations in all categories since the inception of PISA. However, in examining the PISA results from 2009, researchers found that Finnish test scores were dropping, especially among students in the lower Socio-Economic Status (SES) categories (Strauss, 2010). Implementing such a system in the U.S. where a great amount of concern is placed on closing achievement gaps between high and low SES students would be unlikely to achieve the desired result despite the international recognition the Finnish education system received as a result of its high PISA scores. In fact, the national anxiety over student achievement and test results was common to many of the highest achieving nations as well (Ripley, 2013).

Definition of Terms

The report of this study used several terms repeatedly throughout and thus require further explanation. They are as follows:

ESCS. The Programme for International Student Assessment (PISA) index of economic, social and cultural status (Economic, Social and Cultural Status) was created on the basis of the following variables: the International Socio-Economic Index of Occupational Status (ISEI); the highest level of education of the student's parents, converted into years of schooling; the PISA index of family wealth; the PISA index of

home educational resources; and the PISA index of possessions related to "classical" culture in the family home (OCED, 2013, p. 1).

Geographic Categories. These categories are population-based categories used to define school location for all school participants of the PISA in all nations (PISA, 2003a). The individual categories are specified below.

***Rural area or small town*.** A rural area or small town is an area with a population of about 15,000 or less residents (PISA, 2003a).

Town. A town is an area with a population between 15,000 and about 100,000 residents (PISA, 2003a).

City. A city is an area with a population of 100,000 to about 1,000,000 residents (PISA, 2003a).

Large city. A large city is one with over 1,000,000 residents (PISA, 2003a).

NCES. The National Center for Education Statistics is the primary federal entity responsible for the collection and analysis of educational data in the U.S. (NCES, 2013).

NSLP. The National School Lunch Program is a federally assisted meal program operating in public and nonprofit private schools and residential child care institutions. It provides nutritionally balanced, low-cost or free lunches to children each school day. The program was established under the National School Lunch Act, signed by President Harry Truman in 1946 (U.S. Department of Agriculture, 2013, p. 2). Children from families with incomes at or below 130 % of the poverty level are eligible for free meals. Those with incomes between 130 % and 185 % of the poverty level are eligible for reduced-price meals, for which students can be charged no more than 40 cents (U.S. Department of Agriculture, 2013, p. 2).

OECD. The Organization for Economic Cooperation and Development has a primary mission to promote policies that will improve the economic and social well-being of people around the world (OCED, 2013). The OECD was funded by its member nations using a formula related to the size of the individual member's economy, with the U.S. contributing 22% of the budget. The 2013 budget was 354 million Euros (OCED, 2013). The organization currently has 34 member countries with the earliest memberships dating back to 1961 (OCED, 2013).

PISA.

> The Program for International Student Assessment (PISA) is an international assessment that measures 15-year-old students' reading, mathematics, and science literacy. PISA also includes measures of general or cross-curricular competencies, such as problem solving. PISA emphasizes functional skills that students have acquired as they near the end of compulsory schooling. (NCES, 2013, para. 1)

Overview of Methodology

This study utilized a quantitative research methodology. The NCES was the source for PISA data for all U.S. school and student participants (NCES, 2013). The PISA test included a questionnaire for each student participant and one for the senior school administrator at each participating school, with slight variations in the questionnaire within each researched cycle (Schulz, 2005). The student questionnaire had individual sections that addressed specific information about the test taker. For example, the 2003 version had sections titled About You, You and Your Family, Your Education, Your School, and a section with questions specific to the major emphasis of that testing cycle, reading, mathematics, or science ("PISA 2003 student questionnaire," 2003b).

The school questionnaire was designed to ask specific questions about key areas that provided the researcher with background information about the characteristics and learning environment for each participating school (Schulz, 2005). The questions were comprehensive and included characteristics of the school, the student body, pedagogical practices, resources, and administrative structures ("PISA 2003 school questionnaire," 2003a). The researcher chose questions from both questionnaires that were present in identical or similar form on each of the three testing cycles that comprised the study. School and student questionnaire data was utilized for schools with more than 25% poverty, as defined by the participation rates of its students in the NSLP. Data from the same categories were compiled and studied for the 2003, 2006, and 2009 cycles of the PISA and disaggregated based upon the geographic location of the school: rural area/small town, town, city, or large city.

Hypotheses

Hypotheses tested for this study were:

Hypothesis #1: There will be a measurable difference in achievement measured on the mathematics portion of the PISA with regard to the responses on the PISA questionnaires in the defined categories of Student and Family Characteristics, and School Composition, Socio-Economic Status (SES), Organization, Staffing and Resources and Governance, among high poverty schools in the geographic locations represented by rural/small town, town, city, or large city.

Hypothesis #2: There will be a relationship between the categories of achievement, high or low, measured on the mathematics portion of the PISA and the geographic location of the school, represented by rural/small town, town, city, or large city.

Hypothesis #3: There will be a measurable difference in achievement measured on the mathematics portion of the PISA, when comparing the geographic location of the school, represented by rural/small town, town, city, or large city.

Hypothesis #4: There will be a relationship between the achievement measured on the mathematics portion of the PISA and the geographic location of the school represented by rural/small town, town, city, or large city.

Limitations of the Study

Limitations are present in most academic research. These include items outside of the sphere of control of the researcher, and could have an impact on the study itself. This particular research calls on data that results from a test, testing environment, and results presentation not of this researcher's design, which presents certain inherent limitations.

This study was limited by the design of both the school and student questionnaires. Both questionnaires included multiple-choice answers and prohibited free writing. This limited the ability of the individual completing the questionnaire to give greater depth to responses. In addition, the choice of the questions' topics and depth for both schools and students was not of the researcher's choosing, and thus potentially limit what types of information derived.

A second limitation to the study was that the questions in both the school and student questionnaires were not completely consistent from cycle to cycle. The researcher was unable to compare exact responses from cycle to cycle; even though the intent, tone, and 'spirit' of the questions remained consistent. The student questionnaires required responses based solely on students' understanding. For example, a student may or may not have a firm understanding of the nature of their parent's job, yet they provided their

best estimation for the purposes of the questionnaire. Both school and student questionnaires were dependent upon the administrator or student completing them to be honest and forthright. The volume of participant data and the duration for which the data was collected should mitigate the impact of this limitation.

The outcomes derived from this study may also be difficult to translate into concrete assessments of what produced the differences and similarities for student and school achievements. The large U.S. population and the diversity of schools and school districts makes it nearly impossible to ascertain the impact of policies, plans, training, and leadership, even at a state level and much less at a national level. The timing for implementation of new plans and strategies and the knowledge of the plans and strategies that were replaced are best done at a school or district level to allow for the depth of study required to determine causal relationships (Loveless, 2009).

Summary

Politicians, educators, school administrators, and parents of students have been provided with national data that revealed that U.S. students have not performed above the OECD average on the PISA in any subject for any cycle. In fact, U.S. students have never performed well on international tests, at the time of this writing (Mathews, 2011) although the general achievement levels have risen since the 1960s when these types of tests began (Loveless, 2013). As will be explained in greater detail in Chapter Two, research has been completed in an attempt to determine the impact of school factors and funding on the achievement of U.S. students. Despite research showing a minimal impact from school factors in the U.S., governmental intervention in the education process has focused on the schools themselves, and on teachers, rather than on non-school factors that

may impact student achievement; specifically, the impact of poverty (Hampden-Thompson & Johnston, 2006).

While an agreed upon method of how to measure poverty in a transnational setting has proved difficult to find consensus, comparisons were possible within the U.S. by use of the national 'definition' or standard provided through the participation rates in the National School Lunch Program. This standard was used to provide depth to the research-backed understanding that poverty may have a significant negative impact on student achievement. Research showed that this negative impact was found, in varying degrees, throughout all the nations and education systems participating in PISA; however, it was particularly significant in the U.S. (Ravitch, 2013a). The greater negative impact in the U.S. was primarily due to the poverty level for its youth, at 21.7%; greater than any other participating nation (Riddile, 2014). New Zealand's poverty rate was closest at 16.3% (Riddile, 2014). Research has also shown that these percentages were increasing in the U.S. at a rapid pace (Weissmann, 2013) that would likely exacerbate the challenges unless identified accurately, with policies and programs implemented to either lessen poverty among U.S. youth or mitigate its impact on achievement. The research reported in this document attempted to provide a partial advancement and depth of knowledge necessary to understand which aspects of poverty were common to all youth and which were specific to the location in which they were being raised and educated.

Chapter Two will explain the progression of research and literature that has led to this study. This will begin with the foundational Coleman Report (Coleman et al., 1966) that established the importance of non-school inputs into student achievement, as well as subsequent research designed to test its veracity. The literature review also explored the

impact of socioeconomic status on achievement, along with the key factors resulting from poverty conditions for students. Chapter Three explained the parameters of the study. The method of data collection and its usages are outlined. The mechanics of the data exploration tool available on the NCES website is examined, as well. Chapter Four will summarize the analysis of the data collected. Tables are presented representing the impact of each of the criteria from the student and school questionnaires and their apparent impact on student achievement. Descriptive statistics will also be presented for the data collected for each of the hypotheses analyzed. Statements regarding the characteristics of the findings will complete Chapter Four. The interpretation of the data will be presented in Chapter Five. Conclusions and recommendations for further study will conclude the chapter and the dissertation.

Chapter Two: Literature Review

Introduction

The literature review represents a historical analysis of more than 50 years of international and domestic testing, education research, and education reform with a focus on the United States and its place in the global educational and economic community. This section will explore the historical and current research and publications regarding the impact of school factors, non-school factors, and socioeconomic status on the academic achievement of students in the United States. The literature review will reference student achievement at the school, national, and international levels, in particular the PISA, which forms the basis for this study. Attention and analysis will also be given to some of the most recent major educational system reforms that were put in place partially as the result of achievement scores on national and international tests, and partially to address the issue of poverty in the United States of America. Lastly, attention will be given to the variety of standardized achievement tests given in the United States, as well as the trends observed from those tests.

Since the introduction of the PISA in the year 2000, politicians, government agencies, educators, and the media have awaited the release of the results, often with the motivation to reinforce or promote their own beliefs and objectives ("Pisa envy" , 2013). In the U.S., headlines appeared comparing American students to the other industrialized nations of the world on the PISA, which had been referred to as "the world's report card," noting the impact on the current and future economy (Hanushek et al., 2011, p. vii). The headlines and articles often noted broad generalities based on national test score averages and failed to compare the data in a disaggregated manner

which could lead to policy that positively impacted the nation's education system (Thompson, 2013). President Barack Obama declared in 2009, "Fifty years later, our generation's Sputnik moment is back [and] America is in danger of falling behind" (Dillon, 2010, para. 22). U.S. Secretary of Education Duncan commented on the release of the 2009 PISA results by stating, "American students are poorly prepared to compete in today's knowledge economy . . . Americans need to wake up to this educational reality – instead of napping at the wheel while emerging competitors prepare their students for economic leadership" (Tucker, 2013, para. 17). Generally, the statements that received the most repetition and best placement in the popular press were those that lamented the failures of the U.S. education system relative to their political and economic challengers and how these failures signaled the imminent downfall of the country if not corrected with haste (Mathews, 2011).

Increasingly, researchers, policymakers, government officials, and educators deepened their discussions of student achievement beyond the context of simple overall nationwide or statewide average scores on standardized tests. The composition of the U.S. student body had a level of diversity of resources, family involvement and support, and most of all, poverty that necessitated deeper consideration of the factors contributing to achievement for those various socioeconomic levels of the country's students ("Hyde Park Johnny," 2011). Disaggregated data that allowed for deeper analysis of school and student factors such as school composition and student socioeconomic status also resulted in a nuanced set of conclusions regarding student achievement (Carnoy & Rothstein, 2013). The conclusions drawn from these studies increased the depth of understanding of the nation's school and student factors that could lead to future reform in school policy

and instructional practice within an ever-changing population of students. As one of the creators of the PISA, Andreas Schleicher says, “Without data, you are just another person with an opinion” (Ripley, 2013, p. 19).

Achievement: School versus Non-School Factors

On July 4, 1966, Coleman and colleagues released the report titled “Equality of Educational Opportunity” (Coleman et al., 1966); 12 years after the socially and educationally groundbreaking decision of *Brown vs. Board of Education* (1954) which officially abolished the concept of separate but equal schooling for Black and White students in the U.S. (Edghill, 2013). The common assumption of the day was that poor and minority students performed lower in school due to a lack of school resources that persisted, despite the end of school segregation (Gamoran & Long, 2006). The findings, however, were nearly the opposite.

The Coleman report concluded that school resources had much less impact on student performance than students’ family background (Coleman et al., 1966). The authors of the Coleman report created an input-output model, referred to as the education production function, to measure the impact a school had on student achievement (Gamoran & Long, 2006). This model examined the school as a “black box” (Gamoran & Long, 2006, p. 6) in that nothing that happened at the school was examined; only the inputs and outputs were measured in the form of scores on standardized assessments. The five categories of inputs examined for variance included: school facilities, curriculum, teacher qualities, teacher attitudes, and student body characteristics (Gamoran & Long, 2006). Coleman et al.’s (1966) research found that all five characteristics, when combined, accounted for 8% of variance among schools (p. 312). The analysis of two

additional factors related to family background and individual attitude increased the percentage to 38% (p. 312). However, the report found that the higher the average socioeconomic level for the school, the higher the achievement was for its students at both the high and low end of the socioeconomic spectrum at the individual school (Gamoran & Long, 2006).

Coleman et al.'s (1966) work was fundamental and foundational for clarifying the impact schools had on student achievement, evidenced by his research being cited more than 2700 times in academic journals since its original publication (Gamoran & Long, 2006). Subsequent researchers followed Coleman et al.'s lead and provided additional studies on the impact of school versus non-school factors (Blau & Duncan, 1967; Entwisle & Alexander, 1993; Hout, 1988; Jencks, et al., 1979). The early 1970s had a variety of studies focused on reproducing and re-examining the findings from the Coleman report. In 1972, Smith revised the Coleman report by changing the percent of variance factor and instead directed his attention to regression coefficients that resulted in the same conclusions as Coleman regarding the lack of effect of school resources on student achievement (Gamoran & Long, 2006).

In the same year, Jencks et al. (1972) published *Inequality: A Reassessment of the Effect of Family and Schooling in America.* This research also concluded that the findings of the Coleman Report held up to the scrutiny of additional research. Jencks et al. built on Coleman's findings that school resources had little impact on student achievement by concluding that schools and school resources could not address inequalities, as long as inequalities existed in parental factors such as income, education, and occupational status (Gamoran & Long, 2006). Averch, Carroll, Donaldson, Kiesling, and Pincus (1974) also

conducted research to re-examine Coleman's findings and failed to show a strong connection between school resource factors and student achievement.

Since the original release of Coleman et al.'s (1966) work, researchers have conducted hundreds of studies based on its findings. More current educational research completed by Goldhaber (2002) found that approximately 9% of student achievement was attributed to the influence of the teacher while all school input combined represented approximately 21% of student outcome variation (Horn, 2012, para. 9). Far greater impact on student outcomes was attributed to non-school factors such as individual and family characteristics, which accounted for nearly 60% of student variation (Goldhaber, p. 2). Certainly not all of the subsequent research agreed completely with those original findings, but a significant number of studies did find that school resources in the U.S. were less important and their impact on student achievement was significantly less than family, socioeconomic, and out-of-school factors (Hampden-Thompson & Johnston, 2006).

It is a somewhat intuitive conclusion that out-of-school factors would have a large impact on achievement when one considers that the average U.S. student spent four times as many hours per year with his/her family and in the community as they did in school (Berliner, 2009). The researcher believes this ratio is not problematic in and of itself but it does show that non-school influences have the potential to greatly enhance or detract from the school experience. The impact of out-of-school factors begins before a student even reaches formalized schooling. A child who comes from a family living in poverty will begin kindergarten nearly 18 months behind the average kindergartner from a non-poverty background (*The School Principal*, 2011). Children from low socioeconomic

families who began school often lacked the vocabulary to acquire knowledge and to take meaning and draw conclusions from text when they learned to read, which inhibits learning across all subject material (Goodson, Wolf, Bell, Turner, & Finney, 2010). Hart and Risley (2004) found that children from homes whose parents were professionals heard roughly 382 words per hour at home, and children from homes where the parents were on welfare heard just 167 words per hour. In addition to the spoken words heard by young children, a nationwide study found that the percentage of parents who read daily to their kindergarten aged children varied significantly. Coley (2002) found that 36% of parents in the lowest quintile of socioeconomic status read daily to their kindergarten aged children as compared to 62% of parents in the highest quintile (p. 54). Research has shown that this gap in vocabulary among children from high and low socioeconomic households persisted through their school years and was an important correlate to school performance (Blachowicz, Fisher, Ogle, & Watts-Taffe, 2006). By the time children from low socioeconomic status homes reached high school, they were 3.3 grade levels behind their classmates from high socioeconomic status backgrounds (Palardy, 2008). Salzman of the Urban Institute summarized the situation by saying, “The U.S. education system does not do a good job in compensating for non-school achievement factors” (Cavanagh, 2007, para. 25).

Socioeconomic Status (SES) and Student Achievement

Educational research has repeatedly found a correlation between socioeconomic status and student achievement (Schulz, 2005). Research has also shown that low socioeconomic status impacts students’ overall health, cognitive development, and socio-emotional outcomes (Bradley & Corwyn, 2002). Students from families of higher

socioeconomic status benefit from the financial support and resources that enable individual learning and are more likely to have a stimulating home environment that facilitates cognitive development (Schulz, 2005). Tirozzi, former executive director of the National Association of Secondary School Principals, explained the correlation by saying, “Once again, we’re reminded that students in poverty require intensive supports to break past a condition that formal schooling alone cannot overcome” (McCabe, 2010, para. 4). The situation of poverty was compounded as the U.S. system tended to have less demanding curricula and poorer quality teachers for students in low socioeconomic communities than their peers in more affluent areas (Cavanagh, 2007). This is particularly important for any study of U.S. student achievement since America had the second highest percent of youth poverty within the 34 industrialized countries who participated in the PISA with an average of 23% (Krashen, 2012, para. 3). This fact is likely to be a persistent barrier as the percentage of youth in poverty within the U.S. rapidly increased during the past decade and the pattern tended to be that students from low-income families often failed to overcome the barrier and became parents of low-income families themselves (Weissmann, 2013). In addition, schools in the U.S. tended to be segregated in a significant, yet unplanned way by income, ethnicity, and race (Posner, 2011). This segregation created persistent poverty related challenges resulting in a cumulative negative effect for students in schools located in low socioeconomic status communities whereby, over time, these individual factors were compounded and produced an even greater negative impact than the sum of the parts (Berliner, 2009). The data revealed that just 12% of the United States’ approximately 2,000 public high schools produced nearly half of the nation’s high school dropouts (Fenty & Rhee, 2010, p. 12). In

addition, students from low socioeconomic backgrounds performed lower if they studied at schools with very high concentrations of students with backgrounds similar to their own (Carnoy & Rothstein, 2013). An example of the impact of high concentrations of poverty was evidenced by the fact that over 50% of new ninth graders in urban, high poverty schools arrived reading at least three years below their grade level (Fenty & Rhee, 2010). Again, this pressure on the U.S. school system quadrupled from the year 2000 to 2010 as the number of states that provided free or reduced cost meals to more than 50% of their students rose from four to 17 states (Weissmann, 2013). The researcher agreed with Schulz (2005) that the study of SES impact on achievement was particularly useful when studied over several cycles.

At the time of this writing, throughout the current literature socioeconomic status (SES) was frequently defined differently by different researchers. This lack of clarity of definition produced challenges for researchers seeking to use this measure for transnational comparisons of student achievement. Asking such information of students was often inconclusive, as students lacked a deep understanding of their parents' income levels or other indicators of wealth. Three indicators of socioeconomic status were shown to be largely unique: parental income, parental education, and parental occupation (Bollen, Glanville, & Stecklov, 2001; Hauser & Huang, 1997). Household possessions have been used to measure SES as these items were typically easier for a student to identify with greater accuracy. Examples of household possessions measured included: dishwasher, television, Internet, dictionary, car, a computer, cellular telephone, and a calculator ("PISA 2003 student questionnaire," 2003b).

One standard measurement of socioeconomic status with a strong correlation to achievement was books in the home. Evans, Kelley, Sikora, and Treiman (2010) studied approximately 70,000 15-year-olds in over 27 countries and found that students from homes with more than 500 books remained in formal school for three years longer than children in bookless homes. Their study controlled for other factors such as social class, father's occupation, and parental education (Evans et al., 2010). The correlation of books in the home to achievement was so strong that it resulted in nearly the same impact as parental education, was two times as strong as the impact of father's education, and stronger than the effect of the student's standard of living (Evans et al.). The researcher believes this measurement of socioeconomic status had a clear value in research; however, its use as an indicator may be waning as more residents of countries with advanced economies, and even some members of developing nations, were reading books and magazines through electronic devices. These e-books would no longer allow children to have an understanding of how many books were in the home, as did books sitting on a shelf.

Low socioeconomic status has proven to negatively impact the achievement of students (Schulz, 2005). However, Coleman et al. (1966) and subsequent researchers found that the resources available for U.S. schools were not significantly different and had a minimal impact on achievement. Other research indicated that a high concentration of students from low socioeconomic backgrounds over utilized resources in a manner that did not necessarily lead to greater achievement (Berliner, 2009). Schools with high socioeconomic status tended to allocate their resources directly toward those activities and efforts that led to greater student achievement (Berliner, 2009). In addition, students

from low socioeconomic families who attended schools with a lower percentage of poverty tended to perform better than the students from the same low socioeconomic backgrounds attending schools with higher concentrations of poverty (OECD, 2010).

This study focused on the availability and use of resources within U. S. schools and not the relationship between educational spending and achievement levels on international tests. The U.S. spent 50% more per pupil than Western Europe and 40% more per pupil than Japan in 2007 (Sanandaji, 2010, para. 28). The country with the highest spending per student at the time of this study was Luxembourg with a population smaller than Nashville, TN (Ripley, 2013). Spending per pupil in the U.S. was consistently high and had increased at a rapid rate. The current spending at the time of this study was nearly two and a half times what it was in 1970, when adjusted for inflation (Hanushek et al., 2013). Ripley (2013) reported in her book, *The Smartest Kids in the World and How They got that Way,* that U.S. students who studied abroad and foreign students who studied in the U.S. were surveyed, and nearly 45% of both groups believed that U.S. schools contained "much more" technology than those in other nations; while approximately 25% of both groups believed that U.S. classrooms contained "a little more" technology (p. 224). For these reasons, the researcher believes the issue for American schools becomes one of resource utilization to promote learning and achievement versus a scarcity of resources.

Berliner (2009) stated that attempting to drive change through test-based accountability was destined to fail without addressing the out-of-school factors that contributed to low achievement in poverty situations. Many of these out-of-school factors were beyond physical support, such as a computer or Internet access in the home.

Students in high poverty situations lacked resources and also a family environment that promoted cognitive development through stimulation, frequent engagement in conversations of greater intellectual depth, or by taking family trips to places that stimulated intellectual curiosity such as museums or botanical gardens (Schulz, 2005).

While this study focused on PISA results for the United States' 15-year-olds and the impact that characteristics of poverty had on achievement, other research studied the changing impact socioeconomic status had from childhood. Research has shown that divergence, in achievement for those from non-poverty versus poverty backgrounds, was increasingly large the longer the students were in school due to the cumulative effects of poverty (Caro, McDonald, & Willms, 2009). The phenomenon of "cumulative advantage process" (Caro et al., 2009, p. 561), originally developed by Merton (1973), explained an increased success in scientific careers but has since been used to explain the increasing impact over time of other types of change. Caro et al. (2009) originally used this theory in his work studying Canadian school children from kindergarten through high school. They proposed that both school and non-school influences widened the gap for low socioeconomic students as they progressed through the school system. Schools tended to assign a disproportionate number of vocational track programs to schools with low socioeconomic levels (Kerkhoff, 1993). Conversely, students in high socioeconomic environments had a higher tendency for enrolling in advanced courses that led to college education (Oakes, 1990).

Caro et al. (2009) reported that non-school influences contributed to the education gap for students. One non-school influence was learning that occurred over the summer in higher socioeconomic families. Downey, von Hippel, and Broh (2004) found that the

socioeconomic status-learning gap had its greatest growth during the summer due to an increase in learning opportunities present in a much greater proportion for families of higher status. Another non-school influence that impacted the widening achievement gap correlated with age was the increased realization and acceptance that the same opportunities for advancement in education and in life were not available to young people from their particular socioeconomic level. This realization led students to perceive that providing maximum effort in school may not be worth it or may not produce a desired outcome (Guo, 1998).

The widening achievement gap was pronounced within the content area of mathematics. Caro et al. (2009) found that the mathematics achievement gap doubled when comparing the age range of 12 to15-year-olds with students ranging in ages 7-11. Berliner's (2009) study titled *Poverty and Potential: Out-of-School Factors and School Success,* identified six factors that limited what schools could accomplish for students living in poverty conditions: low birth weight, non-genetic prenatal influences, medical, dental and vision care inadequacies, food insecurity, environmental pollutants such as lead, family stress, and neighborhood factors. One prescient example of Berliner's findings was the impact of words used in the home by affluent and poor families. For example, lower socioeconomic families tended to speak less to their children and in less complex ways (Berliner). The research showed that the children at three years of age with the least developed vocabulary from affluent families still had a much more extensive and developed vocabulary than the children with the most extensive vocabulary from welfare families (Berliner).

Another finding noted in Berliner's (2009) study related to the difference in type of language used in affluent and welfare homes. By using recordings at the homes of these families, he found that the average three year old from an affluent family received 32 affirmative messages and five prohibitions per hour for a 6 to 1 ratio (Berliner, p. 28). The ratio for children from working class families was 2 to 1, or 12 affirmative messages to seven prohibitions per hour (Berliner, p. 28). The study also found that welfare families reversed the ratio and had five affirmatives and 11 prohibitions per hour (Berliner). While Berliner's results lacked conclusions on how this use of language and messages in families of varying socioeconomic levels impacted achievement during the schooling years, it seemed unlikely to the researcher that children from the lowest levels developed in the type of supportive and stimulating family environment conducive to producing confident, engaged students.

Berliner's (2009) study also revealed the impact of absenteeism on achievement within New York City neighborhoods. During the 2007-2008 school year, 12 of 32 districts had rates of chronic absenteeism exceeding 25% within their primary schools (Berliner, p. 34). This level of absenteeism was defined as missing more than 20 school days per year and at the extreme, six school districts noted between 8-11% of their students missed more than 38 days of school in a single school year (Berliner, p. 34). The negative impact on achievement for these children was evident. What was not evident was the impact of absenteeism rates on those students who were regularly present. Teachers with classrooms suffering from high absenteeism often spent disproportionate amounts of time re-teaching information and helping those students catch up with the rest of the class (Berliner). In the meantime, the students who were regularly present were not

moving ahead at a rate that helped them reach the achievement levels of their peers in areas with high socioeconomic levels (Berliner). Over time, students who attended and those who were absent, living in low socioeconomic levels, fell further behind their peers and did not encounter these out-of-school influences (Berliner).

Student mobility was another factor with a similarly damaging impact on all students in schools of lower socioeconomic status. Berliner (2009) separated mobility into categories: opportunity-based and poverty-based. Opportunity-driven mobility occurred when families relocated in search of a better quality of life. Poverty-driven mobility is relocation driven by factors created from living in poverty such as a loss of a job, eviction, or illness. Regardless of the type of mobility, the negative impact on achievement was the same for those who moved or arrived and those who stayed in school. Teachers in these situations spent disproportionate amounts of time re-teaching material and experienced a slower progression toward higher-level material and achievement ("Student mobility," 2004). Student mobility issues occurred in both rural and urban areas. Mobility in rural settings related to migrant farm labor families who brought their highly mobile children to rural schools where the farming jobs were available for the particular planting or harvesting season ("Student mobility," 2004). Berliner also found that if the residential mobility rate for low-income students could be brought down to the level of middle-income students the achievement gap could be reduced by 8% and the Black/White achievement gap could be reduced by 14% if the Black residential mobility rate was reduced to the level for White students.

Current Discussions of the United States School System

The topic of the education system in the U.S. has been debated and written about since the inception of international standardized tests during the 1960s (Mathews, 2011). The state of discussion and debate amplified as the various media of communication allowed for rapid and wide dissemination of information. In addition, the number and frequency of standardized tests given to U.S. students increased over the decades following the beginning of the modern testing era ("No Child Left Behind," 2011). The rise of China and India as economic rivals replaced the security threat from the former Soviet Union in the post-WWII era (Kenny, 2014). In both cases, the state of the U.S. education system became the focus of much effort to ensure the continued prosperity and safety of the U.S. Hanushek and Woessmann (2010) estimated the impact on the U.S. economy with a 25-point PISA average increase over 20 years would result in a gross domestic product (GDP) increase of $41 trillion.

Statements made about the success of Chinese students on the PISA were only generalizations, as they did not allow testing of the entire system but instead selected specific regions for participation (Stout, 2013). China had a large population and had suffered from profound poverty resulting in inability to participate in international tests as an entire nation (Mathews, 2011). In the case of China, the city of Shanghai was selected to participate and was a city where 83.8% of high school students continued on to attend college while the national average at the time of this study was 24% (Loveless, 2011, p. 12). The average income of Shanghai was noted by Sanandaji (2010) as being nearly three times the average income of China, as a nation.

The U.S. also had its own success stories, if only limited individual areas were considered similar to China and India. The school district of Clayton, a suburb of St. Louis, MO, participated in the 2009 PISA and scored first in the world in science and reading and second in the world in mathematics (Robelen, 2011). This relatively affluent district had just 16% of its students qualify for the National School Lunch Program, according to Robelen (2011, para. 15). At the state level, Massachusetts, Connecticut, and Florida participated in the 2012 PISA. Massachusetts scored highest among the three states and placed seventh and tenth in science and math respectively, when compared against the official participants in the PISA (Lu, 2013).

The state of education in the U.S. also involved both political parties as each had developed plans to fix a damaged system (McCloskey & Warden, 2014). The debate largely remained a partisan one in the U.S., with Republicans stressing accountability and seeking to limit school funding increases (Committee on Education & The Workforce Democrats, 2013). Democrats traditionally espoused legislation providing more funding for schools and seeking to ease accountability measures (Loveless, 2003). The topic of education was a recurring and prominent issue during election years and its strategy implications were succinctly summed up in the words of Emanuel, President Barack Obama's former Chief of Staff, when he said, "You never want a serious crisis to go to waste" (Seib, 2008, para. 6).

U.S. School System Reform and the War on Poverty

The modern efforts for education reform and the connected efforts to reduce childhood poverty had their roots in the work of President Lyndon Baines Johnson during his presidency in the 1960s. Johnson began many of the seminal programs under his

"Great Society" plan of domestic programs designed to eliminate poverty and racial injustice (Sparks, 2014, para. 3). These programs primarily dealt with urban problems, transportation, medical care, and education (Sparks, 2014). The principle educational effort of the Great Society was the Elementary and Secondary Education Act (ESEA) of 1965. The ESEA was enacted in an effort to raise achievement and close the achievement gap among students (National Education Association, n.d.).

Johnson's original plan was to eliminate poverty throughout the U.S., yet poverty was still present and growing, at this writing. The U.S. Census Bureau showed that 16 million children under the age of 18 lived in poverty in the year 1964, which represented 23% of American youth. At this writing, the percentage has stayed the same and represents just fewer than 22% of that age group (Sparks, 2014, para. 5). This percentage dropped considerably through the 1960s and 1970s but subsequently increased again (Yen, 2012), while the characteristics of those living in poverty changed (Belsie, 2010). The poor of 1964 typically had no plumbing, health insurance, and often attended school for just a few years (Sparks, 2014). The U.S. Census Bureau also showed that in 1960, nearly 80% of adults living in poverty had not attained a high school diploma (Sparks, 2014). That statistic has reversed itself and 80% of adults living in poverty achieved a high school diploma (Sparks, 2014).

Despite this relative improvement in high school attainment, the level of college attainment for students from families of low socioeconomic status was still lagging. The highest performing students from low socioeconomic families of the first decade in the 21st century had about the same likelihood of earning a bachelor's degree as the lowest performing students from high socioeconomic status families (Friedman, 2012). This

becomes particularly important when one considers that 46% of Americans from low socioeconomic families who did not earn a college degree remained in the lowest quintile of income when compared to 16% for those who did earn a college degree (Friedman, 2012, para. 1). Research showed that educational attainment, not full-time employment, provided a way out of poverty. The percentage of children whose families were low-income, if the parents had some college education, was just 24%, compared to 57% for those whose parents had a high school diploma, and 82% for those whose parents had less than a high school diploma (National Center for Children in Poverty, 2007, p. 1).

A Nation at Risk

"A Nation at Risk" was a document published in 1983 at the height of the Cold War with Russia and meant to summarize the current state of education in the U.S. (Khadaroo, 2013). Much of the imagery and phrases used to describe the educational system came directly from the militaristic atmosphere of the time and set the tone for much of the reform that was to follow (Ansary, 2007). A frequently cited example from the report quoted:

> If an unfriendly foreign power had attempted to impose on America the mediocre educational performance that exists today, we might well have viewed it as an act of war. . . . We have, in effect, committed an act of unthinking, unilateral educational disarmament. (Gardner, Larsen, Baker, & Campbell, 1983, p. 5)

The report made use of data that created a compelling case for the need for system-wide reform. The summation of the report and its data presented a sobering picture of the American education system by stating that this would be the first time that "in education, in literacy, and in economic attainment . . . the educational skills of one

generation will not surpass, will not equal, will not even approach those of their parents" (Burdick, 2012, p. 2).

The "Nation at Risk" report was viewed as the impetus for the copious amounts of studies and reform efforts at both the state and federal level that continues to date, at this writing. It was often viewed as the beginning of a relentless and persistent criticism or "bashing" of the United States' public school system (Khadaroo, 2013, para. 16). The report had the impact of redirecting the national education focus generated by the Coleman et al.'s (1966) report's emphasis on social and economic non-school factors toward a focus on schools alone, as being able to improve achievement and diminish the achievement gap (Rothstein, 2008). The impact of the report was immediate. According to the United States Department of Education, by the end of the first year following the release of the report, every state in the union had undertaken reform initiatives, and more than 275 state-level task forces had begun work on educational issues (as cited in Armaline, Farber, & Kretovics, 2004). Despite the speed and profundity of action taken in response to the report, it was then, and remained, divisive in the education community. The widely read educational historian Ravitch (2013) called "A Nation at Risk" "the most important education reform document of the 20th century" (as cited in Toppo, 2008, para. 9). Others on the opposite side of the debate believed the report was the beginning of "teacher bashing" whereby teachers were unfairly blamed for all the ills of the nation's education system (Khadaroo, 2013, para. 16). The members of the teachers' union, National Education Association, were reassured by their executive committee that the report was "just another passing fad that would fade like the morning haze" (Toppo, 2008, para. 10). Results of the report persisted and many educators agreed that much of

what was reported about the problems of the U.S. educational system was still, at the time, evident although more than 30 years had passed (Burdick, 2012).

The Sandia Report

The government, nearly seven years following "A Nation at Risk," commissioned a second report. The U.S. Secretary of Energy, Watkins, wanted more data added to the discussion of the nation's educational system, so he had the Sandia Laboratories of New Mexico analyze the supposed decline in performance of the United States' students (Ansary, 2007). The result of this analysis was "Perspectives on Education in America," which had commonly been called the "Sandia Report" (Bracey, 2007, para. 1). This report did not support the assertions found in "A Nation at Risk" and, in fact, the "Sandia Report" found nearly the opposite to be true (Ansary, 2007). The report found in nearly every category measured the U.S. students and their subgroups performed equally from year-to-year, or showed improvement. Specifically, high SES and low SES, ethnic minority subgroups, and every subgroup measured from high achievers to low achievers showed steady or improving results. In some cases both the "Nation at Risk" and the "Sandia Report" were correct; even though their assertions were opposite in nature. For example, the "Nation at Risk" highlighted the decline of U.S. students on the Scholastic Achievement Test (SAT) from 1963 to 1980 and used that as partial evidence of the decline of U.S. schools (Rothstein, 2008). The "Sandia Report" found that from the 1970s to 1990 nearly every ethnic and socioeconomic subgroup saw increasing scores on the very same SAT (Ansary, 2007). This may have occurred because the proportion of test takers in each of these subgroups changed from the beginning to the end of the periods analyzed (Rothstein, 2008). In the early years, the majority of the SAT test takers

were high achieving students. As time went on, more of the nation's students, at all demographic and socioeconomic levels, were engaged in the educational and testing processes and subsequently took the SAT. This paradox meant that the overall average for the SAT over that period of time was declining, while each of the subgroups experienced gains over the same period; a statistical anomaly known as Simpson's Paradox (Ansary, 2007).

The government never released the "Sandia Report" (Bracey, 2007). It was peer reviewed, but gained very little national attention and did not impact U. S. educational policy in the same manner as the "Nation at Risk" (Ansary, 2007). The far-reaching impact of the "Nation at Risk" meant that both political parties were equally invested in attempting to out-do the other in their education reforms and plans to fix the broken school system (Rothstein, 2008). The "Sandia Report" simply did not execute those plans and forgotten, if not even suppressed, by the Bush administration as it conflicted with funding and policy objectives (Miller, 1991). At the time of this writing, the assertions of the "Nation at Risk" influenced governmental education policy. The No Child Left Behind Act was a direct descendent of the 1983 governmental report (Burdick, 2012).

No Child Left Behind and Race to The Top

The start of the 21st century included two major governmental actions in an attempt to improve the U.S. educational system and, as a result, improve the scores achieved by its students on standardized tests meant to measure learning and the application of knowledge. The No Child Left Behind Act of 2001 (NCLB) was signed into law by President George W. Bush on January 8th, 2002 ("No Child Left Behind," 2011). It was a reauthorization of the Elementary and Secondary Education Act (ESEA),

first enacted in 1965 by President Johnson and reauthorized for the first time in 1994 by President Clinton (Standerfer, 2006). Part of the ESEA was the establishment of funding called Title 1, designed to aid in the improvement of the academic achievement of students from disadvantaged backgrounds ("Elementary & Secondary Education," 2004).

NCLB included measures aimed at state and school level accountability and gains in student achievement for all students in the public education system ("No Child Left Behind," 2011). These efforts focused on six main areas; 1) annual testing, 2) academic progress, 3) achievement report cards for states, districts, and schools, 4) teacher qualifications, 5) reading programs, and 6) funding changes ("No Child Left Behind"). The law outlined deadlines for implementation of statewide testing for various grades and subjects. The 2005-2006 school year requirements were for all students in grades 3 through 8 to be annually tested in reading and mathematics ("No Child Left Behind"). The 2007-2008 school year had a mandate for testing of students in science at least once in elementary, middle, and high school ("No Child Left Behind-Overview," 2013). All tests aligned with academic standards developed and determined by each state. The National Assessment of Educational Progress (NAEP) was also made a requirement for 4th and 8th graders in the areas of math and reading, at least every other year ("No Child Left Behind"). The purpose of the mandated tests were to accurately understand the progress, and lack of progress, made by each state's students over time ("No Child Left Behind"). An area of the law that had been the topic of much debate and passionate feelings, both in support and opposition, was the academic progress component which was commonly referred to as 'adequate yearly progress,' or simply AYP (Dillon & Rotherham, 2007). AYP outlined year-to-year increases in proficiency standards for all of

a state's students. The culmination of this progressively challenging scale was that all students and student categories were to reach the 'proficient' level by the 2013-2014 school year (Dillon & Rotherham). This aspect of the law meant that a school with a high overall proficiency rate with a specified demographic category not performing at the required level would fail as a school (Mathis, 2004). Districts, for the first time, needed to demonstrate an ability to educate all students regardless of potential challenges such as student poverty, recent immigrant students with less than mastery of the English language, and developmental difficulties, etc. (Mathis, 2004).

The AYP component of NCLB was added to ensure that the achievement gap between demographic groups would be phased out completely over time. Failure to meet these proficiency targets had severe implications for schools receiving Title 1 funding. Missing the target for two consecutive years would enable that school's students to have the choice to leave the school and attend a different public high school ("No Child Left Behind-Overview," 2013). Failure in three consecutive years meant the school's students would be given access to additional education services, including private tutoring (Dillon & Rotherham, 2007). A school failing to meet AYP for four consecutive years would be subject to outside measures to correct the failures and could include changes in governance ("No Child Left Behind," 2011). This expectation for achievement equality for all students regardless of background conditions, such as low socioeconomic status, placed a burden on schools to overcome circumstances that were, perhaps, well beyond their control and which occurred outside their school walls (Gamoran & Long, 2006).

Along with the annual tests, states and individual school districts were required to self-report achievement levels for demographic subgroups and individual building results

at the school level. Accountability for student achievement would be required of every school, district, and state for each group of students; achievement would be comprehensive (Mathis, 2004). Each state was allowed to design its proficiency tests and standards for its students, resulting in vastly different expectations for the students in each of the fifty states (Gamoran & Long, 2006).

NCLB also sought to address the quality of teachers in the classroom for core subjects in the belief that more knowledgeable teachers would translate into higher student achievement. Specifically, NCLB mandated that each public school classroom would have a 'highly qualified' teacher for core content areas by the 2005-2006 school year ("No Child Left Behind-Overview," 2013). Preceding this mandate was a requirement that by 2002-2003 all newly hired teachers in public schools would need to meet the 'highly qualified' definition described as being certified in their subject area and able to demonstrate proficiency ("No Child Left Behind," 2011). All paraprofessionals were also required to have met requirements related to their own education by the end of the 2005-2006 school year. They were required to have an associate's degree, completed at least two years of college, or passed an assessment of their knowledge and ability to teach (California Department of Education, 2013).

A grant program called Reading First was created as a result of the enaction of NCLB to reward states and districts that created reading programs for children in grades K through 3 that were research-based and scientific in their approach. The program was funded in 2004 with $1.02 billion, and programs geared toward high poverty students were given priority ("No Child Left Behind," 2011). The creators of NCLB used scientific research to identify five key components to successful reading education; 1)

phonemic awareness, 2) phonics, 3) fluency, 4) vocabulary, and 5) comprehension. For this reason, programs seeking grants from this fund were required to demonstrate how they had addressed each of these areas leading to the development of successful readers ("An Overview of Reading First," n.d.).

Lastly, NCLB created changes in the way in which Title 1 funds were distributed. The new law targeted fund distribution to districts and schools with greater proportions of poor children ("No Child Left Behind-Overview," 2013). Four separate funding formulas were used to determine allocation; 1) the Basic Grant, 2) Concentration Grant, 3) Targeted Assistance Grant, and 4) the Education Finance Incentive Grant ("Federal Education Budget Project," 2014).

During the 2014 fiscal year, the Basic Grant formula accounted for 45% of all Title 1 funding and provided funds to almost all school districts. The formula provided funds to any district with 10 poor students and 2% of its students in poverty ("NCLB Federal Funding," n.d., para. 3). The Concentration Grant followed a strict eligibility threshold of 15% or more of students in poverty or 6,500, whichever was less ("NCLB Federal Funding," para. 3). Both the Basic Grant and Concentration Grant did not provide increased funding amounts for increased numbers or percentages of poor students; once the minimum threshold was met the amount awarded was constant ("Federal Education Budget Project," 2014). Concentration Grants were awarded on top of funding for the Basic Grant. These grants represented 9% of total Title 1 funding in the 2014 fiscal year ("Federal Education Budget Project"). The Targeted Grant differed from the Concentration Grant in that it used a formula to award larger grants based on the depth of

the poverty present for the students in a particular school district ("Federal Education Budget Project").

The final grant type impacted by NCLB was the Education Finance Incentive Grant. This grant sought to reward states that were managing their finances responsibly, resulting in an equitable distribution of federal funds both within and across states (Smole, 2002). The formula also sought to award extra funding to high poverty districts in states that had not demonstrated equitable distribution of resources and sound financial management by doubling the weights of the Target Grant formula in that state's high poverty districts ("Federal Education Budget Project," 2014). For 2013, this grant program represented 23% of Title 1 funds ("Federal Education Budget Project," para. 8).

A second major governmental action implemented since the time of the first PISA was the Race to the Top (RTTT) competition which included $4.35 billion of incentives and was announced by President Barack Obama on July 24, 2009 ("The White House," 2009). In announcing the program, President Obama had the following words to say about the U.S. education system and his program aimed at fixing it.

> America will not succeed in the 21st century unless we do a far better job of educating our sons and daughters. . . . And the race starts today. I am issuing a challenge to our nation's governors and school boards, principals and teachers, businesses and non-profits, parents and students: if you set and enforce rigorous and challenging standards and assessments; if you put outstanding teachers at the front of the classroom; if you turn around failing schools – your state can win a Race to the Top grant that will not only help students outcompete workers around

> the world, but let them fulfill their God-given potential. ("The White House," para. 1)

According to the government announcement, RTTT intended to provide funding to states with education plans focusing on five key reform areas. The first area of reform was the act of putting in place a system of well-designed, rigorous standards and assessments; to produce college and workforce ready graduates who possessed both knowledge and higher order thinking skills ("The White House," 2009). The second targeted area for reform focused on the qualifications and quality of teachers in the American classroom; to evaluate teacher effectiveness and reward it so that the best teachers would stay in the classrooms where they were most needed ("The White House"). The use of longitudinal data for making key educational decisions was the third reform outlined by the Obama administration. In addition to collecting this data, the intent was for it to be accessible to key stakeholders to be used in both decision making and to drive instruction ("The White House"). States wishing to be awarded RTTT grant money also needed to demonstrate reform in the area of turning around that states' struggling schools through innovative practices ("The White House"). The final area of reform mandated by the RTTT program regarded the ability to sustain educational reform through collaboration with business leaders, community leaders, educational leaders, and other stakeholders. This collaboration was supposed to demonstrate a commitment to close the achievement gap and raise student achievement overall, support public charter schools that had demonstrated high performance, and reinforcing education in the areas of math and science ("The White House"). States submitting plans that touched on each of these key

areas would be eligible for hundreds of millions of dollars in grants from the RTTT fund and enable them to enact expansive reform plans ("The White House").

As the impact of poverty heightened and was increasingly accepted as a main source of educational shortcoming in the U.S., the call for system wide reform was increasingly questioned (Goldhaber, 2002). Krashen (2012) stated that no evidence existed that teachers, parents or students were any worse now than they were in the past. He concluded in his publication, "Protecting Students against the Effect of Poverty: Libraries," that our educational system had been successful and that the true problem was poverty. Berliner (2009), a respected educational psychologist and researcher, asked the question, "Why, when we have so much credible research making connections between poverty and school success, do we keep looking for other answers?" (Gelberg, 2007, p. 51). The call from government officials for schools to raise achievement for all students when research revealed that the greatest influences on achievement was outside their sphere of influence or control presented serious problems (Berliner, 2009). Neuman was one of the overseers of the creation of the No Child Left Behind Act of 2001 that was designed to ensure that students of all races and socioeconomic levels achieved at an increasingly higher level, and by 2008 she had joined a coalition of educators to promote a broader approach to education in the U.S. (as cited in Cody, 2009). Neuman came to the following conclusion:

> The potential effectiveness of NCLB has been seriously undermined, however, by its acceptance of the popular assumptions that bad schools are the major reason for low achievement, and that an academic program revolving around standards,

> testing, teacher training, and accountability can, in and of itself, offset the full impact of low socioeconomic status on achievement. (Cody, 2009, para. 1)

Contrary to the concept of a broken school system, American students outscored nearly all other countries on standardized tests, if they lived in areas of well-funded schools and high socioeconomic families (Carnoy, 2013). However, without further investigation of the PISA results, some educators incorrectly assumed that their students were performing at a lower level compared to similarly industrialized nations (Rabinovitz, 2013). This researcher believes these generalized conclusions have often led education policymakers to call for an urgent need for far-reaching reforms. However, studies within the U.S. identified a greater social class inequality among its 15-year-olds than those countries to which the U.S. was typically compared (Carnoy & Rothstein, 2013). Over the first decade in the 21st century, the achievement of the United States' lowest socioeconomic status students improved while that same group of students in the world's highest achieving nations had steadily declined (Carnoy & Rothstein, 2013). The seemingly contradictory findings of overall decline on the PISA averages for the U.S. and the relative increase in achievement of its most disadvantaged students was one example of why the researcher believes that broad-based statements about the U.S. education system as a whole are unlikely to accurately depict the nuanced nature of the situation. Buckley (2013), who oversaw the administration of the PISA in the U.S. as commissioner of the NCES, described the dangers of making such decisions based on average scores by stating, "You don't look at a thermometer to figure out why it's cold outside" (Clayton, 2013, p. 3). The fact that PISA and most standardized international tests serve as a 'snapshot' of achievement at a single point in time rather than a view from longitudinal

studies presented obstacles in drawing causal inferences from their numbers (Schneider, 2009).

Research has shown that the disparity of resources among U.S. schools was not that significant and that this factor has shown very little impact on student achievement (Coleman et al., 1966). This fact has not however, addressed possible reforms for the nation's school system, segregated by income and whose achievement levels have been impacted by the poverty of its students. In examining other high achieving nations, it became evident that they allocated the greatest amount of resources to low achieving schools rather than seeking absolute equality among schools in terms of resource allocation (Ripley, 2013). The researcher believes the application of such a reform would look different in the U.S., as the overall percentage of students living in poverty was different than in other high achieving nations.

Standardized Tests

At the time of this study, NCLB had been implemented for 12 years, which means the kindergartners who were beginning school during the school year following its January, 2002 passing would be in the 10th grade, and would have spent their entire educational careers under the reforms ("No Child Left Behind-Overview," 2013). Two rounds of RTTT funding have been disbursed since the program announcement in 2009, and during the same 12-year period several rounds of international and national level testing occurred ("The White House," 2009; Loveless, 2013). The PISA testing cycles included the following years: 2003, 2006, 2009, and 2012 for 15-year-old students (NCES, n.d.). The NAEP occurred in 2004, 2008, and 2012 for 9, 13, and 17-year-old

students. TIMSS occurred in 2003, 2007, and 2011 for 4th and 8th grade students (TIMSS, n.d.).

An overview of scores from these various tests and testing cycles revealed areas of academic gains and where academic achievement still remained elusive (Carnoy & Rothstein, 2013). A general analysis of the literature revealed that progress was made improving achievement for lower economic categories while the high income students continued to underperform when compared to their international peers (Strauss, 2010). The PISA average mathematics scores were nearly unchanged from the original PISA implementation in 2000. The NAEP math scores for all age groups were relatively flat for the 2004, 2008, and 2012 testing cycles, as shown in Table 1.

Table 1.

NAEP Mathematics Scores

Age Group	2004	2008	2012
9	239	243	244
13	279	281	285
17	305	306	306

The average TIMSS math scores for U.S. 4th grade students increased significantly over the 2003, 2007, and 2011 testing cycles, as shown in Table 2. The average TIMSS math scores for U.S. 8th grade students remained nearly unchanged over the 2003, 2007, and 2011 testing cycles, which is also shown in Table 2. In addition, the 2011 scores for both 4th and 8th grade students were statistically the same as educational benchmark nation Finland (Loveless, 2013).

Table 2.

TIMSS Mathematics Scores (U.S.)

Grade Level	2003	2007	2011
4th	518	529	541
8th	504	508	509

When U.S. mathematics performance on the TIMSS-4 (4th grade), TIMSS-8 (8th grade), and PISA was measured against the 12 countries that were common across the three tests, the results revealed no relative performance decline on PISA relative to the TIMSS tests (Cooke et al., 2005). The researcher believes this is an important notation, as reports on U.S. student achievement often appeared to show that performance was dropping in the high school years when in reality the composition of nations tested influenced whether achievement was above or below the national average (Cooke et al., 2005). This seemingly opposite assessment of the performance on these tests came from sources such as the U.S. Department of Education and the NCES (Cooke et al., 2005). While not incorrect, the researcher believes the depiction of this variance in performance lacked proper perspective for a true comparison.

Many of the countries that performed successfully on the PISA complained of their own system and called for reforms. Historically, Finland had been at the top, or near the top of achievement on each of PISA's three categories during each of the cycles (Loveless, 2013). Despite this success, over 200 Finnish mathematicians formally complained that students were arriving at university unprepared to succeed in university level mathematics (Loveless, 2011). In addition, the performance of Finland's lower socioeconomic groups was falling rapidly over previous testing cycles (Thompson, 2013).

South Korea had been an exemplar of national academic achievement throughout the various PISA cycles, yet they too had an intense national dialogue related to their perceived shortcoming of the educational system (Ripley, 2013). Despite these recognized achievement levels, the Korean government hired a new Minister of Education, Lee Ju-Ho, to dismantle its education system based on intense student pressure to score well on a single college placement exam (Ripley, 2013). So intense was the pressure that students spent nearly 11 to 12 hours per day either in school or attending, often expensive, after-school tutoring centers known as hagwons (Ripley, 2013). The intense pressure to achieve in the Korean educational system led to two developments that were unimaginable in the U.S. The government felt compelled to create special police taskforce units to catch hagwons that were operating after the 11:00 mandated curfew, resulting in some hagwons creating elaborate schemes to hide the fact that they were actually teaching after the curfew (Ripley, 2013). Secondly, the demand for library space during the summer led to a system whereby students rented small study cubicles at for-profit libraries to ensure they had a space to improve over the summer break (Ripley, 2013). The high intensity and focus given to standardized tests in China and other Asian countries ignited a debate in those countries to become more like the U.S. system that produced independent thinkers through hands-on learning (Levin, 2013). The combination of the relative incremental improvements of the United States' lower SES students and the understanding that even the traditionally high-scoring nations had self-perceived weaknesses led the researcher to believe that solutions based on the unique characteristics of U.S. students and their needs was likely to have the desired positive impact on achievement.

Changing Landscape and Geography of Poverty in the United States of America

The plight of urban poverty has been studied and discussed throughout American politics, the media, and among education reformers ("Rural Education," 2004). Less discussed and studied was the condition of poverty in rural areas. According to the NCES, more than 33% of the nation's elementary and secondary students attended schools in areas classified as rural where approximately half of the states in the union had a majority of their students attending rural schools ("Rural Education," 2004, para. 2). The rural poverty rate reached 18% as compared to urban poverty rate of 12% by the year 1986 (O'Hare, 1988). In addition, the characteristics of students in rural poverty differed greatly from their urban counterparts as did their relative academic achievement. The percentage of White students in rural areas at the time of this study was 78%, noted as high, compared to towns at 72%, suburban areas at 62%, and urban areas at 35% (NCES, 2007, para. 3). However, while Blacks are presented in lesser percentages, they are more likely to be poor in rural areas than in urban; 44% to 33% in 1987 (Shapiro, 1989). Rural poor also tended to be actively working as compared to urban poor, yet their low wages kept them in poverty (Shapiro). This fact was especially meaningful as far more rural families were comprised of two-parent households (62%) where both adults were working yet they still remained in poverty (Shapiro).

The NCES noted in 2009-2010 there were more schools in rural areas than in either suburbs or cities. Rural areas selected and implemented school consolidation in an effort to save money and combat declining enrollments ("Rural Education," 2004). The potential negative impact of this consolidation came through the increase in transportation budgets, but more importantly in student achievement ("Rural Education").

Previous studies have shown that smaller schools were superior in many measures and at least equal in the remaining measures (Cotton, 2001; Raywid, 1997). According to research completed by Cotton (2001) evidence existed that smaller schools could narrow the achievement gap between students of higher socioeconomic status and minority and/or students of lower socioeconomic status.

Despite the severity of poverty throughout rural areas, students often scored near their suburban peers and higher than their urban peers on standardized tests ("Rural Education," 2004). Academic achievement was threatened by the difficulties in attracting and keeping quality teachers in rural areas due to relatively low wages and the isolation of being in a rural, sparsely populated area (Schwartzbeck, Redfield, Morris, & Hammer, 2003). Schools in these locations also had a heavy reliance upon teachers to teach more than one subject area, which has the potential to result in less depth of expertise in a particular field of study (Schwartzbeck et al). Rural schools tended to have a disproportionately difficult time complying with the AYP portion of the NCLB Law ("Rural Education"). As mentioned previously, many of the schools in rural America were small in size, meaning that relatively small amounts of data were used to determine whether they met AYP standards ("Rural Education").

The distribution of poverty had been changing and shifting to the suburbs. Kneebone (2014) of The Brookings Institution noted that poverty in the suburbs had risen 65% since the year 2000 (Thompson, 2014, para. 15). The number of suburban students eligible for the NLSP increased by 22%, while growth in the urban communities was just 8% (Kneebone, 2014, para. 3) and suburban school districts had seen student poverty levels increase as much as 143%, as in Austin, TX (Thompson, para. 16). The total

number of suburban poor was more than three million higher than in urban areas by the year 2012, which meant that 1 in 3 poor people resided in the suburbs (Kneebone). The shift of poverty had been so pervasive that the number of poor was greater in the suburbs than in urban or rural environments (Kneebone). This change had its origins in several factors. The Great Recession resulted in an increase in the number of suburban residents living in poverty as their household incomes slipped below the poverty line due to lost or decreased income (Kneebone). In addition, more people had been moving to the suburbs during the recent decades, at the time, including new immigrants, as well as people who were already in the category of low-income or poverty (Thompson, 2014). This presented a difficult challenge for suburban municipalities, as they did not have the same safety net type of supports in place as urban environments that had been developed over time to aid families and individuals living in poverty (Thompson). In many municipalities, budgets were already tight or overextended and adding such a safety net program was difficult or impossible. At the primary and secondary school level, the increase in poverty required a restructuring of thought and programs in order to ensure that all students' needs were met and they could experience high academic achievement.

Findings from PISA 2003

The PISA testing cycle of 2003 was the first to feature mathematics as the major category with reading and science as the two minor categories of testing (Lemke & Gonzales, 2006). The PISA test included four subscale categories; 1) space and shape, 2) change and relationships, 3) quantity, and 4) uncertainty (Cooke et al., 2005). The test also measured student performance in the major category using six proficiency levels with six being the highest (Lemke et al., 2004). The 2003 test results in the area of

mathematics verified that U.S. students were performing below their OECD counterparts at all proficiency levels (Lemke et al.). The overall average mathematics score for U.S. students was 483 while the average for participating OECD member nations was 500 (Lemke et al, p. 14.). This average reflected no measurable change over the 2000 PISA results or the U.S' relation to other participating nations (Jocelyn et al., 2004). The average score was lower than 20 of the other 28 OECD participating nations, as well as lower than three of 10 participating non-OECD countries (Cooke et al., 2005). Eleven countries performed worse than the U.S.; five OECD countries and six non-OECD countries (Jocelyn et al.). The U.S. had a stronger relationship between socioeconomic background and mathematics achievement than all but five OECD nations (Lemke et al.).

The PISA was designed to provide a measure for mathematics literacy**.** Mathematics literacy was defined by the OECD (2009) as:

> An individual's capacity to identify and understand the role that mathematics plays in the world, to make well-founded judgments and to use and engage with mathematics in ways that meet the needs of that individual's life as a constructive, concerned and reflective citizen. (p. 84)

Jan de Lange, PISA's head of mathematics experts group, explained the difference between literacy and school-based knowledge by saying "mathematics curricula have focused on school-based knowledge whereas mathematics literacy involves mathematics as it is used in the real world" (Loveless, 2011, p.11).

Mathematics literacy was categorized into six proficiency levels on the PISA with level one being the lowest and level six the highest (Jocelyn et al., 2004). The performance of U.S. students at each of the proficiency levels was comparable to the

OECD average and commonly below that average. The U.S. had greater percentages of students at the 1 and 2 level or below the other OECD nations; 50% to 42% (Jocelyn et al., p. 19). Moving up the scale of proficiency levels the U.S. had smaller percentages at each level than their OECD peers. The OECD average percentage for students at levels 3, 4 and 5 were 54% while the U.S. average percentage was 49% for the same categories. The highest proficiency level, reported as a 6, included just 2% of the U.S. students compared to a 4% for the OECD average (Jocelyn et al., p. 19).

Findings from PISA 2006

The average score for U.S. students in mathematics literacy on the 2006 PISA was 474 while the average score for OECD countries was 498 (Gonzales et al., 2009, p. iv). The U.S. score placed 32nd out of 57 nations who participated in the PISA 2006 (Baldi et al., 2007, p. 11). The highest achieving U.S. students, those in the 90th percentile, had an average mathematics score of 593; 22 points lower than the OECD average for 90th percentile students (Baldi et al., 2007, p. iv). This score placed the U.S. in 30th place among all nations that participated in the PISA when comparing the 90th percentile (Baldi et al., p. iv). The lowest performing U.S. students in the 10th percentile had an average score of 358; 21 points lower than the OECD average and placed the U.S. in 27th place overall for the 10th percentile (Gonzales et al., p. 21). Only 1% of U.S. students performed at the highest level of mathematics mastery as compared to 27 other nations who had a higher percentage of students who performed at this level (Gonzales et al., p. 21). Overall, the 2006 mathematics results were not measurably different than the 2003 results (Gonzales, et al.).

Findings from PISA 2009

The 2009 PISA cycle had reading literacy as the major topic of in-depth study with mathematics and science literacy noted as secondary topics (OECD, 2010). The test participation included 60 nations and 5 unique educational systems (Fleishman et al., 2010). Of the 65 nation and educational system participants, 34 were OECD member nations (Fleishman et al.). The 2009 PISA participation for the U.S. consisted of 165 schools and 5,233 students (Ripley, 2013).

Overall, the U.S. scores increased five points in reading, 13 points in math, and 13 points in science over the PISA 2006 results (Mathews, 2011). The average score for U.S. students in mathematics literacy in 2009 was 487, which was nine points lower than the OECD average and placed the U.S. at 24th out of 64 participating nations and education systems (Fleischman et al., 2010, p. 17). This average was higher than the 2006 average, but not significantly different from the 2003 average, and the scoring trend continued for the third consecutive testing cycle (Strauss, 2013). Considering these scores in practical terms, the difference in average math and science scores between the United States' students and top performers in Korea and Finland translated into roughly one to two years of additional schooling (U.S. Department of Education, 2010).

The persistent perceived mediocrity of U.S. students on the PISA continued to cause apprehension among educators (Sailer, 2010). Krashen's (2012) analysis of the data led to the conclusion that poverty had its usual strong negative impact on U.S. achievement results. The average score for U.S. students in schools with less than 10% poverty, as determined by NSLP participation, was 551, which would have placed it above any other OECD nation (McCabe, 2010, para. 3; Strauss, 2010). Students in

schools with 10-25% poverty had an average score of 527, which was second only to Finland and Korea (Strauss, 2010). The achievement deficiencies for U.S. students continued to occur in schools where NSLP participation exceeded 25% (*The School Principal*, 2011, para. 4). One example of the negative impact on student achievement was noted by Tirozzi, head of the National Association of Secondary School Principals, when he concluded that schools with 75% or greater NSLP participation averaged 446 on the 2009 PISA, which was 37 points lower than last placed Greece (McCabe, 2010, para. 4).

Sailer (2010) disaggregated the scoring data by ethnic heritage and found U.S. subgroups performed comparatively ahead of their international peers. Asian-American students outscored every Asian country and Hispanic-American students outperformed all eight Latin American countries (Sailer, 2010). White-American students outperformed all 37 historically White countries except for Finland and African-American students had no comparable country for which to compare scores (Sailer, 2010).

The response to the overall PISA average scores for 2009, were perceived by many within education circles as a call for increased educational reforms of the same kind that lacked favorable results for nearly a decade (Strauss, 2010). Loveless reasserted that “There was no sharp decline - in either the short or long run” (Loveless, 2011, p. 9). He further went on to state, that U.S. performance on the PISA had ranged from flat to slightly increased and that performance on TIMSS had improved since 1995 (Mathews, 2011).

In addition, just 32% of those tested in the U.S. demonstrated a proficient level of mathematics, which placed the U.S. at 32nd among all participants on the 2009 PISA

cycle (Hanushek et al., 2011, p. 8). Twenty- seven percent of U.S. students scored at levels four or above which was five percentage points below the OECD average of 32 percent (Fleischman et al., 2010, p. 20). At this level (above proficiency level four) the U.S. was outperformed by 16 OECD nations and six non-OECD nations, was essentially even with 12 OECD nations, and performed better than five OECD nations and 25 non-OECD nations (Fleischman et al., 2010, p. 20).

Though there was movement in U.S.' student achievement scores both up and down in various categories since the inception of the PISA in 2000, the overall average scores remained largely consistent (Lu, 2013). Schleicher of the OECD commented after the release of the 2006 PISA results that the U.S. was not slipping so much as other countries were gaining (Cavanagh, 2007). Since the inception of the PISA, disadvantaged students in the U.S. improved mathematics scores more rapidly than comparable industrial nations, while some of the top performing nations such as Finland were seeing the opposite result (Thompson, 2013). Achievement gaps between high and low socioeconomic status students existed in every country, but that gap was less in the U.S. than in most post-industrial countries and only minimally larger than in the highest performing nations (Rabinovitz, 2013). In addition, the 2009 results showed that 20% of American students in high-poverty schools matched the achievement of the performance average for high scoring Finland (U.S. Department of Education, 2010). While the U.S. student scores on the PISA, since it began in 2000, gave room for improvement, the country improved over the 50 years since international math and science tests were first given. The U.S. has gone from the very bottom of the achievement scale to above the

international average (Zhao, 2012). However, as stated previously, scores on tests do not tell the story of how to improve.

Summary

The literature summarized in this chapter shows a diverse and conflicting history of education in the U.S. This history begins with the findings of Coleman (1966) which showed that non-school factors required the greatest attention if educators sought to positively impact achievement for all students. Political and social leaders believed in these finding and enacted legislation and programs designed to combat the negative effects of poverty that played such a strong part in the non-school student environment.

The literature and research then took a strong turn towards focusing attention on school factors with the release of the "Nation at Risk" report. Government leaders of both parties quickly sought to implement programs based on intensive testing designed to measure student performance against their peers as well as against other nations. The intensity and passion displayed by stakeholders in the U.S. education system generated many conclusions based on incomplete or biased research and reports. In particular, the notion that U.S. student performance was losing its once dominant position in the world seemed to drive most of the efforts at reform and legislation. This assertion persisted at the time of this writing, despite consistent evidence that the U.S. never led the world on international tests and that, in fact, U.S. performance was rising somewhat in many key categories. The study that follows in this report seeks to build upon and further the literature by analyzing U.S. performance over a period of six years (3 testing cycles) for the nation's most 'at risk' students who attended high poverty schools. The researcher

believes that only with the nuanced study of these traditionally underperforming students can the U.S. enact effective legislation and reforms.

Chapter Three: Methodology

The methodology for this study was influenced by methodological decisions made by the OECD in the design and implementation of the PISA. The researcher made methodological decisions for how to use and present the original data collected by the NCES in its administration of the PISA in the U.S. The combinations of macro and micro decisions resulted in a full exploration of the data as it related to the hypotheses of this study and are summarized in this chapter.

One data management decision was how to best summarize the socioeconomic status of the PISA test takers in the U.S. The attempt to use socioeconomic status for comparisons among the students of different countries proved difficult for researchers. This researcher's review of the literature regarding socioeconomic status and educational achievement found a lack of consensus regarding which measures to use (Cauthen & Fass, 2008). Many researchers utilized the Economic, Social and Cultural Status (ESCS) to provide for comparability of student socioeconomic status for students of varying countries (The Scottish Government, 2010; Wong, n.d.).

This study used the National School Lunch Program (NSLP) qualification for students as the qualifier for student poverty for schools and students within the U.S. This measurement was invalid for international poverty-related achievement comparisons, as the NSLP is a program used exclusively in the U.S.; but it did provide consistency and commonality among all states, school systems, districts, and individual schools in the U.S. The NSLP was also one of the items tracked by the PISA school questionnaire for participants in the U.S. ("PISA 2003 school questionnaire," 2003). This portion was completed by the principal of each participating school, which also provided the

researcher with a consistent measurement as opposed to using the less certain student-provided answers, such as parental occupation to determine socioeconomic status. While the socioeconomic status of an individual family may change over the three years between each PISA cycle, the SES of 15-year-old students in a country were unlikely to do so in a meaningful way (Schulz, 2005).

PISA Sampling Process

The PISA denoted specific procedures to select the school and student test-taking sample in each participating nation. The PISA was generally understood to be administered exclusively to 15-year-old students. However, the actual age parameters were students who, at the time of the testing period, were between 15 years and 3 months to 16 years and 2 months of age (Lemke et al., 2004). The rationale for allowing participation by students who may have already reached their 16th birthday was the ability to better fit the age structure of many of the northern hemisphere member nations who planned the testing for April (OECD, 2005). The students were in private or public schools; home schooled students were not part of the target population (OECD, 2005). A sampling frame was submitted by each participating nation or educational system to a consortium of organizations who administered the PISA internationally, which was then validated by an independent survey research firm (NCES, n.d.).

Upon validation of the sampling frame, the survey research firm selected a scientific random sample of no less than 150 schools (Adams & Wu, 2002). Each school selected had two replacement schools selected, as well (OECD, 2005). The original and replacement schools list were then delivered to the agency or organization approved to administer the PISA in each country; for the U.S. this was the National Center for

Educational Statistics (Adams & Wu, 2002). This process ensured that no country selected specific schools within their borders to participate in the PISA.

The NCES had the responsibility to recruit schools to participate from the original schools list (NCES, n.d.). If any originally selected school declined to participate, the NCES then moved on to the two chosen replacement schools and attempted to recruit them. The replacement schools were mandated by PISA to represent the same characteristics and like demographics as the original school (NCES, n.d.). The NCES, or any other nation's administering agency, was required to attract a minimum of 65% of the originally selected schools in the sample to have results included in the international database (OECD, 2005). The administration of the PISA and other international tests was expensive, which could be a deterrent to school, district, or state level participation (Schneider, 2009).

Once the requisite numbers of schools agreed to participate, the students were then sampled. Each country was required to submit s student list of those who fit within the age requirements to OECD, the chosen education research firm, so that student sampling could be conducted (NCES, n.d.). That firm then used software to validate the student data to ensure that the list generated sufficiently represented the overall characteristics of each school's student population (Adams & Wu, 2002). Students, unlike schools, were not selected with potential replacement pre-chosen (NCES, n.d.). Students were not notified of their selection to participate until the actual assessment day. Only nations who achieved 85% school participation and 80% student participation rates were included in data reported by the OECD (Lemke et al., 2004).

The number of participating students in the U.S. for the 2003, 2006, and 2009 testing cycle were 5,456, 5,611, and 5,233 respectively (NCES, n.d.). The number of participating schools for the same cycles were 262, 166, and 165. The overall student participation rates for these cycles were 85%, 91%, and 87% (NCES, n.d.).

Hypotheses

The null hypotheses addressed in the analysis for this study were:

Null Hypothesis #1: There will not be a measurable difference in achievement measured on the mathematics portion of the PISA with regard to the responses on the PISA questionnaires in the defined categories of Student and Family Characteristics, and School Composition, Socio-Economic Status (SES), Organization, Staffing and Resources and Governance, among high poverty schools in the geographic locations represented by rural/small town, town, city, or large city.

Within each characteristics category, and for each possible pairing of geographic location, a z-test for difference in means was applied to average scores on the mathematics portion of the PISA, at a 95% level of confidence.

Null Hypothesis #2: There will not be a relationship between the categories of achievement, high or low, measured on the mathematics portion of the PISA and the geographic location of the school, represented by rural/small town, town, city, or large city.

Average mathematics PISA scores for participating schools were ordered high-to-low to divide those schools that scored high from those that scored low. Geographic location categories were assigned number values; populations were numbered low to high. A Pearson Product Moment Correlation Coefficient analysis was planned to

establish whether or not there was a relationship between the geographic locations and the level of scoring on the mathematics PISA. However, the measure of mathematics ability for the participating schools did not provide scores within the researcher's definition of high. This hypothesis was not addressed by the available data.

Null Hypothesis #3: There will not be a measurable difference in achievement measured on the mathematics portion of the PISA, when comparing the geographic location of the school, represented by rural/small town, town, city, or large city.

To provide an overall analysis for differences, for each possible pairing of geographic location a z-test for difference in means was applied to average scores on the mathematics portion of the PISA, at a 95% level of confidence.

Null Hypothesis #4: There will not be a relationship between the achievement measured on the mathematics portion of the PISA and the geographic location of the school represented by rural/small town, town, city, or large city.

Geographic location categories were assigned number values; populations were numbered low to high. Each average mathematics PISA score was paired with the numbered representing the geographic location from which the data was gathered. A Pearson Product Moment Correlation Coefficient analysis was conducted to establish whether or not there was a relationship between the geographic locations and the level of scoring on the mathematics PISA, along with its relative strength if the relationship was established.

Variables and Measures

Variables examined in this study were poverty levels, student achievement, student and school characteristics, and geographic location of the attended school.

Poverty levels were indicated by indicated by Socio-Economic Status, as related to NSLP participation, recorded in PISA data. Student achievement was measured by average student scores on the mathematics portion of the PISA. Student and school characteristics were indicated by student and administrator responses to PISA questionnaires. And, geographic location of the schools from which data was obtained was represented by populations within the categories of rural/small town, town, city, or large city.

Data Selection Process

The data source for this study was the publicly-available database maintained by the National Center for Educational Statistics (NCES). The NCES served, at the time of this study, as the primary federal entity responsible for collection and analysis of educational data for the U.S. (NCES, 2013). NCES was also the agency responsible for administering the PISA in the U.S. and for maintaining the resultant data (NCES, 2013).

The NCES provided the researcher with data-retrieval and comparison tools found within the "International Data Explorer (IDE)" (NCES, 2013). The IDE allowed the researcher to filter data using a multi-step selection process, based upon the criteria and responses to the school and student questionnaires completed by participants on the PISA. First, the researcher selected the specific subject area; for the purposes of this study the subject area was mathematics. Once the subject was chosen the researcher selected specific measures, testing years, and jurisdictions based on the available data.

The researcher completed an examination of the measures available to ensure that test score data related to each individual variable were available for each of the 2003, 2006, and 2009 PISA cycles. In addition, IDE category and individual question selections from the school and student questionnaires were determined, based on those measures

and variables noted in the current literature, and which the researcher believed to have implications on student achievement or demonstrated observable differences with regard to socioeconomic levels of students.

The specific measures chosen within use of the IDE tool for all aspects of the research were overall mathematics scores for the PISA cycles of 2003, 2006, and 2009 and participation in the National School Lunch Program located in the category of 'School Composition, SES, and Organization' within the U.S. The researcher chose common data available within the three PISA cycles studied, relevant to the hypotheses of the study.

Analysis Decisions

The researcher conducted data analysis on mathematics PISA data with regard to each category and subcategory represented on the school and student questionnaires to better understand the impact of each characteristic in relationship to each hypothesis. The analysis was conducted to follow the same organizational structures of the school and student questionnaires. Categories of questions were grouped together for analysis based on their primary, secondary, tertiary and quaternary positions on the PISA developed questionnaires for participants in the PISA. Table 3 shows the primary categories and the secondary, tertiary, and quaternary categories that follow.

The researcher chose to combine the data of two geographic locations that were present for all PISA school and students. The village category was comprised of schools located in an area of less than 3,000 inhabitants and the small town category represented schools located in an area of less than 15,000, but more than 3,000 inhabitants.

Table 3.

Categories for PISA School and Student Questionnaires

Primary	Secondary	Tertiary	Quaternary
School Criteria			
	Governance		
		Responsibility Assigned To Other Groups	
		School Responsibility-Curriculum	
		Teacher Participation and School Responsibility	
			Budget Allocation
			Budget Formulation
			Discipline Policies
			Student Assessment
			Teacher Firing
			Teacher Hire
			Teacher Salary Increase
			Teacher Starting Salary
	School Staffing and Resources		
Student Criteria			
	Language and Immigration		
	Parent's Employment and Education		
	Possession Analysis		

The researcher averaged the scores for these two areas and used them in the study as the common category named small town for use in the study. This decision was made since the village level data was incomplete for many categories and the combination of the two still accurately and adequately represented the researcher's intended purpose of studying the educational characteristics of schools and students in a rural setting.

Data Analysis

The NCES provided the publically-available PISA data analyzed for this study. The researcher organized the findings by major and minor categories represented in the organization of data within the International Data Explorer (IDE) tool. The two major categories of School Criteria Analysis and Student Criteria Analysis were analyzed separately. The School Criteria Analysis included the questions and responses from the administrator at each school that participated in the PISA. Within this category, the questions were grouped into two secondary categories; Governance and School Staffing and Resources. The Governance category was further divided into three tertiary categories that included Responsibility Assigned to Other Groups, School Responsibility-Curriculum, and Teacher Participation and School Responsibility. The Teacher Participation and School Responsibility category was subdivided further into eight additional quaternary categories: Budget Allocation, Budget Formulation, Discipline Policies, Student Assessment, Teacher Firing, Teacher Hiring, Teacher Salary Increase, and Teacher Starting Salary.

The Student Criteria Analysis category was disaggregated into subcategories, as well. The secondary categories included: Language and Immigration, Parent's Employment and Education, and Possessions Analysis. Each of the subcategories in both

school and student analysis contained a separate analysis for each individual question on the PISA questionnaire that preceded the actual administration of the test. Questions for analysis in this study were selected due to consistent reporting between the 2003, 2006, and 2009 PISA cycles. After separation into response categories, the PISA scores corresponding to each cycle for each question were averaged together to create a cumulative mean score for the four distinct regions of small town, town, city, and large city. The means were then ordered to compare the achievement levels in each of the four regions. A *z*-test for difference in means was performed using the 95% confidence level comparing each individual geographic region to the other geographic regions to determine if the difference in the mean achievement scores was significant. Chapter Four provides the results from each of these ordering of means, as well as the individual *z*-test outcomes. The results of these tests provided evidence to reject or not reject Null Hypothesis #1: There will not be a measurable difference in achievement measured on the mathematics portion of the PISA with regard to the responses on the PISA questionnaires in the defined categories of Student and Family Characteristics, and School Composition, Socio-Economic Status (SES), Organization, Staffing and Resources and Governance, among high poverty schools in the geographic locations represented by rural/small town, town, city, or large city.

Z-Test

The average mean score for the three testing cycles was then used in a *z*-test for difference in means to compare each achievement for each geographic category to all other geographic locations. This process created a *z*-score for the following six comparisons: small town to town, small town to city, small town to large city, town to

city, town to large city, and city to large city. In this way, all possible geographic combinations were considered for an examination of the significance of the difference in the mean achievement score. The average test value and the designation of a 'Y' or 'N,' representing 'yes' or 'no' for significance, was added to a table for each question on the school and student questionnaire considered in this study.

Ordering of Means: The IDE generated mean test score data for each question selected from the school or student questionnaire. The common variables selected for each question were mathematics mean scores from the PISA cycles for 2003, 2006, and 2009, and the population-based geographic category for the school location.

Using this procedure, a mean test score was generated for each geographic category for each testing cycle. The mean score for each geographic location and for each testing cycle was then averaged together to create a single mean average for each geographic location. The researcher chose to average the mean score for each cycle to create a single common score that represented the achievement of students over the length of the three testing cycles. The mean scores were then ordered from highest to lowest for the mean score average for each geographical category. This ordering of means and application of a *z*-test for difference in means allowed the researcher to reject or not reject Null Hypothesis #3: There will not be a measurable difference in achievement measured on the mathematics portion of the PISA, when comparing the geographic location of the school, represented by rural/small town, town, city, or large city.

Pearson Product Moment Correlation Coefficient

The researcher chose to calculate the Pearson correlation coefficient to investigate whether to reject or not reject Null Hypotheses #2. Null hypothesis #2 stated: There will not be a relationship between the categories of achievement, high or low, measured on the mathematics portion of the PISA and the geographic location of the school, represented by rural/small town, town, city, or large city. The researcher chose to use the OECD average for mathematics as the determining point for whether a mean score in the study was high or low. The OECD mean mathematics score for the 2003, 2006, and 2009 PISA cycles was averaged together to create a single mean score for use in this study, in deciding whether a school mathematics PISA score was considered high or considered low. There were no scores in the random sampling for this study that were found to be high. Therefore, Null Hypothesis #2 could not be tested with data provided for this study.

The researcher chose to calculate the Pearson correlation coefficient to investigate whether to reject or not reject Null Hypotheses #4. Null Hypothesis #4 stated: There will not be a relationship between the achievement measured on the mathematics portion of the PISA and the geographic location of the school represented by rural/small town, town, city, or large city. The researcher randomly selected 20 school criteria questions and 20 student criteria questions to utilize for the Pearson correlation coefficient formula. The results of the Pearson formula were then considered individually and collectively as an average of all mean scores to reject or not reject the null hypothesis.

Summary

The methodology of this study utilized data available through the National Center for Education Statistics and made use of that agency's research tool known as the

International Data Explorer. The hypotheses established for this study sought to determine if there were differences in and relationships between student achievement on the mathematics portion of the PISA based on the overall poverty level of the school, the location of the school, the responses of both student and administrator on questionnaires used to establish an understanding of both, and the mean score for other participating OECD nations. The data compiled was analyzed by a variety of tests to determine whether or not to reject the study hypotheses. A *z*-test for difference in proportions was used to establish the significance of differences in achievement, based upon particular responses to a school or student questionnaire, also with consideration of the geographic location of the school. The ordering of means for each geographic location allowed for an understanding of whether the response to an individual question related to a difference in mean scores based on geography. Finally, the Pearson Product Moment Correlation Coefficient revealed whether a relationship existed between high and low achievement based upon the location of the school.

Chapter Four: Data Analysis and Findings

Overview

The analyses contained within this chapter will seek to answer the overarching questions of this research. Primarily these questions pertained to the impact of school location on mathematics achievement for students attending high poverty schools. The data either supported or provided evidence that contradicted the null hypotheses listed below.

Null Hypothesis #1: There will not be a measurable difference in achievement measured on the mathematics portion of the PISA with regard to the responses on the PISA questionnaires in the defined categories of Student and Family Characteristics, and School Composition, Socio-Economic Status (SES), Organization, Staffing and Resources and Governance, among high poverty schools in the geographic locations represented by rural/small town, town, city, or large city.

A *z*-test for difference in means was performed for each combination of geographic location at a 95% confidence level. This process yielded a *z*-test score for each pairing that established the significance or nonsignificance of the difference in mean scores.

Null Hypothesis #2: There will not be a relationship between the categories of achievement, high or low, measured on the mathematics portion of the PISA and the geographic location of the school, represented by rural/small town, town, city, or large city.

This null hypothesis was not tested due to the absence of data in the category defined in the research study as 'high'. There were no means that represented the defined category of high achievement for this sample.

Null Hypothesis #3: There will not be a measurable difference in achievement measured on the mathematics portion of the PISA, when comparing the geographic location of the school, represented by rural/small town, town, city, or large city.

The rejection or non-rejection of this null hypothesis was determined by ordering the mean scores for each geographic location, followed by a z-test for difference in achievement in geographic location.

Null Hypothesis #4: There will not be a relationship between the achievement measured on the mathematics portion of the PISA and the geographic location of the school represented by rural/small town, town, city, or large city.

A Pearson Product Moment Correlation Coefficient was calculated to allow for a decision to reject or not reject this hypothesis, concerning a relationship between mathematics achievement and the geographic location of the high poverty school in the sample.

School Criteria Analysis

School Governance: The first category to be considered under the main category of school analysis was governance. Under the category of governance, the tertiary category of responsibility was examined for nine questions asked of the school administrator. Data analysis of the school administrator question one, 'In your school, do external examination boards exert a direct influence on decision making about assessment practices?' revealed a declining level of achievement scores from small town

to town to city, with large city having the lowest achievement score. The z-test for difference in means comparative outcomes of individual geographic regions demonstrated significance within all categories (Table 4). The null hypothesis was rejected for all geographic locations. The data supported a difference in mean scores for each paired comparison.

Table 4.

Characteristic: Decision Making by External Board for Assessment

Comparison Pairing	Test Value	Significance
Small Town to Town	-17.66	Y
Small Town to City	-84.99	Y
Small Town to Large City	-160.42	Y
Town to City	-71.6	Y
Town to Large City	-130.94	Y
City to Large City	-8.19	Y

Note: Critical Value = 1.96

The school administrator question two, 'In your school, do external examination boards exert a direct influence on decision making about instructional content?' was analyzed for student outcome differences in the secondary category of governance and the tertiary category of responsibility. The ordering of means revealed a declining level of achievement scores from small town to town to city with large city having the lowest achievement score. The z-test for difference in means comparative outcomes of individual geographic regions demonstrated significant differences within all categories (Table 5). The null hypothesis was rejected for all geographic locations. The data supported a difference in mean scores for each paired comparison.

Table 5.

Characteristic: Decision Making by External Board for Instructional Content

Comparison Pairing	Test Value	Significance
Small Town to Town	-36.31	Y
Small Town to City	-93.87	Y
Small Town to Large City	-292.92	Y
Town to City	-69.66	Y
Town to Large City	-217.84	Y
City to Large City	-37.87	Y

Note: Critical Value = 1.96

The school administrator question three, 'In your school, do parent groups exert a direct influence on decision making about instructional content?' was analyzed for student outcome difference in achievement scores in the secondary category of governance and the tertiary category of responsibility. The ordering of means revealed a declining level of achievement scores from small town to town to city with large city having the lowest achievement score. The z-test for difference in means comparative outcomes of individual geographic regions demonstrated significance within all categories (Table 6). The null hypothesis was rejected for all geographic locations. . The data supported a difference in mean scores for each paired comparison.

Table 6.

Characteristic: Decision Making by Parents for Instructional Content

Comparison Pairing	Test Value	Significance
Small Town to Town	-38.56	Y
Small Town to City	-71.16	Y
Small Town to Large City	-43.75	Y
Town to City	-43.02	Y
Town to Large City	-7.75	Y
City to Large City	35.76	Y

Note: Critical Value = 1.96

The school administrator question four, 'In your school, do parent groups exert a direct influence on decision making about budgeting?' was analyzed for student outcome differences in achievement scores in the secondary category of governance and the tertiary category of responsibility. The ordering of means for this question revealed the highest achievement in the town category; two points higher over the small town category followed by declining mean scores for city and large city. The z-test for difference in means comparative outcomes of individual geographic regions demonstrated significance within all categories (Table 7). The null hypothesis was rejected for all geographic locations. The data supported a difference in mean scores for each paired comparison.

Table 7.

Characteristic: Decision Making by Parents for Budgeting

Comparison Pairing	Test Value	Significance
Small Town to Town	6.29	Y
Small Town to City	-124.71	Y
Small Town to Large City	-131.67	Y
Town to City	-139.92	Y
Town to Large City	-141.7	Y
City to Large City	-34	Y

Note: Critical Value = 1.96

The school administrator question five, 'In your school, do student groups (e.g. student association, youth organization) exert a direct influence on decision making about instructional content?' was analyzed for student outcome differences in achievement scores in the secondary category of governance and the tertiary category of responsibility. The ordering of means for this question revealed towns to have the highest achievement; five points higher than small town, followed by a decline in the scores among the

category of city and large city. The z-test for difference in means comparative outcomes of individual geographic regions demonstrated significance within all categories (Table 8). The null hypothesis was rejected for all geographic locations. The data supported a difference in mean scores for each paired comparison.

Table 8.

Characteristic: Decision Making by Students for Instructional Content

Comparison Pairing	Test Value	Significance
Small Town to Town	8.62	Y
Small Town to City	-47.29	Y
Small Town to Large City	-154.04	Y
Town to City	-20.87	Y
Town to Large City	-82.32	Y
City to Large City	-123.12	Y

Note: Critical Value = 1.96

The school administrator question six, 'In your school, do teacher groups (e.g. Staff Association, curriculum committees, trade union) exert a direct influence on decision making about assessment practices?' was analyzed for student outcome differences in achievement scores in the secondary category of governance and the tertiary category of responsibility. The ordering of means for this question revealed towns to have the highest achievement; seven points higher than small town, followed by a decline in the scores among the category of city and large city. The z-test for difference in means comparative outcomes of individual geographic regions demonstrated significance within all categories (Table 9). The null hypothesis was rejected for all geographic locations. The data supported a difference in mean scores for each paired comparison.

Table 9.

Characteristic: Decision Making by Teachers for Assessment

Comparison Pairing	Test Value	Significance
Small Town to Town	39.68	Y
Small Town to City	-101.69	Y
Small Town to Large City	-181.45	Y
Town to City	-121.97	Y
Town to Large City	-218.11	Y
City to Large City	-15.84	Y

Note: Critical Value = 1.96

The school administrator question seven, 'In your school, do teacher groups (e.g. Staff Association, curriculum committees, trade union) exert a direct influence on decision making about budgeting?' was analyzed for student outcome differences in achievement scores in the secondary category of governance and the tertiary category of responsibility. The ordering of means revealed a declining level of achievement scores from small town to town to city with large city having the lowest achievement score. The z-test for difference in means comparative outcomes of individual geographic regions demonstrated significance within all categories (see Table 10). The null hypothesis was rejected for all geographic locations. The data supported a difference in mean scores for each paired comparison.

Table 10.

Characteristic: Decision Making by Teachers for Budget

Comparison Pairing	Test Value	Significance
Small Town to Town	-38.11	Y
Small Town to City	-116.74	Y
Small Town to Large City	-167.78	Y
Town to City	-53.81	Y
Town to Large City	-96.41	Y
City to Large City	-53.77	Y

Note: Critical Value = 1.96

The school administrator question eight, 'In your school, do teacher groups (e.g. Staff Association, curriculum committees, trade union) exert a direct influence on decision making about instructional content?' was analyzed for student outcome differences in achievement scores in the secondary category of governance and the tertiary category of responsibility. The ordering of means revealed a declining level of achievement scores from small town to town to city with large city having the lowest achievement score. The z-test for difference in means comparative outcomes of individual geographic regions demonstrated significance within all categories (Table 11). The null hypothesis was rejected for all geographic locations. The data supported a difference in mean scores for each paired comparison.

Table 11.

Characteristic: Decision Making by Teachers for Instructional Content

Comparison Pairing	Test Value	Significance
Small Town to Town	-14.87	Y
Small Town to City	-131.65	Y
Small Town to Large City	-197.17	Y
Town to City	-98.81	Y
Town to Large City	-144.37	Y
City to Large City	-33	Y

Note: Critical Value = 1.96

The school administrator question nine, 'In your school, do teacher groups (e.g. Staff Association, curriculum committees, trade union) exert a direct influence on decision making about staffing?' was analyzed for student outcome differences in achievement scores in the secondary category of governance and the tertiary category of responsibility. The ordering of means revealed a declining level of achievement scores from small town to town to city with large city having the lowest achievement score. The

z-test for difference in means comparative outcomes of individual geographic regions demonstrated significance within all categories (Table 12). The null hypothesis was rejected for all geographic locations. The data supported a difference in mean scores for each paired comparison.

Table 12.

Characteristic: Decision Making by Teachers for Staffing

Comparison Pairing	Test Value	Significance
Small Town to Town	-17.92	Y
Small Town to City	-96.85	Y
Small Town to Large City	-157.84	Y
Town to City	-78.43	Y
Town to Large City	-123.77	Y
City to Large City	-19.74	Y

Note: Critical Value = 1.96

Under the secondary category of governance the tertiary category of school responsibility for curriculum was examined for nine questions asked of the school administrator. Data analysis of the school administrator question one, 'Regarding your school, does a school governing board have considerable responsibility for approving students for determining course content?' revealed a declining level of achievement scores from small town to town to large city with the city category having the lowest achievement score. The z-test for difference in means comparative outcomes of individual geographic regions demonstrated significance within all categories (Table 13). The null hypothesis was rejected for all geographic locations. The data supported a difference in mean scores for each paired comparison.

Table 13.

Characteristic: Responsibility; Course Content - Board

Comparison Pairing	Test Value	Significance
Small Town to Town	-16.77	Y
Small Town to City	-140.34	Y
Small Town to Large City	-75.89	Y
Town to City	-104.14	Y
Town to Large City	-58.81	Y
City to Large City	15.59	Y

Note: Critical Value = 1.96

The school administrator question two, 'Regarding your school, do principals have considerable responsibility for approving students for determining course content?' was analyzed for student outcome differences in achievement scores in the secondary category of governance and the tertiary category of school responsibility for curriculum. The ordering of means revealed a declining level of achievement scores from small town to town to city with large city having the lowest achievement score. The z-test for difference in means comparative outcomes of individual geographic regions demonstrated significance within all categories (Table 14). The null hypothesis was rejected for all geographic locations. The data supported a difference in mean scores for each paired comparison.

Table 14.

Characteristic: Responsibility Course Content - Principals

Comparison Pairing	Test Value	Significance
Small Town to Town	-41.3	Y
Small Town to City	-87.11	Y
Small Town to Large City	-147.07	Y
Town to City	-31.28	Y
Town to Large City	-88.95	Y
City to Large City	-69.07	Y

Note: Critical Value = 1.96

The school administrator question three, 'Regarding your school, do teachers have considerable responsibility for approving students for determining course content?' was analyzed for student outcome differences in achievement scores in the secondary category of governance and the tertiary category of school responsibility for curriculum. The ordering of means revealed a declining level of achievement scores from small town to town to city with large city having the lowest achievement score. The z-test for difference in means comparative outcomes of individual geographic regions demonstrated significance within all categories (Table 15). The null hypothesis was rejected for all geographic locations. The data supported a difference in mean scores for each paired comparison.

Table 15.

Characteristic: Responsibility; Course Content - Teachers

Comparison Pairing	Test Value	Significance
Small Town to Town	-5.28	Y
Small Town to City	-130.91	Y
Small Town to Large City	-128.82	Y
Town to City	-87.86	Y
Town to Large City	-99.68	Y
City to Large City	-30.51	Y

Note: Critical Value = 1.96

The school administrator question four, 'Regarding your school, does a school governing board have considerable responsibility for approving students for deciding which courses are offered?' was analyzed for student outcome differences in achievement scores in the secondary category of governance and the tertiary category of school responsibility for curriculum. The ordering of means revealed a declining level of achievement scores from town to small town to city with large city having the lowest

achievement score. The z-test for difference in means comparative outcomes of individual geographic regions demonstrated significance within all categories (Table 16). The null hypothesis was rejected for all geographic locations. The data supported a difference in mean scores for each paired comparison.

Table 16.

Characteristic: Responsibility; Courses Offered - Board

Comparison Pairing	Test Value	Significance
Small Town to Town	13.38	Y
Small Town to City	-132.93	Y
Small Town to Large City	-69.7	Y
Town to City	-145.91	Y
Town to Large City	-75.78	Y
City to Large City	-12.13	Y

Note: Critical Value = 1.96

The school administrator question five, 'Regarding your school, do principals have considerable responsibility for approving students for deciding which courses are offered?' was analyzed for student outcome differences in achievement scores in the secondary category of governance and the tertiary category of school responsibility for curriculum. The ordering of means revealed a declining level of achievement scores from small town to town to city with large city having the lowest achievement score. The z-test for difference in means comparative outcomes of individual geographic regions demonstrated significance within all categories (Table 17). The null hypothesis was rejected for all geographic locations. The data supported a difference in mean scores for each paired comparison.

Table 17.

Characteristic: Responsibility; Course Offered - Principals

Comparison Pairing	Test Value	Significance
Small Town to Town	-14.27	Y
Small Town to City	-133.02	Y
Small Town to Large City	-136.31	Y
Town to City	-100.25	Y
Town to Large City	-117.74	Y
City to Large City	-51.89	Y

Note: Critical Value = 1.96

The school administrator question six, 'Regarding your school, do teachers have considerable responsibility for approving students for deciding which courses are offered?' was analyzed for student outcome differences in achievement scores in the secondary category of governance and the tertiary category of school responsibility for curriculum. The ordering of means revealed a declining level of achievement scores from small town to town to city with large city having the lowest achievement score. The z-test for difference in means comparative outcomes of individual geographic regions demonstrated significance in all categories (Table 18). The null hypothesis was rejected for all geographic locations. The data supported a difference in mean scores for each paired comparison.

Table 18.

Characteristic: Responsibility; Courses Offered - Teachers

Comparison Pairing	Test Value	Significance
Small Town to Town	-29.19	Y
Small Town to City	-118.39	Y
Small Town to Large City	-164.77	Y
Town to City	-99.92	Y
Town to Large City	-148.51	Y
City to Large City	-38.4	Y

Note: Critical Value = 1.96

The school administrator question seven, 'Regarding your school, does a school governing board have considerable responsibility for approving students for choosing which textbooks are used?' was analyzed for student outcome differences in achievement scores in the secondary category of governance and the tertiary category of school responsibility for curriculum. The ordering of means revealed a declining level of achievement scores from small town to town to city with large city having the lowest achievement score. The z-test for difference in means comparative outcomes of individual geographic regions demonstrated significance in all categories (Table 19). The null hypothesis was rejected for all geographic locations. The data supported a difference in mean scores for each paired comparison.

Table 19.

Characteristic: Responsibility; Textbook Use - Board

Comparison Pairing	Test Value	Significance
Small Town to Town	-8.71	Y
Small Town to City	-131.9	Y
Small Town to Large City	-99.62	Y
Town to City	-133.58	Y
Town to Large City	-97.53	Y
City to Large City	-2.46	Y

Note: Critical Value = 1.96

The school administrator question eight, 'Regarding your school, do principals have considerable responsibility for approving students for choosing which textbooks are used?' was analyzed for student outcome differences in achievement scores in the secondary category of governance and the tertiary category of school responsibility for curriculum. The ordering of means revealed a declining level of achievement scores from small town to town to city with large city having the lowest achievement score. The z-test

for difference in means comparative outcomes of individual geographic regions demonstrated significance in all categories (Table 20). The null hypothesis was rejected for all geographic locations. The data supported a difference in mean scores for each paired comparison.

Table 20.

Characteristic: Responsibility; Textbook Use - Principals

Comparison Pairing	Test Value	Significance
Small Town to Town	-32.82	Y
Small Town to City	-122.31	Y
Small Town to Large City	-190.22	Y
Town to City	-77.91	Y
Town to Large City	-147.69	Y
City to Large City	-106.48	Y

Note: Critical Value = 1.96

The final school administrator question in the secondary category of governance and the tertiary category of school responsibility for curriculum, 'Regarding your school, do teachers have considerable responsibility for approving students for choosing which textbooks are used?' was analyzed for student outcome differences in achievement. The ordering of means revealed a declining level of achievement scores from small town to town to city with large city having the lowest achievement score. The z-test for difference in means comparative outcomes of individual geographic regions demonstrated significance in all categories (Table 21). The null hypothesis was rejected for all geographic locations. The data supported a difference in mean scores for each paired comparison.

Table 21.

Characteristic: Responsibility; Textbook Use - Teachers

Comparison Pairing	Test Value	Significance
Small Town to Town	-15.1	Y
Small Town to City	-115.98	Y
Small Town to Large City	-238.12	Y
Town to City	-105.56	Y
Town to Large City	-232.49	Y
City to Large City	-89.72	Y

Note: Critical Value = 1.96

The final tertiary category under the secondary category of governance was teacher participation and school responsibility. This tertiary category had eight quaternary categories comprised of three questions each. The analysis for this study was limited to just those questions with enough data to provide meaningful comparisons and analysis. The data supported a difference in mean scores for each paired comparison.

The first school administrator question in the quaternary category of budget allocation, 'Regarding your school, does a school governing board have considerable responsibility for deciding on budget allocations within the school?' was analyzed for student outcome differences in achievement scores in the secondary category of governance and the tertiary category of teacher participation and school responsibility. The ordering of means revealed a declining level of achievement scores from small town to town to city with large city having the lowest achievement score. The z-test for difference in means comparative outcomes of individual geographic regions demonstrated significance in all categories (Table 22). The null hypothesis was rejected for all geographic locations. The data supported a difference in mean scores for each paired comparison.

Table 22.

Characteristic: Responsibility; Budget Allocation by Board

Comparison Pairing	Test Value	Significance
Small Town to Town	-43.25	Y
Small Town to City	-151.84	Y
Small Town to Large City	-365.91	Y
Town to City	-28.21	Y
Town to Large City	-181.51	Y
City to Large City	-318.74	Y

Note: Critical Value = 1.96

The school administrator question two, 'Regarding your school, do principals have considerable responsibility for deciding on budget allocations within the school?' was analyzed for student outcome differences in achievement scores in the subcategory of governance and the tertiary category of teacher participation and school responsibility. The ordering of means revealed a declining level of achievement scores from small town to town to city with large city having the lowest achievement score. The z-test for difference in means comparative outcomes of individual geographic regions demonstrated significance in all categories (Table 23). The null hypothesis was rejected for all geographic locations. The data supported a difference in mean scores for each paired comparison.

Table 23.

Characteristic: Responsibility; Budget Allocation by Principal

Comparison Pairing	Test Value	Significance
Small Town to Town	-11.4	Y
Small Town to City	-121.86	Y
Small Town to Large City	-140.62	Y
Town to City	-95.15	Y
Town to Large City	-121.38	Y
City to Large City	-52.31	Y

Note: Critical Value = 1.96

The school administrator question three, 'Regarding your school, do teachers have considerable responsibility for deciding on budget allocations within the school?' was analyzed for student outcome differences in achievement scores in the subcategory of governance and the tertiary category of teacher participation and school responsibility. The ordering of means revealed a declining level of achievement scores from small town to town to large city with city having the lowest achievement score. The z-test for difference in means comparative outcomes of individual geographic regions demonstrated significance in all categories (Table 24). The null hypothesis was rejected for all geographic locations.

Table 24.

Characteristic: Responsibility; Budget Allocation by Teacher

Comparison Pairing	Test Value	Significance
Small Town to Town	-6.4	Y
Small Town to City	-170.82	Y
Small Town to Large City	-65.31	Y
Town to City	-86.08	Y
Town to Large City	-50.21	Y
City to Large City	7.45	Y

Note: Critical Value = 1.96

The first school administrator question in the quaternary category of budget formulation, 'Regarding your school, does a school governing board have considerable responsibility for formulating the school budget?' was analyzed for student outcome differences in achievement scores in the secondary category of governance and the tertiary category of teacher participation and school responsibility. The ordering of means revealed a declining level of achievement scores from small town to town to city with large city having the lowest achievement score. The z-test for difference in means

comparative outcomes of individual geographic regions demonstrated significance in all categories (Table 25). The null hypothesis was rejected for all geographic locations. The data supported a difference in mean scores for each paired comparison.

Table 25.

Characteristic: Responsibility; Budget Formulation by Board

Comparison Pairing	Test Value	Significance
Small Town to Town	-12.77	Y
Small Town to City	-103.35	Y
Small Town to Large City	-140.06	Y
Town to City	-61.32	Y
Town to Large City	-107.61	Y
City to Large City	-69.16	Y

Note: Critical Value = 1.96

The school administrator question two, 'Regarding your school, do principals have considerable responsibility for formulating the school budget?' was analyzed for student outcome differences in achievement scores in the secondary category of governance and the tertiary category of teacher participation and school responsibility. The ordering of means revealed a declining level of achievement scores from small town to town to city with large city having the lowest achievement score. The z-test for difference in means comparative outcomes of individual geographic regions demonstrated significance in all categories (Table 26). The null hypothesis was rejected for all geographic locations. The data supported a difference in mean scores for each paired comparison.

Table 26.

Characteristic: Responsibility; Budget Formulation by Principal

Comparison Pairing	Test Value	Significance
Small Town to Town	-8.31	Y
Small Town to City	-112.41	Y
Small Town to Large City	-133.1	Y
Town to City	-92.16	Y
Town to Large City	-115.67	Y
City to Large City	-34.61	Y

Note: Critical Value = 1.96

The first school administrator question in the quaternary category of discipline policies, 'Regarding your school, does a school governing board have considerable responsibility for establishing student disciplinary policies?' was analyzed for student outcome differences in achievement scores in the secondary category of governance and the tertiary category of teacher participation and school responsibility. The ordering of means revealed a declining level of achievement scores from small town to town to city with large city having the lowest achievement score. The z-test for difference in means comparative outcomes of individual geographic regions demonstrated significance in all categories (Table 27). The null hypothesis was rejected for all geographic locations. The data supported a difference in mean scores for each paired comparison.

Table 27.

Characteristic: Responsibility for Student Discipline Policies by Board

Comparison Pairing	Test Value	Significance
Small Town to Town	-24.71	Y
Small Town to City	-113.86	Y
Small Town to Large City	-194.78	Y
Town to City	-54.72	Y
Town to Large City	-131.8	Y
City to Large City	-114.92	Y

Note: Critical Value = 1.96

The school administrator question two, 'Regarding your school, do principals have considerable responsibility for establishing student disciplinary policies?' was analyzed for student outcome differences in achievement scores in the secondary category of governance and the tertiary category of teacher participation and school responsibility. The ordering of means revealed a declining level of achievement scores from town to small town to city with large city having the lowest achievement score. The z-test for difference in means comparative outcomes of individual geographic regions demonstrated significance in all categories (Table 28). The null hypothesis was rejected for all geographic locations. The data supported a difference in mean scores for each paired comparison.

Table 28.

Characteristic: Responsibility for Student Discipline Policies by Principal

Comparison Pairing	Test Value	Significance
Small Town to Town	4.57	Y
Small Town to City	-133.02	Y
Small Town to Large City	-170.67	Y
Town to City	-119.68	Y
Town to Large City	-157.87	Y
City to Large City	-57.92	Y

Note: Critical Value = 1.96

The school administrator question three, 'Regarding your school, do teachers have considerable responsibility for establishing student disciplinary policies?' was analyzed for student outcome differences in achievement scores in the secondary category of governance and the tertiary category of teacher participation and school responsibility. The ordering of means revealed a declining level of achievement scores from town to small town to city with large city having the lowest achievement score. The z-test for

difference in means comparative outcomes of individual geographic regions demonstrated significance in all categories (Table 29). The null hypothesis was rejected for all geographic locations. The data supported a difference in mean scores for each paired comparison.

Table 29.

Characteristic: Responsibility for Student Discipline Policies by Teachers

Comparison Pairing	Test Value	Significance
Small Town to Town	16.02	Y
Small Town to City	-127.9	Y
Small Town to Large City	-156.82	Y
Town to City	-110.88	Y
Town to Large City	-135.89	Y
City to Large City	-34.53	Y

Note: Critical Value = 1.96

The first school administrator question in the quaternary category of student assessment, 'Regarding your school, does a school governing board have considerable responsibility for establishing student assessment policies?' was analyzed for student outcome differences in achievement scores in the secondary category of governance and the tertiary category of teacher participation and school responsibility. The ordering of means revealed a declining level of achievement scores from small town to town to city with large city having the lowest achievement score. The z-test for difference in means comparative outcomes of individual geographic regions demonstrated significance in all categories (Table 30). The null hypothesis was rejected for all geographic locations. The data supported a difference in mean scores for each paired comparison.

Table 30.

Characteristic: Responsibility for Student Assessment by Board

Comparison Pairing	Test Value	Significance
Small Town to Town	-5.74	Y
Small Town to City	-144.83	Y
Small Town to Large City	-129.85	Y
Town to City	-131.14	Y
Town to Large City	-123.31	Y
City to Large City	-41.93	Y

Note: Critical Value = 1.96

The school administrator question two, 'Regarding your school, do principals have considerable responsibility for establishing student assessment policies?' was analyzed for student outcome differences in achievement scores in the secondary category of governance and the tertiary category of teacher participation and school responsibility. The ordering of means revealed a declining level of achievement scores from small town to town to city with large city having the lowest achievement score. The z-test for difference in means comparative outcomes of individual geographic regions demonstrated significance in all categories (Table 31). The null hypothesis was rejected for all geographic locations. The data supported a difference in mean scores for each paired comparison.

Table 31.

Characteristic: Responsibility for Student Assessment by Principal

Comparison Pairing	Test Value	Significance
Small Town to Town	-18.13	Y
Small Town to City	-120.56	Y
Small Town to Large City	-135.11	Y
Town to City	-95.88	Y
Town to Large City	-114.96	Y
City to Large City	-31.99	Y

Note: Critical Value = 1.96

The school administrator question three, 'Regarding your school, do teachers have considerable responsibility for establishing student assessment policies?' was analyzed for student outcome differences in achievement scores in the secondary category of governance and the tertiary category of teacher participation and school responsibility. The ordering of means revealed a declining level of achievement scores from small town to town to city with large city having the lowest achievement score. The z-test for difference in means comparative outcomes of individual geographic regions demonstrated significance in all categories (Table 32). The null hypothesis was rejected for all geographic locations. The data supported a difference in mean scores for each paired comparison.

Table 32.

Characteristic: Responsibility for Student Assessment by Teachers

Comparison Pairing	Test Value	Significance
Small Town to Town	-24.29	Y
Small Town to City	-125.59	Y
Small Town to Large City	-172.88	Y
Town to City	-100.48	Y
Town to Large City	-135.35	Y
City to Large City	-7.98	Y

Note: Critical Value = 1.96

The first school administrator question in the quaternary category of teacher firing, 'Regarding your school, does a school governing board have considerable responsibility for firing teachers?' was analyzed for student outcome differences in achievement scores in the secondary category of governance and the tertiary category of teacher participation and school responsibility. The ordering of means showed a declining level of achievement scores from small town to town to city with large city having the

lowest achievement score. The z-test for difference in means comparative outcomes of individual geographic regions showed significance in all categories (Table 33). The null hypothesis was rejected for all geographic locations. The data supported a difference in mean scores for each paired comparison.

Table 33.

Characteristic: Responsibility for Teacher Firing by Board

Comparison Pairing	Test Value	Significance
Small Town to Town	-30.05	Y
Small Town to City	-164.22	Y
Small Town to Large City	-126.79	Y
Town to City	-127.42	Y
Town to Large City	-111.2	Y
City to Large City	-49.34	Y

Note: Critical Value = 1.96

The school administrator question two, 'Regarding your school, do principals have considerable responsibility for firing teachers?' was analyzed for student outcome differences in achievement scores in the secondary category of governance and the tertiary category of teacher participation and school responsibility. The ordering of means showed a declining level of achievement scores from small town to town to city with large city having the lowest achievement score. The z-test for difference in means comparative outcomes of individual geographic regions showed significance in all categories (Table 34). The null hypothesis was rejected for all geographic locations. The data supported a difference in mean scores for each paired comparison.

Table 34.

Characteristic: Responsibility for Teacher Firing by Principal

Comparison Pairing	Test Value	Significance
Small Town to Town	-7.29	Y
Small Town to City	-116.71	Y
Small Town to Large City	-180.05	Y
Town to City	-72.81	Y
Town to Large City	-126.25	Y
City to Large City	-74.46	Y

Note: Critical Value = 1.96

The first school administrator question in the quaternary category of teacher hiring, 'Regarding your school, does a school governing board have considerable responsibility for selecting teachers for hire?' was analyzed for student outcome differences in achievement scores in the secondary category of governance and the tertiary category of teacher participation and school responsibility. The ordering of means revealed a declining level of achievement scores from small town to town to city. The large city category did not have enough data to be analyzed for this question. The z-test for difference in means comparative outcomes of individual geographic regions demonstrated significance in all categories able to be analyzed due to the absence of data in the large city category (Table 35). The null hypothesis was rejected for all geographic locations for which data was available for comparison. The data supported a difference in mean scores for each paired comparison with available data.

Table 35.

Characteristic: Responsibility for Teacher Hiring by Board

Comparison Pairing	Test Value	Significance
Small Town to Town	-29.22	Y
Small Town to City	-138.92	Y
Small Town to Large City	Not Enough Data	
Town to City	-72.53	Y
Town to Large City	Not Enough Data	
City to Large City	Not Enough Data	

Note: Critical Value = 1.96

The school administrator question two, 'Regarding your school, do principals have considerable responsibility for selecting teachers for hire?' was analyzed for student outcome differences in achievement scores in the secondary category of governance and the tertiary category of teacher participation and school responsibility. The ordering of means revealed a declining level of achievement scores from small town to town to city with large city having the lowest achievement score. The z-test for difference in means comparative outcomes of individual geographic regions demonstrated significance in all categories (Table 36). The null hypothesis was rejected for all geographic locations. The data supported a difference in mean scores for each paired comparison.

Table 36.

Characteristic: Responsibility for Teacher Hiring by Principal

Comparison Pairing	Test Value	Significance
Small Town to Town	-16.67	Y
Small Town to City	-140.55	Y
Small Town to Large City	-164.34	Y
Town to City	-110.46	Y
Town to Large City	-145.8	Y
City to Large City	-74.97	Y

Note: Critical Value = 1.96

The school administrator question three, ‘Regarding your school, do teachers have considerable responsibility for selecting teachers for hire?’ was analyzed for student outcome differences in achievement scores in the secondary category of governance and the tertiary category of teacher participation and school responsibility. The ordering of means revealed a declining level of achievement scores from town to small town to large city with city having the lowest achievement score. The z-test for difference in means comparative outcomes of individual geographic regions demonstrated significance in all categories (Table 37). The null hypothesis was rejected for all geographic locations. The data supported a difference in mean scores for each paired comparison.

Table 37.

Characteristic: Responsibility for Teacher Hiring by Teachers

Comparison Pairing	Test Value	Significance
Small Town to Town	-11.07	Y
Small Town to City	-103.2	Y
Small Town to Large City	-67.28	Y
Town to City	-138.19	Y
Town to Large City	-72.35	Y
City to Large City	15.95	Y

Note: Critical Value = 1.96

The first school administrator question in the quaternary category of teacher salary increase, ‘Regarding your school, does the school governing board have considerable responsibility for determining teachers' salaries increases?’ was analyzed for student outcome differences in achievement scores in the secondary category of governance and the tertiary category of teacher participation and school responsibility. The ordering of means revealed a declining level of achievement scores from small town to town to city with large city having the lowest achievement score. The z-test for

difference in means comparative outcomes of individual geographic regions demonstrated significance in all categories (Table 38). The null hypothesis was rejected for all geographic locations. The data supported a difference in mean scores for each paired comparison.

Table 38.

Characteristic: Responsibility for Teacher Salary Increase by Board

Comparison Pairing	Test Value	Significance
Small Town to Town	-5	Y
Small Town to City	-147.55	Y
Small Town to Large City	-108.34	Y
Town to City	-136.66	Y
Town to Large City	-104.31	Y
City to Large City	-29.63	Y

Note: Critical Value = 1.96

The first school administrator question in the quaternary category of teacher starting salary, 'Regarding your school, does a school governing board have considerable responsibility for establishing teachers' starting salaries?' was analyzed for student outcome differences in achievement scores in the secondary category of governance and the tertiary category of teacher participation and school responsibility. The ordering of means revealed a declining level of achievement scores from small town and town (equal scores) to city with large city having the lowest achievement score. The z-test for difference in means comparative outcomes of individual geographic regions showed significance in all categories except for small town to town where the null hypothesis was accepted (Table 39). The null hypothesis was rejected for all geographic locations, except for the comparison of Small Town to Town. The data supported a difference in mean scores for each paired comparison, except for the comparison of Small Town to Town.

Table 39.

Characteristic: Responsibility for Starting Teacher Salary by Board

Comparison Pairing	Test Value	Significance
Small Town to Town	0	N
Small Town to City	-109	Y
Small Town to Large City	-137.02	Y
Town to City	-98.54	Y
Town to Large City	-129.53	Y
City to Large City	-53.08	Y

Note: Critical Value = 1.96

School Staffing and Resources: The second category under the primary category of school criteria analysis was school staffing and resources. This category contained seven individual analyses. The first school administrator question, 'Is your school's capacity to provide instruction hindered by a shortage or inadequacy of audio-visual resources?' was analyzed for student outcome differences in achievement scores in the secondary category of staffing and resources. The available responses were 'Not at All,' 'Very Little,' 'To Some Extent,' and 'A Lot'. The scores for 'Very Little' and 'To Some Extent' were combined to provide a simplified understanding of schools that, at some level, are experiencing lack. In addition, this combination helped provide a complete data set for analysis as some geographic locations did not have enough responses to provide a score for both separate answers. The response for 'A Lot' did not have enough respondents to provide a mean score for any of the questions in this secondary category. The ordering of means for schools responding 'Little to Some' shortage or inadequacy revealed a declining level of achievement scores from small town to town to city with large city having the lowest achievement score. The z-test for difference in means comparative outcomes of individual geographic regions demonstrated significance in all

categories (Table 40). The null hypothesis was rejected for all geographic locations. The data supported a difference in mean scores for each paired comparison.

Table 40.

Characteristic: Audio Visual Shortage; 'Very Little' and 'To Some Extent'

Comparison Pairing	Test Value	Significance
Small Town to Town	-47.21	Y
Small Town to City	-343.43	Y
Small Town to Large City	-484.06	Y
Town to City	-167.28	Y
Town to Large City	-295.07	Y
City to Large City	-242.42	Y

Note: Critical Value = 1.96

The ordering of means for schools responding 'Not at All' to the same question revealed a declining level of achievement scores from small town to town to city with large city having the lowest achievement score. The z-test for difference in means comparative outcomes of individual geographic regions demonstrated significance in all categories (Table 41). The null hypothesis was rejected for all geographic locations. The data supported a difference in mean scores for each paired comparison.

Table 41.

Characteristic: Audio Visual Shortage; 'Not at All'

Comparison Pairing	Test Value	Significance
Small Town to Town	-4.83	Y
Small Town to City	-55.16	Y
Small Town to Large City	-114.59	Y
Town to City	-53.19	Y
Town to Large City	-115.27	Y
City to Large City	-24.80	Y

Note: Critical Value = 1.96

The school administrator question two, 'Is your school's capacity to provide instruction hindered by a shortage or inadequacy of computer software for instruction?'

was analyzed for student outcome differences in achievement scores in the secondary category of staffing and resources. The same combination of response categories was used for this question as well as in all subsequent questions for the subcategory of staffing and resources. The ordering of means for schools responding 'Little to Some' revealed the highest achievement in the town category by less than three points over the small town category followed by city and large city. The z-test for difference in means comparative outcomes of individual geographic regions demonstrated significance in all categories (Table 42). The null hypothesis was rejected for all geographic locations. The data supported a difference in mean scores for each paired comparison.

Table 42.

Characteristic: Computer Software Shortage; 'Very Little' and 'To Some Extent'

Comparison Pairing	Test Value	Significance
Small Town to Town	22.95	Y
Small Town to City	-86.40	Y
Small Town to Large City	-326.41	Y
Town to City	-115.29	Y
Town to Large City	-406.74	Y
City to Large City	-193.27	Y

Note: Critical Value = 1.96

The ordering of means for schools responding 'Not at All' to the same question revealed a declining level of achievement scores from small town to town to large city with city having the lowest achievement score at 2.5 points under the score for large city. The z-test for difference in means comparative outcomes of individual geographic regions demonstrated significance in all categories (Table 43). The null hypothesis was rejected for all geographic locations. The data supported a difference in mean scores for each paired comparison.

Table 43.

Characteristic: Computer Software Shortage; 'Not at All'

Comparison Pairing	Test Value	Significance
Small Town to Town	-13.18	Y
Small Town to City	-50.02	Y
Small Town to Large City	-105.12	Y
Town to City	-35.52	Y
Town to Large City	-52.81	Y
City to Large City	5.27	Y

Note: Critical Value = 1.96

The school administrator question three, 'Is your school's capacity to provide instruction hindered by a shortage or inadequacy of computers for instruction?' was analyzed for student outcome differences in achievement scores in the secondary category of staffing and resources. The ordering of means for schools responding 'Little to Some' shortage or inadequacy showed a declining level of achievement scores from small town to town to city with large city having the lowest achievement score. The z-test for difference in means comparative outcomes of individual geographic regions showed significance in all categories (Table 44). The null hypothesis was rejected for all geographic locations. The data supported a difference in mean scores for each paired comparison.

Table 44.

Characteristic: Computer Shortage; 'Very Little' and 'To Some Extent'

Comparison Pairing	Test Value	Significance
Small Town to Town	-19.08	Y
Small Town to City	-126.94	Y
Small Town to Large City	-132.50	Y
Town to City	-153.32	Y
Town to Large City	-158.42	Y
City to Large City	-10.54	Y

Note: Critical Value = 1.96

The ordering of means for schools responding 'Not at All' to the same question revealed a declining level of achievement scores from small town to town to city with large city having the lowest achievement score. The z-test for difference in means comparative outcomes of individual geographic regions demonstrated significance in all categories (Table 45). The null hypothesis was rejected for all geographic locations. The data supported a difference in mean scores for each paired comparison.

Table 45.

Characteristic: Computer Shortage; 'Not at All'

Comparison Pairing	Test Value	Significance
Small Town to Town	-32.56	Y
Small Town to City	-51.33	Y
Small Town to Large City	-95.24	Y
Town to City	-22.72	Y
Town to Large City	-41.58	Y
City to Large City	-6.74	Y

Note: Critical Value = 1.96

The school administrator question four, 'Is your school's capacity to provide instruction hindered by a shortage or inadequacy of library materials?' was analyzed for student outcome differences in achievement scores in the secondary category of staffing

and resources. The ordering of means for schools responding 'Little to Some' shortage or inadequacy showed a declining level of achievement scores from small town to town to city with large city having the lowest achievement score. The z-test for difference in means comparative outcomes of individual geographic regions showed significance in all categories (Table 46). The null hypothesis was rejected for all geographic locations. The data supported a difference in mean scores for each paired comparison.

Table 46.

Characteristic: Library Material Shortage; 'Very Little' and 'To Some Extent'

Comparison Pairing	Test Value	Significance
Small Town to Town	-51.66	Y
Small Town to City	-201.98	Y
Small Town to Large City	-252.77	Y
Town to City	-122.81	Y
Town to Large City	-180.81	Y
City to Large City	-90.54	Y

Note: Critical Value = 1.96

The ordering of means for schools responding 'Not at All' to the same question revealed a declining level of achievement scores from small town to town to city with large city having the lowest achievement score. The z-test for difference in means comparative outcomes of individual geographic regions demonstrated significance in all categories (Table 47). The null hypothesis was rejected for all geographic locations. The data supported a difference in mean scores for each paired comparison.

Table 47.

Characteristic: Library Material Shortage; 'Not at All'

Comparison Pairing	Test Value	Significance
Small Town to Town	-21.65	Y
Small Town to City	-71.74	Y
Small Town to Large City	-119.98	Y
Town to City	-42.76	Y
Town to Large City	-76.45	Y
City to Large City	-28.56	Y

Note: Critical Value = 1.96

The school administrator question five, 'Is your school's capacity to provide instruction hindered by a lack of qualified mathematics teachers?' was analyzed for student outcome differences in achievement scores in the secondary category of staffing and resources. The ordering of means for schools responding 'Little to Some' revealed the highest achievement in the town category by less than five points over the small town category followed by city and large city. The z-test for difference in means comparative outcomes of individual geographic regions demonstrated significance in all categories (Table 48). The null hypothesis was rejected for all geographic locations. The data supported a difference in mean scores for each paired comparison.

Table 48.

Characteristic: Qualified Math Teacher Shortage; 'Very Little' and 'To Some Extent'

Comparison Pairing	Test Value	Significance
Small Town to Town	14.99	Y
Small Town to City	-124.13	Y
Small Town to Large City	-97.48	Y
Town to City	-93.88	Y
Town to Large City	-89.74	Y
City to Large City	-22.34	Y

Note: Critical Value = 1.96

The ordering of means for schools responding ‘Not at All’ to the same question revealed a declining level of achievement scores from small town to town to city with large city having the lowest achievement score. The z-test for difference in means comparative outcomes of individual geographic regions demonstrated significance in all categories (Table 49). The null hypothesis was rejected for all geographic locations. The data supported a difference in mean scores for each paired comparison.

Table 49.

Characteristic: Qualified Math Teacher Shortage; ‘Not at All’

Comparison Pairing	Test Value	Significance
Small Town to Town	-12.06	Y
Small Town to City	-114.84	Y
Small Town to Large City	-227.70	Y
Town to City	-68.10	Y
Town to Large City	-118.55	Y
City to Large City	-53.71	Y

Note: Critical Value = 1.96

The school administrator question six, ‘Is your school’s capacity to provide instruction hindered by a shortage of support personnel?’ was analyzed for student outcome differences in achievement scores in the secondary category of staffing and resources. The ordering of means for schools responding ‘Little to Some’ shortage or inadequacy showed a declining level of achievement scores from small town to town to city with large city having the lowest achievement score. The z-test for difference in means comparative outcomes of individual geographic regions showed significance in all categories (Table 50). The null hypothesis was rejected for all geographic locations. The data supported a difference in mean scores for each paired comparison.

Table 50.

Characteristic: Support Personnel Shortage; 'Very Little' and 'To Some Extent'

Comparison Pairing	Test Value	Significance
Small Town to Town	-35.03	Y
Small Town to City	-61.62	Y
Small Town to Large City	-177.51	Y
Town to City	-19.00	Y
Town to Large City	-95.87	Y
City to Large City	-83.92	Y

Note: Critical Value = 1.96

The ordering of means for schools responding 'Not at All' to the same question revealed a declining level of achievement scores from small town to town to city with large city having the lowest achievement score. The z-test for difference in means comparative outcomes of individual geographic regions demonstrated significance in all categories (Table 51). The null hypothesis was rejected for all geographic locations. The data supported a difference in mean scores for each paired comparison.

Table 51.

Characteristic: Support Personnel Shortage; 'Not at All'

Comparison Pairing	Test Value	Significance
Small Town to Town	-22.48	Y
Small Town to City	-96.06	Y
Small Town to Large City	-103.28	Y
Town to City	-72.49	Y
Town to Large City	-79.02	Y
City to Large City	-5.35	Y

Note: Critical Value = 1.96

The school administrator question seven, 'Is your school's capacity to provide instruction hindered by a shortage of textbooks?' was analyzed for student outcome differences in achievement scores in the secondary category of staffing and resources.

The ordering of means for schools responding 'Little to Some' revealed the highest achievement in the town category by two points over the small town category followed by city and large city. The z-test for difference in means comparative outcomes of individual geographic regions demonstrated significance in all categories (Table 52). The null hypothesis was rejected for all geographic locations. The data supported a difference in mean scores for each paired comparison.

Table 52.

Characteristic: Textbooks Shortage; 'Very Little' and 'To Some Extent'

Comparison Pairing	Test Value	Significance
Small Town to Town	7.73	Y
Small Town to City	-139.25	Y
Small Town to Large City	-105.27	Y
Town to City	-137.48	Y
Town to Large City	-107.92	Y
City to Large City	-24.45	Y

Note: Critical Value = 1.96

The ordering of means for schools responding 'Not at All' to the same question revealed a declining level of achievement scores from small town to town to city with large city having the lowest achievement score. The z-test for difference in means comparative outcomes of individual geographic regions demonstrated significance in all categories (Table 53). The null hypothesis was rejected for all geographic locations. The data supported a difference in mean scores for each paired comparison.

Table 53.

Characteristic: Textbooks Shortage; 'Not at All'

Comparison Pairing	Test Value	Significance
Small Town to Town	-22.89	Y
Small Town to City	-67.45	Y
Small Town to Large City	-153.63	Y
Town to City	-41.71	Y
Town to Large City	-98.29	Y
City to Large City	-39.55	Y

Note: Critical Value = 1.96

Student Criteria Analysis

The second primary category analyzed was Student Criteria Analysis. This category contained three secondary categories; language and immigration, parent's employment and education, and possessions analysis. Each student participating in the PISA was given a questionnaire prior to taking the test which was designed to better understand the characteristics of that student and their home life, educational career, and learning behaviors (Schulz, 2005).

Language and Immigration: The student question one, 'In what country was your father born?' was analyzed for student outcome differences in achievement scores in the secondary category of language and immigration. The ordering of means revealed the highest achievement in the town category for students answering that their father was not born in the U.S. The lowest achieving category was small town with city and large city being almost identical at approximately 12 points higher than small town. The z-test for difference in means comparative outcomes of individual geographic regions demonstrated significance in all categories (Table 54). The null hypothesis was rejected

for all geographic locations. The data supported a difference in mean scores for each paired comparison.

Table 54.

Characteristic: Country of Birth Father

Comparison Pairing	Test Value	Significance
Small Town to Town	151.24	Y
Small Town to City	55.37	Y
Small Town to Large City	57.7	Y
Town to City	-95.87	Y
Town to Large City	-105.5	Y
City to Large City	-2.98	Y

Note: Critical Value = 1.96

The student question two, 'In what country was your mother born?' was analyzed for student outcome differences in achievement scores in the secondary category of language and immigration. The results and patterns were very similar to the responses for the question about the country of birth for fathers. The ordering of means for students answering that their mother was not born in the U.S. revealed the highest achievement in the town category for students answering that their mother was not born in the U.S. The lowest achieving category was small town. The city mean was second only to town and the large city mean was smaller than both town and city but larger than small town. The z-test for difference in means comparative outcomes of individual geographic regions demonstrated significance in all categories (Table 55). The null hypothesis was rejected for all geographic locations. The data supported a difference in mean scores for each paired comparison.

Table 55.

Characteristic: Country of Birth Mother

Comparison Pairing	Test Value	Significance
Small Town to Town	121.29	Y
Small Town to City	55.39	Y
Small Town to Large City	36.82	Y
Town to City	-76.28	Y
Town to Large City	-127.25	Y
City to Large City	-33.54	Y

Note: Critical Value = 1.96

The student question three, 'In what country were you born?' was analyzed for student outcome differences in achievement scores in the secondary category of language and immigration. The small town mean could not be calculated as not enough data was collected during the PISA test process to provide valid results. The ordering of means for students answering that they were not born in the U.S. revealed the highest achievement in towns, followed by large city and then city. The absence of data for the small town category meant that z-test for difference in means comparisons could only be performed for three categories. The z-test for difference in means comparative outcomes of individual geographic regions demonstrated significance in all categories (Table 56). The null hypothesis was rejected for all geographic locations for which data was available for comparison. The data supported a difference in mean scores for each paired comparison with available data.

Table 56.

Characteristic: Country of Birth - Self

Comparison Pairing	Test Value	Significance
Small Town to Town	Not Enough Data	
Small Town to City	Not Enough Data	
Small Town to Large City	Not Enough Data	
Town to City	-71.3	Y
Town to Large City	-64.39	Y
City to Large City	25.76	Y

Note: Critical Value = 1.96

The student question four, 'Which best describes you (White, Black, Hispanic, Asian, More than One Race)?' was analyzed for student outcome differences in achievement scores in the secondary category of language and immigration. Sufficient data for analysis was present only for the White, Black, and Hispanic responses. The ordering of means for students answering 'White' revealed the highest achievement in the city followed by town and then small town and large city with equal scores. The absence of reported data for the 2003 and 2006 cycle meant that a z-test could not be performed for any comparison that included large city. The z-test for all demonstrable comparisons was significant (Table 57). The null hypothesis was rejected for all geographic locations for which data was available for comparison. The data supported a difference in mean scores for each paired comparison with available data.

Table 57.

Characteristic: Race Ethnicity - White

Comparison Pairing	Test Value	Significance
Small Town to Town	28.78	Y
Small Town to City	43.61	Y
Small Town to Large City	Not Enough Data	
Town to City	23.91	Y
Town to Large City	Not Enough Data	
City to Large City	Not Enough Data	

Note: Critical Value = 1.96

The ordering of means for students answering 'Black' revealed the highest achievement in the town category followed by small town, large city, and city. The z-test for difference in means comparative outcomes of individual geographic regions demonstrated significance in all categories (Table 58). The null hypothesis was rejected for all geographic locations. The data supported a difference in mean scores for each paired comparison.

Table 58.

Characteristic: Race Ethnicity - Black

Comparison Pairing	Test Value	Significance
Small Town to Town	125.94	Y
Small Town to City	-18	Y
Small Town to Large City	-3.53	Y
Town to City	-75.42	Y
Town to Large City	-78.19	Y
City to Large City	12.65	Y

Note: Critical Value = 1.96

The ordering of means for students answering 'Hispanic' revealed the highest achievement in the town category followed by small town, city, and large city. The z-test for difference in means comparative outcomes of individual geographic regions

demonstrated significance in all categories (Table 59). The null hypothesis was rejected for all geographic locations. The data supported a difference in mean scores for each paired comparison.

Table 59.

Characteristic: Race Ethnicity - Hispanic

Comparison Pairing	Test Value	Significance
Small Town to Town	76.52	Y
Small Town to City	-7.5	Y
Small Town to Large City	-14.75	Y
Town to City	-67.05	Y
Town to Large City	-68.9	Y
City to Large City	-6.34	Y

Note: Critical Value = 1.96

Parent's Employment and Education: The next secondary category under the primary category of student criteria analysis was parent's employment and education. The PISA questionnaire determined the numbers of years of parental schooling by translating the highest level of education into the estimated number of years typically required for completion. The categories in number of years used were 0-3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, and 18 or more years. Only three of these categories yielded enough data to be reported for students who fell within the poverty category; 12 years, 14 years, and 16 years. Analysis was performed on these three categories and reported separately.

The highest years of parental education at the 12 years level was analyzed for student outcome differences in achievement scores in the secondary category of parent's employment and education. The ordering of means revealed a declining level of achievement scores from small town to town to city with large city having the lowest

achievement score. The z-test for difference in means comparative outcomes of individual geographic regions demonstrated significance in all categories (Table 60). The null hypothesis was rejected for all geographic locations. The data supported a difference in mean scores for each paired comparison.

Table 60.

Characteristic: Highest Parental Education in Years (12)

Comparison Pairing	Test Value	Significance
Small Town to Town	-17.34	Y
Small Town to City	-89.05	Y
Small Town to Large City	-132.52	Y
Town to City	-86.43	Y
Town to Large City	-133.57	Y
City to Large City	-46.58	Y

Note: Critical Value = 1.96

The highest years of parental education at the 14 years level was analyzed for student outcome differences in achievement scores in the subcategory of parent's employment and education. The ordering of means revealed a declining level of achievement scores from small town to town to city with large city having the lowest achievement score. The z-test for difference in means comparative outcomes of individual geographic regions demonstrated significance in all categories (Table 61). The null hypothesis was rejected for all geographic locations. The data supported a difference in mean scores for each paired comparison.

Table 61.

Characteristic: Highest Parental Education in Years (14)

Comparison Pairing	Test Value	Significance
Small Town to Town	-2.83	Y
Small Town to City	-65.54	Y
Small Town to Large City	-152.46	Y
Town to City	-49.26	Y
Town to Large City	-86.73	Y
City to Large City	-20.11	Y

Note: Critical Value = 1.96

The highest years of parental education at the 16 years level was analyzed for student outcome differences in achievement scores in the subcategory of parent's employment and education. The ordering of means revealed a declining level of achievement scores from small town to town to city with large city having the lowest achievement score. The z-test for difference in means comparative outcomes of individual geographic regions demonstrated significance in all categories (Table 62). The null hypothesis was rejected for all geographic locations. The data supported a difference in mean scores for each paired comparison.

Table 62.

Characteristic: Highest Parental Education in Years (16)

Comparison Pairing	Test Value	Significance
Small Town to Town	-22.64	Y
Small Town to City	-120.55	Y
Small Town to Large City	-130.23	Y
Town to City	-107.16	Y
Town to Large City	-120.41	Y
City to Large City	-49.72	Y

Note: Critical Value = 1.96

Possessions: The final secondary category under the primary category of student criteria analysis was possessions. Question number one in this secondary category, 'Do you have works of art (e.g. paintings) in your home?' was analyzed for student outcome differences in achievement scores. The ordering of means revealed a declining level of achievement scores from small town to town to city with large city having the lowest achievement score. The z-test for difference in means comparative outcomes of individual geographic regions demonstrated significance in all categories (Table 63). The null hypothesis was rejected for all geographic locations. The data supported a difference in mean scores for each paired comparison.

Table 63.

Characteristic: Do You Have Works of Art?

Comparison Pairing	Test Value	Significance
Small Town to Town	5.788	Y
Small Town to City	-98.26	Y
Small Town to Large City	-135.57	Y
Town to City	-147.5	Y
Town to Large City	-158.53	Y
City to Large City	-89.25	Y

Note: Critical Value = 1.96

The student question two, 'How many bathrooms (in your home)?' was analyzed for student outcome differences in achievement scores in the secondary category of possessions. The mean test scores were averaged into a category labeled "two or more" which was comprised of the responses for "two" and "three or more." The ordering of means revealed a declining level of achievement scores from small town to town to city with large city having the lowest achievement score. The z-test for difference in means comparative outcomes of individual geographic regions demonstrated significance in all

categories (Table 64). The null hypothesis was rejected for all geographic locations. The data supported a difference in mean scores for each paired comparison.

Table 64.

Characteristic: How Many Bathrooms (2 or More)

Comparison Pairing	Test Value	Significance
Small Town to Town	-23.21	Y
Small Town to City	-115.48	Y
Small Town to Large City	-123.69	Y
Town to City	-70.86	Y
Town to Large City	-95.11	Y
City to Large City	-51.81	Y

Note: Critical Value = 1.96

The student question three, 'How many books are there at your home?' was analyzed for student outcome differences in achievement scores in the secondary category of possessions. This question was studied individually for each of the possible responses; 0-10, 11-25, 26-100, 101-200, and 201-500. The ordering of means for the level 0-10 revealed a declining level from small town to town to city. The mean score for the large city category uncharacteristically increased by nearly eight points over the city category. The z-test for difference in means comparative outcomes of individual geographic regions showed significance in all categories (Table 65). The null hypothesis was rejected for all geographic locations. The data supported a difference in mean scores for each paired comparison.

Table 65.

Characteristic: Books in Home; 0-10

Comparison Pairing	Test Value	Significance
Small Town to Town	-6.79	Y
Small Town to City	-93.21	Y
Small Town to Large City	-312.92	Y
Town to City	-72.8	Y
Town to Large City	-84.92	Y
City to Large City	26.63	Y

Note: Critical Value = 1.96

The ordering of means for the level 11-25 revealed a declining level of achievement scores from small town to town to city with large city having the lowest achievement score. The z-test for difference in means comparative outcomes of individual geographic regions demonstrated significance in all categories (Table 66). The null hypothesis was rejected for all geographic locations. The data supported a difference in mean scores for each paired comparison.

Table 66.

Characteristic: Books in Home; 11-25

Comparison Pairing	Test Value	Significance
Small Town to Town	-44.59	Y
Small Town to City	-87.08	Y
Small Town to Large City	-79.66	Y
Town to City	-45.77	Y
Town to Large City	-44.04	Y
City to Large City	-2.24	Y

Note: Critical Value = 1.96

The ordering of means for the level 26-100 revealed the highest achievement for towns at approximately seven points higher than small town. The average mean score for city was significantly lower than both town and small town and the large city category

was the lowest of all. The z-test for difference in means comparative outcomes of individual geographic regions demonstrated significance in all categories (Table 67). The null hypothesis was rejected for all geographic locations. The data supported a difference in mean scores for each paired comparison.

Table 67.

Characteristic: Books in Home; 26-100

Comparison Pairing	Test Value	Significance
Small Town to Town	32.75	Y
Small Town to City	-95.2	Y
Small Town to Large City	-76.57	Y
Town to City	-112.81	Y
Town to Large City	-91.32	Y
City to Large City	-12.27	Y

Note: Critical Value = 1.96

The ordering of means for the level 101-200 was without data for the large city category due to a lack of sufficient responses on the questionnaire. The ordering of means for the remaining three categories revealed highest achievement in small towns followed by towns and then cities. The z-test for difference in means comparative outcomes of individual geographic regions demonstrated significance in all relevant categories (Table 68). The null hypothesis was rejected for all geographic locations. The data supported a difference in mean scores for each paired comparison.

Table 68.

Characteristic: Books in Home; 101-200

Comparison Pairing	Test Value	Significance
Small Town to Town	-33.6	Y
Small Town to City	-70.73	Y
Small Town to Large City	Not Enough Data	
Town to City	-57.95	Y
Town to Large City	Not Enough Data	
City to Large City	Not Enough Data	

Note: Critical Value = 1.96

The ordering of means for the level 201-500 was also without data for the large city category due to a lack of sufficient responses on the questionnaire. The ordering of means for the remaining three categories revealed highest achievement in towns followed by small towns and then cities at 2.5 points lower than small towns. The z-test for difference in means comparative outcomes of individual geographic regions demonstrated significance in all relevant categories (Table 69). The null hypothesis was rejected for all geographic locations for which data was available for comparison. The data supported a difference in mean scores for each paired comparison.

Table 69.

Characteristic: Books in Home; 201-500

Comparison Pairing	Test Value	Significance
Small Town to Town	45.23	Y
Small Town to City	-40.7	Y
Small Town to Large City	Not Enough Data	
Town to City	-58.59	Y
Town to Large City	Not Enough Data	
City to Large City	Not Enough Data	

Note: Critical Value = 1.96

The student question four, ‘Do you have classic literature (e.g. [Shakespeare]) in your home?’ was analyzed for student outcome differences in achievement scores in the secondary category of possessions. The ordering of means revealed a declining level of achievement scores from small town to town to city with large city having the lowest achievement score. The z-test for difference in means comparative outcomes of individual geographic regions showed significance in all categories (Table 70). The null hypothesis was rejected for all geographic locations. The data supported a difference in mean scores for each paired comparison.

Table 70.

Characteristic: Classic Literature

Comparison Pairing	Test Value	Significance
Small Town to Town	-4.04	Y
Small Town to City	-89.65	Y
Small Town to Large City	-80.03	Y
Town to City	-104.93	Y
Town to Large City	-82.98	Y
City to Large City	-27.93	Y

Note: Critical Value = 1.96

The student question five, ‘Do you have a computer you can use for school work in your home?’ was analyzed for student outcome differences in achievement scores in the secondary category of possessions. The ordering of means revealed a declining level of achievement scores from small town to town to city with large city having the lowest achievement score. The z-test for difference in means comparative outcomes of individual geographic regions showed significance in all categories (Table 71). The null hypothesis was rejected for all geographic locations. The data supported a difference in mean scores for each paired comparison.

Table 71.

Characteristic: Computer in Home

Comparison Pairing	Test Value	Significance
Small Town to Town	-21.08	Y
Small Town to City	-116.04	Y
Small Town to Large City	-159.24	Y
Town to City	-98.45	Y
Town to Large City	-145.66	Y
City to Large City	-71.58	Y

Note: Critical Value = 1.96

The student question six, 'Do you have a desk to study at in your home?' was analyzed for student outcome differences in achievement scores in the secondary category of possessions. The ordering of means revealed a declining level of achievement scores from small town to town to city with large city having the lowest achievement score. The z-test for difference in means comparative outcomes of individual geographic regions showed significance in all categories (Table 72). The null hypothesis was rejected for all geographic locations. The data supported a difference in mean scores for each paired comparison.

Table 72.

Characteristic: Desk in Home

Comparison Pairing	Test Value	Significance
Small Town to Town	-18.78	Y
Small Town to City	-105.96	Y
Small Town to Large City	-146.56	Y
Town to City	-92.52	Y
Town to Large City	-136.84	Y
City to Large City	-73.36	Y

Note: Critical Value = 1.96

The student question seven, 'Do you have a dictionary in your home?' was analyzed for student outcome differences in achievement scores in the secondary category of possessions. The ordering of means showed a declining level of achievement scores from small town to town to city with large city having the lowest achievement score. The z-test for difference in means comparative outcomes of individual geographic regions showed significance in all categories (Table 73). The null hypothesis was rejected for all geographic locations. The data supported a difference in mean scores for each paired comparison.

Table 73.

Characteristic: Dictionary in Home

Comparison Pairing	Test Value	Significance
Small Town to Town	-18.98	Y
Small Town to City	-124.05	Y
Small Town to Large City	-161.87	Y
Town to City	-104.55	Y
Town to Large City	-145.63	Y
City to Large City	-62.33	Y

Note: Critical Value = 1.96

The student question eight, 'Do you have a dishwasher in your home?' was analyzed for student outcome differences in achievement scores in the secondary category of possessions. The ordering of means revealed a declining level of achievement scores from small town to town to city with large city having the lowest achievement score. The z-test for difference in means comparative outcomes of individual geographic regions showed significance in all categories (Table 74). The null hypothesis was rejected for all geographic locations. The data supported a difference in mean scores for each paired comparison.

Table 74.

Characteristic: Dishwasher in Home

Comparison Pairing	Test Value	Significance
Small Town to Town	-12.00	Y
Small Town to City	-183.70	Y
Small Town to Large City	-183.63	Y
Town to City	-122.70	Y
Town to Large City	-154.00	Y
City to Large City	-83.38	Y

Note: Critical Value = 1.96

The student question nine, 'Do you have educational software in your home?' was analyzed for student outcome differences in achievement scores in the secondary category of possessions. The ordering of means revealed a declining level of achievement scores from small town to town to city with large city having the lowest achievement score. The z-test for difference in means comparative outcomes of individual geographic regions showed significance in all categories (Table 75). The null hypothesis was rejected for all geographic locations. The data supported a difference in mean scores for each paired comparison.

Table 75.

Characteristic: Educational Software in Home

Comparison Pairing	Test Value	Significance
Small Town to Town	-22.60	Y
Small Town to City	-92.70	Y
Small Town to Large City	-125.29	Y
Town to City	-69.96	Y
Town to Large City	-109.47	Y
City to Large City	-76.40	Y

Note: Critical Value = 1.96

The student question ten, ‘Do you have a link to the internet in your home?’ was analyzed for student outcome differences in achievement scores in the secondary category of possessions. The ordering of means showed a declining level of achievement scores from small town to town to city with large city having the lowest achievement score. The z-test for difference in means comparative outcomes of individual geographic regions showed significance in all categories (Table 76). The null hypothesis was rejected for all geographic locations. The data supported a difference in mean scores for each paired comparison.

Table 76.

Characteristic: Internet Link in Home

Comparison Pairing	Test Value	Significance
Small Town to Town	-16.88	Y
Small Town to City	-119.19	Y
Small Town to Large City	-160.21	Y
Town to City	-100.65	Y
Town to Large City	-147.35	Y
City to Large City	-92.50	Y

Note: Critical Value = 1.96

The student question eleven, ‘Do you have a room of your own in your home?’ was analyzed for student outcome differences in achievement scores in the secondary category of possessions. The ordering of means revealed a declining level of achievement scores from small town to town to city with large city having the lowest achievement score. The z-test for difference in means comparative outcomes of individual geographic regions showed significance in all categories (Table 77). The null hypothesis was rejected for all geographic locations. The data supported a difference in mean scores for each paired comparison.

Table 77.

Characteristic: Own Room

Comparison Pairing	Test Value	Significance
Small Town to Town	-14.02	Y
Small Town to City	-121.51	Y
Small Town to Large City	-145.70	Y
Town to City	-99.69	Y
Town to Large City	-131.14	Y
City to Large City	-65.00	Y

Note: Critical Value = 1.96

The student question twelve, 'Do you have books of poetry in your home?' was analyzed for student outcome differences in achievement scores in the secondary category of possessions. The ordering of means revealed a declining level of achievement scores from small town to town to city with large city having the lowest achievement score. The z-test for difference in means comparative outcomes of individual geographic regions showed significance in all categories (Table 78). The null hypothesis was rejected for all geographic locations. The data supported a difference in mean scores for each paired comparison.

Table 78.

Characteristic: Poetry Books in Home

Comparison Pairing	Test Value	Significance
Small Town to Town	-17.93	Y
Small Town to City	-143.78	Y
Small Town to Large City	-172.34	Y
Town to City	-120.61	Y
Town to Large City	-155.70	Y
City to Large City	-74.67	Y

Note: Critical Value = 1.96

The student question thirteen, 'Do you have a quiet place to study in your home?' was analyzed for student outcome differences in achievement scores in the secondary category of possessions. The ordering of means revealed a declining level of achievement scores from small town to town to city with large city having the lowest achievement score. The z-test for difference in means comparative outcomes of individual geographic regions showed significance in all categories (Table 79). The null hypothesis was rejected for all geographic locations. The data supported a difference in mean scores for each paired comparison.

Table 79.

Characteristic: Quiet Place to Study in Home

Comparison Pairing	Test Value	Significance
Small Town to Town	-12.73	Y
Small Town to City	-108.59	Y
Small Town to Large City	-145.00	Y
Town to City	-102.38	Y
Town to Large City	-140.66	Y
City to Large City	-56.98	Y

Note: Critical Value = 1.96

The student question fourteen, 'Do you have books to help with your school work in your home?' was analyzed for student outcome differences in achievement scores in the secondary category of possessions. The ordering of means showed a declining level of achievement scores from small town to town to city with large city having the lowest achievement score. The z-test for difference in means comparative outcomes of individual geographic regions showed significance in all categories (Table 80). The null hypothesis was rejected for all geographic locations. The data supported a difference in mean scores for each paired comparison.

Table 80.

Characteristic: Textbooks in Home

Comparison Pairing	Test Value	Significance
Small Town to Town	-16.14	Y
Small Town to City	-112.17	Y
Small Town to Large City	-148.25	Y
Town to City	-108.44	Y
Town to Large City	-146.95	Y
City to Large City	-57.57	Y

Note: Critical Value = 1.96

The entirety of the data revealed a strong and consistent pattern of achievement relative to the geographic location of the participating school. Regardless of the subject matter of the question, mean achievement scores consistently decreased from small town to town to city to large city. In addition, those scores also revealed a pattern of small town and town having relatively close scores as did the city and large city categories. However, the difference in scoring between the small town/town pairing and the city/large city pairing tended to represent the difference of approximately one year of schooling. These trends were also consistent for achievement related to responses by students on the student questionnaire and for principals on the school questionnaire.

Null Hypothesis number four stated: There will not be a relationship between the achievement measured on the mathematics portion of the PISA and the geographic location of the school represented by rural/small town, town, city, or large city. The researcher chose to test this hypothesis using a Pearson Product Moment Correlation Coefficient. Twenty questions for analysis were randomly selected from the school and student criteria analysis sections. A Pearson correlation coefficient analysis was then calculated for each question.

The school criteria Pearson analysis revealed 17 of 20 results that were less than -0.9, indicating a very strong inverse relationship. The remaining three values were -0.88, -0.87, and -0.6, indicating strong, strong, and moderate inverse relationships. The average for these scores was -0.93, indicating a strong average relationship between geography and student relationship. These results demonstrated that a very strong relationship existed between the geography of a school and its student achievement scores on the mathematics portion of the PISA. Based on this analysis, the null hypothesis was rejected for the entirety of the sample chosen from the school questionnaire. The more urban the geography, the weaker the student achievement.

The student criteria Pearson analysis revealed 14 of 20 results that were less than -0.9, indicating a very strong inverse relationship. The remaining six values were -0.8, -0.86, -0.23, indicating strong, strong, and weak inverse relationships; and 0.09, 0.07, and -0.67, indicating strong moderate, and moderate positive relationships. The average for all these scores was -0.8, which also demonstrated an average strong inverse relationship between school location and student achievement scores on the mathematics portion of the PISA. Based on this analysis, the null hypothesis was rejected for the entirety of the sample chosen from the student questionnaire. The more urban the geography, the weaker the student achievement.

Summary

The analysis of the data in this study revealed consistency across each geographic category and each category of questions for both the school and student questionnaires. The null hypotheses were consistently rejected. The literature relating to achievement of American students on the PISA was expansive on the negative impact caused by poverty.

The data and analysis of this study supported the literature and also revealed that the location of the school had a negative impact on achievement within the category of poverty.

Chapter Five: Interpretations, Conclusions, and Recommendations

The intent of this research study was to seek a possible difference among schools that exhibited a 25% or greater participation in the National School Lunch Program in student achievement on the mathematics portion of the PISA, based on the geographic location of a student and the school attended. The literature, current at the time of this writing, revealed that socioeconomic status had a negative impact on student achievement on the PISA for students in the U.S. (Cavanagh, 2007). Research also showed that the U.S. had a disproportionately high percentage of its students living in poverty when compared to the other nations participating in the PISA (Krashen, 2012). However, the literature lacked studies on the impact of poverty when geography was considered.

To provide a more nuanced understanding of the impact of poverty on student achievement in the U.S., the researcher first gathered data from PISA participant schools that exhibited a high percentage of poverty, then statistically analyzed the responses of both students and school administrators who participated in the PISA for the 2003, 2006, and 2009 testing cycles. The mean mathematics scores for each cycle in each geographic location were averaged together to provide a single representative achievement score for each geographic category. The researcher then ordered the mean scores for students in each geographical location for each question on the student and school questionnaire and then performed a z-test for difference in means to seek a possible statistical significance between the mean scores of each geographical location.

The hypotheses addressed in this analysis were:

Hypothesis #1: There will be a measurable difference in achievement measured on the mathematics portion of the PISA with regard to the responses on the PISA

questionnaires in the defined categories of Student and Family Characteristics, and School Composition, Socio-Economic Status (SES), Organization, Staffing and Resources and Governance, among high poverty schools in the geographic locations represented by rural/small town, town, city, or large city.

Hypothesis #2: There will be a relationship between the categories of achievement, high or low, measured on the mathematics portion of the PISA and the geographic location of the school, represented by rural/small town, town, city, or large city.

Hypothesis #3: There will be a measurable difference in achievement measured on the mathematics portion of the PISA, when comparing the geographic location of the school, represented by rural/small town, town, city, or large city.

Hypothesis #4: There will be a relationship between the achievement measured on the mathematics portion of the PISA and the geographic location of the school represented by rural/small town, town, city, or large city.

The ordering of means for both student and school administrator questions showed consistently that achievement in these high poverty schools was highest in small towns, followed by towns, cities, and large cities. When the ordering of means deviated from this pattern, it was typically for small differences in means and then only between small town and town as a group and between city and large city as a group. There were only three exceptions where the mean score in a city or large city exceeded those on the small town or town regions. The respondents whose listed race was 'White'" had an ordering of means with the geography of city highest followed by the geography of town, with small town and large city exhibiting equal scores. The questions regarding whether or not the student's mother or father was born in another country revealed an ordering of

means where town was the largest, but both city and large city were greater than the scores for small town.

The ordering of means was followed by z testing for differences in means and showed nearly identical patterns. The difference in mean z-scores for all permutations of the geographic locations, in all categories, resulted in rejection of the null hypotheses, and thus the alternate hypotheses were supported. Hypothesis # 2 could not be analyzed as there was no data to support conclusions for any of the geographic categories meeting the researcher's definition of high achievement; a mean score above the OECD average. These findings support the literature which concluded that poverty had a negative impact on academic achievement (Riddile, 2014). In addition, the differences in mean scores for small town and town, as compared to city and large city, typically represented the difference of approximately one year of schooling. It is important to mention that this difference of one year's schooling was only among those students studying in high poverty schools. Although not a part of the analysis of this study, the difference in mean scores for students in poverty and those at schools with less than 25% participation in the NSLP was more than the difference of a single year of schooling (OECD, 2010).

The questions on the school and student questionnaires were grouped into categories by the OECD and were studied as such for this study. Not all questions in a category provided enough data to be useful in this comparative analysis and were thus not used for analysis. The schools criteria subcategories were governance and school staffing, and resources. The student criteria subcategories were language and immigration, possessions, and parents' employment and education. An examination of each of these categories revealed trends for both the geographic locations and for the overall study.

Discussion

School Criteria Analysis-Governance: In the area of school governance and the tertiary categories of responsibility assigned to other groups (not the principal), the questions pertained to whether decision making for staffing, instructional content, budgeting, or assessment were assigned to an external board, teachers, parents, or students. Each of the nine questions demonstrated a significant difference in means in student achievement for all geographic relationships. Five of the nine questions had mean scores that followed the pattern of decreasing means from small town to large city. The four questions whose means did not follow that pattern revealed deviation in either small town to town (three occurrences) or in the category city to large city (one occurrence). The range between the high and low mean score for these questions was 51.39 points. This variance in points among students in poverty represented one and one-third year of schooling (OECD, 2010). In summary, the data provided evidence that geographic location was a major factor in the achievement levels of students with respect to type of school governance and the subcategory of responsibility assigned to other groups (not the principal).

The tertiary category of curriculum, under the secondary category of governance, contained questions pertaining to whether responsibility for courses offered, course content, and the selection of textbooks was made by the board members, principals, or teachers. The total questions analyzed for this area of investigation were nine, of which seven demonstrated an ordering of means that decreased sequentially from small town to large city. The two questions whose means did not follow this pattern revealed a switch for small town and town and a switch for city to large city. The range between the high

and low mean score for these questions was 42.09 points. This variance in points among students in poverty represented more than a year of schooling (OECD, 2010). All z-tests for difference in means provided significance when comparing the possible geographic pairings for each question's mean score data. This tertiary category also demonstrated significant differences in mathematics achievement on the PISA based on school geography.

The final tertiary category under the major category of school criteria analysis and the secondary category of governance was teacher participation and school responsibility. This subcategory had eight quaternary categories analyzed separately. The quaternary categories were budget allocation, budget formulation, discipline policies, student assessment, teacher firing, teacher hiring, teacher salary increases, and teacher starting salary. The individual questions studied in these tertiary categories also related to who had primary control for each of these areas of governance at the school or district level.

The quaternary category of budget allocation question had three questions that demonstrated the differences in mean scores based on who controlled budget allocation; the board, the principal, or the teachers. The board and principal questions followed the pattern of decreasing means from small town to large city in sequence. For both of those questions, each of the z-tests for difference in means for geographic combinations was significant. The final question related to budget allocation control being given to the teachers differed in results only that the large city mean average was approximately three points higher than the city category. This swapping of the city and large city categories did not change the fact that the z-test for difference in means comparisons for all geographic locations and for each of the three questions revealed significant results, and

therefore the alternate hypotheses were supported. The range between the high and low mean score for these questions was 47.68 points. This variance in points among students in poverty represents more than a year of schooling (OECD, 2010).

The quaternary category of budget formulation analyzed two questions pertaining to whether budget formulation control was given to the board or to the principal of the school. Both categories demonstrated decreasing means from small town to large city in sequence. The range between the high and low mean score for these questions was 49.56 points. This variance in points among students in poverty represents more than a year and a quarter of schooling (OECD, 2010). Each of the z-tests for difference in means performed to compare the geographic locations demonstrated significance in the differences in student achievement, and the alternate hypotheses were supported in each case.

The quaternary category of discipline policies examined who had primary responsibility for the establishment of student discipline policies; the board, the principal, or the teachers. In schools where the board had this responsibility, the mean scores decreased sequentially from small town to large city and each z-test demonstrated significance and the alternate hypothesis was supported. In the examination of schools where the principal or teachers had primary responsibility, the geographic locations of small town and town switched places from the standard sequential order for mean scores. The z-test for difference in means comparison for geographic locations for these two questions resulted in significant differences in the comparison of student achievement, and the alternate hypotheses were supported in each instance. The range between the high

and low mean score for these questions was 47.71 points. This variance in points among students in poverty represents more than a year of schooling (OECD, 2010).

The quaternary category of student assessment compared the mean scores for schools dependent upon whether the primary responsibility for student assessment was given to the board, the principal, or the teachers. Each of these three categories revealed a decreasing mean score from small town to large city in sequence. This also meant that the z-tests for difference in mean achievement for each comparative geographic location were significant, and the alternate hypotheses were supported. The range between the high and low mean score for these questions was 44.78 points. This variance in points among students in poverty represented more than a year of schooling (OECD, 2010).

The teacher firing category examined the impact on mean scores for schools depending on whether the board or the principal had primary responsibility for firing teachers. Both categories revealed sequentially decreasing mean scores from the small town category to the large city category. The range between the high and low mean score for these questions was 47.35 points. This variance in points among students in poverty represents more than a year of schooling (OECD, 2010). The z-test for difference in mean comparisons for geographic locations were all significant, and the alternate hypotheses were supported in each case.

The teacher hiring category examined the impact of responsibility for teacher hiring based on whether that responsibility was given to the board, the principal, or the teachers. The board responsibility analysis was incomplete as not enough data could be gathered for the large city category. However, the mean scores for the small town, town, and city decreased as population increased for this question, and the z-test for difference

in means comparisons were all significant, and the alternate hypotheses were supported in each instance. The mean scores for the principal category decreased sequentially from small town to large city and the z-test for difference in means comparisons were all significant, and the alternate hypotheses were supported in each instance. The final examination of schools where teachers had the primary teacher hiring responsibility deviated from the decreasing mean trend in that the large city category was approximately 8.5 points higher than the city category. The z-test for difference in means comparison demonstrated significance for all geographic locations, and the alternate hypotheses were supported for each. The range between the high and low mean score for these questions was 49.23 points. This variance in points among students in poverty represents more than a year and a quarter of schooling (OECD, 2010).

The final two quaternary categories related to the responsibility for teacher salary increases and teacher starting salaries. For both of these categories there was not enough data present for principal and teacher responsibility to be able to examine. Thus, the questions of board responsibility were the only ones analyzed. The salary increase question revealed sequentially decreasing means from small town to large city and significant z-test for difference in means comparisons for all geographic locations. The alternate hypotheses were supported in each instance. The range between the high and low mean score for this question was 39 points. The variance in points among students in poverty represents one year of schooling (OECD, 2010). The starting teacher salary question differed only in that small town and town had identical mean score averages, which also meant that the z-test for difference in means for that comparison was insignificant, and the alternate hypothesis was not supported. The range between the high

and low mean score for this question was 37.33 points. The variance in points among students in poverty also represents slightly less than one year of schooling (OECD, 2010).

As with the previous two tertiary categories, the category of teacher participation and school responsibility also demonstrated a strong correlation between achievement and school location. A pattern was demonstrated of higher mean scores associated with a decrease in population of the area where a school was located. In addition to this pattern of ordering of means, the difference in mean scores between the two geographic locations of small town and town, as compared to city and large city were noticeable. For the majority of the questions of analysis the mean scores for small town and town was similar, as were the scores for city and large city. The gap between these combined geographic areas was consistent and, as mentioned previously, represented the difference of approximately one year of schooling. As we know from previous research, these types of achievement gaps tended to increase with each year of schooling which means that by graduation the students in the city and large city category were likely to be even further behind their peers living in poverty conditions in small towns and towns (Caro et al., 2009).

School Criteria Analysis-School Staffing and Resources: The analysis for school staffing and resources asked school administrators if they lacked certain items that could inhibit the ability of their students to learn. This study analyzed the mean scores measured by achievement on the PISA for the response ‘Not at All’ and the combined responses for ‘Very Little’ and ‘To Some Extent’. The response ‘A Lot’ did not have enough data for any of the questions to be able to be included in an analysis. The specific

shortages considered in this subcategory were audio-visual equipment, computer software, computers, library material, qualified math teachers, support personnel, or textbooks.

The tertiary category relating to the shortage of audio- visual equipment revealed the same results for both the 'Not at All' response and the 'Little to Some' combined category. The mean scores followed a decreasing score pattern from small town to large city. The z-test for difference in means comparisons for the various geographic location combinations proved to provide significant results, and thus the alternate hypotheses were supported for each. The range between the high and low mean score for this the 'Not at All' response was 34.5 points and 38.66 for the 'Little to Some' response. These variances in points among students in poverty also represent approximately one year of schooling (OECD, 2010).

The category relating to a shortage in computer software followed the same pattern for the ordering of means and the z-test for difference in means comparisons with two exceptions. The first exception came in the ordering of means for the response 'Not at All' where the mean score for large city was 2.5 points higher than that of city. The second exception was in the combined category of 'Little to Some,' where the mean score for town was approximately 2.67 points higher than the mean score for small town. The z-tests for difference in means for all geographic location comparisons for both responses were significant, and the alternate hypotheses were supported for each. The range between the high and low mean score for the 'Not at All' response was 26 points and the 'Little to Some' response variance was 43.34 points; which represents an

approximate difference of two-thirds of one year and slightly more than one year of schooling respectively (OECD, 2010).

The shortage of computers produced the same results for both responses of 'Not at All' and the combined response of a 'Little to Some'. Those results were an ordering of means that showed sequential diminishing mean scores from small town to larger city and significance in the differences of mean scores for each permutation of the geographic locations. In accordance with these findings, the alternate hypotheses were supported in all categories for both responses. The range between the high and low mean score for the 'Not at All' response was 24 points, and the 'Little to Some' response variance was 37.33 points; which represents an approximate difference of two-thirds of one year and slightly less than one year of schooling respectively (OECD, 2010).

The shortage of library material had the identical findings as did the responses to shortages in computers in terms of the ordering of means, the significance of all z-tests for difference in means for geographic locations, and no support of all null hypotheses. The range between the high and low mean score for the 'Not at All' response was 33 points, and the 'Little to Some' response variance was 42 points; which represents an approximate difference of 85% of one year and slightly more than one year of schooling respectively (OECD, 2010).

The shortage of qualified math teachers for the response of 'Not at All' followed this same pattern of declining mean scores. The only deviation in this category was for the combined response 'Little to Some' in the area of small town and town where the higher mean score for town was approximately five points higher than that of small town. The z-test for difference comparisons of mean scores for geographic locations were

significant for all comparisons for both the 'Not at All' and 'Little to Some' responses. The range between the high and low mean score for the 'Not at All' response was 36.33 points, and the 'Little to Some' response variance was 32.33 points; which represents nearly one year of schooling and 85% of one year of schooling respectively (OECD, 2010).

The shortage of textbooks question followed the pattern of declining mean scores from small town to large city with the single exception of the mean score for town which was two points higher than small town for the 'Little to Some' response. All z-tests for difference in means demonstrated significance for all geographic locations and for both responses. The range between the high and low mean score for the 'Not at All' response was 44 points, and 36.5 for the 'Little to Some' response. These variances in points among students in poverty also represent nearly one year of schooling and 85% of one year of schooling respectively (OECD, 2010).

Lastly, the shortage of support personnel analysis followed the same data pattern as the majority of the questions in this subcategory. The mean scores for both 'Not at All' response and the combined responses of 'Little to Some' followed the sequential diminishing mean score from small town to large city. The z-test for difference in means comparisons for geographical pairings were all significant, and thus the alternate hypotheses were supported for all. The range between the high and low mean score for this the 'Not at All' response was 36.33 points and 35.67 for the 'Little to Some' response. These variances in points among students in poverty also represent approximately 85% of one year of schooling.

The findings for this secondary category supported the hypotheses of this study that the geographic location of a school had a significant impact on the scores of students in high poverty circumstances. As this particular section is examining school resources it also supports some of the findings of Coleman's work from 1966. The presence or absence of these resources had very little impact on the achievement of students as compared to the criteria of where their school was located.

Student Criteria Analysis-Language and Immigration: The next primary category that was studied was the student criteria categories. The three secondary categories under this major category were language and immigration, parent's employment and education, and possessions analysis. These secondary categories showed greater variation in the impact of geography on academic achievement. While the vast majority still followed the pattern of decreasing achievement from small town to town to city to large city, some of the criteria revealed true anomalies that will be discussed in greater detail later in this chapter. The z-test for difference in means comparisons also demonstrated a significant difference in the mean scores depending upon geographical relationships; however, insightful anomalies were present here, too.

The first secondary category studied under the major category of student criteria analysis was language and immigration. The three questions studied in this secondary category related to the country of birth for the father, the mother, and for the test taker themselves. The only response that was studied was for those who chose 'Other' meaning that the person in question was born in a country other than the U.S. This was the first set of data studied that differed widely from the previous patterns. The ordering of means for country of birth for the father indicated three categories demonstrated higher achievement

than small town. City and large city mean scores were nearly equal at approximately twelve points higher than the small town score. Yet, the highest mean score occurred in the town category. All z-test for difference in means comparisons demonstrated significant differences in mean scores, and so the alternate hypotheses were supported for each. The difference between the high and low mean score was 38 points, which represented nearly one year of schooling (OECD, 2010).

The birth country mother category revealed the same ordering of means pattern and same z-test for difference in means pattern as did the category for the father. The alternate hypotheses were supported for all comparative geographic locations. The difference between high and low mean scores decreased slightly to 34.33 points but that still represented nearly one year of schooling (OECD, 2010).

The data for country of birth did not yield enough data in the small town category to be reported. The ordering of means continued in the same atypical pattern as was present for the country of birth question for both father and mother. The town category again had the highest mean score at 470.5 followed by large city and then city. The z-test for difference in means comparisons for the geographic locations with data were all significant, and all alternate hypotheses were supported. The range in mean scores from high to low was 36 points. The question regarding race and ethnicity deviated from the standard pattern of many of the questions and will be discussed in greater detail later in this chapter.

Student Criteria Analysis-Parent's Employment and Education: The next question analyzed was for the highest parental education in number of years. The student respondent could make a selection form 0-3 years all the way through 18 or more years.

The responses with sufficient reporting to be considered for this study were 12, 14, and 16 years. The questionnaire made no assertions as to whether any of these years of schooling corresponded to degrees earned but the responses roughly correspond to what would be a high school diploma, an associate degree and a bachelor's degree based on the number of years in school. The researcher chose to study each of these years in schooling responses separately.

The data for a response of 16 years of schooling again revealed an ordering of means with small town being highest and then progressively downward to the large city category. The high score of 498.33 in small town was 41.33 points higher than the large city score of 457. This variance represented more than one year of schooling (OECD, 2010). The z-test for difference in means comparisons for the geographic locations with data were all significant, and all the alternate hypotheses were supported.

The data for a response of 14 years of schooling revealed an ordering of means with small town being highest and then progressively downward to the large city category. The high score of 470 in small town was 37 points higher than the large city score of 433. This variance represented nearly one year of schooling (OECD, 2010). The z-test for difference in means comparisons for the geographic locations with data were all significant, and all alternate hypotheses were supported.

The data for a response of 12 years of schooling revealed an ordering of means with small town being highest and then progressively downward to the large city category. The high score of 461.67 in small town was 39.34 points higher than the large city score of 422.33. This variance represented approximately one year of schooling

(OECD, 2010). The z-test for difference in means comparisons for the geographic locations with data were all significant, and all alternate hypotheses were supported.

The question and responses for the highest parental education in years was particularly interesting for the impact it had within the same geographic category. The small town category revealed scores of 498.33, 470, and 461.67 for the responses of 16, 14, and 12 years of parental schooling. The range for those scores within the small town category was 36.66. This variance represented nearly an extra year of schooling for students attending high poverty schools in small towns whose parents stayed in school and extra four years after high school (OECD, 2010). The researcher also noted that the lowest average mean for the 16 years category occurred in the large city region and that score was nearly equal to the highest average mean for the 12 years category, which occurred in the small town region.

Although it was not a primary focus of this study, data revealed the mean score for students in small town schools with less than 24.99% participation in the NSLP and whose parents completed 16 years of schooling was 540.4 as compared to the 498.33 for high poverty respondents. The same calculation for students in small town schools with less 24.99% participation in the NSLP and whose parents completed 12 years of schooling was 498.33 as compared to the 461.67 for high poverty respondents. This mean score identified students in high poverty small town schools whose parents completed 16 years of schooling scored the same as students in small town low poverty schools whose parents completed just 12 years of schooling.

Student Criteria Analysis-Possessions Analysis: The final secondary category for analysis under the primary category of student criteria was possessions analysis. This

category asked student test takers to answer questions regarding the number and types of possessions they have in their home. This category also included an insightful question regarding the number of books in the student's home.

The researcher began the analysis with the question regarding whether the student had works of art in their home and the response of 'yes'. The ordering of means revealed the mean score for town to be two points above that of the small town category and both were followed by decreasing mean scores for city and large city. The range between the high and low score was 41.33 points, which represented more than a year of schooling (OECD, 2010). The z-test for difference in means comparisons for each geographic combination proved to be significant for each pairing, and all alternate hypotheses were supported.

The next question analyzed asked how many bathrooms were in the student's home. The researcher chose to combine the responses for two or more for analysis. The ordering of means for this question followed the dominant pattern of decreasing means from small town to large city. The range between small town and large city scores was 49 points, which represented more than one and a quarter year of schooling (OECD, 2010). The z-test for difference in means comparisons demonstrated significance for all geographic combinations, and all alternate hypotheses were supported.

The presence of classic literature in the home was also asked of test takers. For students who responded in the affirmative, the ordering of means followed the pattern of decreasing mean scores from the small town to the large city category. The range in scores from top to bottom was 34.67 points. The z-test for difference in means

comparisons demonstrated significance for all geographic combinations, and all alternate hypotheses were supported.

Students who responded that they had a computer in their home revealed mean scores that decreased from small town to town to city to large city with a range between high and low scores of 38.67. The z-test for difference in means comparisons demonstrated significance for all geographic combinations, and all alternate hypotheses were supported.

Test takers were also asked if they had a desk in their home. The mean scores of those who responded affirmatively followed the predominant pattern of decreasing mean scores from small town to large city. The range from the high score to the low score was 39.33 points. The z-test for difference in means comparisons demonstrated significance for all geographic combinations, and all alternate hypotheses were supported.

Students who indicated they had a dictionary in the home followed the same patterns as those with a desk in their home. The mean score range from high to low was 40.33 points. The z-tests were all significant, and the alternate hypotheses were supported.

The presence of a dishwasher in the home produced the same results as a dictionary in home except that the mean score range from high to low was 42.67 points. Educational software in the home produced the same results with a range of 36.67. An internet link in the home remained consistent with these other categories and produced a range between high and low mean scores of 40 points. Students who possessed their own room in the house also followed the pattern of the other recently mentioned responses. The high to low range in mean scores for this response was 40.33 points. Having poetry

books in the home reproduced the same pattern with a range in mean scores of 42 points. A quiet place to study in the home matched the aforementioned pattern with a range of 38.67 points. The last response to replicate this pattern was an affirmative response for having textbooks in the home. There was a range in mean score average of 36.67. Each of the mean orderings for the responses in this paragraph had its high average in the small town category and diminished sequentially to the large city category. Each of the z-test pairings for geographic comparisons were significant, and the alternate hypotheses were supported in every instance. The question regarding the number of books in the home deviated from these standard patterns for the ordering of means and for the z-test for difference in means comparisons, and will be discussed in the next section.

Student Criteria Analysis-Anomalies: The analysis of school criteria and student criteria questions supported the hypotheses that there was a measurable difference in both responses and achievement based upon geographic location and that there was a relationship between high and low achievement on the PISA depending on where the student attended school. It was demonstrated that mean scores for school and student criteria analysis were paired at a higher and comparable level for small town and town and a significantly lower, but comparable scores in the city and large city categories. Further examination of those mean scores demonstrated declining achievement from small town to town to city to large city. Occasionally, that pattern deviated slightly but only with the order alternating between small town and town and alternating between city and large city. The z-test for difference in means comparison that was used to determine if the differences in mean scores were significant when considering all permutations of the geographic locations demonstrated significant differences in average achievement

with regard to responses on both school and student questions and across the secondary categories for each questionnaire.

Despite the comprehensive nature of these findings, three questions stood out as anomalies; highest parental education in years, books in home, and race and ethnicity. The highest parental education (in years) category followed the ordering of means and z-test score patterns presented for the majority of the other questions. In fact, the interest in the results for this question was not for the differences among geographic location, but rather for the differences within each geographic category. The mean scores for the year of parental schooling 16, 14, and 12 in the small town category were 498.33, 470, and 461.67 respectively. The same analysis for the town category revealed mean scores of 494.33, 469, and 458.33. The city category revealed the following scores; 473.33, 442.5, and 437.67. Lastly, the large city mean scores for 16, 14, and 12 years of parental education were 457, 433, and 422.33. This study showed consistently that a year or more of schooling separated the student scores in the highest scoring geographic location from the student scores in the lowest performing region. The data from this single question regarding years of parental education demonstrated that within each geographic location there existed, among the high poverty students, the same difference of one year of schooling based on the educational attainment of the parents. This finding pointed to the work of Coleman (1966) and the relatively minimal impact that the school itself had on achievement versus the impact in the home environment. The researcher believes this finding to be particularly important as it demonstrates significant heterogeneity of student circumstances within the broad category of students in high poverty schools. This study revealed that to fully understand the students within this broad category the geographic

location must be considered. Beyond the geographic location, individual out-of-school factors such as parental education must be considered. A student who attended a high poverty school in the small town region and who had a parent who attended school for 16 years had a mean score of 498.33. Still, within the high poverty category but at the opposite end of the achievement spectrum would be a student attending a high poverty school in a large city and whose parents attended 12 years of schooling. The mean score for this student was 76 points lower at 422.33. This student would be more than two years behind in mathematical education than the other student yet both would fall into the broad category of attending a high poverty school. Both the needs of these students and the methods needed to help them are likely to vary significantly.

The books in home category also revealed nuanced findings that could be helpful in developing a deeper understanding of the nature of students and achievement in high poverty situations. The questions regarding books in home gave students the ranges of 0-10, 11-25, 26-100, 101-200, and 201-500. Similar to the highest years of parental education question, the question of books in the home revealed the characteristic differences between geographic locations, but also revealed greater differences within regions. The small town category mean scores for this question in order from smallest range to largest were as follows: 427.3, 454.67, 472.67, 495, and 513. The town category scored from smallest books in home range to largest were 428.67, 442, 480, 491, and 521. The scores for the city category were 402.33, 422.67, 447.67, 479, and 510.5. Finally, the scores for the large city category only had sufficient response for the first three categories and those mean scores were 410, 421.5, and 442.33.

As with the parental education (by the number of years) question, this analysis demonstrated that it was not possible to fully understand students and their achievement by labeling them as being in high or low poverty schools. The geographic location of the student and some out-of-school considerations such as these required a deeper analysis and understanding to be able to make meaningful, comprehensive improvement. The range from high to low scores in the small town, town, and city locations represented approximately three additional years of schooling within each geographical category. The variance for the large city category represented the difference of a single year of schooling even though there was only data for the three lowest books in home ranges. The U.S. average score for the mathematics portion of the PISA was 483 in 2003, 474 in 2006, and 487 in 2009 (Loveless, 2011). While it was previously proven that the U.S. scored among the world's best when the scores for students at the 25% or more participation in the NSLP were removed (Riddile, 2010), this study showed that even within that category there were geographic locations where students scored well above the average if certain non-school conditions were met. This lack of uniformity in both the achievement levels and the conditions that related to that achievement, required that educators and policy makers perform in depth analysis to focus the attention where it belongs and to develop plans that are tailored to the unique needs of subgroups under the umbrella of poverty.

The final question that produced an anomaly in the research was the question related to the test taker's race and ethnicity. Students were given the choice of White, Black, Hispanic, Asian, or More than One Race. This study analyzed responses for White, Black, and Hispanic, as not enough data was present for either Asian or More than

One Race. The results from this question represented an anomaly in that the scores for each race were highly similar regardless of their geographic location. This was the only question to produce such results. The students who chose White achieved mean scores of 487 for the small town, 492 for the town category, 494 for the city category, and 487 for the large city category. These mean scores represented a range of just 7 points from high to low. The same sequential scores for Hispanic students was 431.67, 449.67, 430.33, and 428.67. While these scores were not as tightly grouped as those for the White students the range was only 21 points. Three of the four scores had a range of just 3 points. The scores for students who responded as being Black and following the same geographical progression from small town to large city were 405, 422, 400.33, and 404.33. The range for this response was just 21.67. As with the Hispanic category, by removing the mean score for the town category that range dropped to just 4.67 points. This analysis revealed that across all geographic regions studies (small town, town, city and large city), White, Hispanic, and Black students of poverty achieved nearly the same on the mathematics portion of the PISA.

In addition to this relative homogeneity of scores within each race, the differences between the scores for each race were revealing. The average score for White respondents was 490, 435.09 for Hispanic respondents, and 407.92 for Black respondents. The gap between both White to Hispanic and White to Black respondents represented approximately 2 years of schooling. As with the previous two examples of anomalies in the data, race and ethnicity required unique consideration for educators and policy makers. Contrary to the findings of the majority of this study, school location did

not appear to have a significant impact on the achievement of students in poverty when race and ethnicity were controlled.

The anomalies in this study provided some interesting possibilities for future research. However, the overwhelming majority of the findings proved the original hypotheses to be true. The geographic location of a high poverty school has a significant impact on the achievement of its students. There also exists a strong relationship between these high poverty schools and student achievement. The strong empirical evidence of the truth of these hypotheses also provides opportunities for useful future research. The consistency of the findings lead the researcher to believe that the stakeholders in the U.S. education system must seek individualized strategies for system wide improvement that take into account the fact that the issues and challenges facing the nation's poor vary based upon the geographic location where they attend school.

Recommendations

This research study revealed consistent and pronounced differences in student achievement on the PISA for students attending high poverty schools based upon where those schools are located. In very generalized terms, the lower the population of the town where the high poverty school was located, the higher was the achievement for that school's students who had poverty levels greater than 25%. These findings lead the researcher to believe that a variety of future studies will provide even greater insight into the achievement of students in the U.S.

A fairly simple direction for future studies would be to perform the same analysis for both the reading and science portions of the PISA. In addition, adding the results for the latest 2012 PISA testing to all three subject areas would also assist in ascertaining if

the same trends were consistent. The general analysis of the 2012 results was that scores were relatively unchanged. However, as this study demonstrated, a deeper analysis could reveal positive or negative movement in the achievement of the nation's high poverty students.

The researcher also believes that duplicating this study for all three PISA subject areas for students attending schools with 25% or less participation in the NSLP could reveal information useful for future educational strategy and policy. This research study and many of those cited within this report demonstrated that these two categories of poverty (above or below 25% participation in the NSLP) have different and diverging factors influencing achievement on the PISA. In addition to the poverty level, the geographic location of the school has revealed different and diverging factors influencing achievement. Effective strategy and policy must address the uniqueness of both the poverty level and geographic location of the school to truly hope to offer changes that positively impact student achievement. A future study such as the one described in this paragraph would more deeply reveal those vital characteristics necessary for differentiated educational strategies.

These recommendations have been for the inclusion of the most recent PISA cycle, additional subject results, and additional poverty level categories for the PISA. An additional recommendation would be for the same range of items to be studied but for a different international test; the TIMSS. The TIMSS test could be studied for both the 4th and 8th grade levels. The importance of such studies would be to determine if the nation's students are achieving differently at different ages. This study discussed the challenges of the cumulative negative impact of poverty over time. Studying the two TIMSS tests for

the same poverty and geographic locations could determine that the severity of the cumulative impact. As was discussed in Chapter Two of this study, the country composition for the TIMSS and PISA make broad international comparisons difficult but the proposed study could be confined to achievement comparisons just for students in the U.S. to mitigate that effect.

A final recommendation for further study would be in the category of ethnicity or race. The revelation from this current study is that students who attended high poverty schools of a particular race or ethnicity tended to score similarly regardless of geographic location points to a need for deeper understanding of the contributing factors related to this outcome. This study demonstrated that differences existed for high poverty schools and their students based on their location that also produced consistent variances in achievement on the mathematics portion of the PISA. It has also revealed that the achievement gap persisted even when the students all came from similarly disadvantaged socioeconomic environments.

References

Achieve. (2008, September 8). Top state education policy organizations form expert advisory group on international benchmarking [Press release]. Retrieved from http://www.achieve.org/top-state-education-policy-organizations-form-expert-advisory-group-international benchmarking

Adams, R., & Wu, M. (eds.). (2002). *PISA 2000. Technical report.* Paris: OECD Publications. Retrieved from http://works.bepress.com/cgi/viewcontent.cgi?article=1029&context =ray_adams

An overview of reading first. (n.d.). *Scholastic.* Retrieved from http://www.scholastic.com/teachers/article/overview-reading-first

Ansary, T. (2007, March 9). Education at risk: Fallout from a flawed report. Retrieved from *edutopia*: The George Lucas Educational Foundation website: http://www.edutopia.org/landmark-education-report-nation-risk

Armaline, W. D., & Farber, K. S., & Kretovics, J. (2004). It ain't brain surgery: Restructuring schools to improve the education of children placed at risk. *Educational Horizons*, *82*(3), 213-225. Retrieved from http://files.eric.ed.gov/fulltext/EJ684772.pdf

Averch, H. A., Carroll, S. J., Donaldson, T. S., Kiesling, H. J., & Pincus, J. (1974). *How effective is schooling? A critical review of research*. Englewood Cliffs, NJ: Educational Technology Publications.

Bairu, G., Calsyn, C., Jocelyn, L., Kastberg, D., Kruger, T., Lemke, M. . . . Williams, T. (2001). Outcomes of learning: Results from the 2000 Program for International Student Assessment of 15-year-olds in reading, mathematics, and science literacy

(NCES 2002–115). Washington, DC: U.S. Department of Education, National Center for Education Statistics. Retrieved from http://nces.ed.gov/pubs2002/2002115.pdf

Baldi, S., Jin, Y., Skemer, M., Green, P. J., & Herget, D. (2007). *Highlights from PISA 2006: Performance of U.S. 15-year-old students in science and mathematics literacy in an international context* (NCES 2008–016). National Center for Education Statistics, Institute of Education Sciences. Washington, DC: U.S. Department of Education.

Belsie, L. (2010, September 19). Poverty rate: Are Americans really poorer than in 1960? *The Christian Science Monitor*. Retrieved from http://www.csmonitor.com/Business/new-economy/2010/0919/Poverty-rate-Are-Americans-really-poorer-than-in-1960

Berliner, D. (2009). *Poverty and potential: Out-of-school factors and school success.* Education and the Public Interest Center & Education Policy Research Unit. Retrieved from http://epicpolicy.org/publication/poverty-and-potential

Bernstein, J. (2007, April 22). Is education a cure for poverty? [Web log post]. Retrieved from http://prospect.org/article/education-cure-poverty

Blachowicz, C. L. Z., Fisher, P. J. L., Ogle, D., & Watts-Taffe, S. (2006). Vocabulary: Questions from the classroom. *Reading Research Quarterly, 41*(4), 524–539.

Blau, P. M., & Duncan, O. D. (1967). *The American occupational structure*. New York, NY: Wiley.

Bollen, K., Glanville, J. A., & Stecklov, G. (2001). Socioeconomic status and class in studies of fertility and health in developing countries. *Annual Review of Sociology, 27*:153-185.

Bowers, C. (2010, August, 12). Skilled labor shortage frustrates employers. [News report]. Retrieved from http://www.cbsnews.com/8301-18563_162-6764731.html

Bracey, G. (2007, December 3). Righting wrongs. *The Huffington Post*. Retrieved from http://www.huffingtonpost.com/gerald-bracey/righting-wrongs_b_75189.html

Bradley, R. H., & Corwyn, R. F. (2002). Socioeconomic Status and Child Development. *Annual Review of Psychology*, *53*, 371-99

Brief history of IEA: 50 years of educational research. (2013). International Association for the Evaluation of Educational Achievement. Retrieved from http://www.iea.nl/brief_history.html

Buckley, J. (2013, December 3). *NCES statement on PISA 2012.* National Center for Education Statistics. Retrieved from http://nces.ed.gov/whatsnew/ commissioner/remarks2013/12_03_2013.asp

Burdick, J. (2012, February 12). *The legacy of 'A Nation at Risk.'* Retrieved from http://files.eric.ed.gov/fulltext/ED533909.pdf

California Department of Education. (2013, August 5). *Paraprofessional requirements for Title I Programs.* Retrieved from http://www.cde.ca.gov/nclb/sr/tq/paraprofessionals.asp

Carnoy, M., & Rothstein, R. (2013, January 28). *What do international tests really show about U.S. student performance?* Retrieved from Economic Policy Institute website: http://www.epi.org/publication/us-student-performance-testing/

Caro, D. H., McDonald, J. T., & Willms, J. D. (2009). Socio-economic status and academic achievement trajectories from childhood to adolescence. *Canadian Journal of Education, 32*(3), 558-590. Retrieved from http://files.eric.ed.gov/fulltext/EJ859263.pdf

Cauthen, K., & Fass, S. (2008). *10 Important questions about child poverty & family economic hardship.* Retrieved from National Center for Children in Poverty website: http://www.nccp.org/faq.html

Cavanagh, S. (2007, December 7). Poverty's effect on U.S. scores greater than for other nations. *Education Week.* Retrieved from http://www.edweek.org/ew/articles/2007/12/12/15pisa.h27.html

Celano, D., & Neuman, S. B. (2001). Access to print in low-income and middle-income Communities: An ecological study of four neighborhoods. *Reading Research Quarterly, 36*(1), 8-26. Retrieved from http://www-personal.umich.edu/~sbneuman/pdf/AccessToPrint.pdf

Child poverty: Most recent by country. (2005). [Interactive map and bar graph]. Retrieved from http://www.nationmaster.com/red/graph/eco_chi_pov-economy-child-poverty&b_map=1

Clayton, M. (2013, December 3). PISA test shows 'stagnation.' Is US education reform failing? *The Christian Science Monitor*. Retrieved from http://www.csmonitor.com/USA/Education/2013/1203/PISA-test-shows-stagnation.-Is-US-education-reform-failing-video

Cody, A. (2009, June 30). Beyond NCLB: Broader, bolder proponents explain how to get there [Web log post]. Retrieved from http://blogs.edweek.org/teachers/living-in-dialogue/2009/06/beyond_nclb_broader_bolder_pro_1.html

Coleman, J. S., Campbell, E. Q., Hobson, C. J., McPartland, F. Mood, A. M., Weinfeld, F. D., & York, R. L. (1966). Equality of Educational Opportunity. Washington, DC: U.S. Government Printing Office.

Coley, R. J. (2002). *An uneven start: Indicators of inequality in school readiness*. Princeton, NJ: Educational Testing Service. Retrieved from http://files.eric.ed.gov/fulltext/ED466473.pdf

Committee on Education & The Workforce Democrats. (2013, June 19). 'Republicans pass education bill that undermines progress and raids funding for poor, minority students'. [Press release]. Retrieved from http://democrats.edworkforce.house.gov/press- release/republicans-pass-education-bill-undermines-progress-and-raids-funding-poor- minority

Compulsory Education. (2013). Education bug. Retrieved on September 6, 2013, from http://www. educationbug.org/a/compulsory-education.html

Cooke, G., Ginsburg, A., Leinwand, S., Noell, J., & Pollock, E. (2005, November). *Reassessing U.S. International Mathematics Performance: New Findings from the 2003 TIMSS and PISA.* Retrieved from http://eric.ed.gov/?q=Reassessing+U.S.+International+Mathematics+Performance%3A+New+Findings+from+the+2003+TIMSS+and+PISA

Cooke, K., Ojha, H., & Rohde, D. (2012, December 19). The end of 'the great equalizer' in Massachusetts. Retrieved from http://www.theatlantic.com/business/archive/2012/ 12/the-decline-of-the-great-equalizer/266455/

Cotton, K. (2001). New small learning communities: Findings from recent literature. *Northwest Regional Education Laboratory.* Retrieved from http://files.eric.ed.gov/fulltextED459539.pdf

Dillon, E., & Rotherham, A. (2007, July 23). States' evidence: What it means to make 'Adequate Yearly Progress' under NCLB. Retrieved from http://www.educationsector.org/sites/default/files/publications/EXPAYP.pdf

Dillon, S. (2010, December 7). Top test scores from Shanghai stun educators. *The New York Times.* Retrieved from http://www.nytimes.com/2010/12/07/education/07education.html?pagewanted=all&_r=1&

Downey, D. B., von Hipple, P. T., & Broh, B. A. (2004). Are schools the great equalizer? Cognitive inequality during the summer months and the school year. *American Sociological Review*, *69*(5), 613-635.

Edelman, P. (2012, July 28). Poverty in America: Why can't we end it? *The New York Times Sunday Review*. Retrieved from http://www.nytimes.com/2012/07/29/opinion/sunday/why-cant-we-end-poverty-in-america.html?pagewanted=all&module=Search&mabReward=relbias%3Aw%2C%7B%222%22%3A%22RI%3A13%22%7D&_r=0

Edghill, A. (2013, May 29). Remembering the promise of *Brown vs. Board of Education.* [Web log post]. Retrieved from http://www.ed.gov/blog/2013/05/remembering-the-promise-of-brown-vs-board-of-education/

Entwisle, D. R., & Alexander, K. (1993). Entry into School: The Beginning School Transition and Educational Stratification in the United States. *Annual Review of Sociology, 19*, 401-423.

Evans, M. D. R., Kelley, J., Sikora, J., & Treiman, D. H. (2010). Family scholarly culture and educational success: Books and schooling in 27 nations. *Research in Social Stratification and Mobility, 28,* 171-197

Federal education budget project. (2014, April 24). Retrieved from http://febp.new america.net/background-analysis/no-child-left-behind-act-title-i-distribution-formulas

Fenty, A., & Rhee, M. (2010, October, 30). The education manifesto. *The Wall Street Journal.* Retrieved from http://online.wsj.com/news/articles/SB10001424052702303362404575580221511231074

Finn, Jr., C. (2010, December 8). A Sputnik moment for U.S. education. *The Wall Street Journal*. Retrieved from http://www.hoover.org/news/daily-report/59621

Fleischman, H. L., Hopstock, P. J., Pelczar, M. P., & Shelley, B. E. (2010). *Highlights from PISA 2009: Performance of U.S. 15-Year-Old Students in Reading, Mathematics, and Science Literacy in an International Context* (NCES 2011-004). U.S. Department of Education, National Center for Education Statistics. Washington, DC: U.S. Government Printing Office. Retrieved from http://nces.ed.gov/pubs 2011/2011004.pdf

Florida Department of Education. (n.d.). *National assessment of educational progress*. Retrieved from http://www.fldoe.org/asp/naep/role.asp

Friedman, H. S. (2012, August, 29). America's poverty-education link [Web log post]. *The Huffington Post*. Retrieved from http://www.huffingtonpost.com/howard-steven-friedman/americas-poverty-education_b_1826000.html

Gamoran, A., & Long, D. A. (2006, December). *Equality of educational opportunity*: *A 40-year retrospective* (Working Paper No. 2006-9). Retrieved from Wisconsin Center for Educational Research website: http://www.wcer.wisc.edu/ publications/workingPapers/Working_Paper_No_2006_09.pdf

Gardner, D. P., Larsen, Y. W., Baker, W. O., & Campbell, A. (1983). A nation at risk: The imperative for educational reform. An open letter to the American people. A report to the nation and the Secretary of Education. *National Commission on Excellence in Education.* Retrieved from http://files.eric.ed.gov/fulltext/ ED226006.pdf

Gelberg, D. (2007, Spring). The business agenda for school reform: A parallel universe. *Teacher Education Quarterly.* Retrieved from http://files.eric.ed.gov/full text/EJ795156.pdf

Goldhaber, D. (2002, March 10). The mystery of good teaching. *Education Next.* Retrieved from https://www.stcloudstate.edu/tpi/initiative/ documents/ preparation/The%20Mystery%20of%20Good%20Teaching.pdf

Gonzales, P., Miller, D., & Provasnik, S., (2009). *U.S. Performance across International Assessments of Student Achievement: Special Supplement to the Condition of Education 2009* (NCES 2009-083). National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education. Washington, DC. Retrieved from: http://nces.ed.gov/pubs2009/2009083.pdf

Goodson, B., Wolf, A., Bell, S., Turner, H., & Finney, P.B. (2010). *The Effectiveness of a Program to Accelerate Vocabulary Development in Kindergarten (VOCAB).* (NCEE 2010-4014). Washington, DC: National Center for Education Evaluation and Regional Assistance, Institute of Education Sciences, U.S. Department of Education. Retrieved from http://ies.ed.gov/ncee/edlabs/regions/southeast/pdf/REL_20104014.pdf

Guo, G. (1998). The timing of the influences of cumulative poverty on children's cognitive ability and achievement. *Social Forces, 77*(1), 257-288.

Hampden-Thompson, G., & Johnston, J. (2006, April). *Variation in the Relationship between Non-school Factors and Student Achievement on International Assessments.* (NCES 2006-014) National Center for Education Statistics, Institute of Education Sciences, U.S. Department of Education. Washington, DC. Retrieved from http://nces.ed.gov/pubs2006/2006014.pdf

Hanushek, E., Lastra-Anadon, C., Peterson, P., Woessmann, L. (2011, August). *Globally challenged: Are U.S. students ready to compete?* (PEPG Report No.: 11-03). Retrieved from http://www.hks.harvard.edu/pepg/PDF/Papers/PEPG11-03_GloballyChallenged.pdf

Hanushek, E., Peterson, P., Woessmann, L., & Summers, L. (2013). Endangering prosperity: A global view of the American school. Washington D.C.: The Brookings Institution

Hanushek, E., & Woessmann, L. (2010). The high cost of low educational performance: The long-run impact of improving PISA outcomes. Retrieved from http://www.oecd.org/pisa/44417824.pdf

Hart, B., & Risley, T. R. (2004). *Meaningful differences in the everyday experience of young American children*. Baltimore: Paul H. Brookes Publishing.

Hauser, R.M. (1994, December). Measuring socioeconomic status in studies of child Development. *Child Development, 65*(6), 1541-1545. Retrieved from http://personal.psc.isr.umich.edu/yuxie-web/files/soc543/Hauser1994.pdf

Hauser, R. M., & Huang, M. H. (1997). Verbal ability and socioeconomic success: A trend analysis. *Social Science Research, 26*, 331-376.

Horace Mann. (2013). *The Biography Channel website*. Retrieved from http://www. biography.com/people/horace-mann-9397522.

Horn, J. (2012, April 28). How much teachers affect student achievement, and other myths [Web log post]. Retrieved from http://www.schoolsmatter.info/ 2012/04/ how-much-teachers-affect-student.html

Hout, M. (1988). More universalism, less structural mobility: The American occupational structure in the 1980s. *American Journal of Sociology, 93*, 1358-1400.

Hyde Park Johnny. (2011, June 11). Our schools are not broken: The problem is poverty [Web log post]. Retrieved from http://www.dailykos.com/story/2011/06/11/ 984322/-Our-Schools-are-Not-Broken-The-Problem-is-Poverty#

Jencks, C., Smith, M., Acland, H., Bane, M. S., Cohen, D. . . . Gintis, H. (1972). *Inequality: A reassessment of the effect of family and schooling in America*. New York, NY: Basic Books.

Jencks, C., Bartlett, S., Corcoran, M., Crouse, J., Eaglesfield, D., Jackson, G., McClelland, K. . . . Williams, J. (1979). *Who gets ahead? The determinants of economic success in America.* New York, NY: Basic Books.

Jocelyn, L., Kastberg, D., Lemke, M., Miller, D., Pahlke, E., Partelow, L. . . . Williams, T. (2004). International Outcomes of Learning in Mathematics Literacy and Problem Solving: PISA 2003 Results From the U.S. Perspective. (NCES 2005–003). Washington, DC: U.S. Department of Education, National Center for Education Statistics. Retrieved from http://nces.ed.gov/pubs2005/2005003.pdf

Kenny, C. (2014, January, 17). Developing countries: More than economic rivals and terror threats. *The Atlantic*. Retrieved from http://www.theatlantic.com/international/archive/2014/01/developing-countries-more-than-economic-rivals-and-terror-threats/283147/

Khadaroo, S. T. (2013, April 26). 'A Nation at Risk': How much of 'apocalyptic' education report still applies? *The Christian Science Monitor.* Retrieved from http://www.csmonitor.com/USA/Education/2013/0426/A-Nation-at-Risk-How-much-of-apocalyptic-education-report-still-applies

Kneebone, E. (2012, September, 20). The changing geography of metropolitan poverty. *The Atlantic.* Retrieved from http://www.theatlanticcities.com/politics/2012/09/changing-geography-metropolitan-poverty/3348/

Kneebone, E. (2014, January 20). The changing face of poverty and how it's impacting Suburban children [Web log post]. Retrieved from http://www.learningfirst.org/changing-face-poverty-and-how-it-s-impacting-suburban-children

Krashen, S. (2012). Protecting students against the effects of poverty: Libraries. *New England Reading Association Journal.* Retrieved from http://www.sdkrashen.com/articles/protecting_students.pdf

Lemke, M., & Gonzales, P. (2006). *U.S. Student and Adult Performance on International Assessments of Educational Achievement: Findings from the Condition of Education 2006* (NCES 2006-073). U.S. Department of Education. Washington, DC: National Center for Education Statistics. Retrieved from http://nces.ed.gov/pubs2006/2006073.pdf

Lemke, M., Sen, A., Pahlke, E., Partelow, L., Miller, D., Williams, T. . . . Jocelyn, L. (2004). *Outcomes of learning in mathematics literacy and problem solving: PISA 2003 results from the U.S. perspective.* (NCES 2005–003). Washington, DC: U.S. Department of Education, National Center for Education Statistics. Retrieved from http://nces.ed.gov/pubs 2005/2005003.pdf

Levin, D. (2013, September 2). Chinese educators look to American classrooms. *The New York Times.* Retrieved from http://www.nytimes.com/2013/09/03/science/Chinese-educators-look-to-american-classrooms.html?_r=0

Loveless, T. (2003, October). The 2003 Brown Center report on American education: How well are American students learning? (Vol. I, No. 4). Retrieved from The Brookings Institute website: http://www.brookings.edu/~/media/research/files/reports/2003/10/education%20loveless/10education_loveless.pdf

Loveless, T. (2009, January). The 2008 Brown Center report on American Education: How well are American students learning? (Vol. II, No. 3) Retrieved from The Brookings Institute website: http://www.brookings.edu/~/media/research/files/reports/2009/2/25%20education%20loveless/0225_education_loveless.pdf

Loveless, T. (2011, February). The 2010 Brown Center Report on American Education: How well are American students learning? (Vol. II, No. 5) Retrieved from The

Brookings Institute website: http://www.brookings.edu/~/media/research/files/reports/2011/2/07%20education%20loveless/0207_education_loveless.pdf

Loveless, T. (2013, March). The 2013 Brown Center Report on American Education: How well are American students learning? (Vol. 3, No. 2) Retrieved from The Brookings Institute website: http://www.brookings.edu/~/media/research/files/reports/2013/03/18%20brown%20center%20loveless/2013%20brown%20center%20report%20web

Lu, A. (2013, December 3). U.S. scores flat on international test; Massachusetts exceeds Average. *Stateline*. Retrieved from http://www.pewstates.org/projects/stateline/headlines/us-scores-flat-on-international-test-massachusetts-exceeds-average-85899524026

Mathews, J. (2011, February 11). The myth of declining U.S. schools: They've long been Mediocre [Web log post]. Retrieved from http://voices.washingtonpost.com/class-struggle/2011/02/myth_of_declining_us_schools.html

Mathis, W. (2004). NCLB and high-stakes accountability: A cure? Or a symptom of the disease? Retrieved from http://files.eric.ed.gov/fulltext/EJ684639.pdf

McCabe, C. (2010, December 9). The economics behind international education rankings. *neatoday.* Retrieved from http://neatoday.org/2010/12/09/a-look-at-the-economic-numbers-on-international-education-rankings/

McCloskey, P., & Warden, J. (2014, February 11). Bad measurements promote U.S. education failure: Urgent national security risk. *Forbes*. Retrieved from http://www.forbes.com/sites/mccloskeywarden/2014/02/11/bad-measurements-promote-u-s-education-failure-urgent-national-security-risk/

Merton, R. K. (1973). The Matthew effect in science. In N. Storer (ed.), *The Sociology of Science*, pp. 439-459. Chicago, IL: The University of Chicago Press.

Miller, J. (1991, October 9). Report questioning 'crisis' in education triggers an uproar. *Education Week*. Retrieved from http://www.edweek.org/ew/articles/1991/10/09/06crisis.h11.html

National Center for Children in Poverty. (2007, November). Parent's low education leads to low income, despite full-time employment. Retrieved from Columbia University Mailman School of Public Health website: http://www.nccp.org/publications/pdf/text_786.pdf

National Center for Education Statistics. (n.d.). *Frequently asked questions*. Retrieved from http://nces.ed.gov/surveys/pisa/faq.asp

National Center for Education Statistics. (2007a). Status of education in rural America, 2007. Demographics. Retrieved from http://nces.ed.gov/pubs2007/ruraled/hl_demographics.asp

National Center for Education Statistics. (2007b). Status of education in rural America, 2007. Public school students, by race/ethnicity. Retrieved from http://nces.ed.gov/pubs 2007/ruraled/chapter1_3.asp

National Center for Education Statistics. (2013). *Welcome to NCES.* Retrieved from http://nces.ed.gov/surveys/pisa/index.asp

National Center for Education Statistics. (2014). *NAEP overview*. Retrieved from http://nces.ed.gov/nationsreportcard/about/

National Education Association. (n.d.). *No Child Left Behind Act (NCLB) | ESEA*. Retrieved from http://www.nea.org/home/NoChildLeftBehindAct.html

The Nation's Report Card. (n.d.). *About the nation's report card*. Retrieved from http://nationsreportcard.gov/about.aspx

No Child Left Behind. (2011, September 19). *Education Week*. Retrieved from http://www.edweek.org/ew/issues/no-child-left-behind/

No Child Left Behind-Federal Funding. (n.d.). *Illinois State Board of Education*. Retrieved from http://www.isbe.net/funding/html/nclb_funding.htm

No Child Left Behind-Overview. (2013, July 1). *New America Foundation*. Retrieved from http://febp.newamerica.net/background-analysis/no-child-left-behind-overview

Oakes, J. (1990). Multiplying inequalities: The effects of race, social class, and tracking on opportunities to learn mathematics and science. Retrieved from http://files.eric.ed.gov/fulltext/ED329615.pdf

Offshoring: Welcome home. (2013, January 19). *The Economist*. Retrieved from http://www.economist.com/news/leaders/21569739-outsourcing-jobs-faraway-places-wane-will-not-solve-wests

O'Hare, W. (1988). The rise of poverty in rural America. Washington, DC: Population Reference Bureau. (ERIC Document Reproduction Service No. ED 302 350)

Organization for Economic Cooperation and Development. (2005). *PISA 2003. Technical report.* Paris: OECD Publications. Retrieved from http://www.oecd.org/edu/school/programmeforinternationalstudentassessmentpisa/35188570.pdf

Organization for Economic Cooperation and Development. (2010). *PISA 2009 Results: Executive Summary.* Retrieved from http://www.oecd.org/pisa/pisa products/46619703.pdf

Organization for Economic Cooperation and Development. (2013a). *About the OECD.* Retrieved from http://www.oecd.org/about/

Organization for Economic Cooperation and Development. (2013b). *About the OECD.* Retrieved from http://stats.oecd.org/glossary/ detail.asp?ID=5401

Palardy, G. J. (2008). Differential school effects among low, middle, and high social class composition schools: A multilevel, multiple group latent growth curve analysis. *School Effectiveness and School Improvement*, *19*(1), 21-49. Retrieved from http://education.ucr.edu/pdf/faculty/palardy/Palardy7.pdf

PISA 2003 school questionnaire. (2003a). [School questionnaire for international test] Retrieved from http://nces.ed.gov/Surveys/PISA/pdf/quest_pisa_2003_school.pdf

PISA 2003 student questionnaire. (2003b). [Student questionnaire for international test] Retrieved from http://nces.ed.gov/surveys/pisa/pdf/quest_pisa_2003_student.pdf

PISA envy. (2013, January, 19). *The Economist*. Retrieved from http://www.economist.com/news/international/21569689-research-comparing-educational-achievement-between-countries-growing-drawing

Posner, R. (2011, January 2). The PISA rankings and the role of schools in student performance on standardized tests [Web log post]. Retrieved from http://www.becker-posner-blog.com/2011/01/the-pisa-rankings-and-the-role-of-schools-in-student-performance-on-standardized-testsposner.html

Ravitch, D. (2013a, September 7). Rothstein and Carnoy: A re-analysis of international tests [Web log post]. Retrieved from http://dianeravitch.net/2013/09/07/rothstein-carnoy-we-are-not-lagging-on-international-tests/

Ravitch, D. (2013b, December 5). Daniel Wydo disaggregates PISA scores by income [Web log post]. Retrieved from http://dianeravitch.net/2013/12/05/daniel-wydo-disaggregates-pisa-scores-by-income/

Raywid, M. A. (1997). Synthesis of research/small schools: A reform that works. *Educational Leadership, 55*(4), 34-39. Retrieved from http://www.ascd.org/publications/educational-leadership/dec97/vol55/num04/-Small-Schools@-A-Reform-That-Works.aspx

Riddile, M. (2010, December 15). PISA: It's poverty not stupid [Web log post]. Retrieved from http://nasspblogs.org/principaldifference/2010/12/pisa-its-poverty-not-stupid/

Riddile, M. (2014, February 12). PISA: It's still 'poverty not stupid' [Web log post]. Retrieved from http://nasspblogs.org/principaldifference/2014/02/pisa-its-still-poverty-not-stupid/

Ripley, A. (2013). *The smartest kids in the world and how they got that way.* New York, NY: Simon & Schuster.

Robelen, E. W. (2011, January 25). Missouri district competes against nations. *Education Week.* Retrieved from http://www.edweek.org/ew/articles/2011/01/26/18pisa.h30.html

Rothman, R. (2013, December 3). The deepest learners: What PISA can reveal about the learning that matters. Retrieved from Alliance for Excellent Education website:

http://all4ed.org/reports-factsheets/the-deepest-learners-what-pisa-can-reveal-about-the-learning-that-matters/

Rothstein, R. (2008, April 7). 'A Nation at Risk' twenty-five years later. *Cato Unbound: A Journal of Debate.* Retrieved from http://www.cato-unbound.org/2008/04/07/richard-rothstein/nation-risk-twenty-five-years-later

Rural Education. (2004, August 9). *Edweek.* Retrieved from www.edweek.org/ew/issues/rural-Education/

Sailer, S. (2010, December 19). PISA scores show demography is destiny in education too-but Washington doesn't want you to know [Web log post]. Retrieved from http://vdare.com/articles/pisa-scores-show-demography-is-destiny-in-education-too-but-washington-doesnt-want-you-to-k

Sanandaji, T. (2010, December 28). The amazing truth about PISA scores: USA beats Western Europe, ties with Asia. [Web log] Retrieved from http://www.newgeography.com/content/001955-the-amazing-truth-about-pisa-scores-usa-beats-western-europe-ties-with-asia

Schleicher, A. (2007, December). Losing our edge: Are American students unprepared for the global economy? Symposium presented at the National Press Club for the Alliance for Excellent Education. Washington, D.C. Retrieved from http://all4ed.org/webinar-event/losing-our-edge-are-american-students-unprepared-for-the-global-economy/

Schneider, M. (2009). The international PISA test: A risky investment for states. *Education next.* Vol. 9, No. 4. Retrieved from http://educationnext.org/the-international-pisa-test/

The School Principal. (2011, January 10). The good news about PISA scores - and now we know what the REAL problem is! [Web log comment]. Retrieved from http://www.inthetrenches withschoolreform.com/the-good-news-about-pisa-scores-and-now-we-know-what-the-real-problem-is/

Schulz, W. (2005, April). *Measuring the socio-economic background of students and its Effect on achievement in PISA 2000 and PISA 2003.* Paper presented at the annual meetings of the American Educational Research Association, San Francisco, CA. Abstract retrieved from https://mypisa.acer.edu.au/images/mypisadoc/aera 2006_schulzw_pisa_escs%26achievement.pdf

Schwartzbeck, T.D., Redfield, D., Morris, H., & Hammer, P.C. (2003). How are rural school districts meeting the teacher quality requirements of No Child Left Behind? *American Association of School Administrators.* Retrieved from http://www.aasa.org/uploadedFiles/Policy_and_Advocacy/files/RuralTeacherQualityStudy.pdf

The Scottish Government. (2010). *Programme for International Student Assessment (PISA) 2006: Highlights from Scotland's results.* Retrieved from http://www. scotland.gov.uk/Publications/2007/12/03153600/1

Seib, G. F. (2008, November 21). In crisis, opportunity for Obama. *The Wall Street Journal.* Retrieved from http://online.wsj.com/news/articles/SB12272127 8056345271?mg=reno64-wsj&url=http%3A%2F%2Fonline.wsj.com%2Farticle% 2FSB122721278056345271.html

Shapiro, I. (1989). Laboring for less: Working but poor in rural America. Washington, DC: Center on Budget and Policy Priorities. (ERIC Document Reproduction Service No. ED 319566)

Smole, D. (2002, January 28). Education finance incentive grants under ESEA Title I. CRS Report for Congress. Retrieved from http://www.congressionalresearch.com/RL31256/document.php?study=Education+Finance+Incentive+Grants+Under+ESEA+Title+I

Sparks, S. D. (2014, January 22). 50 years later, war on poverty yields mixed success. *Education Week, 33*(18), 1, 14-15. Retrieved from http://www.edweek.org/ew/articles/2014/01/22/18wopoverview_ep.h33.html?tkn=ZOXFXnFprGArqQlu5AZzbFeKytYGBykqBA4v&cmp=clp-edweek

Standerfer, L. (2006, April 14). Before NCLB: The history of ESEA. Retrieved from http://www.redorbit.com/news/education/470190/before_nclb_the_history_of_esea/

Stevenson, H., & Stigler, J.W. (1994). The learning gap: Why our schools are failing and what we can learn from Japanese and Chinese education. New York, NY: Simon & Schuster.

Stout, D. (2013, December 4). China is cheating the world student rankings system. *Time*. Retrieved from http://world.time.com/2013/12/04/china-is-cheating-the-world-student-rankings-system/

Strauss, V. (2010, December). Hysteria over PISA misses the point. *The Washington Post*. Retrieved from http://voices.washingtonpost.com/answer-sheet/standardized-tests/hysteria-over-pisa.html

Student mobility. (2004, August 4). *Education Week*. Retrieved from http://www.edweek.org/ew/issues/student-mobility/

Thompson, D. (2013, January 22). Why gloomy pundits and politicians are wrong about America's education system. *The Atlantic*. Retrieved from http://www.theatlantic.com/business/archive/2013/01/why-gloomy-pundits-and-politicians-are-wrong-about-americas-education-system/267278/

Thomas, P. (2011, July 6). Avoiding the poverty issue. *The New York Times*. Retrieved from http://www.nytimes.com/roomfordebate/2011/05/30/testing-students-to-grade-teachers/avoiding-the-poverty-issue

Thompson, M. (Interviewer). (2014, January 11). Poverty rates surge in American suburbs. [Video]. *PBS Newshour.* Retrieved from http://www.pbs.org/newshour/bb/nation-jan-june14-povertysuburb_01-11/

Toppo, G. (2008, August 1). 'Nation at Risk': The best thing or the worst thing for education? *USA Today.* Retrieved from http://usatoday30.usatoday.com/news/education/2008-04-22-nation-at-risk_N.htm

Trends in International Mathematics and Science Study. (n.d.). Retrieved from http://nces.ed.gov/timss/

Tucker, J. (2013, January, 16). Re: U.S. schools fare better in analysis [Online commentary]. Retrieved from http://www.sfgate.com/education/article/U-S-schools-fare-better-in-analysis-4197439.php

U.S. Census Bureau. (2012, September 12). Poverty Chart [Excel file]. Retrieved from http://www.census.gov/hhes/www/poverty/data/historical/ people.html

U.S. Department of Agriculture. (2013). *National school lunch program (NSLP).* Retrieved from http://www.fns.usda.gov/cnd/Lunch/AboutLunch/NSLP FactSheet.pdf

U. S. Department of Education. (2004, September 15). Elementary and secondary education. Retrieved from http://www2. ed.gov/policy/elsec/leg/esea02/pg1.html

U.S. Department of Education. (2010, December 7). Secretary Arne Duncan's remarks at OECD's release of the Program for International Student Assessment (PISA) 2009 results. Retrieved from http://www.ed.gov/news/speeches/secretary-arne-duncans-remarks-oecds-release-program-international-student-assessment-

Weber, S. (2011, February 11). 'Our sputnik moment': Then and now. Retrieved from http://www.pbs.org/wnet/need-to-know/the-daily-need/our-sputnik-moment-then-and-now/7286/

Weissmann, J. (2013, October). Study: Almost half of public school students are now low-income. *The Atlantic.* Retrieved from http://www.theatlantic.com/business/archive/2013/10/study-almost-half-of-public-school-students-are-now-low-income/280664/

The White House, Office of the Press Secretary. (2009, November 4). Fact sheet: The race to the top [Press release]. Retrieved from http://www.whitehouse.gov/the-press-office/fact-sheet-race-top

Wong, Y. (n.d.). Economic, social, and cultural status and related issues in PISA-Macau 2012. Retrieved from http://www.umac.mo/fed/pisa/research%20reports/201314_ENG.pdf

Yen, H. (2012, July 22). U.S. poverty on track to rise to highest since 1960s. *The Huffington Post.* Retrieved from http://www.huffingtonpost.com/2012/07/22/us-poverty-level-1960s_n_1692744.html

Zhao, Y. (2012, December 11). Numbers can lie: What TIMSS and PISA truly tell us, if anything? [Web log post]. Retrieved from http://zhaolearning.com/2012/12/11/numbers-can-lie-what-timss-and-pisa-truly-tell-us-if-anything/

Appendix A

Common Variables for PISA Research

The categories and subcategories below are the standardized sections of the school and student PISA questionnaire that will be used to identify differences in high poverty schools and their students. While other meaningful categories exist, these were chosen based on the fact that they are each present in all three PISA cycles which make up this study. In addition, it is the researcher's belief that these areas are most likely to point to critical differences in school management and attributes as well as student characteristics and potential educational challenges.

Category: Student and Family Characteristics

Sub-category: Student Demographics
- Race/Ethnicity

Sub-category: Language & Immigration
- Index Immigration Status
- Country of birth: Self, Mother, Father
- Country Arrival Age
- Language at Home

Sub-category: Parents' Employment and Education
- Index highest education level of parents
- Index highest education level of mother, father
- Index highest parental education in years of schooling
- Mother [highest schooling]
- Father [highest schooling]
- Mother currently doing (Father currently…)
- Highest employment of either parent
- Mother's employment category (Father's employment…)

Sub-category: Home Possessions and Socioeconomic Status
- Dishwasher
- Own Room
- Educational software
- Internet
- Possessions computer

How many cellular phones
How many televisions
How many computers
How many cars
How many bathrooms
Dictionary
Quiet place to study
Desk
Textbooks
Classic literature
Poetry
Artworks
How many books at home

Category: School Composition, SES, and Organization

Sub-category: School size
Sub-category: School type and Community
Public or private
School location
Sub-category: School SES
Eligible free lunch (FRPL)

Category: School Staffing and Resources

Sub-category: Staffing
Teacher-student ratio

Sub-category: Shortage of School Staff including Teachers
Shortage mathematics teachers
Shortage support personnel

Sub-category: Quality of School Educational Resources
Shortage textbooks
Shortage computers
Shortage computer software
Shortage library material
Shortage audio-video

Category: Governance

Sub-category: Teacher Participation and School Responsibility
Sub-category: Responsibilities assigned to Other Groups and Organizations
Sub-category: School Responsibility: Curriculum

Vitae

Brett A. Barger

EDUCATION

Lindenwood University

Ed.D. (Expected Completion 2014)

MBA (1998)

BA: Bus. Admin.: Summa Cum Laude (1993)

PROFESSIONAL EXPERIENCE

Lindenwood University

Associate V. P. for Operations & Finance and Chief Purchasing Officer	2014-Current
Dean of Evening Admissions & Extension Campuses	2007-2014
Director of Athletic Management & Marketing	2005-2007
Novus International Inc.	2003-2004
Affina/Monsanto	2002-2003
International Business Solutions	2000-2002
Lindenwood University	1994-2000
Consolidated Communications Inc. (McCleod USA)	1993-1994

CLASSROOM EXPERIENCE

-taught courses in the school of management (Intro to Small Business Mgmt., Principles of Mgmt., and Event Mgmt.)

VOLUNTEER WORK

St. Anthony's Charitable Foundation Golf Tournament Committee	2012-Present
YMCA Board Member	2007-2009
Lindenwood University Board of Overseers	2003-2005
Mathews-Dickey Boys Club Soccer Program (Founder)	1996-1997
Lindenwood University Alumni Board	1995-1997
Historic Daniel Boone Home Advisory Council Member	1995-1996

AWARDS

"30 Leaders in Their 30's"-North County Inc.	2007
USA Today All-USA Academic Team Candidate	1993
Lindenwood University Student Athlete of the Year	1992 & 1993
NSCAA Academic All-American (Soccer)	1992 & 1993