

Pay for Performance:

The Relationship between Teacher Salaries and Student Achievement

Tara Whitley

Creighton University

Abstract

The American education system continues to fall behind when compared internationally, revealing vulnerability for the future of the United States. Because reform is necessary for the success of students, who are the future, examining educational outcomes in the United States is critical. I test whether meaningful differences between school administrator salaries and teacher salaries negatively impact standardized test scores. Additionally, I test several important political and social variables affect the standardized test scores of 4th grade students in the United States. Using a compilation of data from the Department of Education, I examine this relationship using a cross sectional time series analysis. I find that the ratio of teacher to administrator salaries, political party of the Governor, the percentage of the vote to the Democratic candidate in previous Presidential elections, the presence of ballot initiative process, instructional expenditures per pupil, and average family income are statistically significant predictors of math test scores while only average family income is a statistically significant predictor of reading test scores. This study identifies variables influencing the variation in student performance in the hopes of reforming the American education system to improve student outcomes across the United States.

Introduction

As other countries advance technologically, economically, and politically, maintaining the United States role as a world leader is critical for the future. However, as time goes on, data and research show the dramatic downturn that the United States education system has taken, especially when compared to the education systems in foreign countries. As politicians promote education reform policies to “save American schools be it enforcing standards, opening charter schools, providing vouchers for private education, or paying teachers based on their performance” (Mehta, 2013) it has become obvious that there is no one solution to solve the education crisis occurring in America. Reports from the Organization for Economic Cooperation and Development state that the US spends an average of \$15,571 per student compared to Japan’s average of \$10,596 per student yet “Japanese students score higher than American ones by 33 points on the Programme for International Student Assessment test” (de Avila, 2013) illustrating that no matter how much money is thrown into educational programs, it does not correlate with higher performance rates. The No Child Left Behind Act, passed in 2001 “sought to use standards and accountability to push all students to proficiency” (Mehta, 2013). While some progress has been made, widespread improvement has yet to occur, leaving policymakers puzzled as they work to bring American education up to international standards.

How do we explain the variation in student performance across the United States? There is variation in performance among elementary school students across the United States, specifically in standardized test scores.

Answering why elementary school students’ test scores vary across the United States will provide answers on how to increase test scores within states that have lower average test scores

than others. It will also allow for comparison between years perhaps shedding light on programs that have or have not worked. Organizations focusing on the education system in America such as The American Council on Education, National Association for the Education of Young Children and the Alliance for Excellent Education have an interest in this question. In addition, groups such as teachers, school administrators, government officials and local school boards are interested in these findings.

I include all fifty of the United States for the years 2003, 2005, 2007, 2009, and 2011 in my analysis. A standardized test is a nationwide test given to students in order to measure their proficiency in reading and mathematics. The largest and most widely recognized standardized test in the United States is the National Assessment of Educational Progress (NAEP).

In the past, scholars have generally analyzed socioeconomic status, race, gender, and classroom resources to understand the variance in student performance. I argue that the variation in student performance across the United States is dependent on the salary that teachers and administrators receive. When administrators are paid more than teachers, teachers will leave the classroom to become administrators in order to receive a higher salary. I hypothesize that as money and resources shift away from the teachers and classrooms towards administrators, test scores as well as students' performance will ultimately decrease. Additionally, political variables such as political party of the Governor, presence of an initiative or popular referendum process, and percentage of the vote to the Democratic candidate in the previous Presidential election will affect student test scores and performance. I include these variables to test the effectiveness and overall level of influence that political factors have on educational outcomes.

Literature Review

There are several main hypotheses in the literature explaining the variation in the outcomes of high school students across the United States. These hypotheses discuss several political hypotheses such as ballot initiatives and party preferences. Additionally, other literature discusses hypotheses such as instructional expenditures, income, race, and gender.

Political factors are important to consider because politics shapes many of the outcomes, especially educational outcomes. Political leaders have significant power, yet so do the people and the opinions of the people influence leaders as well.

Ballot Initiatives:

Ballot initiatives have been used across the United States as a way for citizens to take the “agenda-setting and decision-making” (Branton, 2004) power into their own hands; “the use of such democratic procedures allows citizens to directly influence public policy decisions without a public official intermediary” (Wilhelm & Cann, 2011). Ballot initiatives and popular referendums have become increasingly popular in the United States and education policy is paid particular attention as it is “one of the policy areas that have received much attention from the direct democracy movement” (Bali, 2008). Past ballot initiatives have included topics “as diverse and comprehensive as bilingual education, class size reduction, student loans, after-school program funding, and kindergarten school quality” (Bali, 2008), reflecting the shift away from the previous citizen voting on school finance issues (Bali, 2008). Ballot initiatives motivate citizens “to use direct democracy when they prefer policies, or alternatively when they perceive a need for them” (Wilhelm & Cann, 2011). A possible reason for the rise in recent educational based ballot initiatives is that state citizens are identifying and demanding a need for change in

the educational system established in their state. Wilhelm and Cann identify a different reason stating that “another meaningful indicator is the difference between their own state’s...and that of other states” (Wilhelm & Cann, 2011).

Party Importance:

Another group of literature addressed the difference between the Republican Party and the Democratic Party in the United States and how these differences impact education and educational outcomes. When first looking at the issue of educational funding alone, it’s been shown that “Democratic control of the lower chambers of state houses and of governors’ offices positively associated with funding levels” (McLendon, Hearn, and Mokher, 2009) and that “virtually any popular definition of conservatism will lead one to expect conservatives to oppose federal aid to education, which they do” (Buchanan, 1962). A study done in 2006 found that “both party affiliation of the governor and party control of legislatures may influence education appropriate levels, with Democrats associated with higher funding levels over the past two decades” (McLendon, Hearn, and Mokher, 2009). In many cases, there is direct conflict, and even extreme polarization, between the Parties on specific issues. For example, Texan Democrats “oppose any form of private school vouchers because vouchers would drain resources essential to guarantee a quality public education for all our children” (Coffey, 2011) whereas Texan Republicans “encourage the Governor and Texas Legislature to enact legislation which establishes child centered school funding options to bring about the maximum freedom of choice in public, private or parochial education” (Coffey, 2011). This example illustrates the variance in each state’s educational structure, demonstrating the extent to which “education in the United States is a state-level responsibility” (Millet, 2011) which allows each state to “organize and operate its education system differently, which creates verity in the structure of education and

also in education expenditures” (Millet 2011) thus leading naturally to the variety of student outcomes from state to state. These varieties in structure, funding, and outcomes are as a result of party differences in each state.

No Child Left Behind:

The instructional expenditure hypothesis argues that states have varying student outcomes because each state allocates resources differently. The No Child Left Behind Act was passed in 2001 with the intention of “raising achievement and closing achievement gaps” (National Education Association, 2011). The law was passed in response to the growing concern that “our system of education performs poorly” (Dee, 2005) and set “high standards for Academic performance of America’s public schools” (Andrews & Thompson, 2010). The No Child Left Behind Act created benchmarks to force schools to meet minimum standards (Andrews & Thompson, 2010) which allowed lawmakers and organizations to monitor students and schools to ensure that they were receiving the resources necessary for meeting standards (National Education Association, 2011). Additionally, the No Child Left Behind Act “hopes to improve student outcomes by introducing accountability” within school districts (Dee, 2005).

A study done in 2002 in reference to the equality of distribution of funds showed that “states with higher proportions of revenues provided by state governments generally showed a more equitable distribution of resources than states in which districts were more dependent on local revenue” (Moser & Rubenstein, 2002). On the other hand, a study done in New Jersey showed that the more school funds which were raised locally, the more positive influence it had on students because of its direct influence on classroom spending (Mensah, Schoderbek, & Sahay, 2002). The citizens within the community knew exactly what their money was going to

and they had a greater opportunity to make sure it was put to good use and was used to help the students.

Resource Allocation:

One of the most common complaints in reference to public schools is the misallocation of resources. Many believe too few resources are directed towards the classroom and toward student instruction. There is a rising apprehension that school administrations “consume too much of the educational dollar in traditional public schools, diverting much needed resources from classrooms and hampering efforts to improve student outcomes” (Arsen & Ni, 2012). A study done in Michigan compared “resource allocation” (Arsen & Ni, 2012) in charter schools and in public schools finding that “charter schools spend on average \$774 more per pupil per year on administration and \$1141 less on instruction than traditional public schools” (Arsen & Ni, 2012). The Michigan charter schools do however spend “a great deal more on administration” (Arsen & Ni, 2012).

Other studies also claim that administration consumes too much of the educational resources which is a detriment to “educational productivity (Brewer, 1996). Brewer hypothesized that more administration lowers output because of the “increased burden central offices and building administrators place on teachers” because more administration displaces other instructional resources within the fixed budget (Brewer, 1996). How a school or school district chooses to allocate the financial resources it is given can greatly advance students’ knowledge or greatly hinder it. Districts that have ensured all possible funds are put towards the classroom have seen greater results. The difficulty arises with the fact that administrators and teachers still

need to be paid for their work which is the reason that not all the financial resources can make it to the classroom.

Social Influences:

The social influences hypothesis states that because social influences vary from state to state, student outcomes will also vary from state to state. Many different factors are included in social influences including participation in extracurricular activities, family dynamics, race, and income.

After School Activities:

Previous research has stressed the importance of participation in after-school activities to keep students busy and off the streets. The College Board looked at the relationship between participation and student outcomes, particularly SAT scores. The data, from a national sample of college-bound high school students showed that those who participate in extracurricular activities have higher SAT scores than those who don't participate in extracurricular activities; furthermore, participation in extracurricular activities benefits minorities and socioeconomically disadvantaged students more than white students (Everson & Millsap, 2006). A study in Georgia found that the implementation of after school programs greatly increased student outcomes. The study examined After-School All-Stars, which is "a comprehensive after school program designed specifically for middle school children living within the urban environment" (Andrews & Thompson, 2010). The program includes academic tutoring, enrichment programs such as field trips and clubs, parental involvement, and physical activity. By comparing the results of students who participated to students who did not participate, it was found that grade point

average and attendance at school was higher than those who did not participate (Andrews & Thompson, 2010).

Parental Education:

Parental education and influence is another social influence discussed at length within the literature. In addition, children who have parents that are “more highly educated will enjoy greater age-linked gains in cognitive abilities and academic achievement” according to recent studies (Tucker-Drob, 2013). These studies have shown how critical parental involvement is in student outcomes (Tucker-Drob, 2013), comparing the role of a parent to that of a teacher (Groves, 1932). Previous research has found that parental involvement is key in development of skills and knowledge when children are younger finding that parents are most influential in the “building up of a background of knowledge” before their children enter school (Groves, 1932). If parents have minimal education, they will be unable to pass their knowledge on to their children as they grow, because “parent education makes known the sources of the various sorts of information that the parent needs to have as the child passes through the progressive stages of his development” (Groves, 1932). If parents are unable to build this foundation of knowledge and learning skills for their children at a young age, the children will already be behind other students who have received this knowledge at a young age from their parents.

Race:

The third social influence the literature largely discussed was race. The achievement gap between white students and minority students is a frequently discussed topic in regards to education as it is always present and persistent. In early years, segregation of all public places, including schools, was not only commonplace but expected. The integration of schools changed

all of this, but because the beginning of the United States separated blacks from whites, the issue of race still continues today (Cohen, 1969). The effect of race is usually discussed at the policy level, as many educational policies have been implemented in an attempt to equalize race inequality. In the 1980's, many "education authorities produced policy documents where were designed to remedy racism" (Williams, 1986). A small number of schools across the country have "been able to narrow the achievement gap through implementation of strategies that impact everything from student-teacher relationships to the role of the district as a whole" (Williams, 2011). The strategies adopted by these schools could be easily implemented in any school across the country however the researcher notes that a "dramatic shift in the attitude and priorities of policy-makers, administration, and teachers must occur" (Williams, 2011). Many research articles depict the issue of race as a perpetuation of a stereotype identifying "racial minorities as educational problems" (Williams, 1986). The dominance-differentiation theory examines "how immigrants' place of education, whether in the United States or abroad, and whether racial status affects their ability to integrate into U.S. society (Painter II, 2013). The theory accompanied with this is that receiving an education in a foreign country is generally linked to "lower wealth accumulation" (Painter II, 2013).

Income:

The issue of income is one of the most influential factors in student's educational outcomes, affecting students before they enter school to long after they complete school. Coming from a low-income family is considered one of the most "influential and consistent factor related to schooling outcomes" (Fowler & Walberg, 1991). The effect of income on education creates a cyclical pattern, difficult to escape from. Because "ability is a key determinant of capital accumulated" (Cardak, 2004), if a child is born into a low-income family, their chances of being

successful in school are immediately lower than children in wealthy families. The likelihood of them failing out, dropping out, or only receiving a GED are higher because of lack of financial resources to be successful which catapults them into a life of poverty and if they have children, their children will more than likely experience the same results (Morgan & David, 1963). After analyzing private education models and public education models, it was found that students who attend private schools have higher incomes later in life than compared to students who attend public schools (Cardak, 2004). The economic advantage of families with money is clear here as they can afford to send their children to private schools to receive a better education than low-income families

Social factors come from a variety of sources whether they are something the students have control over or they don't; regardless social influences greatly impact students' educational outcomes. By joining extracurricular activities or engaging with their parents, students and parents can be proactive to improve outcomes. However, some students don't have access to after school programs or they don't parents who are actively involved with their education. Unfortunately, the issue of race and income are factors that will continue to plague students until better research finds a method to break from the cyclical pattern created by race and income.

Gender:

The topic of gender and its wide influences on several aspects of life have been studied, including effects on educational outcomes of students. In fact, "issues related to gender continue to be a major challenge for educators in the 21st century "(Aldridge 2009) as the wide range of educational challenges created by gender differences is growing even larger. For example, some schools are now experimenting with single gender schools, or even single gender classrooms.

These separations imply that “females are not as qualified as males” (Aldridge, 2009) which ultimately creates competition between the two groups. The variance in treatment towards males and females stems from earlier times in the country when “parents and educators worried about the need to prepare boys and girls for their different roles in the largely segregated work world” (Sadker and Klein, 1991) which has seemingly been carried on throughout time. The underlying physiological difference between males and females is well known throughout society, yet the constant discussion of it and use as explanation may in fact be perpetuating the stereotypes of gender roles (Hyde, 2005). In fact the perpetuation of stereotypes will only continue as long as “the mass media and the general public remain captivated by findings of gender differences” (Hyde, 2005). Only more recently has the issue of gender distinctions in education become more prominent as “throughout the 20th century, gender distinctions were more blurred in school than in the workplace” (Sadker and Klein, 1991). While some literature measures overall differences in educational attainment between males and females, it’s important to identify their base education levels. Recent years have seen a trend in parents holding off in sending their children to kindergarden in order to let them age another year, physically and mentally. Data from the “Early Childhood Longitudinal Study of the Kindergarten Cohort indicate that boys comprise about 60% of the children with delayed kindergarten entry and 66% of those who repeat kindergarten” (Buchmann, DiPrete, and McDaniel, 2008). When analyzing test score data, recent data shows that boys have higher scores in mathematics while girls have higher reading test scores, yet “there is considerable cross-national variation in the size of the gaps” (Buchmann, DiPrete, and McDaniel, 2008).

Hypotheses and Theory

Throughout my research on student performance and test scores, I found varying theories. However, the literature on the topic helped me formulate my hypotheses in order to test them.

Hypothesis 1: States that pay their teachers more than their administrators will have higher test scores than states that pay their administrators more than their teachers.

This specific variable will be my contribution to the already existing literature. Because previous literature has looked at salaries of teachers and classroom money, but not administrator salaries, I thought this would be an interesting topic. The argument I make for this is that teachers will take jobs that pay them more money. If schools are going to pay administrators more, it will entice teachers to leave the classrooms in order to be paid more money. This will pull the good educators from the classroom at the expense of the students as their performance decreases.

Hypothesis 2: States with a Democratic Governor will have higher test scores than states with a Republican Governor.

Based on the literature discussing the increase in funding to education when legislatures are Democratic majority and Governors are Democrats (McLendon, Hearn, and Mokher), I hypothesize that states with Democratic governors will have higher test scores and ultimately, better student performance.

Hypothesis 3: States that gave the Democratic candidate a higher percentage of the vote during the most previous Presidential election will have higher test scores than states that gave the Republican candidate a higher percentage of the vote.

Because Democrats spend more money on education and education reform, I predict that states with a higher percentage of the overall vote to the Democratic candidate will have higher test scores because the citizens voting for the Democrats are also concerned with educational reform.

Hypothesis 4: States that have a ballot initiative or popular referendum process will have higher test scores than states without ballot initiative or popular referendum processes.

Most educational ballot initiatives are concerned with reforming some aspect of the system changing it for the better, ensuring that children can perform better. Therefore, I hypothesize that if a state has a ballot initiative or popular referendum process, they will have higher educational outcomes, and test scores because some type of reform will have occurred through this initiative process in comparison to states that have no such process in place.

Hypothesis 5: States that have higher instructional expenditures per student will have higher test scores than states with lower instructional expenditures per student.

This hypothesis was developed through the examination of school resources, including my earlier hypothesis of teacher and administrator salaries. As classrooms receive more money, more money is being used for the educational purposes of children thus offering more opportunities and chances for success in the classroom.

Hypothesis 6: Students who come from a higher income family will perform better and have higher test scores than students from low income families. States with a higher median family income will have higher test scores than states with a lower median family income.

Because high income families have more access to educational resources, better schools, and more one-on-one time spent with their children, it follows that their children will positively respond to this extra attention and assistance, allowing them to perform better in school.

Hypothesis 7: White students will perform better and have higher test scores than nonwhite students. States with a higher percentage of white students will have higher test scores than states with a higher percentage of nonwhite students.

As the literature discusses, the issue of race and student performance is a perpetuation of stereotypes. Nevertheless, socioeconomic stereotypes prevail and statistically white students live in better neighborhoods with better schools and more funding, allowing them to receive a better education and test better and perform better.

Hypothesis 8: Female students will perform better and have higher test scores than male students. States with a higher percentage of female students will have higher test scores than states with a higher percentage of male students.

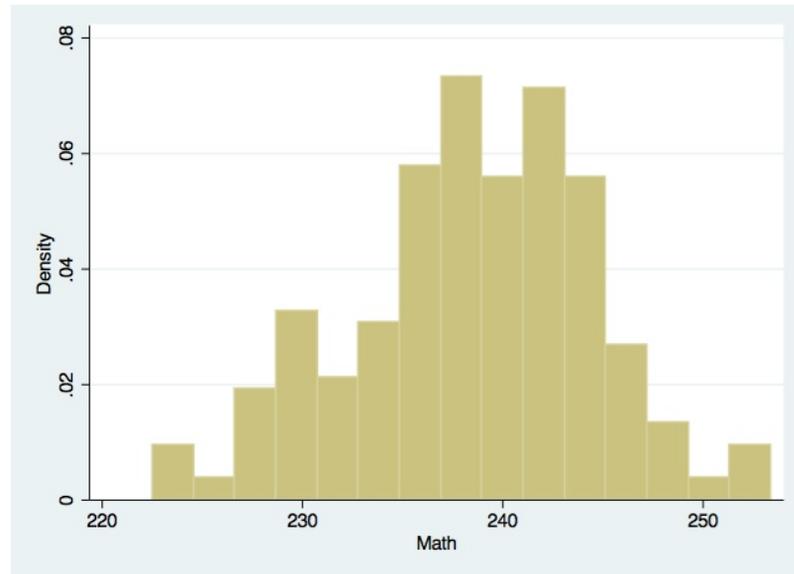
Data

To test these hypotheses which I studied, I used data which I collected from a variety of sources including the Annie E. Casey Foundation's Kids Count Data, The National Education Association, the United States Census Bureau, and the United States Department of Education.

The dependent variable is standardized math and reading test scores of fourth graders across the United States for the years 2003, 2005, 2007, 2009, and 2011.

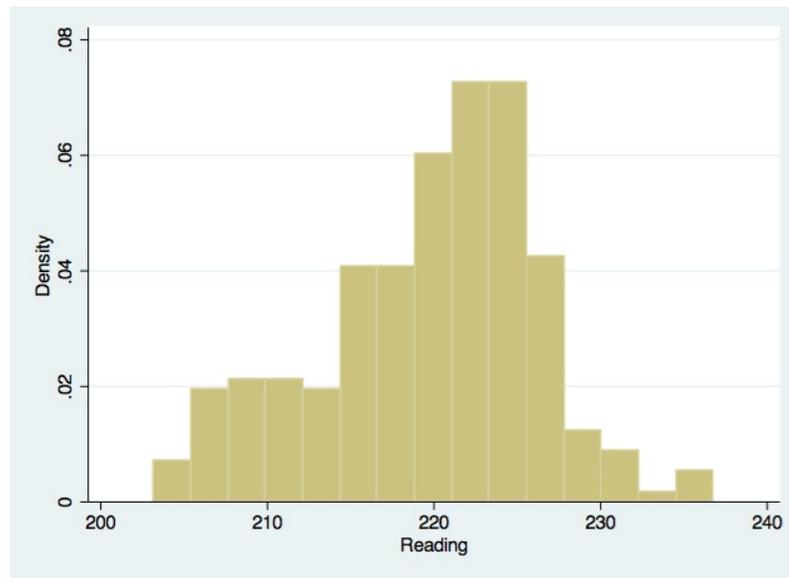
An interval variable, the test scores for math tests ranged from 223 to 253. Figure 1, below, demonstrates the range in math test scores across the United States. States such as Alabama have math test scores on the lower range while states such as Massachusetts had an average math test score of 253.

Figure 1: Distribution of Math Test Scores



Measured as an interval variable, the test scores for reading tests ranged from 203 to 237. Figure 2, below, illustrates the range in reading test scores across the United States. States such as New Mexico tested on the lower range for reading test scores while states such as Massachusetts had an average reading test score of 237 one year.

Figure 2: Distribution of Reading Test Scores

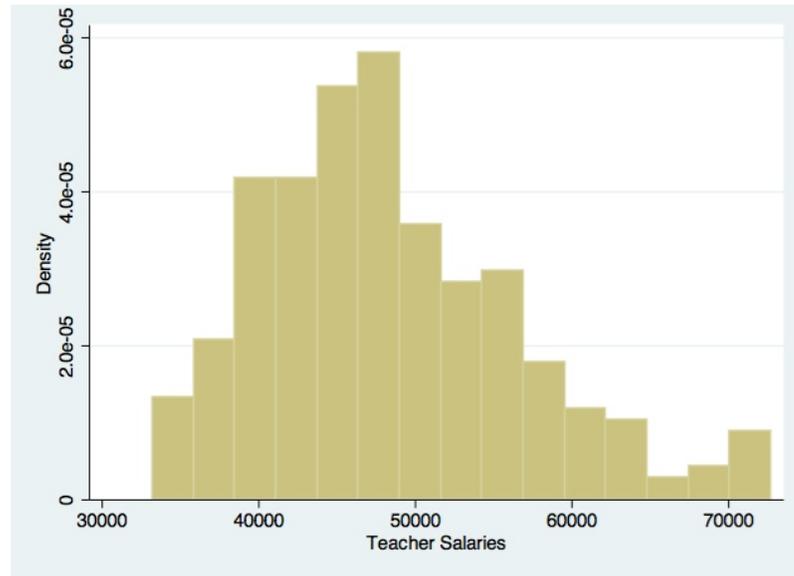


My explanatory variables were ratio of teacher to administrator salaries, political party of the Governor, percentage of vote to the Democratic candidate in most previous Presidential election, presence of a ballot initiative or popular referendum process, average instructional expenditures per pupil, average family income, race, and gender.

An interval variable, the ratio of teacher to administrator salaries was measured by dividing average teacher salary for that year by the average school administrator salary for that year in each state.

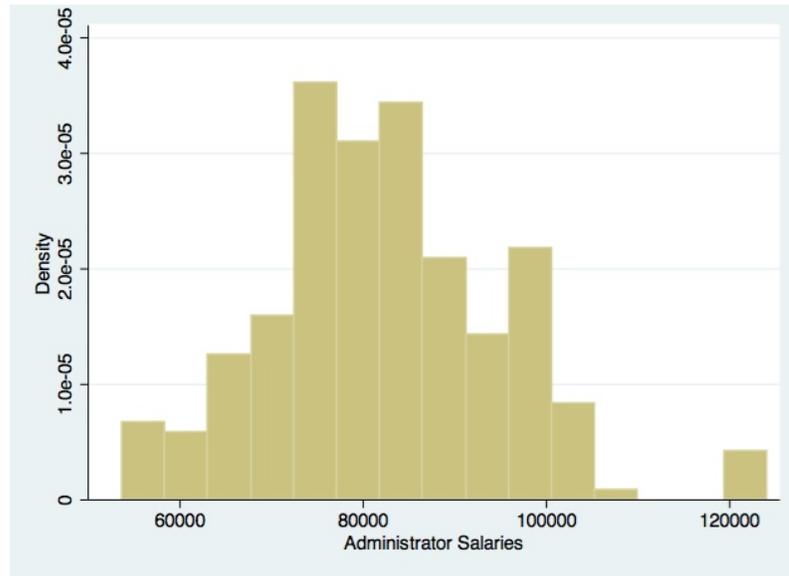
The average teacher salary for all fifty states between the tested years was \$48,322 ranging from a minimum of \$33,236 to \$72,708. The figure, below, illustrates the range of teacher salaries across the United States. South Dakota has one of the lowest teacher salaries while New York pays their teachers some of the highest salaries.

Figure 3: Distribution of Teacher Salaries



The average administrator salary for all fifty states between the tested years was \$82,373.65 ranging from a minimum of \$53,700 to \$124,100. Figure 4, below, illustrates the range of administrator salaries across the United States. Wyoming fell on the lower range of administrator salaries with an average of \$53,700 while New York paid their school administrators some of the highest salaries. Although the distribution looks similar to that of teacher salaries, it is important to recognize that the numbers are significantly higher than teacher salaries.

Figure 4: Distribution of Administrator Salaries



Political party of the Governor was measured on a two point scale with Democratic Governors being scored as 1, and Republican Governors being scored as 0.

The percentage of the vote to the Democratic candidate in the previous Presidential election before that school year is measured as a percentage, but calculated into the regression as a decimal number. The percentages ranged from 26% (.26) to 85% (.85) demonstrating the variance in state voting trends.

The presence of a ballot initiative or popular referendum process was measured on a two point scale of either having a process (1) or not having a process (0).

Instructional expenditures per pupil were measured as an interval variable ranging from \$3,103 to \$16,674.

Average family income ranged from \$31,008 to \$83,700, also an interval variable.

Race was measured as a percentage. The percentage used is the percentage of the child population of each state that is white. The percentage is expressed as a decimal number in the regression. The percentage of white children ranged from 13% (.13) to 93% (.93) in each state.

Gender was measured as a percentage. The percentage used is the percentage of the child population of each state that is female. The percentage is expressed as a decimal number in the regression. The percentage of female children ranged from 48% (.48) to 49% (.49) in each state.

Table 1, shown below, lists the descriptive summary statistics of my dependent variable and other independent variables.

Table 1: Descriptive Statistics on Dependent and Independent Variables

	Mean	Standard Deviation	Min	Max
Math Scores	238.49	5.98	223	253
Reading Scores	219.72	6.38	203	237
Teacher Salaries	48,322.05	8,305.77	33,236	72,708
Administrator Salaries	82,269.23	12,963.52	53,700	124,100
Ratio of Salaries	0.59	0.06	0.42	0.78
Political Party of Governor	0.49	0.50	0	1
Percentage of the vote to the Democratic Candidate in previous Presidential Election	0.48	0.095	0.26	0.85
Initiative/Popular Referendum	0.5	0.50	0	1
Instructional Expenditures per Pupil	6,698.14	2,783.41	3,103	16,674
Average Family Income	54,893.39	11,273.31	31,008	83,700
Percent White Children	3.53	32.21	0.13	0.93
Percent Female Children	0.49	0.002	0.48	0.49

Methods

I regress the standardized math and reading test scores of fourth graders across the United States on all variables. I test the years 2003, 2005, 2007, 2009, and 2011, with a total of 249 observations. Because I am testing multiple years worth of data, I will perform a cross sectional time series analysis testing two separate models to separate the two different standardized tests. The first model regresses the math test scores on the independent variables. The second model regresses the reading test scores on the same independent variables. I expect to find a statistically significant correlation between my dependent and independent variables.

Findings

Table 2: Math Test Scores

<u>Variable</u>	<u>Coefficient(Standard Error)</u>
Ratio of Teacher to Administrator Salaries	-4.97(4.12)^
Political Party of Governor	0.99(0.93) **
Percentage of the Vote to the Democratic Candidate in previous Presidential election	-5.14(4.22)**
Initiative/Popular Referendum Presence	-0.11(0.34)^
Instructional Expenditures per Pupil	0.002(0.0002)**
Average Family Income	0.0002(0.00004)**
Percent White Children in State	.0001(0.006)
Percent Female Children in State	304.67(305.31)
R Squared	0.2926
N Size:	249

** Denotes a variable significant at the 99% confidence level (0.01)
* Denotes a variable significant at the 95% confidence level (0.05)
^ Denotes a variable significant at the 90% confidence level (0.1)

Table 2, above, reports the findings from the regression analysis on math test scores. In the model, we see that the ratio of teacher to administrator salaries, political party of the

Governor, percentage of the vote to the Democratic candidate in the previous Presidential election, initiative or popular referendum presence, instructional expenditures per pupil, and average family income are statistically significant.

The ratio of teacher to administrator salaries is a statistically significant indicator of standardized math test performance at the 90% significance level. The political party of the Governor is a statistically significant indicator of standardized math test performance at the 99% significance level. The percentage of vote to the Democratic candidate in the most previous Presidential election is a statistically significant indicator of standardized math test performance at the 99% significance level. The presence of a ballot initiative or popular referendum process is a statistically significant indicator of standardized math test performance at the 90% significance level. Instructional expenditures per pupil is a statistically significant indicator of standardized math test performance at the 99% significance level. Average family income is a statistically significant indicator of standardized math test performance at the 99% significance level.

Not significant in this study was race and gender, suggesting that males and females as well as whites and nonwhites do not differ when it comes to standardized math test scores.

The R-squared value came to 0.2926, meaning that the model explains about 29.26% of my question.

Table 3: Reading Test Scores

<u>Variable</u>	<u>Coefficient(Standard Error)</u>
Ratio of Teacher to Administrator Salaries	-5.19(3.01)
Political Party of Governor	1.29(0.52)
Percentage of the Vote to the Democratic Candidate in Previous Presidential Election	-8.87(3.11)
Initiative/Popular Referendum Presence	-0.37(0.22)
Instructional Expenditures per Pupil	0.0002(0.00009)
Average Family Income	0.0003(0.00002)**
Percent White Children in State	0.002(0.009)
Percent Female Children in State	108.23(200.83)
R Squared	0.4308
N Size:	249

** Denotes a variable significant at the 99% confidence level (0.01)

* Denotes a variable significant at the 95% confidence level (0.05)

^ Denotes a variable significant at the 90% confidence level (0.1)

Table 3, above, reports the findings from the regression on reading test scores. In the model, we see that income is statistically significant.

Average family income is a statistically significant indicator of standardized reading test performance at the 99% significance level.

Not significant in this study was the effect of teacher to administrator salary, political party of the Governor, percentage of the vote to the Democratic candidate in the previous Presidential election, ballot initiative or popular referendum presence, instructional expenditures per pupil, race, and gender, suggesting that these variables do not predict reading test scores.

The R-squared value came to 0.4308, meaning that the model explains about 43.08% of my question.

Discussion

The regression models demonstrated the significance of the explanatory variables. The regression model for math did not support my hypotheses about the role that race and gender has on student test scores as these variables were not statistically significant. The regression model for reading did not support my hypotheses about the role that race, gender, instructional expenditures, political party of the Governor, ballot initiatives, percentage of the vote to the Democratic candidate in the previous Presidential election, and ratio of salaries has on student test scores as these variables were not statistically significant.

Hypothesis 1 predicted that states that pay their teachers more than their administrators (creating a bigger ratio) would have higher student test scores. My regression model showed me that for every one unit increase of the teacher to administrator salary ratio (meaning as administrators get paid more and teachers paid less) math test scores will decrease by 4.97 points. This finding supported my hypothesis.

Hypothesis 2 predicted that state with a Democratic Governor would have higher test scores. The regression model showed that states went from having a Republican Governor to a Democratic Governor, math test scores would increase by 0.99 points. These findings supported my hypothesis.

Hypothesis 3 predicted that states with a higher percentage of the vote to the Democratic candidate in the most recent Presidential election would have higher test scores. The regression model showed that for every one percent increase in percent of vote to the Democratic candidate in the most previous Presidential election, math test scores will decrease by 5.14 points. This finding did not support my hypothesis.

Hypothesis 4 predicted that states with a ballot initiative or popular referendum process would have higher test scores. The regression model showed that as states go from having no ballot initiative or popular referendum process to having a process in place, math test scores decrease by 0.11 points. This finding did not support my original hypothesis.

Hypothesis 5 predicted that states with higher instructional expenditures per pupil will have higher test scores. The regression model showed that for every one unit increase in instructional expenditures per pupil, math test scores will increase by 0.002 points. This finding supported my original hypothesis.

Hypothesis 6 predicted that states with higher average family incomes would have higher test scores. The regression supported my hypothesis showing that for every one unit increase in average family income, math test scores would increase by 0.0002 points. The regression on reading tests showed that for every one unit increase in average family income, reading test scores will increase by 0.0003 points. These findings supported my original hypotheses.

Hypothesis 7 about race and hypothesis 8 about gender were not significant in my study and therefore my hypotheses were not supported by these models.

My R-squared for math tests came to 0.4308. This means that my model explained about 43% of the question and is a seemingly good fit. My R-squared for reading tests came to 0.2926 meaning that the model only explains about 29% of the question yet is still a good fit.

The two separate models reveal very that math and reading tests themselves are different. The variables that influence them are not the same. While I originally predicted that my variables would influence both tests in the same way, it is logical that my results do not support my hypotheses.

When looking at the American education system, there is a clear emphasis placed on students' math and reading skills. However, teachers place emphasize them differently. Reading is integrated into all subject areas; without reading skills, students cannot be successful. Because of this, much of early childhood education is focused on teaching children the skills necessary to learn to read, to read, and to read effectively. Teachers spend far more time on reading skills in the classroom than they do on math skills. Students who fall behind in reading are given extra attention, whether it be with additional attention from the teacher, special instruction from a teacher's aide inside or outside the classroom, or more help at home. Schools ensure that their students have the skills necessary in order to be able to read. That is why only family income is a significant predictor for reading test scores. While the other variables I test may be influencing scores somewhat, there are so many outside forces working to pull up those test scores, my variables aren't influential enough. The influence of income illustrates the importance of outside help hinting that families which have the resources to seek extra help for their children, will do so thus improving their reading test scores.

It is also important to identify why math scores are influenced by so many variables. Because of the close relation between math and science, as well as the importance that the United States has focused on the two in order to remain a high status in the international world, there is a lot of focus on math test performance. Simply put, math has a higher focal priority in terms of education policy because of its importance in the international world.

Conclusion

The importance of understanding the factors contributing to the results of standardized test taken by students across the country is an important issue facing educators, school

administrators, and policy makers today. This study analyzed and discussed previous literature on the topic of educational outcomes and student success and then used statistical analysis to further demonstrate the impact of several variables on scores from math and reading standardized tests taken by fourth graders in the United States. Applications can be made to apply past research and this study to examining the overall success of students.

Results from my analyses were not as I had originally predicted. The strongest model was the model testing math scores. My variable of interest, ratio of salaries, was statistically significant. The model explained 43.08% of the question, meaning it is a good fit. In regards to the model testing reading test scores, I was expecting to find more statistically significant variables as well as to have more of the question explained. Because previous literature found some variables significant that I did not find significant, there are a lot of improvements to be made in the future in order to better explain the question.

In order to improve outcomes in future studies, it would be better to look at these variables on a smaller scale, rather than state averages. Considering the massive size and density of some states, using state averages may not be as accurate as it would be to look at the variables by county or by school district. Further research should also examine this relationship over time and examine any possible changes in test scores to determine what variables are causing this change. Additionally, it could be insightful to combine variables to observe how they interact with each other and affect the relationship with the dependent variable. For example, looking at low-income female students in comparison to high-income female students and how their math test scores and reading test scores compare. Additional variables, such as material taught in classroom and presence (or lack of presence) of teaching assistants could be tested in the future to see what effects they have on students' standardized test scores.

While all the variables I tested influence math and reading test scores in some way, my research and analysis supported one main idea: money trumps all. As shown by the significance of average family on both sets of test scores, it's clear that money is one of the most influential variables affecting student performance. Does this mean policymakers should just throw more money into the American education system? No. It has already been proven that money does not equal performance. Instead, the results suggest that policymakers find a way to effectively use money, perhaps using it bring students from all different backgrounds onto the same playing field, giving them all equal chance to succeed. From these findings, I propose that politicians find a way to ensure that all students have access to the same resources, the same help, and the same education. Once we equal the playing field at home and ensure equal opportunity for all students, then I believe we will truly be able to compete in the international academic ring.

Works Cited

- Aldridge, Jerry. (2009). "Gender and Education." *Childhood Education*. 86.1 : 59-61.
- Andrews, E. B., & Thompson, W. R. (2010). Structured physical activity can co-exist with improvements in academic performance in after school setting. *Medicine & Science in Sports & Exercise*, 42(5), 523.
- Annie E. Casey Foundation. (2013). "Child Population by Gender." *Kids Count* n.pag. *Kids Count Data Center*. Web. 26 Feb 2014. <<http://datacenter.kidscount.org/data/tables/102-child-population-by-gender?loc=1&loct=2>>
- Annie E. Casey Foundation. (2013). "Child Population by Race." *Kids Count* n.pag. *Kids Count Data Center*. Web. 24 Feb 2014. <<http://datacenter.kidscount.org/data/tables/103-child-population-by-race?loc=1&loct=2>>
- Annie E. Casey Foundation. (2013). "Median Family (With Child) Income." *Kids Count* n.pag. *Kids Count Data Center*. Web. 24 Feb 2014. <<http://datacenter.kidscount.org/data/tables/65-median-family-with-child-income?loc=1&loct=2>>
- Arsen, D., & Ni, Y. (2012). Is administration leaner in charter schools? Resource allocation in charter and traditional public schools. *Education Policy Analysis Archives*, 20 (31), 1-24.
- Bali, Valentina. (2008). "The Passage of Education Citizen Initiatives Evidence from California." *Educational Policy*. 22.3. 422-456.

- Branton, Regina. (2004). "Voting in Initiative Elections: Does the Context of Racial and Ethnic Diversity Matter?." *State Politics & Policy Quarterly*. 4.3 (2004): 294-317.
- Brewer, D. J. (1996). Does more school district administration lower educational productivity? Some evidence on the "administrative blob" in New York public schools. *Economics of Education Review*, 15 (2), 111-124.
- Buchanan, William. (1962). "Federal Aid to Education on the Conservative-Liberal Scale." *Annals of the American Academy of Political and Social Science*. 344: 55-64.
- Buchmann, Claudia, Thomas DiPrete, and Anne McDaniel. (2008). "Gender Inequalities in Education." *Annual Review of Psychology*. 34: 319-337.
- Cardak, B. A. (2004). Ability, education, and income inequality. *Journal of Public Economic Theory*, 6 (2), 239-276.
- Coffey, David. (2011). "More than a Dime's Worth: Using State Party Platforms to Assess the Degree of American Party Polarization." *PS: Political Science & Politics*. 44.2: 331-337.
- Cohen, D. K. (1969). Education and race. *History of Education Quarterly*, 9 (3), 281-286.
- de Avila, Alexander. (2013). "The Graph That Shows How Badly U.S. Education is Failing." *PolicyMic*. <<http://www.policymic.com/articles/70993/the-graph-that-shows-how-badly-u-s-education-is-failing>>.
- Dee, T. S. (2005). Expense preference and student achievement in school districts. *Eastern Economic Journal*, 31 (1), 23-44.

- Di Carlo, Matthew, Nate Johnson, and Pat Cochran. (2007). United States. AFL-CIO American Federation of Teachers. *Survey and Analysis of Teacher Salary Trends 2007*. New Jersey: <<http://www.aft.org/pdfs/teachers/salarysurvey07.pdf>>.
- Fowler, W. J., & Walberg, H. J. (1991). School size, characteristics, and outcomes. *Educational Evaluation and Policy Analysis*, 13 (2), 189-202.
- Groves, E. (1932). The modern American family. *Annals of the American Academy of Political Science*, 160, 216-222.
- Hyde, Janet. (2005). "Gender Similarities Hypothesis." *American Psychologist*. 60.6: 581-592.
- Info Please. (2014). "Presidential Election, Electoral and Popular Vote Summary." *US Elections*. <<http://www.infoplease.com/us/government/presidential-election-vote-summary.html>>.
- Info Please. (2014). "The Governors of the Fifty States." <<http://www.infoplease.com/ipa/A0108908.html>>.
- McLendon, Michael, James Hearn, and Christine Mokher. (2009). "Partisans, Professionals, and Power: The Role of Political Factors in State Higher Education Funding." *Journal of Higher Education*. 80.6 (2009). <http://muse.jhu.edu/journals/journal_of_higher_education/v080/80.6.mclendon.html>.
- Mehta, Jal. (2013). "Why American Education Fails: And How Lessons From Abroad Could Improve It." *Foreign Affairs*. The Council on Foreign Relations. <<http://www.foreignaffairs.com/articles/139113/jal-mehta/why-american-education-fails>>.

- Mensah, Y. M., Schoderbek, M. P., & Sahay, S. P. (2013). The effect of administrative pay and local property taxes on student achievement scores: Evidence from New Jersey public. *Economics of Education Review*, 34, 1-16.
- Millet, Dixie. (2011). *Is Education Non-Partisan? Effects of Partisan Politics on State Education Expenditures*. Diss. Georgetown University. Washington DC.
- Morgan, J., & David, M. (1963). Education and income. *The Quarterly Journal of Economics*, 77 (3), 423-437.
- Moser, M., & Rubenstein, R. (2002). The equality of public school district funding in the United States: A national status report. *Public Administration Review*, 62 (1), 63-72.
- National Education Association. Department of Education, (2010). *Rankings of the states 2010 and estimates of school statistics 2011*. Washington DC: National Education Association.
- National Education Association. (2011). "Teaching Salary Data by State." *Teacher Portal National Education Association*. <<http://www.teacherportal.com/teacher-salaries-by-state/>>.
- Painter II, M. A. (2013). Immigrant and native financial well-being: The roles of place of education and race/ethnicity. *Social Science Research*, 42 (5), 1375-1389.
- Sadker, Myra, David Sadker, and Susan Klein. (1991). "The Issue of Gender in Elementary and Secondary Education." *American Educational Research Education*. 17. 269-334.
- Tucker-Drob, E. M. (2013). How many pathways underlie socioeconomic differences in the development of cognition and achievement? *Learning and Individual Differences*, 25, 12-20.

United States Census Bureau (2004). "State Median Household Income 2002-2003." *American Community Survey Office*. <<http://ssti.org/Digest/Tables/091304t.htm>>.

United States. Department of Education. (2004). *Average Annual Salary For Public School Principals And Average Annual Salary By Years Of Experience As A Principal, By State: 2003-04*. Washington DC. <http://nces.ed.gov/surveys/sass/tables/state_2004_30.asp>.

United States. Department of Education. (2013). *Estimated Average Annual Salary Of Teachers In Public Elementary And Secondary Schools, By State Or Jurisdiction: Selected Years, 1969-70 Through 2009-10*. Washington DC.
<http://nces.ed.gov/programs/digest/d10/tables/dt10_083.asp>.

United States. (2013). Department of Education. *NAEP Data Explorer*. Washington DC.
<<http://nces.ed.gov/nationsreportcard/naepdata/dataset.asp&xgt;>>.

United States. Department of Education. (2003-2011). *Principals' Salaries*. Washington DC.
<<http://www.naesp.org/resources/2/Principal/2006/M-Jp45.pdf>>.

United States. Department of Education. (2013). *State Total Current Expenditures per Pupil*. Washington DC.
<<http://nces.ed.gov/ccd/elsi/expresstables.aspx?bridge=quickFacts&tableid=16&level=State&year=2003-04>>.

United States. Department of Justice. (2013). *Media Family Income by Family Size*. Washington DC.
<http://www.justice.gov/ust/eo/bapcpa/20121101/bci_data/median_income_table.htm>.

University of Southern California. (2013). "Statewide Data." *Initiative and Referendum Institute IRI At the University of Southern California*.

<http://www.iandrinstitute.org/statewide_i&r.htm>.

Virginia. Department of Education. (2005). *Teacher Salary Study*.

<[http://leg2.state.va.us/dls/h&sdocs.nsf/fc86c2b17a1cf388852570f9006f1299/c4309d7e3cb0fc56852570f80065ffba/\\$FILE/RD38.pdf](http://leg2.state.va.us/dls/h&sdocs.nsf/fc86c2b17a1cf388852570f9006f1299/c4309d7e3cb0fc56852570f80065ffba/$FILE/RD38.pdf)>.

Wilhelm, Teena, and Damon Cann. (2011). "Policy Venues and Policy Change: The Case of Education Finance Reform." *Social Science Quarterly*. 92.4: 1074-1095. Print.

Williams, A. (2011). A call for change: Narrowing the achievement gap between white and minority students. *The Clearing House: A Journal of Educational Strategies, Issues, and Ideas*, 84 (2), 65-71.

Williams, J. (1986). Education and race: The racialisation of class inequalities?. *British Journal of Sociology and Education*, 7 (2), 135-154.