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Compensation and Organizational Outcomes: Examining the Relationship between Teacher Salaries and Student Achievement for School Divisions in Virginia

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COMPENSATION AND ORGANIZATIONAL OUTCOMES: EXAMINING THE RELATIONSHIP BETWEEN TEACHER SALARIES AND STUDENT ACHIEVEMENT FOR SCHOOL DIVISIONS IN VIRGINIA

A dissertation submitted in partial fulfillment of the requirements for the degree of Doctor of Philosophy at Virginia Commonwealth University.

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Abstract

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Major Director: Blue E. Wooldridge, D. P. A., Professor, L. Douglas Wilder School of Government and Public Affairs

This research presents the results of general linear modeling (GLM) of 131 school divisions in Virginia. The purpose of this research is to answer the question: What is the relationship between teacher salaries and student achievement as measured by Adequate Yearly Progress (AYP)? Utilizing an equity theory and distributive justice perspective, data related to achievement in English and mathematics by high school students, as measured by the requirements of AYP, were culled from the Virginia Department of Education for every school division in Virginia in the subjects of reading, writing, algebra I, geometry, and algebra II. These data represent the dependent variables and are analyzed with teacher salary and principal salary data, which represent the independent variables. Intervening variables identified in the education, public policy and economic literature are also included in the modeling. An analysis of nine general linear models produced evidence that the relationship between teacher salaries

and student achievement, as measured by AYP, is relatively weak. Though the results do not support a wide range of policy recommendations, one recommendation is for school divisions in the northern region of the state to consider a readjustment of their pay scales in order for teacher salaries in those Northern Virginia school divisions to be more competitive with other school divisions in the state when adjusted for cost-of-living.

CHAPTER 1: INTRODUCTION

In 1983 the National Commission on Excellence in Education published *A Nation at Risk: The Imperative of Educational Reform* describing the state of the American educational system as in need of reform and improvement to avoid mediocrity for students, teachers, and administrators (The National Commission on Excellence in Education, 1983). This report lead to legislation at the state and federal levels intended to improve public education, but student achievement continued to decline in comparison to other countries, especially in math and science (National Commission on Teaching and America's Future, 1996). As reports of declining student achievement in the American educational system have surfaced, education and public policy focus has turned to the teaching profession (Jupp, 2005; National Commission on Teaching and America's Future, 1996). Research among educational experts, economists and public policy researchers report that teacher inputs such as experience and education have a positive impact on student achievement (Kukla-Acevedo, 2009; Jupp, 2005; Odden & Kelley, 1997, 2002; Gill & Meier, 2001; Clotfelter, Ladd, & Vigdor, 2006; Goldhaber & Anthony, 2007; Goldhaber & Brewer, 1997; Jepsen, 2005; Krueger, 1999; Rivkin, Hanushek, & Kain, 2005; Rockoff, 2004). Another input that might impact student achievement is teachers' salaries. Gill and Meier (2001) have found in their research of school districts in Texas that a positive correlation exists between teacher salaries and student achievement on standardized tests. Understanding compensation, often the largest portion of educational budgets, is one of the key elements to determining what

steps might be taken to improve effectiveness in school districts as measured by student achievement (Odden & Kelley, 1997, 2002).

Whether in the private, non-profit, or public sector, institutional rewards (Katz, 1964) such as pay and benefits can influence individual behavior which impacts organizational success (McGregor, 1960; Herzberg, 1966; Vroom, 1964; Lawler, 1971, 1990, 1992, 2000; Kalleberg, Marsden, Reynold & Knoke, 2006). As Odden and Kelley (1997, 2002) have suggested, teachers have the greatest direct influence on students within the educational setting, and student achievement represents the greatest proportion of educational outcomes. As the concern for improving the American public educational system has increased, economists, public policy and education scholars have pointed to several areas in teacher compensation packages to reward teachers for successful outcomes, such as: better work environments; increased training; and, moving from a single pay schedule to a more progressive system that can reward teachers for student achievement (Jupp, 2005; Solomon, 2005; National Commission on Teaching and America's Future, 1996; Odden & Kelley, 1997, 2002).

Two initiatives during the presidency of George W. Bush have placed primary and secondary education at the forefront of federal public policy: "No Child Left Behind" and the "Reading First" initiative. The former is public law 107-110. No Child Left Behind created a target of 100% literacy among school children within twelve years of its inception (Linn, Baker, & Betebenner, 2002). The No Child Left Behind Act of 2001 (NCLBA) amended the Elementary and Secondary Education Act of 1965 mandating strict accountability on states to improve education (Linn, Baker, & Betebenner, 2002). The NCLB Act of 2001 reinforced existing

infrastructures in many states for creating and fostering an atmosphere of high performance among primary and secondary school children (Linn, Baker, & Betebenner, 2002). What differentiates the NCLB Act of 2001 from the Education Act of 1965 is that the NCLB Act of 2001 allows the federal government to redirect funds from low performing school districts to higher performing school districts (U.S, Department of Education, 2008).

This study utilizes a secondary analysis of data for Virginia's school divisions provided by the Virginia Department of Education for the 2007-2008 school year. Distributive justice and its antecedent, equity theory, provide a theoretical perspective for understanding the relationship between individual inputs and organizational outcomes. A multivariate data analysis approach will provide evidence as to whether a relationship exists between elements of teacher compensation and student achievement while considering intervening social and economic variables.

Purpose and Research Question

The purpose of this research is to identify the influence that teachers' compensation has on student achievement. The overall research question is: what is the relationship between teacher salaries and student achievement as measured by adequate yearly progress (AYP)? This research will consider this question with regard to variables that might mitigate the link between salary comparisons and student achievement. For the purposes of this research, student achievement will be represented by the pass rate in five academic areas for school divisions in Virginia as measured by AYP. Six intermediary factors identified in the public policy and education literature, which will be treated as moderating variables in this research, include: student

ethnicity, the percentage of students eligible for school lunch programs, the drop-out rate, teacher education beyond a bachelors degree (Goslin & Glass, 1967; Lomax et al., 1995; Gill & Meier, 2001), change in school division size over a five year period, and percentage of participating in limited English programs.

Importance of Study

One area of the public sector with standardized organizational outcomes is public education (Gill & Meier, 2001). According to Gill and Meier (2001), one of the best ways to study organizations with an objective organizational outcome variable in the public sector is to look at public school districts. Among the number of bureaucracies in the United States, school districts are the most prevalent. School districts, more than other bureaucracies in the United States, have well defined organizational outcomes in the form of standardized tests (Gill & Meier, 2001). Though the use of standardized tests is criticized for different reasons, they remain the most popular and effective measure of student achievement (Goslin & Glass, 1967; Paris, Lawton, Turner, and Roth, 1991; Lomax, West, Harmon, Viator, & Madaus, 1995).

As educational issues begin to permeate both public policy and education policy, accountability and improvement have moved to the forefront. In Virginia, the Standards of Learning (SOL) exams are used to measure student achievement and determine whether schools gain accreditation from the state. Along with other measures of student achievement (i.e. student attendance, assessments), the SOLs are factored into calculating AYP, which is used for determining compliance with the NCLBA. Compliance with the NCLBA and school accreditation is the common goal of teachers and administrators in each school in Virginia

(Virginia Department of Education, 2010). Though the organizational goal is the same, there are differences in pay between teachers and administrators and between teachers working in different regions of the state (Virginia Department of Education, 2008). This research is designed to determine whether interregional teacher comparisons or the difference between teacher salaries and administrative salaries have an impact on student achievement, and ultimately school compliance with NCLBA and accreditation.

Gill and Meier’s (2001) research elucidated the positive correlation between teachers’ compensation and student achievement on standardized tests. Gill and Meier approached their research from an organizational management perspective with an emphasis on the impact of individual inputs on organizational outcomes. In education, inputs are the characteristics and tools teachers bring with them to the profession, and organizational outcomes are student achievement on standardized examinations and progress towards NCLBA compliance (Kukla-Acevedo, 2009; Solomon, 2005, Jupp, 2005; Gill & Meier, 2001; National Commission on Teaching and America’s Future, 1996).

Standardized test scores have become a driving force behind local, state, and federal policy (Paris et al.,1991; Lomax et al., 1995). The state of Virginia uses SOL examination scores for budgetary and accreditation reasons, and the federal government uses test scores along with other measures of student progress to determine compliance with NCLBA (U.S. Department of Education, 2008; Virginia Department of Education, 2008). The objective nature of standardized testing has been debated by researchers, education consultants, and educational and public policy scholars (Lomax et al., 1995). Whether or not standardized testing is inherently flawed, it is

likely to remain the primary measuring standard for academic achievement (Paris et al., 1991; Lomax, et al., 1995).

With a well defined organizational outcome variable in the form of AYP, school districts (Gill & Meier, 2001) offer researchers an opportunity to determine whether teachers' compensation impacts organizational outcomes positively or negatively (Adams, 1965; Jasso, 1980, 1986; Greenberg, 1987, 1989, 1990). According to Odden and Kelley (2002), "Because teacher compensation is the largest portion of the education budget, how teachers are paid is key to effective use of educational resources…If better methods exist for paying teachers they should be considered and adopted, especially if they will contribute to improved schools and…higher paid teachers" (p. 2). While merit pay and pay for performance systems (Odden & Kelley, 1997, 2002) have been considered and implemented in several school districts with an emphasis on teacher traits (i.e.: educational attainment, specialized training) (Kukla-Acevedo, 2009; Jupp, 2005; Clotfelter, Ladd, & Vigdor, 2006; Goldhaber & Anthony, 2007; Goldhaber & Brewer, 1997; Jepsen, 2005; Krueger, 1999; Rivkin, Hanushek, & Kain, 2005; Rockoff, 2004), relatively little focus has been given to the impact of salaries on organizational outcomes.

Student Achievement and Public Policy

Accountability in education has shaped public policies such as No Child Left Behind and Virginia's SOLs to improve student achievement (U.S. Department of Education, 2008; Virginia Department of Education, 2008; Odden & Kelley, 2002). Once the focus of educational policy and curriculum creation, standardized test scores have become a driving force behind local, state, and federal policy (Paris, Lawton, Turner, & Roth, 1991; Lomax, West, Harmon, Viator, &

Madaus, 1995). For teachers, pressure mounts for them to perform at high levels in order to ensure that students produce high scores on state mandated tests and compliance with federal policy (Gill & Meier, 2001). Among the obstacles faced by teachers are socioeconomic factors, such as the number of students receiving free and reduced lunches, and racial isolation among African-American and Latino within school districts (Roderick, Jacob, & Byrk, 2002; Gill & Meier, 2001; Winfield, 1990; Edmunds, 1979; Good & Brophy, 1986; Kyle, 1985; Mackenzie, 1983; Purkey & Smith, 1983; Stedman, 1987; Stringfield & Teddlie, 1988).

The No Child Left Behind Act of 2001 has impacted not only federal public policy, but also the public policy of the Commonwealth of Virginia. The goal for Virginia, as well as the other states, is to raise proficiencies in reading and mathematics while narrowing the achievement gap among minorities within Virginia's school aged population (Virginia Department of Education, 2008). Beyond the pillars of NCLBA, the federal government has established guidelines and benchmarks for the states, which include: minimum proficiency in reading and mathematics by 2013-2014; students with limited proficiencies will improve to minimum standards; by 2005-2006 all teachers will have achieved teaching qualifications; schools will be drug and violence free; and, all students will graduate (U.S. Department of Education, 2008; Virginia Department of Education, 2008). Prior to the NCLBA, many states, including the Commonwealth of Virginia, had initiated policy to increase proficiency in academics and promote high school graduation among all students (Linn, Baker, & Betebenner, 2002).

The initial standards were developed in the 1970s and 1980s and were approved by the Virginia Board of Education in 1995 (Virginia Department of Education, 2008). While the SOLs are

primarily born from educational policy, they do impact state public policy just as the NCLBA impacts federal public policy. In Virginia, allocations for school divisions are found in the budget proposed by the General Assembly and approved by the Governor (Virginia General Assembly, Legislative Information System, State Budget, 2005). A definition of Virginia's Standard's of Learning is provided in Figure 1.

> According to the Virginia Department of Education: "The Standards of Learning for Virginia Public Schools describe the commonwealth's expectations for student learning and achievement in grades K-12 in English, mathematics, science, history/social science, technology, the fine arts, foreign language, health and physical education, and driver education."

Figure 1: A Definition of Virginia's Standards of Learning
Source: http://www.doe.virginia.gov/VDOE/Superintendent/Sols/home.shtml

Teacher Compensation and Educational Outcomes

In public education, organizational outcomes are generally measured by results on standardized tests (Edmunds, 1979; Winfield, 1990; Mackenzie, 1983; Purkey & Smith, 1983; Kyle, 1985; Good & Brophy, 1986; Stedman, 1987; Stringfield & Teddlie, 1988; Gill & Meier, 2001; Roderick, Jacob, & Byrk, 2002). Since standardized test scores are used to determine where resources are allocated in school districts, student achievement on standardized tests is paramount (National Commission on Teaching and America's Future, 1996; Linn, Baker, & Betebenner, 2002). One factor that impacts student achievement on standardized test scores is teacher salaries (Gill & Meier, 2001). An intersection of education policy and public policy is in education budgets. The State of Virginia budget for years 2004-2006 included major spending

increases as proposed by HB1500/SB 700[1]. Included in the proposed spending increases were several programs and a teacher salary increase of 3%, which amounted to $54.8 million.[2]

The public policy and education policy literature provides examples of the impact of teacher salaries on student achievement on standardized tests (Kukla-Acevedo, 2009; Gill & Meier, 2001; Goslin & Glass, 1967; Paris et al., 1991; Lomax et al., 1995). However, there is a dearth of information related to the impact of comparative salary calculations that an individual might use to measure a ratio of their inputs (i.e. effort, training, and education) to the pay they receive in light of organizational outcomes (i.e. student achievement on standardized tests). As Jasso (1980, 1986) explains, justice evaluations based on comparative ratios between employees (Adams, 1965) might influence individual behavior, and if inequity is determined by individuals making ratio comparisons, individual inputs might be impacted and effect organizational outcomes. Changes in behavior might also include a change in career direction on the part of individual employees (Lawler, 1971, 1990, 1992; Odden & Kelley, 1997, 2002).

Within the educational setting, it has been suggested that because teachers have the most involvement with students that they have the largest contribution to student achievement (National Commission on Teaching and America's Future, 1996; Kukla-Acevedo, 2009; Jupp, 2005; Solomon, 2005). However, counter to the concept of equity based fairness (or contribution based fairness) in distribution (Deutsch, 1975); teachers receive lower compensation

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[1] From the Overview of Proposed Amendments to the Budget for 2004-2006: "The Governor's budget recommendations provide approximately $1.4 billion in general fund spending adjustments. Of this total, five commitments account for approximately $1.1 billion of the spending adjustments…5) Providing $81.0 million for 3 percent salary increase for state employees, college faculty, teachers, and state-supported local employees, and $31.2 million representing the employer's share of the state employee health insurance premium increase." Source: Virginia General Assembly, Legislative Information System, State Budget, 2005.

[2] Ibid

than administrators who have little direct interaction with students (Odden & Kelley, 1997, 2002). Odden and Kelley (2002) suggests that this situation exists because there has been no update to teacher compensation systems since the early part of the twentieth century. Like other agencies and departments in the public sector (Salamon, 2002; The Volcker Commission, 2005), public education continues to use single-salary pay schedule in formulating teacher compensation (Odden & Kelley, 2002)[3]. Odden and Kelley (2002) suggests that continual use of this system might impact student achievement eventually as teachers leave their posts for more lucrative jobs.

Compensation and Organizational Success

When organizations are efficient and able to maximize resources such that organizational goals are reached, they are often described as "high performing" organizations (Wood, 1996; Godard & Delaney, 2000; Kalleberg, Marsden, Reynold & Knoke, 2006). High performance work organizations (HPWO) is a term that refers to practices utilized by human resources management (HRM) in order to maximize worker efficiency and production by providing mechanisms to increase worker motivation (Wood, 1996). HPWO practices have their origin in the private sector where they were utilized to replace existing hierarchies that were put into place with the advent of mass production (Kalleberg et al., 2006). In the public sector, a shift away from hierarchical management structures has occurred as well (Salamon, 2002). According to Salamon (2002), in order for public organizations to remain competitive, they need to adapt to competitive environments and be flexible (Kalleberg et al., 2006; Godard & Delaney, 2000;

[3] Few authors have provided explanations as to why administrators, on average, have higher salaries than teachers, but Odden & Kelley (1997, 2002) and Stronge, Gareis & Little (2006) explain that the current single-salary pay schedule, used in 97% of the country's school districts, is molded after the pay schedule used in the federal government. According the Volcker Commission (2005), managers (i.e. administrators) are often paid more because of experience, length of time with the organization, or the addition of decision making duties.

Wood, 1996). In becoming more flexible and adaptive, the public sector has adopted HPWO practices from the private sector as an incentive to motivate employees to achieve maximum efficiency in their work (Wood, 1996). Among the motivating practices that are used by HRM to achieve high performance is salary (Herzberg, 1966; Corbo & Kleiner, 1991; Wood, 1996; Kalleberg et al., 2006).

While there are numerous forms of monetary compensation, including salaries, pension plans, bonuses, and stock options, salaries are the most prevalent (Perry, 2003). As Katz (1964) observes, pay and benefits work to motivate employees and encourage desired behavior on the part of employees to achieve organizational goals. “Instrumental system rewards”, a phrase termed by Katz, refers to the use of compensation as a mechanism to encourage organizational membership and loyalty among employees (Perry, 2003; Harmon & Mayer, 1986). While employees might vary in their desires for monetary pay (McGregor, 1960; Herzberg, 1966; Vroom, 1964), cash rewards tend to mitigate the desire for other non-monetary rewards because monetary rewards help individuals to meet basic needs such as food, clothing, and shelter (Maslow, 1970; Dici & Ryan, 2000).

For public school teachers and other public sector employees, the public service motivation (PSM) literature suggests that individuals who work in the public sector do so for reasons beyond self-interest (Perry & Hondeghem, 2008; Paarlberg & Lavigna, 2010). Individuals are generally drawn to teach because they enjoy teaching certain subject areas or are interested in making an impact on students’ lives (Odden & Kelley, 2002), which fits well with the PSM model that suggests that individuals in the public sector are motivated by altruistic reasons rather

than self-interest (Perry & Hondeghem, 2008). Though teachers, as well as other public sector employees, might be motivated by altruism, they are likely to expect to be compensated in a manner that reflects their effort and input (Lawler, 1971).

Salaries provide employees with a measuring device to calculate a ratio of their inputs to outputs to compare to the ratios of others (Adams, 1965; Jasso, 1980, 1986; Greenberg, 1989, 1990). These “others” may be any of a variety of individuals from within or outside the organization or industry of the individual making the comparison (Folger, 1986; Cropanzano & Ambrose, 2001; Greenberg, 1996). There is great potential for inequities to arise because individuals make these calculations either through seemingly rational or irrational justification (Greenberg, 1897, 1989, 1990, 1996). Equity theory (Adams, 1965) and distributive justice are theoretical perspectives that developed in the organizational behavior and motivation literature to explain why employees calculate these ratios and how they use them to determine fairness in the distribution of rewards (Jasso, 1980, 1986; Greenberg 1987, 1990).

Theoretical Framework

Equity theory and distributive justice perspectives provide organization researchers with tools to understand whether inequalities in individual inputs to individual outcomes ratios impact organizational effectiveness (Adams, 1965; Greenberg, 1989). Among several advantages school systems provide to organization researchers are: an objective outcome variable in the form of standardized exams (Gill & Meier, 2001) or AYP (U.S. Department of Education 2010a, 2010b, 2010c); educational requirements for individuals employed within the teaching profession (i.e. bachelors and masters degree, continuing education, etc.); and, the common use

of a single-salary pay schedule (Odden & Kelley, 1997, 2002). While the single-salary pay schedule is criticized, several reformation movements are gaining momentum throughout the country (Jupp, 2005; Odden & Kelley, 1997, 2002), it does provide researchers with a standardized individual outcome variable to observe.

Equity Theory

According Anderson and Patterson (2008), equity theory is a "cognitive" ratio of inputs and outputs that are compared to the inputs and outputs ratio of another person in order to determine organizational fairness, but also to provide a measuring device of professional success for the individual making the comparison (Adams, 1965; Greenberg, 1996; Fadil, Williams, Limpaphayom, & Smart, 2005). Each orientation is determined by how individuals perceive fairness in comparative terms to others (Adams, 1965; Folger, 1986). In order for organizations to succeed, employee allegiance is important, and that allegiance is often determined by employees' perceptions of fairness (Romzek & Hendricks, 1982). Though the concept of fairness permeates the equity theory (Adams, 1965) and distributive justice literature, measuring the impact of an employee on production is difficult because determining the appropriate outcome of an organization, especially in the public sector (Gill & Meier, 2001), is debatable (Lawler, 1971, 1992).

A review of equity theory (Adams, 1963, 1963; Adams & Jacobsen, 1964) provides insight to understand the impact of individually calculated ratios on organizational outcomes. Equity theory (Adams, 1965) provides the foundation for the development of distributive justice. While equity theory does not explain the resulting behavior or consequences of all potential situations

involving perceived fairness in distribution (Weick, 1966; Folger, 1986), it does provide the underpinnings of how obverse comparisons work (Folger, 1984, 1986; Kahneman & Tversky, 1982).

Equity theory (Adams, 1965) was posited in the early 1960s to understand whether individual employees believed they were treated fairly. The theory was founded on the basis that individuals calculate a ratio of inputs to outcomes and compare those results to a comparative other with a similar job and background characteristics (Admas, 1963, 1965; Adams and Jacobsen, 1964). The theory has been criticized (Weick, 1966; Folger, 1986) for being too rigid and simplistic. In the 1970s, Deutsch (1975) expanded the theory to include elements of the distribution of organizational resources: need, equality, and equity. During the same time, equity theory became the basis for distributive justice, which is one of the four elements of organizational justice with procedural justice, informational justification, and social sensitivity being the other three (Greenberg, 1987, 1987, 1990; Colquitt & Greenberg, 2003; Greenberg & Baron, 2008).

Equity theory (Adams, 1963, 1965; Adams & Jacobsen, 1964) states that individuals make ratio comparisons between themselves and others to determine whether individual outcomes (i.e. salary) are fair based on a calculation of inputs performed by individuals to organizational outcomes achieved (Adams, 1965; Greenberg 1989, 1990; Colquitt & Greenberg, 2003). Inputs are individual contributions to organizations in the form of hours worked, effort put forth, and training. Outputs are the results produced from individuals. Individual outcomes are the rewards that individuals receive from organizations, and organizational outcomes are achievements based

on organizational goals and missions (Adams, 1965; Lawler, 1971; 1992; Greenberg, 1987, 1989, 1990). The ratios that individuals calculate to a comparative other (Adams, 1965; Folger, 1986; Greenberg, 1996) are utilized by individuals to determine organizational fairness (Jasso, 1980). If these ratios are relatively equal, the employee determines their treatment by an organization to be fair, but if the ratios are inequitable, the employee will deem their relationship with an organization to be unfair (Adams, 1965; Greenberg 1996; Corpanzano & Ambrose, 2001).

Equity theory (Adams, 1965) posits that there are three results based on calculations made by individuals in measuring themselves to a comparative other: overpayment inequity, underpayment inequity, and equitable payments (Greenberg, 1989). Overpayment inequity occurs when an individual makes a ratio comparison with another employee working to generate similar organizational outcomes and discovers they are paid a higher sum than their comparative other. Underpayment inequity occurs when an individual makes a ratio comparison with another employee working to generate similar organizational outcomes and discovers they are paid a lower sum than their comparative other. If an individual calculates a ratio to a comparative other and discovers that individual outcomes are equal, the individual is generally satisfied that payment is fair and equitable (Adams, 1965; Jasso, 1980, 1986; Greenberg, 1987, 1989, 1990, 1996; Randall & Meuller, 2005; Greenberg & Baron, 2007). The ratios that individuals calculate and use to determine organizational fairness can influence behavior (Jasso, 1980; Randall & Meuller, 2005; Greenberg 1989, 1990).

Perceptions of fairness in pay might influence positive and negative behavioral patterns (Jasso, 1980, 1986; Hegtvedt, 1990). Underpayment inequity might result in less effort put forth by the employee or possibly corporate theft on the part of the individual who believes they are underpaid (Greenberg, 1989; 1996). The psychological impact of underpayment inequity might result in an employee feeling they are not as important as another employee and accept that the other employee is superior to them. Overpayment inequity creates a similar situation, but one where the individual attempts to justify the higher pay rate. Overpayment inequity might result in an employee working longer hours or taking less vacation. Overpayment inequity might lead to a situation where the higher paid employee accepts their higher salary as an indication of superiority to lower salaried employees (Greenberg, 1989, 1990, 1996; Colquitt & Greenberg, 2003). Inequity in pay can become a concern for employers if the resulting behavior based on calculated ratios leads to deteriorating production and lower outputs, as well as adverse changes in behavior, which might include: theft, itinerant attendance, and low morale (Jasso, 1980).

Distributive Justice

Distributive justice is one of the four elements of organizational justice that emphasizes fairness as a result of the distribution of outcomes by an organization (Greenberg & Baron, 2007; Greenberg, 1990, Colquitt & Greenberg, 2003). Distributive justice posits that employees' perceptions of fairness are related to decisions about how organizational resources (usually in form of pay and benefits) are distributed and the fairness of how those resources are distributed (Greenberg 1987, 1989, 1990, 1996; Folger, 1986). There are four approaches to organization justice: distributive justice, procedural justice, information adequacy, and social sensitivity (Greenberg & Baron, 2007; Greenberg 1987, 1989, 1996; Colquitt & Greenberg, 2003).

Distributive justice is the perceived fairness on the part of employees relative to the decisions by organizations concerning the distribution of resources such as pay and benefits. Procedural justice is the perceived fairness on the part of employees in determining whether the procedures that determine organizational decisions are just. Information adequacy is determined by the employee when they feel that they have received the necessary information about decisions made by organizations. And, when employees feel they are respected in interactions with superiors, social sensitivity is achieved (Greenberg & Baron, 2007; Colquitt & Greenberg, 2003; Greenberg, 1989, 1990). Distributive justice provides a perspective for gaining insight into the impact of calculated salary ratios by employees in determining fairness.

The development of distributive justice coincides with researchers' reservations about the applicability of equity theory to circumstances other than an obverse relationship where individuals in similar positions compare their inputs to outcomes ratios (Adams, 1965) to decide whether they are treated fairly by an organization (Weick, 1966; Folger, 1986). Weick (1966) suggests that equity theory as developed is not flexible enough to explain how fairness is determined in relationships beyond a basic dyadic relationship where two individuals compare their calculated ratios. And, individuals may base their determination of fairness on more than inputs (Deutsch, 1975; Folger, 1986; Patrick, Mahoney & Petrosko, 2008).

Deutsch (1975) further developed the concept of fairness in inputs to outcomes ratios when he contended that organizational resources could be used to meet three types of distributive fairness: needs, equality, and equity. According to Adams (1965), the ratios that individuals calculate in determining fairness are dependent on the contributions individuals make to production when

compared to a like other. Deutsch (1975) expanded Adams' contributions to equity theory by suggesting that individuals may deem the allocation of resources to be fair when they met needs-based fairness, equality-based fairness, or equity-based fairness. Needs based fairness is achieved when the individual or group needing the most resources receives the bulk of distributed outcomes; equality based fairness is achieved when each individual or group receives an equal share of distributed outcomes; and, equity based fairness is achieved when the individual or group contributing the most input is rewarded with a proportion of distributed outcomes based on contribution (Deutsch, 1975; Folger, 1986; Patrick, Mahoney & Petrosko, 2008).

Organizations that are successful (Kalleberg et al., 2006) are usually populated with employees who are satisfied that they are receiving equitable payment for their work (Adams, 1963, 1963; Adams & Jacobsen, 1964), and believe that the organizational rewards (i.e. salary and benefits) are distributed fairly (Greenberg 1987, 1989, 1996; Colquitt & Greenberg, 2003). Utilizing an equity theory and distributive justice perspective, this research is focused towards answering the three research questions that are stated here.

Research Questions

Research Question 1: What is the relationship between teachers' salaries and student achievement as measured by AYP?

Research Question 2: What is the relationship between teachers' salaries when adjusted for cost of living and student achievement as measured by AYP?

Research Question 3: What is the relationship between student achievement, as measured by AYP, and the difference between teacher salaries and principal salaries?

Methodology

The data that comprise the dataset are culled from the Virginia Department of Education (Virginia Department of Education, 2008). The dependent variable (DV) is student achievement among high school students in Virginia in the areas of English and math. The independent variable (IV) is teacher compensation. The moderating variables are social and socioeconomic factors. The DV is defined by individual school division performance towards compliance with AYP in the areas of: reading, writing, algebra I, geometry, and algebra II. The IV is defined by elements of teacher compensation: teacher salaries; teacher salaries as compared to other parts of the state when adjusted for cost of living; and, the difference between teacher salaries and principal salaries. Intervening variables are socioeconomic and environmental. The socioeconomic factors are: the percentage of African-American and Latino students within individual school divisions, the percentage of students receiving free and reduced lunches, and the drop-out rate. The environmental variables are: the percentage of teachers with post graduate degrees, the percentage of growth for each division over a five year period, and the percentage of students involved in English as a second language (ESL) programs.

The advantages to doing a secondary data analysis are: time savings, cost savings, and established credibility of the data set. Due to the size of the datasets collected by the Virginia Department of Education (2008), replicating the collection of these data would be time and cost prohibitive (Frankfort-Nachmias & Nachmias, 2000). The data from this dataset has been

included in numerous published reports and articles. While the data are easily accessible and expansive, there are several disadvantages to using secondary data that need to be addressed including: outdated data; the potential for inaccurate data to be included; and, missing data. Although these factors are cause for concern, the breadth of data published by the Virginia Department of Education (2008) makes the use of a secondary data analysis strategy conducive to this research (Frankfort-Nachmias & Nachmias, 2000).

General linear modeling (GLM) will be utilized to investigate the relationships that exist between the IVs and the DVs. GLM is recommended for the analysis of this dataset due to its inclusion of multiple DVs, IVs and intervening variables. GLM allows for examining the mean differences on several DVs simultaneously with at least one IV (Rose & Sullivan, 1996; Tabachnick & Fidell, 2001). The data will be collected in Excel and transcribed into SPSS for statistical analysis. All variables collected are ratio level variables.

Definition of Terms

Comparative Other – A person with whom an individual calculates an inputs to outcomes ratio to determine fairness. A comparative other might be an equal, superior, or subordinate employee. A comparative other might also be someone working in a different organization.

Distribution Principles – Refers to the multiple facets of the distribution of organizational outcomes. As equity theory evolved, researchers noticed that organizations addressed areas of need, equality, and contribution when it came to resource allocations. There are three distribution principles: needs, equality, and equity.

Distributive Justice – One of the four elements of organizational justice. Distributive justice is the perceived fairness with which outcomes are distributed to individuals by organizations.

Equality Principle – Refers to an outcome distribution where resources are distributed equally among entities.

Equity Principle – Refers to an outcome distribution where resources are distributed based on inputs; the greater the amount of inputs put forth, the higher the amount of resources received.

Equity Theory – Developed to explain how individuals perceive fairness. Individuals calculate ratios of inputs to outcomes and then compare them to another individual. Fairness is generally perceived by an individual when the results of the ratio calculation are equal.

General Linear Model (GLM) - Utilizes several multivariate techniques such as ANOVA, ANCOVA, MANOVA, MANCOVA, and multiple regression in its modeling. GLM allows for multiple DVs and IVs to be included within the model.

Informational Justification – One of the four elements of organizational justice. Informational justification is the perceived fairness associated with the quality and quantity of information an individual receives from an organization.

Inputs – Traits brought to a job by individuals. These might include: education, amount of time in a particular position, or hours worked during the day. For teachers, inputs may also include skills and talents related to subjects taught.

Motivation – The process of arousing individuals to work at high levels of efficiency and proficiency in order to meet organizational goals. Common motivational tools are: pay and benefits; bonuses; merit pay; educational opportunities; or, teamwork.

Needs Principle – Refers to an outcome distribution that is based on which entity has the greatest need for allocated resources. Organizations may vary in how they define need, but generally departments within organizations with the least amount of existing resources have the greatest need.

Organizational Justice – The perception of fairness formed from an individual's satisfaction with: the distribution outcomes by an organization (distributive justice); how organizational decisions are made (procedural justice); the respect with which individuals are given in interactional situations (social sensitivity); and, the adequacy of information individuals receive from an organization (informational justification).

Outcomes – For an individual, outcomes are rewards given to individuals. Outcomes might be rewarded in the form of: pay and benefits, bonuses, or time-off. For an organization, outcomes are: the number of items produced; services rendered generating revenue; or, achievement measured by board reviews or standardized examinations.

Outputs – The result of production. Outputs may be tangible or intangible. Tangible outputs might be a product sold on the open market. Intangible outputs might be test scores or organizational improvement as measured by a set of agreed upon standards (i.e. survey results or performance reviews).

Overpayment Inequity – A situation where an individual calculation ratio of inputs to outcomes results in a higher ratio when compared to another person. Resulting behavior might be influenced by guilt.

Procedural Justice – One of the four elements of organizational justice. Procedural justice is the perceived fairness of how organizational decisions are made. Generally, procedural justice is perceived if decisions are made based on existing organizational rules, and if those rules are deemed to be fair and just.

Public Service Motivation (PSM) – Generally defined as a motivating force where individuals choose employment in the public sector for reasons other than self-interest. Often individuals are motivated more by organizational goals or potential community impact than by self-interest.

Referent Outcomes – Outcomes that could have potentially happened in lieu of actual outcomes. Individuals often measure outcomes in terms of whether an imagined outcome is more desirable than the actual outcome. If several individuals apply for a promotion, the individual who comes closest to achieving the promotion but did not get it will feel a greater sense of loss than the individuals who were not as close to receiving the promotion.

Rewards – Also referred to as outcomes, rewards are tangible or intangible resources awarded to individuals for production. Rewards are also used by HPWO for motivational purposes.

Social Sensitivity – One of the four elements of organizational justice. Social sensitivity is the perceived respect with which a person is treated when interacting with organizational leaders or representatives.

Underpayment Inequity – A situation where an individual calculation of inputs to outcomes results in a lower ratio when compared to another person. Resulting behavior might be influenced by anger and/or frustration.

Valence – The desire with which an individual possesses for particular rewards. If an individual places a premium on cash rewards, then the valence for cash rewards is considered high for that individual.

Summary and Outline of Study

The performance of an organization is often determined by the quality or quantity of a measurable outcome (Kalleberg et al., 2006). Often with public organizations, finding an objective outcome variable to measure success is difficult. The universal usage of standardized tests and AYP has made individual school divisions within the State of Virginia an attractive unit of analysis for researching organizational success (Gill & Meier, 2001). The purpose of this research is to determine if organizational outcomes, defined by AYP requirements for school divisions, are impacted by teachers' compensation.

Chapter two provides a review of the literature related to teacher compensation, what variables impact student achievement, equity theory, and distributive justice. Chapter three presents the methodology for the study. In chapter three, the use of secondary data analyses will be discussed along with GLM. Chapter four will present a detailed description of the dataset and the results of nine GLMs. Finally, chapter five will present the findings, recommendations, and opportunities for future research.

CHAPTER 2: LITERATURE REVIEW

Salaries are one of the most discussed topics in public education, specifically primary and secondary education teacher salaries (Odden & Kelly, 1997, 2002). While there has been much attention given to teacher salaries from an individual perspective, little attention has been given to studying teacher salaries from a comparative perspective. As Adams (1963, 1965) and Greenberg (1987, 1989, 1990) have observed, employees working in industries in the public, the private, and the non-profit sectors are likely to make comparisons with other individuals to determine whether they are treated fairly by their organization. To whom an individual makes a comparison is debated among scholars (Weick, 1966; Folger, 1986), but individuals are likely to make comparisons to referent others who hold a similar position or who have held a similar position (Folger, 1986). As Odden and Kelley (1997, 2002) note, most education administrators began their careers in teaching. In the context of Deutsch's (1975) expansion of equity theory (Adams, 1965), it is possible that teachers might view they are not compensated fairly, and possibly not treated fairly, since they have more of a direct influence (Kukla-Acevedo, 2009) on organizational outcomes than administrators.

Organizations in the public, private and non-profit sectors utilize salaries as a motivational device, and, generally, successful results are often tied to the amount of salary awarded to employees (Herzberg, 1966). In education, student achievement on standardized assessment

measurements, usually in the form of standardized tests, is often used as a barometer to measure the effectiveness of a teacher (Goslin & Glass, 1967; Lomax, West, Harmon, Viator, & Madaus, 1995). There have been attempt in several areas of the country to include merit pay or incentive based programs to their compensation structures, but they have not proven effective (Springer, Ballou, Hamilton, Le, Lockwood, McCaffrey, Pepper, & Stecher, 2010; Liu, Johnson & Peske, 2004; Odden & Kelley, 1997, 2002). It is possible that studying teacher salary and student achievement data from a distributive justice perspective may elucidate alternative approaches to the calculation of teacher salaries.

This chapter is divided into two major sections. The first section is focused on elements of teacher compensation and organizational outcomes. The second section is focused on distributive justice and its antecedent, equity theory. The first section contains the following subsections: teacher inputs and student outcomes; the single-salary pay schedule and alternative compensation models; educational staffing and promotion; and, measuring student achievement. The second section contains the following subsections: the use of organizational theory in studying educational issues, equity theory; equity theory as an antecedent to distributive justice; and, distributive justice. A review follows each section of this chapter. The hypotheses drawn from the review of the literature are stated towards the end of section II. A summary is included at the end of this chapter.

Section I

Teacher Inputs and Student Outcomes

In mid 1990s, the National Commission on Teaching and America's Future (1996) released a report entitled *What Matters Most: Teaching for America's Future* in order to move the teaching profession from its current state to one where the profession fulfills the mission of educating students while attracting and retaining the best talent. The Commission outlined three premises:

1) Teachers' knowledge and ability are important influences on students
2) The best strategy to improve school is to recruit, train, and retain the best teachers
3) Concerted effort is necessary to create an environment for teacher to teach to the best of their capabilities.

As well as outlining the mission of the Commission (1996), the report highlights several barriers to student achievement including: low student expectations in achievement, inconsistent teaching standards, lack of rewards, and environments that are not conducive for effective teaching. Along with these barriers, the report also focuses on teacher compensation, which has followed a single pay schedule from early part of the twentieth century (Odden & Kelley, 1997, 2002; Jupp, 2005). The report suggests that better teacher practices, accountability, and progressive pay systems will benefit school systems by rewarding teachers for the inputs they bring into the educational system (National Commission on Teaching and America's Future, 1996).

Recent inquiries by economists and public policy researchers have elucidated what many educational researchers have observed for a number of years; teacher inputs have a significant impact on student achievement (Kukla-Acevedo, 2009; Gill & Meier, 2001; Odden & Kelley,

2002; 1997; Clotfelter, Ladd, & Vigdor, 2006; Goldhaber & Anthony, 2007; Goldhaber & Brewer, 1997; Jepsen, 2005; Krueger, 1999; Rivkin, Hanushek, & Kain, 2005; Rockoff, 2004). In making the case for a more progressive compensation system for teachers, Solomon (2005) argued that as teachers add education and experience to their skill set, they should be rewarded monetarily. In support of this position, Goldhaber and Brewer (1997) observed that there is a statistically significant positive relationship between teachers holding BA and MA degrees in math and student achievement.

Kukla-Acevedo's (2009) research also suggests that there is a strong relationship between teacher characteristics and students achievement. Kukla-Acevedo (2009) performed a secondary data analysis of a dataset provided by Kentucky Educational Professional Standards Board. The dataset consisted of teacher characteristics such as: degrees held by each teacher; undergraduate GPA in math; number of units taken towards a degree in math; and student achievement (Kukla-Acevedo, 2009). Her research also included numerous mediating variables based on previous education literature such as: race; gender; and, school lunch program eligibility (Winfield, 1982; Edmunds, 1979; Good & Brophy, 1986; Kyle, 1985; Mackenzie, 1983; Purkey & Smith, 1983; Stedman, 1987; Stringfield & Teddlie, 1988; Gill & Meier, 2001). Kukla-Acevedo's research was predicated on the impact that teacher inputs have on students outcomes. Utilizing test scores by fifth graders on standardized math examinations provided by the state testing program, Kentucky Core Content Test (KCCT), Kukla-Acevedo (2009) found that teacher characteristics (i.e.: undergraduate GPA and units of math taken) had a positive impact on student achievement in math across various demographic groups including: African-American students, European American Students, and students receiving subsidized lunches.

The implications of Kukla-Acevedo's (2009) research are that increased teacher inputs are valuable tools for generating positive student outcomes. As research has shown the positive relationship between increasing teacher inputs and student achievement (Kukla-Acevedo, 2009; Gill & Meier, 2001; Odden & Kelley, 2002; 1997; Clotfelter, Ladd, & Vigdor, 2006; Goldhaber & Anthony, 2007; Goldhaber & Brewer, 1997; Jepsen, 2005; Krueger, 1999; Rivkin, Hanushek, & Kain, 2005; Rockoff, 2004), there remains no consensus (Cochran-Smith & Fries, 2005) among scholars and observers on how to achieve this success consistently (Kukla-Acevedo, 2009).

While there are statistically significant links between teacher inputs and student achievement, environmental elements might moderate the impact that teachers have on students (Kukla-Acevedo, 2009; Odden & Kelley, 1997; 2002; Tuck, Berman, & Hill, 2009). The education, economics, and public policy literature provide a number of factors that might limit teacher's abilities to influence student achievement, with poverty being the most prevalent (Roderick, Jacob, & Byrk, 2002; Gill & Meier, 2001; Winfield, 1990; Edmunds, 1979; Good & Brophy, 1986; Kyle, 1985; Mackenzie, 1983; Purkey & Smith, 1983; Stedman, 1987; Stringfield & Teddlie, 1988). As Kukla-Acevedo (2009) observed, teachers' skills and knowledge influenced student learning, but characteristics such as poverty stunted student achievement (Tuck, Berman, & Hill, 2009; National Commission on Teaching and America's Future 1996). As Tuck, Berman, and Hill (2009) observe, when the teaching environment is made less conducive by external forces, teachers might transfer districts, or leave the profession altogether (Solomon, 2005; Odden & Kelley, 1997, 2002; National Commission on Teaching and America's Future 1996).

The emphasis on teacher salaries when looking at student achievement is due to the amount influence that teachers have on students (Kukla-Acevedo, 2009; Jupp, 2005; Odden & Kelley, 1997, 2002; The National Commission on Teaching and America's Future, 1996). According to Kukla-Acevedo (2009), economists and policy researchers are emphasizing the role of teaching and student achievement due to recent research that suggests that improved and diverse teaching techniques are influencing student achievement (The National Commission on Teaching and America's Future, 1996). Improved teacher training, new techniques, and newly acquired skills have impacted student achievement on standardized exams, which are used as barometers for student, school, and school district success (Kukla-Acevedo, 2009; The National Commission on Teaching and America's Future, 1996; The National Commission on Excellence in Education, 1983). The recent research on teaching suggests that not only do teachers need to be encouraged to increase their skill set, but that their salaries should reflect their total inputs in terms of producing successful educational outcomes (Kukla-Acevedo, 2009; Jupp, 2005; Odden & Kelley, 1997, 2002).

The Single-Salary Pay Schedule & Alternative Compensation Models

The single-salary pay schedule evolved in the 1920s as a compensation formula to alleviate unfair practices in paying teachers. Many large, urban school districts adopted the method, which is designed to pay teachers along a single pay scale with regards to education and experience on the job (Odden & Kelley, 1997, 2002). For much of the twentieth century, teacher salaries remained competitive with salaries in other industries until 1980s when salaries in other professions increased at a higher rate than those in primary and secondary education (National Commission on Teaching and America's Future, 1996; Odden & Kelley, 1997, 2002). However,

as the private sector and parts of the public sector adopted methods of high performance (Lawler, 1971, 1992, 2000; Wood, 1996; Godard & Delaney, 2000; Kalleberg, Marsden, Reynold & Knoke, 2006; Appelbaum, Bailey, Berg, & Kalleberg, 2000), the single-salary pay schedule remained in place in the majority of school districts in the country (Jupp, 2005; Odden & Kelley, 1997, 2002). Education scholars, economists and public policy researchers are suggesting that there is a need to review and potentially replace the single-salary pay schedule as the salaries of other professions are currently reflective of individual inputs (Lawler, 1971, 1992, 2000; Kukla-Acevedo, 2009; Clotfelter, Ladd, & Vigdor, 2006; Goldhaber & Anthony, 2007; Goldhaber & Brewer, 1997; Jepsen, 2005; Jupp, 2005; Krueger, 1999; Rivkin, Hanushek, & Kain, 2005; Rockoff, 2004).

Before the 1990s teachers entered the job market with a competitive starting salary but did not enjoy the major increases in salary that other professionals received during their careers (Odden & Kelley, 1997, 2002). According to Odden and Kelley (2002) teaching salaries lessened in competitiveness to other professions during the economic boom of the 1990s because the salary structures in place in most public school districts throughout the country remained tied to the single-salary-schedule. The Volcker Commission (2005) produced similar findings when it noted that highly talented employees were leaving the government for more lucrative jobs in the private sector. The Volcker Commission's (2005) recommendation was to move towards a compensation structure that paid individuals for their talents as opposed to paying individuals based on the requirements of the position.

As the marketplace becomes more competitive for public school districts in attracting and retaining quality teachers, changes are under consideration in a number of public school districts across the U.S. to address organizational structure and employee pay (Lawler, 1990, 2000; Heneman, Ledford, & Gresham, 2000; Schuster & Zingheim, 1992; Odden & Kelley, 1997, 2002). However, the public service motivation literature (Perry & Hondeghem, 2008) suggests that teachers, like other public sector employees, are motivated to teach for reasons other than self-interest (Odden & Kelley, 2002).

In the private sector, extrinsic rewards (Vroom, 1964; Herzberg, 1966; McGregor, 1960; Kalleberg, et al., 2006; Salamon, 2002; The Volcker Commission, 2005) are used to motivate employees to add to their skill set such that organizations can profit from the employee's advanced knowledge (Lawler, 1971, 1981, 1990, 1992, 2000). Parts of the public sector have utilized these techniques (The Volcker Commission, 2005; Salamon, 2002), but education remains dubious of monetary reward systems because they might incite a breakdown in collegial communication, which is viewed as paramount to success in education (Jupp, 2005; Solomon, 2005; Odden & Kelley, 1997, 2002). While merit pay (Lawler, 1981, 1990) and bonuses have met with skepticism (Jupp, 2005; Solomon, 2005), there are movements within the profession to motivate school districts to pay teachers based on what teachers bring with them to the classroom (i.e. inputs) (Jupp, 2005; Odden & Kelley, 1997; 2002; Kukla-Acevedo, 2009; Gill & Meier, 2001; Odden & Kelley, 2002; 1997; Clotfelter, Ladd, & Vigdor, 2006; Goldhaber & Anthony, 2007; Goldhaber & Brewer, 1997; Jepsen, 2005; Krueger, 1999; Rivkin, Hanushek, & Kain, 2005; Rockoff, 2004). Though merit-based pay and bonus structures have been recommended

for use by the federal government (The Volcker Commission, 2005), they have been largely avoided by school districts throughout the country (Odden & Kelley, 2002).

Solomon (2005) suggests pay that is reflective of teacher inputs is important for several reasons: increasing student achievement; keeping teachers involved; motivating teachers to improve their craft; and, accountability. One of the positive impacts that pay for performance systems have is that a consistent set of standards are usually adopted when determining salaries (Solomon, 2005; Lawler, 1981, 1990, 1992, 2000). Accountability, along with rewards, serves as a motivating factor in teacher development, which in turn might impact student outcomes positively (Jupp, 2005; Solomon, 2005). However, the Project on Incentives in Teaching (POINT) study in Nashville, Tennessee found that students in classes where teachers were not incentivized performed equal to students in classrooms where teachers were incentivized.

The impasse over adopting alternative pay schedules to the single-salary pay schedule usually emanates from teachers who believe that the competitive element of pay for performance schemes contravenes the collegial interplay that exists in the teaching profession (Odden & Kelley, 1997, 2002; Jupp, 2005). However, as Solomon (2005) argues and as reported in *What Matters Most* (National Commission on Teaching and America's Future, 1996), alternative pay systems with standards of accountability might be necessary for improving the teaching profession and ultimately improving student achievement. One attempt at using an alternative compensation method (signing bonuses) was used in Massachusetts (Liu, Johnson, & Peske, 2004).

Liu et al. (2004) chronicle in their article on a bonus system utilized in Massachusetts that bonuses often devalue retention and ignore the schools where the newly hired teachers are placed. In 1998, the commonwealth of Massachusetts instituted a signing bonus of $20,000 to entice teachers into the profession (Liu et al., 2004). The initiative began out of need to find candidates that were capable of scoring high enough on the state's licensure examination (Liu et al., 2004). According to the Massachusetts State Legislature (1998), the Massachusetts Signing Bonus Program (MSBP) came about as an instrument to encourage candidates, who may otherwise find employment in other professions, to consider teaching[4]. Section 19B of *Chapter 260 to the Act of 1998* describes the need for the bonus structure as well as the amount that qualified candidates will receive upon accepting teaching jobs within the Commonwealth of Massachusetts. However, the signing bonus structure for enticing teachers produced varying results from minor success to teachers choosing to leave the field (Liu et al., 2004)

As Liu et al. (2004) suggest in their Massachusetts study, there are caveats to implementing alternative pay systems to the single-salary pay schedule. As Odden and Kelley (2002) explain, support for the current system is strong because the single-salary pay schedule is based in equality (i.e. pay increases are based on degrees earned and experience). Whether the fear of returning to a pay system based on grade level taught or gender (Odden & Kelley, 1997, 2002) is

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[4] Located on the Internet at: *http://www.mass.gov/legis/laws/seslaw98/sl980260.htm*

Section 19B states "There shall be an incoming teacher signing bonus program to be administered by the department of education for the purpose of encouraging the best and brightest candidates to teach in the public schools. The goal of such program shall be to encourage high achieving candidates to enter the profession who would otherwise not consider a career in teaching. Funding for such program shall be subject to the provisions of section 35S of chapter 10."

Part 1 of section 19B states "On an annual basis, the department of education shall select the best and brightest teaching prospects based on objective measures such as test scores, grade point average or class rank and such other criteria as the department may determine. The department shall establish a system for receiving a limited number of recommendations for outstanding candidates for such bonuses from institutions of higher education across the nation. In selecting bonus recipients, the department shall consider such recommendations."

And Part 4 of Section 19B states "Recipients shall receive a $20,000 signing bonus over at least three years with at least $8,000 distributed in the first year of the bonus."

rational or not, teachers currently fight alternative pay systems for several reasons including: inconsistent standards for quality teaching evaluation; opportunities for training; or, availability to fund programs like performance based pay (Tuck, Berman, & Hill, 2009; Solomon, 2005). As Hill & Johnson (2005) suggest, teacher compensation packages are a large portion of state budgets, and making changes might not derive the desired outcome (Tuck, Berman, & Hill, 2009). However, as the *A Nation at Risk: The Imperative of Educational Reform* and *What Matters Most: Teaching for America's Future* reports observe, not making a change in the way that teachers are reviewed and compensated might impact the future of student achievement (The National Commission on Excellence in Education, 1983; National Commission on Teaching and America's Future, 1996).

Educational Staffing and Promotion

The United States educational system has one of the largest support staffs in the world among developing countries (National Commission on Teaching and America's Future, 1996). Less than half of the resources allocated for education in the United States on average are allotted to teaching (National Commission on Teaching and America's Future, 1996; Organization for Economic Cooperation and Development, 1995). According to the Organization for Economic Cooperation and Development (1995), in the early to mid 1990s, teachers in the U.S. accounted for 43.6% of the education staff, while administrative and support staff (not including principals and assistant principals) accounted for 33.9%. As stated in the 1996 report by the National Commission on Teaching and America's Future, "teaching staff in other countries make up 60% to 80% of public education employees. Rather than hiring many non-teachers who plan and manage the work of teachers, these countries hire more teachers and give them time to plan and

manage their work together—and hence to become ever smarter about what they do" (p. 48). Figure 2 provides a graphic representation of the primary and secondary educational workforce in the United States, and Figure 3 provides a chart that compares the U.S. percentage of the education workforce that are teachers with seven other developed countries.

These numbers reflect a steady trend in American education where educational staff has shifted from a high number of teaching positions to increasing numbers of administrative and support staff positions. In 1950, teachers accounted for about 70% of education positions with administrative and support staff positions accounting for about 25%. By 1990, teachers account for just above half the number of primary and secondary education positions (National Commission on Teaching and America's Future, 1996).

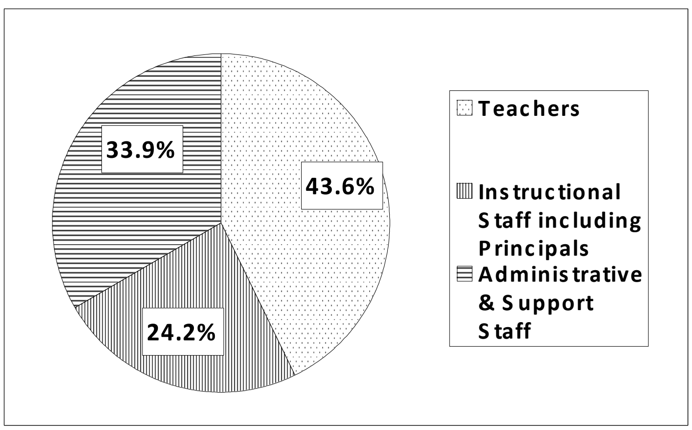

Figure2: A Pie Chart of the Educational Workforce in the United States

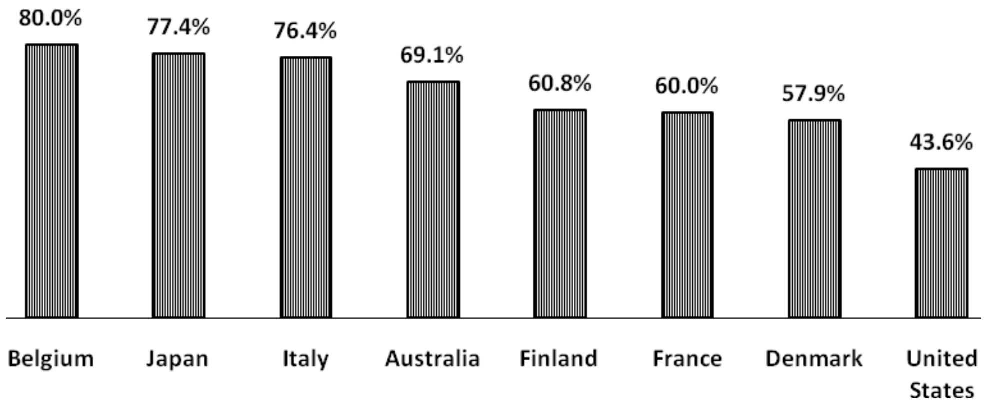

Figure 3: International Comparison of the Percentage of Educational Staffs that are Teachers
Source (Figures 1 and 2): Organization for Economic Cooperation and Development (OECD), Education at a Glance: OECD Indicators (Paris: OECD, 1995), *in Using What We Have To Get the Schools We Need: A Productivity Focus for American Education* (New York: The Consortium on Productivity in the Schools, 1995)

As noted by Odden and Kelley (1997, 2002) and Kukla-Acevedo (2009), there exists a link between teacher involvement and student achievement. Gill and Meier (2001) flesh this point out in their research on Texas school districts by using a 20 step SWAT modeling technique to separate higher achieving school districts from lower and average achieving school districts. Odden and Kelley (2002) suggests that teacher motivation, which is a product of compensation (Lawler, 1971, 1981), and student achievement are linked. In their review of motivational theory, Odden and Kelley (2002) observe interplay between expectancy theory, goal-setting theory, and participative-management theory contributing to teacher motivation. However, there is little focus on individual compensation comparisons that are likely to take place between teachers and a referent other (Folger, 1984, 1986) as Adams (1965) and other have suggested is likely to take place (Greenberg, 1987, 1989, 1990, 1996).

In education, as in other occupations, there is a proclivity on the part of individuals to seek increased incomes by way of promotion (Lawler, 1971, 1981, 1990, 1992, 2000; Odden &

Kelley, 2002, 1997). As the number of administration level jobs within schools and at central school district offices increases, the opportunity for promotions and salary increases rises (National Commission on Teaching and America's Future, 1996). However, in education, promotion often takes highly skilled professionals (Jupp, 2005; Solomon, 2005; Kukla-Acevedo, 2009) out of the classroom (Odden & Kelley, 1997, 2002). Odden and Kelley (2002) summarizes the teacher to administrator conundrum thusly:

> Finally, larger salaries are available to teachers but only for those who leave teaching and enter administration – assistant principal, principal, central office supervisor, or numerous out of the classroom jobs…teachers with a greater array of professional expertise do not earn more than those with fewer skills and competencies, and only in rare circumstances are teachers, who provide the most crucial direct service to students – instruction – able to earn more than individuals who do not work on the classroom (p. 12).

According to Odden & Kelley (1997, 2002), teachers will often seek out promotion opportunities to increase their earning potential.[5] While this is a common occurrence in the private sector and the public sector, which includes education (The Volcker Commission, 2005; Lawler, 1971, 1981, 1990, 1992, 2000), when teachers leave the classroom, they take their skill set and experience with them (Odden & Kelley, 1997, 2002).

In the Commonwealth of Virginia, the average teaching salary in 2007 was $49,252, while the average assistant principal salary was $71,680 and the average principal salary was $86,409.[6] In 2008, those figures were $50,528 for teachers, $72,702 for assistant principals and $89,427 for principals. As nearly all educational administrators come from the teaching ranks, promotions

[5] The Volcker Commission (2005) noted this in their review of government agencies. Often, technically proficient employees will leave their posts for management positions that are paid based on a higher grade level than their current technical position.
[6] Virginia Department of Education, 2010. The averages presented in this text represent an average for teacher, assistant principal, and principal salaries published by the Commonwealth of Virginia at www.doe.virginia.gov.

(Lawler, 1971, 1990, 1992, 2000) are a popular choice among teachers for gaining and increase in personal income. There are other avenues for teachers to make additional income like: coaching, tutoring, and club sponsorship, but promotion remains the most popular way to increase personal income. Administrative incomes often surpass the combination of a teaching salary and a supplemental income (Odden & Kelley, 1997, 2002). However, implementation of an alternative pay system (Herzberg, 1966, 1969; Lawler, 1971, 1981, 1990, 1992, 2000) that pays teachers for their inputs requires an objective measure of organizational success to ensure fairness (Adams, 1965; Greenberg, 1987, 1989, 1990) in rewarding teachers for their service.

Measuring Student Achievement

Though there is not a consensus on measuring success in public school education, standardized testing has often been the as a tool for measuring academic achievement among students, teachers, and schools (Lomax et al., 1995). Standardized testing has been characterized positively as an objective measure of student success that ignores social class, race, and gender (Lomax et al., 1995; Madaus, 1991), but has also been characterized negatively as a rigid tool that is incapable of measuring higher level thinking, conceptual, or procedural knowledge (Lomax et al., 1995). Despite the overwhelming usage of standardized testing at primary and secondary educational levels, standardized tests have come under scrutiny because they interfere with teachers' curriculum planning, placing emphasis on test scores above lesson plans (Lomax et al., 1995; Madaus, 1991; Maduas & Kellaghan, 1992; National Commission on Testing and Public Policy (NCTPP), 1990). Despite criticisms of standardized exams, they provide a politically viable measurement of student achievement that has led to the adoption of minimum

requirements for achievement in local school districts across the United States (Winfield, 1990) and the creation of policies such as the NCLBA (U. S. Department of Education, 2010a; Scott, 2009) on the federal level and the Standards of Leaning (Virginia Department of Education, 2010) on the state level.

By the 1980s school districts began to apply greater accountability based on school test scores than in the previous twenty years of standardized testing (Winfield, 1990; Timar & Kirp, 1989). As the impetus on standardized testing has increased, the pressure to increase graduation rates has increased on school districts and individual schools (Winfield, 1990; Paris et al., 1991; Lomax et al., 1995). As the school reform movement of the 1980s increased in popularity, minimum competency tests (MCT) were developed to gauge not only student competency, but curriculum development and implementation (Airasian, 1987; Winfield, 1990). By the mid 1980s, over two thirds of the states in the US were using MCTs, giving them to students in elementary, junior high, and senior high school (Pipho & Hadley, 1984; Airasian, 1989; Winfield, 1990). The increased attention to standardized testing success has lead to increased pressure on curriculum development, assessment programs, and remedial help for students need to improve scores (Winfield, 1990). Improved scores are necessary for meeting the guidelines established for Adequate Yearly Progress (AYP) as defined by the NCLBA, which requires 100% proficiency in English and mathematics by 2014 (U.S. Department of Education, 2010a, 2010b; Scott, 2009).

AYP are the standards set by each state in order to be in compliance with the NCLBA of 2001. The National Longitudinal Study, written to explore the impact of the NCLBA on three school districts in two cities, summarizes AYP thusly:

> Each state is required to test all students in grades 3–8 and once in grades 10–12 on assessments that are aligned with challenging state standards for reading and mathematics; each state must also set standards for making "adequate yearly progress" (AYP) toward the goal of 100 percent proficiency. To make AYP, schools must meet proficiency targets not only for the school as a whole but also for student subgroups, including major racial and ethnic groups, economically disadvantaged students, students with disabilities, and students with limited English proficiency. (p. xi)

In the state of Virginia, these assessments are given as part of the state's Standard's of Learning, or SOL (Virginia Department of Education, 2010). AYP emphasizes 100% proficiency in English and Mathematics by 2014, but also encourages progress in the areas of social science and science (U.S. Department of Education, 2010a). SOL scores, along with other assessments and student attendance and drop-out rates are utilized to measure each school division's and school unit's progress towards AYP (Virginia Department of Education, 2010). Failure on the part of a school division or individual school to meet compliance after a defined period will lead to "restructuring", which might result in any of the following scenarios that are not necessarily undertaken independently of each other: staff replacement, conversion to charter school status, or administration by a private firm (U.S. Department of Education, 2010a, 2010b). To keep track of school's progress, states are required to create and publish a "report card" to track school district's and school unit's progress towards AYP (U.S. Department of Education 2010c).

In September of 2000, the State of Virginia adopted standards for accrediting school in Virginia (Department of Education, 2010c; Virginia Department of Education, 2010). Prior to NCLB, the State of Virginia had regulations enacted through the state's SOL program. Since the

implementation of the NCLBA of 2001, Virginia has modified its standards to comply with the tenants of NCLBA (U.S. Department of Education, 2010a). As with all 50 states, Virginia has submitted a plan charting its progress towards full proficiency in English and mathematics by 2014 among all students in the form of a "State Report Card" (Department of Education, 2010c). The "Report Card" includes data on assessments (SOL test scores) for school divisions, school units, and student subcategories within school units. Also included with AYP calculations are data related to student drop-out rate, attendance, teacher certification and education, and school safety. The "Report Card" represents in numeric form the state's progress towards NCLB compliance as well as individual school divisions' and school units' progress towards AYP (U.S. Department of Education, 2010a, 2010b, 2010c; Virginia Department of Education, 2010).

Section I Review

As economists, education and public policy researchers have shown, teacher inputs have a statistically significant positive relationship with student achievement, which ultimately might impact the overall success of individual schools and school districts (Kukla-Acevedo, 2009; Jupp, 2005; Solomon, 2005; Odden & Kelley, 1997, 2002; Gill & Meier, 2001). New compensation methods have been attempted across the county, but the single-salary pay schedule remains the most widely used compensation plan (Jupp, 2005; Odden & Kelley, 1997, 2002). For teachers looking to increase their salary, exiting the profession or promotion remain the most viable options (Odden & Kelley, 1997, 2002). However, with a standardized format for measuring student achievement in place (U.S. Department of Education, 2010a, 2010b); the opportunity to address and amend existing compensation systems might be available currently

such that teachers are incentivized to remain in the classroom as opposed to taking positions in administration or leaving the profession (Odden & Kelley, 2002).

Section II

Organizational Theory and Education

The use of organizational management theories in studying education is not unprecedented. Numerous organizational management theories have been utilized to understand phenomena that take place in educational settings, especially theories of motivation (Gill & Meier, 2001; Odden & Kelley, 1997, 2002). Examples of organizational theories that have been used in educational studies and published articles are listed in Figure 4.

Theory	*Definition*	*Usage in Educational Settings*
Contingency Theory (Lawler, 1990)	Incentivizing programs can work provided the programs fit organizational characteristics	Used often for implementing pay for performance systems (Odden & Kelley, 2002).
Goal-Setting Theory (Locke, 1968)	Motivates employees by outlining specific goals that are challenging worthwhile, and achievable.	Study of effective schools in Tennessee; teachers enriched by collegial working towards shared goals (Rosenholtz, 1989).
Expectancy Theory (Herzberg, 1968)	Incentivizing works if: 1) employees believe the goals can be met; 2) employees can make the connection between the task and the relevance to their position; and, 3) employees value the reward.	Study of effective schools in Tennessee; teachers enriched by collegial working towards shared goals (Rosenholtz, 1989).
Social Dilemma Theory (Runge, 1984)	Free-riding is the perceived unintentional result of group-based incentive programs.	Data from Kentucky school based award program for 1995-1997 validated Runge's (1984) position that free-rider is more theoretical than actual (Kelley, 1998; Kelley & Protsik, 1997).
Participative-Management Theory (Vroom, 1964)	A motivational tool to provide an avenue for employees to participate in organizational level decision making.	Research suggests that teachers want to be involved at the management decision making level (Hart, 1994, 1995).

Figure 4: Organizational Management Theories Used in Educational Settings
Source: Odden & Kelley, 2002

While a number of articles, published reports, and books have looked at compensation and worker motivation (Gill & Meier, 2001; Odden & Kelley, 1997; 2002), there is little evidence that equity theory (Adams, 1965) or distributive justice (Jasso, 1980; Greenberg, 1987) have been considered in looking at individual teacher inputs and outcomes and their impact on organizational success.

Equity Theory

Equity theory posits that individual perceptions of fairness result from ratio calculations that individuals make between themselves and a comparative other (Adams, 1965). According to Adams (1965), individuals will calculate a ratio of inputs to outcomes to determine whether an organization is treating them fairly. Equity theory researchers define inputs as the tools and resources that individuals possess for production (Adams, 1965; Jasso, 1980; Greenberg, 1987). Inputs include: effort, time on the job, education, and other personal traits or production items that a person might use in producing outputs. Outputs are the result of production, and are not limited to tactile objects. Outputs, especially in the public sector might be efficiency in the delivery of a service. As individuals calculate inputs to outputs, they use the distribution of organizational resources, such as salary, to determine whether an organization is treating them fairly (Adams, 1965; Walster, Berscheid, & Walster, 1973). If the calculations performed by individuals result in equity, it is likely that individuals will perceive their organization as treating them fairly (Adams, 1965; Adams & Jacobsen, 1964; Jasso, 1980; Greenberg, 1987, 1989, 1990). An illustration of equity theory is presented in Figure 3.

$$\frac{\text{Individual Outcomes}}{\text{Individual Inputs}} = \frac{\text{Comparative Other Outcomes}}{\text{Comparative Other Inputs}}$$

Figure 5: Equity Theory Equation: Inputs-to-Outcomes between an Individual and a Comparative Other
Source: Adams, 1965

Adams (1963, 1965; Adams & Jacobsen, 1964) suggests that when employees are determining fairness within an organization there is a natural inclination for these individuals to compare their

inputs (i.e. hours worked, education) to outcomes (i.e. salary, benefits) ratio to a like other. If the ratio produces an equitable ratio between an employee and a like other, then the individual making the comparison will likely believe that their organization is fair. If the ratio produces an inequitable ratio between an employee and a like other, then the individual making the comparison might alter their work behavior depending on whether there is underpayment or overpayment inequity (Adams, 1963, 1965; Adams & Jacobsen, 1964; Greenberg, 1987, 1989, 1990, 1996; Colquitt & Greenberg, 2003; Jasso, 1980, 1986; Hegtvedt, 1988, 1990, 1993). This concept provides the foundation for the development of distributive justice (Greenberg, 1987, 1989, 1990, 1996; Colquitt & Greenberg, 2003). Distributive justice, one of the four elements of organizational justice, is often studied in organizations to understand work behavior and satisfaction among employees (Colquitt & Greenberg, 2003). Salaries are often scrutinized as a measure of whether an individual believes resources are distributed fairly within an organization (Greenberg, 1989, 1990).

Overpayment inequity is the result of ratio calculation where an individual is receiving more compensation than their comparative other. Underpayment inequity is the result of a ratio calculation where an individual is receiving less compensation that their comparative other (Greenberg 1987, 1989, 1996). Equilibrium is achieved when a ratio calculation is made between an individual and a comparative other and the outcomes are viewed as equitable (Adams, 1965; Adams & Jacobsen, 1964). These calculations may result in changing behavior patterns exhibited by individuals (Jasso, 1980; Jasso 1986; Greenberg, 1987, 1989, 1990; Hegtvedt, 1988, 1990, 1993). An illustration of underpayment inequity and overpayment inequity is presented in Figure 4. When calculated ratios are inequitable, behavioral response on

the part of the individual will vary depending whether the individual was underpaid for their assigned task or overpaid (Hegtvedt, 1988; Greenberg, 1996). In a situation where an employee believes they are underpaid for their work in comparison to referent other, the employee may alter their inputs, which may impact outputs (Greenberg, 1989, 1996; Hegtvedt, 1988, 1990).

Underpayment Inequity:

$$\frac{\text{Individual Outcomes}}{\text{Individual Inputs}} < \frac{\text{Comparative Other Outcomes}}{\text{Comparative Other Inputs}}$$

Overpayment Inequity:

$$\frac{\text{Individual Outcomes}}{\text{Individual Inputs}} > \frac{\text{Comparative Other Outcomes}}{\text{Comparative Other Inputs}}$$

Figure 6: Underpayment Inequity and Overpayment Inequity
Source: Adams, 1965

Adams (1965) suggests that when individual outcomes are lower than expected (Herzberg, 1966), an individual will make conscious decision to change inputs to bring the calculated ratio of inputs to outcomes with a comparative other to an equitable level. The result of this change in inputs (Hegtvedt, 1988) may include: altering the arrival time to work, taking longer to perform assigned tasks, taking longer breaks, or shortening the work day (Adams, 1965; Greenberg, 1987, 1989, 1990). Greenberg (1996) suggests that modified behavior resulting from lower than expected outcomes could result in corporate theft or other criminal activity.

In an experiment by conducted by Greenberg (1996), respondents were given a scenario where they were underpaid for their work by an employer and asked to respond to a questionnaire. From the results of the questionnaire, it is apparent that employees may to take drastic measures to restore equity (Adams, 1965) in the relationship between the individual and the organization. There are several reasons explained by Greenberg (1996) as to why employees pilfer from their organization. First, employee theft might be the result of aggression and anger felt towards the employer due to lower than expected outcomes. Secondly, corporate theft on the part of the employee is an attempt at to address the underpayment issue, such that the employee might steal from an organization to bring the inputs to expected outcomes ratio to balance. Thirdly, fair and honest reasoning given by an employer as to why pay cuts were necessary and how they were determined tends to moderate potential criminal behavior (Greenberg 1987, 1989, 1990, 1996; Clay-Warner, Hegtvedt, & Roman, 2005). While underpayment inequity tends to generate a series of responses related to achieving perceived equality on the part of the individual, overpayment inequity has been shown to result in other types of responses (Greenberg, 1996).

Pay comparisons to a comparable other might lead to behavior moderated by two paradoxical influences: motivation by self-interest versus concerns for fairness in an exchange (Jacques, 1961; Adams, 1965; Loseman, Miedema, Van Den Bos, & Vermunt, 2009). Motivation by self-interest (Adams, 1965) is a reaction to the necessity to meet lower level needs such as physiological needs and safety needs (Maslow, 1970). In contrast to self-interest is the concept of fairness in interpersonal exchanges (Adams, 1965). While advantageous inequity tends to positively impact self-perception and esteem, it also provokes individual perceptions of fairness (Adams, 1965; Greenberg, 1987; Loseman et al., 2009). An advantageous pay differential has

the potential to impact behavior (Jasso, 1980, 1986) and performance (Greenberg, 1989, 1990) by individuals who calculate a ratio of inputs to outcomes that result in higher outcomes (Adams, 1965).

In an experiment conducted by Loseman et al. (2009), the researchers hypothesized that individuals are likely to be motivated by self-interest over distributive fairness when there is a perceived threat. The authors constructed their project around research that reported that when an individual is in a tenuous situation, their need for positive reinforcement will supersede their desire for fairness with a comparative other in the distribution of outcomes (Van den Bos, Peters, Bobocel, & Ybema, 2006; Loseman et al., 2009). Loseman et al. (2009) summarize the impact of positive reinforcement for task completion thusly, “the pleasure that people experience by receiving more than others follows, at least in part, from the immediate positive input on people’s self-image that this treatment entails” (p. 14). Within the context of positive reinforcement, the authors tested their premise in two studies in The Netherlands (Loseman, et al., 2009).

The first study included seventy-three participants (29 men, 44 women) who were customers at a mall in Utrecht and the second included ninety-two students (25 men, 67 women) from Leiden University. The researchers arranged participants into three groups: advantaged, disadvantaged, and equitable. The experimental design produced results that support the view that advantageous outcomes (Adams, 1965) are desired when a potential threat to the self is perceived. The inclusion of a threat to the self in the experiment allowed the researchers to observe the impact that the threat had on the internal psychological conflict between self interest and comparative

equity (Jacques, 1961). The perceived threats introduced in the research design were not of physical or life-threatening nature. The researchers observed that self-interest superseded fairness when participants were placed in threatening conditions as opposed to non-threatening conditions. The researchers concluded that in a situation where a threat to the self is perceived, individuals are not likely to abandon fairness concerns, but will subordinate fairness to self-interest (Loseman, et al., 2009). Building on the work of Miedema, Ven den Bos, & Vermunt (2006), Loseman et al. discovered that the concept of fairness is not abandoned in threatening situations, but that fairness is subordinated in favor of positive reinforcement (Loseman et al., 2009). While the positive reinforcement of an advantageous situation can have an immediate psychological impact as observed by Loseman et al. (2009), behavior alterations due to an advantageous pay situation might also arise (Greenberg, 1989, 1996).

According to Greenberg, as underpayment inequity is capable of generating a sense of less self worth by an individual, overpayment inequity might also give an individual an inflated sense of self worth (Greenberg, 1989, 1996). Individuals who receive a greater outcome for similar inputs when compared to a referent other may experience feelings that run the gamut from guilt to entitlement. It is possible that those who receive a greater outcome may change their behavior to include working more hours, working over holidays, or skipping lunch breaks (Greenberg, 1989). In contrast to guilt is the potential for individuals to believe that they are superior to their referent other, and that the overpayment inequity justifies this belief (Greenberg, 1989, 1996; Loseman, et al., 2009). However, these behavioral responses are dependent on choices made by individuals in terms of how outcomes are evaluated and valued (Jasso, 1980).

Jasso (1980) proposes, from a mathematical perspective, that behavior expressed based in a comparative ratio is the result of individual evaluations of the objective and subjective worth of outcomes. Individuals who make justice valuations will be satisfied by their own choice, meaning that if they feel that the quality of the outcome is equal to a large quantity of another outcome, justice is achieved from their perspective (Jasso, 1980, 1986). However, if injustice is perceived, individuals may alter their behavior (Greenberg, 1989). While these results support the basic tenants of equity theory, there are situations for which the theory does not adequately account (Weick, 1966; Folger, 1986).

Equity Theory as an Antecedent to Distributive Justice

Organizational justice is broadly defined as the perception of fairness of an organization determined by individuals working within the organization (Greenberg, 1987; 1989; 1990; 1996). Early in the development of organizational justice, three elements of organizational justice were identified: distributive justice, procedural justice, and interactional justice. Interactional justice consists of two subunits: interpersonal justice and informational justice (Greenberg, 1990). As the literature on organizational justice has expanded, informational justice and interpersonal justice have been added to replace interactional justice as the third and fourth elements of organizational justice (Colquitt & Greenberg, 2003; Colquitt & Chertkoff, 2002). Each element of organizational justice focuses on perceived fairness when it comes to particular areas of organizational decision making (Greenberg, 1987). Distributive justice, the element of organizational justice most associated with fairness derived from outcomes, is the product of equity theory's continuing evolution (Jasso, 1980, 1986; Greenberg, 1987, 1989, 1990, 1996; Colquitt & Greenberg, 2003).

Though equity theory (Adams, 1965) suffers from rigidity and issues of application (Wieke, 1966; Folger, 1986), it is the antecedent to distributive justice. One of the deficiencies of equity theory (Adams, 1965) is that is tends to assume an obverse relationship (Folger, 1986) between the individual making the ratio calculation of inputs to outcomes and a referent other (Weick, 1966; Folger, 1986). While most experiments during the formative stages in the development of equity theory (Weick , 1966) have highlighted the importance of a sense of fairness perceived by individuals as a result of ratio calculations, little consideration has been given to other factors such as: individual choice (Jasso, 1980), the referent other (Folger, 1986), or the valence (Vroom, 1964) for which an individual shows towards particular outcomes. In a review of the state of the literature in social exchange (Blau, 1964; Homans, 1961), Weick (1966) suggests that elements of interpersonal interaction are precluded from the basic tenants of equity theory. Some of the elements that might impact equity are: who is the referent other to whom a comparison is made (Folger, 1986); the setting in which individuals form their perceptions of fairness; and, whether resulting actions are based on inequity or some other social exchange (Blau, 1964) factor. One such example that Weick (1966) gives is a situation where one has to explain how higher outcomes do not necessarily bring about higher production. Weick (1966) further notes that higher individual outcomes do not necessarily produce higher satisfaction among workers. Equity theory (Adams, 1965), according to Weick, is limited by its dependence on inequity determining future action (Weick, 1966).

Folger (1986) believes that equity theory has become less salient in the fairness literature because it suffers from three “shortcomings” (p. 146) that limit its applicability. First, inputs and outcomes are usually narrowly defined and rigid because outcomes that are influenced by

conditions particular to certain situations are not considered in the literal calculation of inputs to outcomes (Adams, 1965). As Weick (1966) explains, higher outcomes do not necessarily lead to improved production if the conditions of the work setting are unsatisfactory. Secondly, equity theory (Adams, 1965) is limited in its applicability because outcomes are considered irrespective of the procedures used to determine those outcomes. And, thirdly, there is no set time for an individual to determine whether or not outcomes are just. While a response to inequity is predictable (Adams, 1965), there is no indication of when an actionable response will occur. Folger (1986) also suggests that the distance between an individual and their desired outcome can also explain resulting behavior based on ratio calculations.

In the early development of equity theory (Adams, 1965), inequity is usually explained as the result of a dyadic exchange or a relationship where a third party is involved in the determination of outcomes (Weick, 1966). In expanding the applicability of equity theory, Kahneman and Tversky (1982) suggest that resulting behaviors to outcomes might be based on the distance between an actual outcome and a preferred outcome (Folger, 1986). In a situation where two individuals are looking to gain the same desired outcome, the individual who comes closest to attaining the desired outcome is likely to be more disappointed that the other individual who was a greater distance from attaining the desired outcome (Kahneman & Tversky, 1982; Folger, 1986). Most individuals generally strive for maximal outcomes (Adams, 1965; Weick, 1966), and are likely to express a higher degree of frustration due to failure the closer they come to attaining a desired income (Kahneman & Tversky, 1982).

Folger (1984, 1986) bases his referent cognitions theory (RCT) on the concept of referent outcomes, those outcomes which are imagined in relation to those outcomes that have occurred. Referent outcomes are considered high if the imagined outcome is greater than the actual outcome, and referent outcomes (Folger, 1984) are considered low if the imagined outcome is no more favorable that the actual outcome (Folger, 1986). In a circumstance where an individual has experienced a less than desirable outcome, the individual's behavior might be moderated by whether the situation has a high likelihood or low likelihood of amelioration. If the likelihood of amelioration is high, an individual's response is likely to be favorable, but if the likelihood of amelioration is low, an individual's response is likely to be less favorable (Folger, 1986). Amelioration is impacted by the distance (Kahneman & Tversky, 1982) between the desired outcome and the actual outcome (Folger, 1986). In this context, perceived justice is based less on social comparison and more on desired outcomes (Folger, 1984, 1986; Kahneman & Tversky, 1982).

The development of equity theory (Adams, 1965) has provided researchers with insight into how individuals determine fairness (Greenberg, 1987; Folger, 1986) and the framework for distributive justice (Greenberg, 1987, 1989). In its most elementary form, equity theory establishes that contributions are what individuals use to determine whether outcomes are fair (Adams, 1965). Individuals are generally satisfied and believe they are treated fairly when their contributions are rewarded appropriately (Adams, 1965; Weick, 1966; Kahneman & Tversky, 1982; Greenberg, 1990). While equity theory has provided insight into perceptions of fairness on the part of individuals, it has not been accommodating to circumstances that contravene a basic obverse relationship (Weick, 1966; Folger, 1986). Despite the limitations of equity theory

(Weick, 1965), it has provided the foundation for further understanding how individuals perceive fairness in the allocation of outcomes and judge organizations in terms of organizational justice (Greenberg, 1987; 1989; 1990). The following hypotheses are posited using an equity theory framework.

Hypothesis 1a: High teacher salaries will lead to high student achievement as measured by AYP.

Hypothesis 1a (0): High teacher salaries will not lead to high student achievement as measured by AYP.

Hypothesis 1b: In the presences of intervening variables, high teacher salaries will lead to high student achievement as measured by AYP.

Hypothesis 1b (0): In the presences of intervening variables, high teacher salaries will lead to high student achievement as measured by AYP.

Hypothesis 2a: When adjusted for cost of living, an inverse relationship between teacher salaries and student achievement as measured by AYP will occur.

Hypothesis 2a (0): When adjusted for cost of living, an inverse relationship between teacher salaries and student achievement as measured by AYP will not occur.

Hypothesis 2b: In the presence of intervening variables, an inverse relationship between teacher salaries, adjusted for cost-of-living, and student achievement as measured by AYP will occur.

Hypothesis 2b (0): In the presence of intervening variables, an inverse relationship between teacher salaries, adjusted for cost-of-living, and student achievement as measured by AYP will not occur.

Distributive Justice

Distributive justice emphasizes how perceptions of fairness are determined in relationship to outcomes (Greenberg, 1987, 1989, 1990; Hegtvedt, 1993). Procedural justice emphasizes the relationship between fairness perceptions and the procedures used by organizations to make decisions (Hegtvedt, 1993; Corpanzano & Ambrose, 2001). Informational justification refers to individual perceptions of fairness related to the amount of information received. Interpersonal justice refers to individual perceptions of fairness related to the sensitivity applies to interpersonal exchange (Greenberg & Baron, 2007; Colquitt & Chertkoff, 2002), usually in a leader-member exchange relationship (Asgari, Silong, Ahmad, & Samah, 2008). When outcomes resulting from inputs are the focus of perceived fairness, a distributive justice perspective is usually applied (Greenberg, 1990). However, determining which types of outcomes are appropriate for which types of inputs might present a challenge. To further understand the relationship of inputs to outcomes ratios (Adams, 1965) and their impact on perceptions of fairness, a review of the expansion of equity theory and its relationship to distributive justice (Greenberg, 1987) follows.

Adams (1965) predicated that perceptions of fairness derived from input to outcome ratios are based on contributive inputs or equity. Deutsch (1975) expanded equity theory (Adams, 1963), and ultimately distributive justice (Greenberg, 1990), on the inputs side of the ratio equation to include three principles: needs, equality, and equity (Patrick, Mahoney & Petrosko, 2008). The distribution of outcomes by an organizational might be subject to which principle is given priority: within the needs principle, outcomes are distributed to entities based on need, the higher the need the greater proportion of outcomes distributed to that entity; within the equality principle, all entities receive an equal portion of organizational outcomes; and, within the equity principle, the entity contributing the most receives the greatest share of organizational outcomes (Deutsch, 1975). Experiments testing the three principles of distributive justice have elucidated differences between organizational types and gender (Hums & Chelladurai, 1994; Patrick et al., 2008).

Building on the work of Hums and Chelladurai (1994), Patrick, Mahoney and Petrosko (2008) looked at perceptions of distributive justice among the three division of the National Collegiate Athletic Association (NCAA) and gender. In previous research, Hums and Chelladurai (1994) found that the principles of equality and need were preferred among coaches and administrators consistently across all divisions of college athletics, but that there were differences between male and female respondents with males showing a preference for equity and females showing a preference for equality.

To test which distributive justice principle was preferred by which division (i.e. NCAA Division I, II, or III) or by which gender, Patrick et al. (2008) constructed a survey consisting of four

scenarios depicting likely events that impact athletic departments and mailed the instruments to athletic directors and senior women's administrators at colleges across the nation and the three athletic divisions. The first two scenarios were constructed based on work by Mahoney et al. (2002, 2006) and Hums & Chelladurai (1994). The first scenario described a situation where a private donation is made to the department; the second scenario describes a situation where there are university-wide budget cuts; the third scenario describes a situation where the budget increases due to successful athletic seasons; and, the fourth scenario describes a situation where the budget decreases due to poor athletic seasons. The researchers found variation among distribution principles (Mahoney et al., 2002, 2006) with the exception of scenario four where revenue producing teams endured poor seasons.

The researchers observed a preference for equity (contribution) among Division I administrators, and a preference for equality among Division II and III administrators. This finding suggests that Division I institutions are more likely to follow a corporate model of rewards distribution (Kalleberg et al., 2006) than Divisions II or III. The research reaffirmed differences between the two genders with female administrators preferring equality and male administrators preferring equity or contribution based distribution (Mahoney et al., 2002, 2006; Hums & Chelladurai, 1994; Patrick et al., 2008).

These findings support pervious research highlighting the differences between organizational structure (Mahoney et al., 2002, 2006; Hums & Chelladurai, 1994) and sector in the context of outcome distribution (Kalleberg et al., 2006). In a review of data from the 1996 National Organization Study, Kalleberg et al. (2006) observed that organizations differ in terms of how

rewards are distributed and what constitutes rewards offered. As noted by Kalleberg et al. (2006), non-profit and public sectors have adopted elements of HPWO into their HRM strategies, but typically are unable to institute the same level of extrinsic reward (McGregor, 1960; Vroom, 1964; Herzberg, 1966) systems that for-profit organizations utilize to motivate workers (Appelbaum, Bailey, Berg, & Kalleberg, 2000; Appelbaum & Batt, 1994). Generally, corporate organizations utilize more pay-based reward systems for worker motivation than non-profit or public sector organizations because non-profit and public sector organizations lack the resources to fund a pay-based incentive program (Kalleberg et al., 2006).

However, Kallegerg et al. (2006) observed that workers expect (Herzberg, 1966; Vroom, 1964) to be rewarded for their contributions to the production of outcomes (Adams, 1963, 1965; Adams & Jacobsen, 1964). Regardless of the reward offered (i.e. increased pay, bonuses, tuition reimbursement, or cross-training), individual workers tend to perceive an organization as fair if the reward offered appropriately matches what they feel they have contributed to the organization. While rewards might differ (Kalleberg et al., 2006) and individual valence (Vroom, 1964) for specific rewards might vary, organizational success is impacted by worker satisfaction in relation to rewards offered (Lawler, 1992). The following hypotheses are posited using a distributive justice framework.

Hypothesis 3a: Student achievement, as measured by AYP, will be higher in school divisions where the difference between teacher salaries and principal salaries is narrow.

Hypothesis 3a (0): Student achievement, as measured by AYP, will not be higher in school divisions where the difference between teacher salaries and principal salaries is narrow.

Hypothesis 3b: In the presence of intervening variables, student achievement, as measured by AYP, will be higher in school divisions where the difference between teacher salaries and principal salaries is narrow.

Hypothesis 3b (0): In the presence of intervening variables, student achievement, as measured by AYP, will be higher in school divisions where the difference between teacher salaries and principal salaries is narrow.

Section II Review

Equity theory (Adams, 1965) lays the ground work for peer to peer inputs to outcomes ratio comparisons. Calculations of inputs to outputs ratios that are equal tend to suggest that an individual believes they are treated fairly (Adams, 1963, 1965; Adams & Jacobsen, 1964), but underpayment and overpayment inequity have the potential to influence individual behavior that might be counterproductive to the overall mission of an organization (Jasso, 1980; 1986; Hegtvedt, 1988, 1990, 1993; Greenberg, 1987, 1989, 1990). However, as critics of equity theory have explained, the assumption of an obverse relationship has made the application of equity theory difficult in understanding individual behavior in organizational settings (Weick, 1966; Folger, 1984, 1986). Through the work of Deutsch (1975), distributive justice evolved from the tenants of equity theory to understand individual perceptions of fairness based on the distribution of organizational resources (Colquitt & Greenberg, 2003; Greenberg, 1989, 1990).

Summary

In light of equity theory (Adams, 1965) and distributive justice (Jasso, 1980; Greenberg, 1987, 1989; Colquitt & Greenberg, 2003), education is an industry where entry-level positions have the greatest impact on organizational outcomes (Odden & Kelley, 1997, 2002). While teachers might compare their inputs to outcomes ratios with those in other professions (Folger, 1984, 1986; Loseman, Miedema, Van Den Bos, & Vermunt, 2009; Van den Bos, Peters, Bobocel, & Ybema, 2006), they are more likely to compare their inputs to outcomes ratios with an individual from within their field (Adams, 1965). As research continues to show, educational outcomes are often most influenced by teachers (Kukla-Acevedo, 2009; Jupp, 2005; Solomon, 2005; Clotfelter, Ladd, & Vigdor, 2006; Goldhaber & Anthony, 2007; Goldhaber & Brewer, 1997; Jepsen, 2005; Krueger, 1999; Rivkin, Hanushek, & Kain, 2005; Rockoff, 2004). From an equity in the allocation of resources perspective, there is a potential for teachers to believe that underpayment inequity (Adams, 1963, 1965; Adams & Jacobsen, 1964) exists in the allocation of outcomes based on the equity principal that resources should be allocated based on contribution (Deutsch, 1975).

CHAPTER 3: METHODOLOGY

Social phenomena cannot easily be observed in a controlled environment, but they can still be tested using the scientific method and experimental designs that introduce an independent variable to observe change in a dependent variable (Frankfort-Nachmias & Nachmias, 2000; Diesing, 1991). Utilization of an experimental design is stout, especially when primary data are used (Diesing, 1991). However, collecting primary data might be cost prohibitive to answering the research question. In instances where the data are expansive and have already been collected, a secondary analysis of data design is an effective methodology (Frankfort-Nachmias & Nachmias, 2000)

For this research, data have been culled from a large dataset collected by the Virginia Department of Education. The data set for this research includes adequate yearly progress (AYP) scores for high school students in each of Virginia's school divisions (excluding the City of Lexington) in the areas of English and mathematics; teacher and principal salary data; and, other pertinent data such as: the dropout rate, free and reduced lunch participation, percentage of African-American, Hispanic, and white students, teacher education, division change over five years, and students enrolled in English as a second language programs. Given the amount of data collected for analysis, primary collection of these data would be time and cost prohibitive (Frankfort-Nachmias & Nachmias, 2000).

This chapter outlines the methodology for executing the research study. The purpose of this research is to answer the question: What is the relationship between teacher salaries and student achievement as measured by adequate yearly progress (AYP)? This chapter is divided into four sections. The first section of this chapter lists the research questions and their associated hypotheses and null hypotheses. The second section of this chapter summarizes the advantages and disadvantages to using a secondary analysis of data design. The third section describes the construction of the dataset and the variables within the dataset. The fourth section of this chapter will describe how that data will be analyzed. A summary of this chapter follows the fourth section.

Research Questions, Hypotheses and Null Hypotheses

Research Question 1: What is the relationship between teachers' salaries and student achievement as measured by AYP?

Hypothesis 1a: High teacher salaries will lead to high student achievement as measured by AYP.

Hypothesis 1a (0): High teacher salaries will not lead to high student achievement as measured by AYP.

Hypothesis 1b: In the presences of intervening variables, high teacher salaries will lead to high student achievement as measured by AYP.

Hypothesis 1b (0): In the presences of intervening variables, high teacher salaries will not lead to high student achievement as measured by AYP.

Research Question 2: What is the relationship between teachers' salaries when adjusted for cost of living and student achievement as measured by AYP?

Hypothesis 2a: When adjusted for cost of living, an inverse relationship between teacher salaries and student achievement as measured by AYP will occur.

Hypothesis 2a (0): When adjusted for cost of living, an inverse relationship between teacher salaries and student achievement as measured by AYP will not occur.

Hypothesis 2b: In the presence of intervening variables, an inverse relationship between teacher salaries, adjusted for cost-of-living, and student achievement as measured by AYP will occur.

Hypothesis 2b (0): In the presence of intervening variables, an inverse relationship between teacher salaries, adjusted for cost-of-living, and student achievement as measured by AYP will not occur.

Research Question 3: What is the relationship between student achievement, as measured by AYP, and the difference between teacher salaries and principal salaries?

Hypothesis 3a: Student achievement, as measured by AYP, will be higher in school divisions where the difference between teacher salaries and principal salaries is narrow.

Hypothesis 3a (0): Student achievement, as measured by AYP, will not be higher in school divisions where the difference between teacher salaries and principal salaries is narrow.

Hypothesis 3b: In the presence of intervening variables, student achievement, as measured by AYP, will be higher in school divisions where the difference between teacher salaries and principal salaries is narrow.

Hypothesis 3b (0): In the presence of intervening variables, student achievement, as measured by AYP, will not be higher in school divisions where the difference between teacher salaries and principal salaries is narrow.

Secondary Data Analysis

Secondary data analysis is usually applied to inquiries where the amount of data is expansive and the cost of collecting the necessary data is prohibitive (Justice, Breit-Smith, & Rogers, 2010; Frankfort-Nachmias & Nachmias 2000). The data culled for this research have been collected by the State of Virginia and have appeared in publish reports distributed by the Virginia Department of Education giving these data credibility (Justice, Breit-Smith, & Rogers, 2010). While primary data collection and analysis is considered optimal (Diesing, 1991), a secondary analysis of existing data is appropriate for answering the research questions posed (Frankfort-Nachmias &

Nachmias, 2000). The advantages and limitations of utilizing a secondary data analysis are presented here.

Advantages

According to Frankfort-Nachmias and Nachmias (2000), secondary analysis involves analyzing data that have been previously collected. Frankfort-Nachmias and Nachmias (2000) outline several advantages and limitations to utilizing secondary data in a research project. One advantage is that secondary data analysis has a long tradition of usage with various researchers employing the technique, such as Durkhiem, Marx, and Weber (Frankfort-Nachmias & Nachmias, 2000). Another advantage is that the design allows for replication, especially if utilizing historic data (Frankfort-Nachmias & Nachmias, 2000). Also, secondary data analysis is a time and cost effective way to do social inquiry (Nardi, 2006; Frankfort-Nachmias & Nachmias, 2000). In certain cases, the amount of data needed to perform a comprehensive analysis is cost and time prohibitive. Also, if a government agency with numerous employees and resources has already collected the data, or recorded the data, as with public records, the process may be redundant if collected again by researchers (Frankfort-Nachmias & Nachmias, 2000).

Experimental designs can be implemented using secondary data (Diesing, 1991; Justice et al., 2010; Frankfort-Nachmias & Nachmias, 2000). An advantage for using secondary data in an experimental design is that the data are usually collected by a credible agency such as the federal government, state and local agencies, and research universities. Moreover, the methodology used to collect the data originally conveys to the current study (Frankfort-Nachmias &

Nachmias, 2000). Generally, secondary data have existing credibility as they might have been utilized in research projects by researchers within the particular field where the data originate (Justice et al. 2010).

Justice, Breit-Smith, and Rogers (2010) suggest using secondary data because of the amount of data required to construct effective models in field such as education is often expansive. As the authors note, these datasets are usually published and available for a small fee or free (Justice et al., 2010). The authors observe in their research that data already collected can be used to answer new scientific queries. Whether data are collected for a specific purpose or required by an organization for legal reasons, if the researcher is knowledgeable of the existing data, these data may be used to answer research questions in a complementary study (Justice et al., 2010; Frankfort-Nachmias & Nachmias, 2000). Justice et al. (2010) recommend using large datasets collected with the support of federal, state, and local funding in lieu of collecting datasets of primary data where the data to be collected are expansive.

Data on school districts are often expansive and beyond the collecting ability of a single researcher. Gill and Meier (2001) designed an experiment using organizational theory to discern the characteristics of superior performing agencies from an existing dataset of 534 school districts in the State of Texas. The researchers (Gill & Meier, 2001) explain their reason for using school districts to understand high performing public organizations by stating, “School systems are not only the most prevalent public bureaucracies in the United States, they also have some relatively objective measures of outputs that can be used to evaluate performance…that is, the measure of school system outputs – is based on students scores on standardized tests (p. 10).”

The purpose of their research was to discern whether or not environmental constraints, financial resources, district policies, or teacher salaries impacted scores on standardized tests. The researchers developed a design where standardized test scores represented the dependent variable and various characteristics of the school districts (i.e. teacher salary, student ethnicity, socioeconomic level, etc.) represented the independent variable. Utilizing a SWAT analysis, the researchers deduced that high performing agencies produced superior results by maximizing existing assets to mitigate environmental influences (Gill & Meier, 2001). This research benefited from the availability of secondary data.

As Justice et al. (2010) and Gill & Meier (2001) have noted, existing datasets often provide researchers with a cost effective and time effective collection of data that can be used in experimental or exploratory research designs (Franfort-Nachmias & Nachmias, 2000; Diesing, 2001). Secondary data might be used to create a complementary study to the original research for which the data were collected (Justice, et al., 2010), or used to better understand phenomena in one field by using data collected in another field (Gill & Meier, 2001). The use of secondary data is attractive to researchers, but not without caveats (Frankfort-Nachmias & Nachmias, 2000).

Limitations

Secondary data analysis is not without its limitations. While secondary data analysis does provide researchers with the advantage of having immediate data, the data are part of a previous collection that may have no bearing on the current research project (Franfort-Nachmias & Nachmias, 2000). Frankfort-Nachmias & Nachmias (2000) outline three areas of concern when

using secondary data: inherent limitations, access, and insufficient data. When using secondary data, the researcher assumes the limitations and inaccuracies of the original data collection (Frankfort-Nachmias & Nachmias, 2000). As Frankfort-Nachmias and Nachmias explain, if a researcher chooses to utilize data from an earlier project that used an experimental model the researcher assumes existing fallacies in the design as well as the internal and external threats to validity.

Secondly, a researcher may be able to access portions of the desired dataset but not all (Frankfort-Nachmias & Nachmias, 2000). This is especially true when searching for data that has been placed on the Internet. As with data warehouses on the Internet like the U.S. Census, certain search engines or security protocol may be necessary for gaining access to data or data may not be available through the Internet (Frankfort-Nachmias & Nachmias, 2000).

Thirdly, available secondary data might not provide the desired variables for the research project (Frankfort-Nachmias & Nachmias, 2000). One of the most common issues with using secondary data is that the data are not complete, meaning that data are available for some units of analysis, but not all (Justice et al., 2010; Frankfort-Nachmias & Nachmias, 2000). However, researchers have had success utilizing secondary data analyses to determine whether there are relationships between dependent variables and independent variables despite these conditions.

Dataset

This section describes the data that are included in the dataset as well as explaining the reasoning for selecting these data to be included within the dataset. The dataset is comprised of data

collected by the Virginia Department of Education. The units of analysis for this research are 131 public school divisions within the state of Virginia[7]. The advantage to using school divisions data is that the information is published by the State of Virginia and has credibility conveyed from its original collection. The data are expansive and allow for this type of inquiry.

The Virginia Department of Education provides a wealth of data at the school division level for conducting this research, including variables that can be identified as dependent and independent. As evidenced by Gill and Meier's (2001) work, school districts allow researchers to pose theoretically based questions where a standardized, well-defined outcome is present. There are limitations to utilizing school division data including: aggregate level data as opposed to individual level data; nuances in the data are muted; and, statistical differences within school divisions (Tabachnick & Fidell, 2001).

However, individual school units in Virginia might not collect the data required for this project at the building level. Also, individual school units might not follow a standardized format for collecting the data like school divisions, which are required to follow certain standards by the federal government (i.e. AYP Report Card requirements). Smaller school divisions might not have full-time staff to perform data collection in the way larger school divisions might to collect building specific data.

[7] The City of Lexington school division is excluded from analysis because it does not provide instruction for students enrolled in grades 9-12.

Variables

There are three types of variables that are included in the dataset: dependent variables, independent variables, and moderating variables. The dependent variables are the percentage of students passing in two English subjects (reading and writing) and three mathematics subjects (algebra 1, geometry, and algebra 2). The independent variables are the salaries of teachers, the salary of teachers when adjusted for cost of living, and the difference between teacher salaries and principal salaries. The intervening (or moderating) variables are: percentage of students receiving free or reduced lunch; the percentage of African-America students per school division; the percentage of Latino students per school division; the drop-out rate per school division; the percentage of teachers with post graduate degrees; the percentage change over a five year period for each division; and the percentage of students enrolled in English as a second language programs (ELS). Collection and conveyance of the variables for this research are outlined in Figure 7 on the next page.

Dependent Variables

The dependent variable, student achievement, is defined by the percentage of high school students passing assessments that comprise AYP for 131 school divisions in Virginia from the 2007-2008 school year. According to the Department of Education (2010b) each state is required to test all students in grades 3-8 and once in grades 10-12 utilizing assessments that align with the standards of NCLBA. Each state produces a “report card” and publishes the results of each school district and school unit in the state (U.S. Department of Education, 2010c).

Variable Type	*Variable Name*	*VA DOE Collection*	*Dataset Collection*	*SPSS Level*
Dependent Variable	English AYP	Reported in Virginia's Report Card as a percentage of students passing in the subjects of reading and writing	Recorded as a two digit decimal	Scale
	Mathematics AYP	Reported in Virginia's Report Card as a percentage of students passing in the subjects of algebra I & II and geometry	Recorded as a two digit decimal	Scale
Independent Variable	Teacher salaries	Recorded as an integer	Recorded as an integer	Scale
	Teacher salaries adjusted for cost of living	Recorded as an integer	Salaries are multiplied by a cost of living index for each area of the state and recoded as an integer	Scale
	Gap between teacher and principal salaries	Recorded as integers	Percentage calculated of teacher to principal salaries	Scale
Intervening Variable	Free and Reduced Lunch	Recorded as percentage	Recorded as a three digit decimal	Scale
	Percentage of African-American, Latino, & white students	Recorded as integers	Converted to percentages and recorded as a three digit decimal	Scale
	Drop-out rate	Recorded as percentage	Recorded as a three digit decimal	Scale
	Change over a 5-year period	Membership recorded as integer	Percentage calculated and recorded as a three digit decimal	Scale
	ESL enrolment	Membership recorded as integer	Percentage calculated and recorded as a three digit decimal	Scale
	Teachers with post-graduate degrees	Recorded as a percentage	Recorded as a two digit decimal	Scale

Figure 7: Variable Type, Name, Collection and Level

Standardized tests are a commonly used barometer of student achievement (Gill & Meier, 2001), and the standardization of measuring student achievement though AYP (U.S. Department of Education, 2010b, 2010c) lends credibility to using Virginia's AYP score for English and mathematics. The standardization of measuring student achievement makes it possible for answering the research question utilizing equity theory and distributive justice perspectives (Adams, 1965; Deutsch, 1975; Greenberg, 1987, 1989, 1990, 1996). Since every state in the union is required to submit a "report card", a complimentary study (Justice et al., 2010) is possible in states other than Virginia.

The dependent variables (AYP scores in English and mathematics) are recorded in Virginia's Report Card (Virginia Department of Education, 2010) as percentages that have been transcribed into the dataset as two digit decimals for the purposes of analyzing them in SPSS. As of school year 2010-2011, NCLBA requires 100% proficiency in English and mathematics by 2014 (U.S. Department of Education, 2010a, 2010b, 2010c). Researchers might want to consider social studies and science AYP scores for future projects, but currently 100% proficiency in social studies and science is not required (U.S. Department of Education, 2010a, 2010b). For the purposes of this research, the dependent variables included in the dataset are: English reading, English writing, algebra I and II, and geometry. These subjects are taught in grade levels 9 through 12.

Independent Variables

This research utilizes teacher salary as an independent variable due to evidence that teacher salaries have a positive relationship with student achievement when utilizing standardized test

score as a barometer of student achievement (Gill & Meier, 2001). In Gill and Meier's (2001) analysis, as teacher salary increased, the achievement of students, as measured by standardized tests, increased. The independent variable, teacher compensation, is defined by variations on the reported average salaries for 131 school divisions in Virginia from the 2007-2008 school year. There are three independent variables derived from the average: the state recoded average teacher salary for each school division included in the dataset converted to a daily rate; an adjusted average teacher salary for each school division included in the dataset based on cost of living converted to a daily rate; and, the difference between teacher day rate salaries and principal day rate salaries for each school division included in the dataset utilizing the averages provided by the state and converted to a percentage and recorded as a three digit decimal. Assistant principal salaries were considered for inclusion in this research, but were discarded after discovering that the average daily rate for assistant principals was not much greater than that of teachers. Daily rates for teachers were calculated by dividing each average division salary by 200, which is the average number of days teachers are contracted to work in Virginia. Daily rates for principals were calculated by dividing each division average salary by 262, which is the average number of days principals are contracted to work. The adjusted day rate for teachers was calculated by multiplying the teacher day rate by a cost-of-living index based on median household income (Beth Curran, Wolman, Hill & Furdell, 2006).

The use of salary data in this context fits well within equity theory and distributive justice beyond discovering a positive relationship between teacher salaries and student achievement (Adams, 1965; Deutsch, 1975; Greenberg, 1987, 1989, 1990). Within the context of equity theory (Adams, 1965), teachers in certain areas of Virginia might feel that they deserve a higher

allocation of organizational resources based on need (rural divisions), equality (small to medium sized divisions), or equity (high performing divisions). Following Deutsch's (1975) model of distributive justice, which incorporates three principles of distribution (i.e. need, equality, and equity) this research will seek to discover the how the relationship between teacher salaries and student achievement are effected when teacher salaries are considered in relationship to the areas of the state where teachers are employed. Likewise, from a distributive justice perspective, those who directly contribute (teachers) to organizational outcomes (student achievement) might feel they are obligated a higher proportion of organizational resources (salaries) than those who contribute indirectly (administrators) to organizational outcomes (Greenberg, 1987, 1989, 1990). However, those who have attained positions in administration that indirectly impact organizational outcomes might believe they are entitled to their resource allocation (salary) due to their time with an organization and experience gained from previously holding an entry level position (Deutsch, 1975).

Intervening Variables

Intervening variables are included to understand the level of influence that independent variables have on dependent variables (Frankfort-Nachmias & Nachmias, 2000). As Gill & Meier (2001) observe, successful organization results are not achieved within a vacuum, and that while some variables influence student achievement more than others, their influence is moderated by environmental and socioeconomic factors. The education literature suggests that qualified teachers are likely to have the largest direct influence on student achievement (Kukla-Acevedo 2009), but caution that suggesting student achievement is gained through the sole efforts of qualified teachers is glib (Odden & Kelley, 1997, 2002; Cochran-Smith & Fries, 2005; Gill &

Meier, 2001). The intervening variables for this research are included below with a description of how they were collected by the state and how they are recorded into SPSS for use in this research.

The intervening variables are: the percentage of African-American, Latino, and white students within a school division; the percentage of students receiving free and reduced school lunches; the dropout rate; the percentage of teachers within a division with post-graduate degrees; the change in each division over a five year period; and, the percentage of students enrolled in ESL programs. The intervening variables are collected and reported by the Virginia Department of Education (2010) as required by the NCLBA to identify and assist school divisions and school units that are failing to make AYP (U.S. Department of Education, 2010a, 2010b, 2010c). The number of African-American, Latino, and white students is recorded by the Virginia Department of Education as integers. This variable has been recorded in SPSS as a decimal. Students receiving free and reduced lunches, as well as the dropout rate are reported as percentages and included in SPSS as decimals. Division change over a five year period has been determined by using total division enrollment for school years 2002-2003 and 2007-2008 and calculating a percentage, which is recorded in SPSS as a decimal. Students enrolled in ESL programs are collected as an integer, which has been used to calculate a percentage and recorded as a decimal in SPSS. The state collects post-graduate information on teachers as a percentage, which is recorded in SPSS as a decimal. The education, public policy, and economics literature recommends including these variables within any study about student achievement (Winfield, 1982; Edmunds, 1979; Good & Brophy, 1986; Kyle, 1985; Mackenzie, 1983; Purkey & Smith, 1983; Stedman, 1987; Stringfield & Teddlie, 1988; Gill & Meier, 2001; Kukla-Acevedo 2009).

Data Analysis

The data are housed within an Excel spreadsheet and an SPSS dataset. The data collected for this research will be analyzed using a general linear model (GLM), a multivariate technique that allows for testing the influence of one or more IVs on multiple DVs, reducing the potentiality of a Type I error[8] (Tabachnick & Fidell, 2001). GLM makes use of several statistical models including ANOVA, ANCOVA, MANOVA, MANCOVA, t-tests, and F-tests (Tabachnick & Fidell, 2001; Rose & Sullivan, 1996; Mardi, Kent & Bibby, 1979). As with any linear model, GLM assumes that there are no errors in measurement of the independent variables and the absence of collinearity among the variables (Tabachnick & Fidell, 2001). The models produced for analysis were run using SPSS syntax where the dependent variables were entered with the independent and intervening variables. To limit the presence of highly correlated variables, tests of collinearity were run to reduce the number of intervening variables in the reduced models. The results of collinearity testing appear in Appendix B.

Summary

There are advantages and disadvantages to doing secondary analysis of data (Frankfort-Nachmias & Nachmias, 2000). For this research, the advantages outweigh the disadvantages. Since the dataset for this research is culled from large swaths of data that have been previously collected by the Virginia Department of Education (2010), collecting these data independently would be cost and time prohibitive. This dataset has validity conveyed (Frankfort-Nachmias & Nachmias, 2000) to it due to the requirements of NCLBA that each state collect and publish their AYP data. The dependent variables (student achievement) and independent variables (teacher

[8] A Type I error occurs when a researcher rejects the null hypothesis when it is true resulting in a “false positive”. A type two error occurs when the researcher fails to reject the null hypothesis resulting in a “false negative” (Tabachnick & Fidell, 2001).

and administration compensation) are defined by AYP scores and salary information for teaching and administration positions within each school division included in the dataset respectively. Analyzing these date requires a stout multivariate technique that is equipped to allow for testing the influence of one or more independent variables on more than one dependent variable. GLM is appropriate for analyzing these data. The results of the data analysis are presented in chapter four.

CHAPTER 4: RESEARCH FINDINGS

In this chapter the results of the data analysis are presented. Four hypotheses have been posited from an equity theory perspective, and two hypotheses have been posited from a distributive justice perspective. The primary focus of this chapter is on (1) examining the relationship between each of the variables using a correlation matrix (2) examining the relationships between the independent variables and dependent variables and (3) examining the relationship between the independent variables and the dependent variables when intervening variables are present. This chapter is comprised of three sections with a summary of the chapter following section three. The first section of this chapter briefly gives general information on school divisions in Virginia for the 2007-2008 school year and provides a description of the variables included in the analysis. The second section includes two correlation matrices, a description of how the variables interact with each other, and an explanation of how the GLM models were built for analysis in section three. The third section presents the results of nine GLMs and hypotheses testing.

Section I

This section provides a general review of high school level data for school division in Virginia during the 2007-2008 school year and descriptions of the dependent, independent and intervening variables. As presented in chapter three, the methodology utilized for this research is

a secondary analysis of data. The dataset is culled from data collected by the Virginia Department of Education. The Lexington school division is not included because it does not include a high school. Appendix A includes all the data analyzed for this research. The data have been entered into an excel spreadsheet and transmitted to an SPSS file. All predictive models are run using SPSS version 14.

The dataset used in this research is comprised of data relevant to student achievement by high school students in Virginia as measured by adequate yearly progress (AYP), teacher and principal compensation, and demographic and socioeconomic data related to the student body. The dataset is comprised of 131 school divisions within Virginia that offer high school education. Specifically, the school divisions included measure achievement in: English reading, English writing, algebra I and II and geometry. For the purposes of this research, student achievement is measured by the standards required by AYP. Student achievement in this context is measured by the percentage of students passing in specific subjects such that individual schools and school divisions are progressing towards 100% proficiency as defined by the U.S. Department of Education (2010a).

Review of Virginia School Divisions for the 2007-2008 School Year

The State of Virginia’s public high school enrollment is large and diverse. The total student enrollment for all levels of instruction for the school year 2007-2008 (as recorded on September 30, 2007) was 1,231,987, an increase from school year 2002-2003 of nearly 56,000 or about 4.75%. For high schools, the total enrollment for school year 2007-2008 was 384,972. African-American students represented a little over one-fourth of the student population, while

Hispanic/Latino students represented nearly one in every ten students in the population. White student's accounted for over 55% of the student population for the State of Virginia. About one-third of Virginia's student population were eligible for free or reduced lunch in school year 2007-2008 with fewer than 2 in every one hundred students dropping-out of school. Nearly seven out of every 100 students is enrolled in a class to increase proficiency in English for students with limited exposure or practice with the English language. The average teacher salary in school year 2007-2008 was slightly over $50,000 and the average principal salary was slightly less than $90,000. A little more than four out of every ten teachers have a post-graduate degree.

Achievement in English and math AYP was high with about nine out of every ten students passing. Students tested best in English reading with 94%, while geometry posted the lowest passing rate with 87%. Despite being the lowest score of the five subjects included for analysis in this research, nearly nine out of every ten students passed geometry. Table 1 provides a brief overview of high school enrollment, compensation and achievement as measured by AYP for the State of Virginia for the school year 2007-2008.

School divisions in Virginia vary in their population size and diversity. The five largest school divisions in Virginia enrolled at least 50,000 students in school year 2007-2008 with Fairfax County enrolling over 165,000 students. Three of the largest school divisions in Virginia are located in the Northern Virginia region of the state. Three of the five largest school divisions experienced at least 9% growth over a five year period with Loudoun County experiencing a growth of nearly 44%. The median household income in each of the five largest school divisions exceeded $60,000 with Fairfax County and Loudoun County each exceeding $100,000 in median household income.

Table 1: High School Demographics, Compensation and AYP for the State of Virginia for School Year 2007-2008

Demographics	
Total High School Enrollment	384,972
5-Year Percentage Growth	4.75%
Percent African-American	25.7%
Percent Hispanic/Latino	9.0%
Percent White	56.6%
Percent Eligible Free/Reduced Lunch	33.0%
Drop-out Rate	1.90%
Teachers with Post-Graduate Degrees	43%
Limited English Enrollment	6.8%
Compensation	
Average Teacher Salary	$50,527
Average Principal Salary	$89,427
Achievement (AYP)	
Percentage Passing English: Reading	94%
Percentage Passing English: Writing	92%
Percentage Passing Math: Algebra I	93%
Percentage Passing Math: Geometry	87%
Percentage Passing Math: Algebra II	90%

Enrollment in each of the five smallest school divisions for school year 2007-2008 was less than 850 students with Highland County enrolling less than 300 students. Three of the five smallest school divisions are located in the western part of the state. Growth was relatively flat over a five year period for the five smallest school divisions with no division growing by 10% or more. The median household income for three of the five smallest school divisions is less than $50,000. Median household income was not available for Colonial Beach or West Point. Table 2 lists the five smallest and five largest school divisions included in the dataset along with a few characteristics.

Table 2: Five Largest and Five Smallest School Divisions in Virginia

School Division	*Region*	*Enrollment*	*5 Year Change*	*Median Household Income*
Largest				
Fairfax County Public Schools	Northern Virginia	165,734	1.9%	$104,984
Prince William County Public Schools	Northern Virginia	72,989	20.6%	$86,294
Virginia Beach City Public Schools	Tidewater	72,477	-4.5%	$61,234
Chesterfield County Public Schools	Central Virginia	58,969	9.2%	$69,583
Loudoun County Public Schools	Northern Virginia	53,985	43.8%	$107,200
Smallest				
West Point Public Schools*	Peninsula	807	2.0%	N/A
Craig County Public Schools	Western Virginia	749	7.0%	$48,319
Bath County Public Schools	Western Virginia	747	-4.7%	$42,316
Colonial Beach Public Schools*	Peninsula	579	2.7%	N/A
Highland County Public Schools	Western Virginia	282	-0.1%	$36,521

*West Point and Colonial Beach are designated as towns according to the State of Virginia Department of Education

Variables

The dataset is comprised of data that represent the averages or proportion of the population for each of the school divisions included in the research. For the purposes of this research, 131 school divisions are included. The Lexington school division is excluded because it does not offer instruction beyond the 8th grade. All data related to AYP are for high school results, which represent grades 9-12, and are means of the pass rates of the population of school divisions. Wage and teacher education data included in the analysis represent the means for the school division. Data referencing ethnicity, the drop-out rate, free and reduced school lunch eligibility, and participation in limited English programs are represented by the proportion of the student population they represent. As stated earlier, AYP scores represent the dependent variables; wage data represent the independent variables; and, division descriptors, such as ethnicity, school lunch eligibility, the drop-out rate, teacher education, growth rates, and participation in limited English programs represent the intervening variables. Provided below is a brief description of the dependent, independent, and intervening variables included in the analysis. The means and medians might not match the descriptive statistics reported by state because the statistics

presented here represent the 131 school divisions included within the dataset. For the duration of this chapter, the population of school divisions included in the dataset will be referred to as the population.

Dependent Variables

The dependent variables for this analysis fall into two areas: performance in English and mathematics as measured by AYP. There are two AYP scores for the English component: reading and writing. There are three AYP scores for the mathematics component: algebra I, geometry, and algebra II. On average, students tested best in reading and worst in geometry. An examination of how the population performed on each subject is presented here with results in English preceding the results in mathematics.

For the population, school divisions recorded high results for performance in English subjects with a mean for reading and writing of over 91%. The mean of the population for reading performance is nearly 94% with standard deviation of 3.10 and a median of 94%. Two school divisions enjoyed a 100% pass rate for reading and only one school division experienced a pass rate of 85%. For reading scores, the population is not widely dispersed and mostly concentrated towards the top of the scale. The mean for writing performance is slightly less than reading at nearly 92% with a median of 92%. The standard deviation is 4.04, and the range of high to low is wider than the range for reading with a high of 98% accomplished by three school divisions and a low of 79% recorded by three school divisions.

The population performed well in mathematics as well. On average, the population experienced at least an 85% pass rate in all three mathematics subjects with a better than 90% pass rate in algebra I and II. The most successful results in mathematics came in algebra I with a nearly 93% pass rate and a standard deviation of 4.44. The median pass rate for algebra I was 94%. The range of values for algebra I was the narrowest of the three mathematics subjects, but was wider than the ranges for the two English subjects. One division achieved a 100% pass rate and one division reported the lowest pass rate at 77%.

The population scored its lowest pass rate for mathematics in geometry, which was also the lowest score of the five subjects included in the analysis. Although, the pass rate was the lowest of the three mathematics subjects, the population reported a near 86% pass rate for the subject and a standard deviation of 7.87. The median for geometry was 87%. The range of scores for geometry is the widest of all five subjects. However, the range from a high of 98% scored by one school division to a low of 47% scored by one school division is somewhat deceiving because the next lowest score after the 47% pass rate is a 59% pass rate. Even with the removal of the school division with a 47% pass rate, the range of high to low for geometry is still the widest of the five subjects.

The population performed well in algebra II. The population experienced a better than 90% pass rate for students taking algebra II with a standard deviation of 6.28. The median for algebra II is 91%. The range of scores for algebra II is wider than the range of scores for algebra I, but narrower than the range of scores for geometry. One school division achieved a 100% pass rate, while two school divisions reported a pass rate of 64%.

Overall, the population experienced more success in English subjects than mathematics subjects, but achievement was high across the five subjects. A mean pass rate of better than 90% was achieved in four out of the five subject areas. Performance in reading reported the highest mean and narrowest dispersion of scores, and geometry reported the lowest mean and widest dispersion of scores. Table 3 presents the mean, median, standard deviation, and high/low pass rate scores for each of the five subjects included in the analysis.

Table 3: Dependent Variables Descriptive Statistics

Variable	*Mean*	*Median*	*SD*	*High (Frequency)*	*Low (Frequency)*
English: Reading	93.97%	94.00%	3.10	100% (2)	85% (1)
English: Writing	91.63%	92.00%	4.04	98% (3)	79% (3)
Math: Algebra I	92.56%	94.00%	4.44	100% (1)	77% (1)
Math: Geometry	85.64%	87.00%	7.87	98% (1)	47% (1)
Math: Algebra II	90.54%	91.00%	6.28	100% (1)	64% (2)

Independent Variables

There are three independent variables included in this analysis: teacher day rate salary, adjusted teacher day rate and teacher-to-principal salary difference. The teacher day rate salary is calculated by taking the mean teacher salary for each school division and dividing it by 200, which represents the standard number of teaching days included in a contract that most teachers sign when they accept employment or continued employment with their current school division. The adjusted teacher day rate salary is calculated by multiplying the day rate salary by a wage index calculated using median household income (Beth Curran, Wolman, Hill & Furdell, 2006). The wage index is calculated by dividing the median household income of each school division by the median household income of the state. Once a wage index is calculated for each school division, the teacher day rate for that division is divided by the index to create the new variable,

adjusted teacher day rate salary. Principal day rate salaries are determined by taking the mean principal salary for each school division and dividing it by 262, which is the standard number of days within a 12 month contract signed by principals when they accept employment or continued employment with their current school division. The teacher-to-principal salary difference is calculated by dividing the teacher day rate by the principal day rate and calculating a percentage. The higher the percentage, the closer average teacher salaries are to average principal salaries.

The mean teacher day rate for the population is nearly $206 with a standard deviation of 26.55. The median teacher day rate is a little over $201. The range of values within the teacher day rate variable is fairly wide with a high of nearly $311 for one school division and a low of about $164 for one school division. When a wage index based on median household income is applied, the mean adjusted teacher day rate salary is about $269 with a standard deviation of 61.26. The median adjusted teacher day rate salary is approximately $269. The range of values for adjusted teacher day rate salary is wider than that of the standard teacher day rate salary with a high of nearly $405 for one school division and a low of just over $145 for one school division. For the population, teacher salaries on average are about 68% of principal salaries with a standard deviation of 6.4. The median is about 68%. In one school division, on average, teachers make about 91% of principal salaries. In one school division, on average, teachers make less than 51% of principal salaries. Table 4 includes descriptive statistics for the independent variables included in this analysis.

Table 4: Independent Variables Descriptive Statistics

Variable	Mean	Median	SD	High	Low
Teacher Day Rate	$205.82	$201.15	26.55	$310.52	$163.89
Adjusted Teacher Day Rate	$268.56	$269.01	61.29	$404.97	$145.30
Teacher-to-Principal Ratio	67.9%	67.5%	6.40	90.9%	50.8%

Intervening Variables

There are six intervening variables included in the analysis: ethnicity; percentage of students eligible for free or reduced lunch; the drop-out rate; percentage of teachers with a post graduate degree; the percentage growth over a five-year period; and, percentage of students enrolled in a limited English program. Means, medians, and standard deviations for each of the intervening variables, as with the dependent and independent variables, are based on averages for the 131 school divisions.

For the population, African-Americans accounted for about one-fourth of the student population, about one in twenty students were identified as Hispanic or Latino, and more than six in ten students were white. On average, a little more than four in ten students in each school division were eligible for free or reduced lunch. Less than two in one hundred students dropped out during the school year per school division. More than four in ten teachers held a post graduate degree per school division. The average growth rate for the population was three percent. And, a little less than four percent of the student population was enrolled in a limited English program per school division.

The mean percentage of African-American students within the population was about 25% with a standard deviation of 22.57 and a median of about 18%. One division reported a high of over

94% and several divisions reported having no African-American students within their student population. The mean percentage of Hispanic/Latino students within the population was about 5% with a standard deviation of 7.4 and a median of less than 3%. One school division reported a high of 42% and several divisions reported having no Hispanic/Latino students within their student population. The mean percentage of white students within the population was a little over 66% with a standard deviation of 24.19 and a median of a little over 70%. One division reported a white student population of nearly 100% while one school division reported a low of about 2% of white students within their student population.

For the population, the mean of students eligible for free or reduced lunch is nearly 42% with a standard deviation of 15.93 and median of nearly 42%. One division reported that nearly 90% of the student population were eligible for free or reduced lunch while one division reported a low of less than 12% of the student population were eligible for free or reduced lunch. The mean drop-out rate was less than 2% with a standard deviation of 1.24 and a median of less than 2%. One school division reported a drop-out rate of over 6%, and a few school divisions had a drop-out rate of 0%. Among the population, a mean of almost 44% of teachers had post graduate degrees with a standard deviation of 9.33 and a median of 43%. One school division reported that 77% percent of their teachers had a post graduate degree and one school division reported that 23% of its teachers had a post graduate degree.

The mean growth for the population was 3% with a standard deviation of 8.78 and a median of about 2%. One school division grew by nearly 44% while one division declined by nearly 14%. The mean percentage of students enrolled in a limited English program was about 4% with a

standard deviation of 6.4 with a median of just over 1%. One school division reported that over 37% of its student population is enrolled in a limited English program and a few school divisions reported that none of its students are enrolled in a limited English program. Table 5 presents the descriptive statistics of the intervening variables for the population.

Table 5: Intervening Variables Descriptive Statistics

Variable	*Mean*	*Median*	*SD*	*High*	*Low*
Percentage of African-American Students	25.4%	18.2%	22.57	94.4%	0.0%
Percentage of Hispanic/Latino Students	5.2%	2.6%	7.4	42.0%	0.0%
Percentage of White Students	66.1%	70.2%	24.19	99.8%	2.1%
Percentage of Students Elgibile for Free/Reduced Lunch	41.5%	41.9%	15.93	89.9%	11.8%
Dropout Rate	1.9%	1.7%	1.24	6.4%	0.0%
Teachers with Post-Graduate Degrees	42.9%	42.0%	9.04	76.0%	23.0%
5-Year Growth for Divisions	3.0%	1.9%	8.78	43.8%	-13.8%
Percentage of Students Enrolled in Limited English Programs	3.5%	1.3%	6.4	37.5%	0.0%

Section II

This section of the chapter presents the results of bivariate correlations run with the dependent, independent and intervening variables, and an explanation of which variables will be entered into the GLM for analysis in the next section. The first part of this section presents the results of a series of bivaraite correlations to determine which variables are most likely to influence a change in the dependent variables. This section includes a key for how the variables were coded in SPSS as well as a correlation matrix.

Variable Interaction

Prior to running a full statistical analysis on the dependent, independent, and intervening variables, a correlation matrix was produced in SPSS to understand what relationships variables have with each other. The correlation matrix gives clues to how the variables will influence or will be influenced by each other in the GLM analyses. Figure 8 is a key that provides a definition for each variable label in the SPSS dataset. Table 6 is a correlation matrix. The descriptions of variable interaction will refer to Table 6.

Variable	*SPSS Code*	*Definition*
Dependent Variables	AllRead	Percentage of high school students passing reading for the school division
	AllWrite	Percentage of high school students passing writing for the school division
	AllAlg1	Percentage of high school students passing algebra I for the school division
	Allgeo	Percentage of high school students passing geometry for the school division
	AllAlg2	Percentage of high school students passing algebra II for the school division
Independent Variables	TeachDay	Mean day rate salary of teachers for the school division
	Adj08TS	Mean adjusted day rate salary of teachers for the school division
	T_Pratio	Ratio of teacher day rate salaries to principal day rate salaries as a percentage
Intervening Variables	PerAA	Percentage of African-American students for the school division
	PerH	Percentage of Hispanic / Latino students for the school division
	PerW	Percentage of white students for the school division
	FRLunch	Percentage of students receiving free or reduced lunch for the school division
	Dropout	Dropout rate for the school division
	PostGrad	Percentage of teachers with post graduate degrees for the school division
	Chang5yr	Percentage change in division enrollment over a five year period
	LimitEng	Percentage of strudents for the school division participating in limited English programs

Figure 8: Definitions of SPSS Codes

Table 6: Correlation Matrix

		All Read	All Write	All Alg1	All geo	All Alg2	Teach Day	Adj08 TS	T_P ratio	Per AA	Per H	Per W	FR Lunch	Dro pout	Post Grad	Chan g5yr	Limi tEng
AllRead	Pearson	1	.671**	.271**	.465**	.285**	.089	-.216*	.101	-.455**	-.019	.411**	-.339**	-.365**	.074	.162	-.031
	Sig. (2-tailed)		.000	.002	.000	.001	.313	.014	.249	.000	.826	.000	.000	.000	.401	.064	.727
	N	131	131	131	131	131	131	129	131	131	131	131	131	131	131	131	131
AllWrite	Pearson	.671**	1	.303**	.421**	.137	.117	-.266**	-.023	-.277**	-.048	.244**	-.300**	-.297**	.128	.108	-.050
	Sig. (2-tailed)	.000		.000	.000	.117	.182	.002	.797	.001	.586	.005	.000	.001	.144	.220	.573
	N	131	131	131	131	131	131	129	131	131	131	131	131	131	131	131	131
AllAlg1	Pearson	.271**	.303**	1	.536**	.372**	.041	.003	.104	-.335**	.040	.299**	-.066	-.253**	.016	.101	.044
	Sig. (2-tailed)	.002	.000		.000	.000	.645	.971	.237	.000	.652	.001	.452	.004	.854	.250	.619
	N	131	131	131	131	131	131	129	131	131	131	131	131	131	131	131	131
Allgeo	Pearson	.465**	.421**	.536**	1	.494**	.085	-.208*	.005	-.508**	.023	.453**	-.301**	-.350**	.157	.280**	.024
	Sig. (2-tailed)	.000	.000	.000		.000	.333	.018	.956	.000	.793	.000	.000	.000	.074	.001	.785
	N	131	131	131	131	131	131	129	131	131	131	131	131	131	131	131	131
ALLAlg2	Pearson	.285**	.137	.372**	.494**	1	-.021	.057	-.007	-.323**	.040	.292**	-.006	-.127	.036	.010	.053
	Sig. (2-tailed)	.001	.117	.000	.000		.813	.521	.937	.000	.651	.001	.947	.149	.681	.908	.550
	N	131	131	131	131	131	131	129	131	131	131	131	131	131	131	131	131
TeachDay	Pearson	.089	.117	.041	.085	-.021	1	-.342**	-.141	-.080	.596**	-.22*	-.304**	-.140	.708**	.273**	.594**
	Sig. (2-tailed)	.313	.182	.645	.333	.813		.000	.108	.364	.000	.011	.000	.110	.000	.002	.000
	N	131	131	131	131	131	131	129	131	131	131	131	131	131	131	131	131
Adj08TS	Pearson	-.216*	-.266**	.003	-.208*	.057	-.342**	1	.371**	.211*	-.154	-.08	.658**	.263**	-.310**	-.466**	-.106
	Sig. (2-tailed)	.014	.002	.971	.018	.521	.000		.000	.016	.081	.367	.000	.003	.000	.000	.233
	N	129	129	129	129	129	129	129	129	129	129	129	129	129	129	129	129
T_Pratio	Pearson	.101	-.023	.104	.005	-.007	-.141	.371**	1	-.222*	-.183*	.297**	.222*	-.104	-.209*	-.179*	-.129
	Sig. (2-tailed)	.249	.797	.237	.956	.937	.108	.000		.011	.036	.001	.011	.239	.016	.041	.143
	N	131	131	131	131	131	131	129	131	131	131	131	131	131	131	131	131
PerAA	Pearson	-.455**	-.277**	-.335**	-.508**	-.323**	-.080	.211*	-.222*	1	-.045	-.92**	.488**	.512**	-.062	-.307**	-.063
	Sig. (2-tailed)	.000	.001	.000	.000	.000	.364	.016	.011		.607	.000	.000	.000	.485	.000	.476
	N	131	131	131	131	131	131	129	131	131	131	131	131	131	131	131	131
PerH	Pearson	-.019	-.048	.040	.023	.040	.596**	-.154	-.183*	-.045	1	-.34**	-.050	-.012	.375**	.154	.967**
	Sig. (2-tailed)	.826	.586	.652	.793	.651	.000	.081	.036	.607		.000	.573	.890	.000	.080	.000
	N	131	131	131	131	131	131	129	131	131	131	131	131	131	131	131	131
PerW	Pearson	.411**	.244**	.299**	.453**	.292**	-.220*	-.080	.297**	-.916**	-.336**	1	-.390**	-.461**	-.155	.194*	-.314**
	Sig. (2-tailed)	.000	.005	.001	.000	.001	.011	.367	.001	.000	.000		.000	.000	.078	.026	.000
	N	131	131	131	131	131	131	129	131	131	131	131	131	131	131	131	131
FRLunch	Pearson	-.339**	-.300**	-.066	-.301**	-.006	-.304**	.658**	.222*	.488**	-.050	-.39**	1	.344**	-.223*	-.526**	-.009
	Sig. (2-tailed)	.000	.000	.452	.000	.947	.000	.000	.011	.000	.573	.000		.000	.011	.000	.923
	N	131	131	131	131	131	131	129	131	131	131	131	131	131	131	131	131
Dropout	Pearson	-.365**	-.297**	-.253**	-.350**	-.127	-.140	.263**	-.104	.512**	-.012	-.46**	.344**	1	-.114	-.286**	-.018
	Sig. (2-tailed)	.000	.001	.004	.000	.149	.110	.003	.239	.000	.890	.000	.000		.193	.001	.836
	N	131	131	131	131	131	131	129	131	131	131	131	131	131	131	131	131
PostGrad	Pearson	.074	.128	.016	.157	.036	.708**	-.310**	-.209*	-.062	.375**	-.15	-.223*	-.114	1	.210*	.397**
	Sig. (2-tailed)	.401	.144	.854	.074	.681	.000	.000	.016	.485	.000	.078	.011	.193		.016	.000
	N	131	131	131	131	131	131	129	131	131	131	131	131	131	131	131	131
Chang5yr	Pearson	.162	.108	.101	.280**	.010	.273**	-.466**	-.179*	-.307**	.154	.194*	-.526**	-.286**	.210*	1	.099
	Sig. (2-tailed)	.064	.220	.250	.001	.908	.002	.000	.041	.000	.080	.026	.000	.001	.016		.262
	N	131	131	131	131	131	131	129	131	131	131	131	131	131	131	131	131
LimitEng	Pearson	-.031	-.050	.044	.024	.053	.594**	-.106	-.129	-.063	.967**	-.31**	-.009	-.018	.397**	.099	1
	Sig. (2-tailed)	.727	.573	.619	.785	.550	.000	.233	.143	.476	.000	.000	.923	.836	.000	.262	
	N	131	131	131	131	131	131	129	131	131	131	131	131	131	131	131	131

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Dependent Variables Interaction

The dependent variables generally have positive and significant relationships with each other. English variables of AYP performance in reading (AllRead) and writing (AllWrite) are strongly correlated with each other, and mathematics variables of AYP performance in algebra 1 (AllAlg1), geometry (AllGeo), and algebra 2 (AllAlg2) are strongly correlated with each other. The English AYP performance variables correspond best with the mathematics AYP performance variable AllGeo. While the mathematics AYP performance variables do not correlate with each other as strongly as the English AYP performance variables correlate with each other, the mathematics AYP performance variables do correlate better with each other than they do with the English AYP performance variables.

The dependent variables do not correlate strongly to the independent variables, but there are significant relationships between the independent variable adjusted teacher day rate for 2008 (Adj08TS) and three dependent variables: APY performance in reading, writing, and geometry. The relationship between Adj08TS and AllWrite is significant to the $p<.01$. The relationships between Adj08TS and Allread and Adj08TS and AllGeo are significant to the $p<.05$ level. The Pearson correlations between Adj08TS and the three dependent variables with which it is significant are negative (AllRead = -.216, AllWrite = -.266, and AllGeo = -.208).

The dependent variables vary in their relationships with the intervening variables. The dependent variables correlate best with two of the three race/ethnicity variables, percentage of African-American students (PerAA) and percentage of white students (PerW). The relationships between PerAA and all five dependent variables are negative. The strongest negative

relationship is between PerAA and AllGeo with a Pearson correlation of -.508. Relationships between PerAA and all five dependent variables are significant to the $p<.01$ level. The relationships between PerW and all five dependent variables are positive. PerW is correlated strongest to AllGeo with a Pearson correlation of .453. Relationships between PerW and all five dependent variables are significant to the $p<.01$ level. The dependent variables do not correlate much with the race/ethnicity variable of percentage of Hispanic/Latino students (PerH), and none of the bivariate parings yielded any significance.

The dependent variables do not correlate strongly with the socioeconomic variables of free/reduced lunch (FRLunch) and the drop-out rate (Dropout) as they do with the race/ethnicity variables, but there are some significant relationships among the dependent variables and the socioeconomic variables. The relationships between the intervening variables of FRLunch and Dropout and all five dependent variables are negative. The relationships between the DV AllRead and intervening variables FRLunch and Dropout are negative, yielding Pearson correlations of -.339 and -.365 respectively. The relationships between FRLunch and the DVs AllRead, AllWrite, and AllGeo are significant to the $p<.01$ level. The relationships between FRLunch and the DVs AllAlg1 and AllAlg2 are not significant. The relationships between Dropout and the DVs AllRead, AllWrite, AllAlg1, and AllGeo are significant to the $p<.01$ level. The relationship between Dropout and AllAlg2 is not significant.

The relationships between the dependent variables and the division characteristic variables of teachers with post graduate degrees (PostGrad), the division change over a five year period (Chang5yr), and students enrolled in limited English programs (LimitEng) are mostly not

significant. Of the 15 pairings between the dependent variables and the division characteristic variables, only the relationship between AllGeo and Chang5yr is significant, $p<.01$. The relationship between AllGeo and Chang5yr is positive with a Person correlation of .280.

Independent Variables Interaction

The relationships between the independent variables are not as strong as the relationships between the dependent variables, but two of the three parings are significant. The variable Adj08TS has a positive relationship with the teacher-to-principal salary difference variable (T_Pratio) yielding a Pearson correlation of .371 and a negative relationship with teacher day rate salary (TeachDay) yielding a Pearson correlation of -.342. The relationships between Adj08TS and T_Pratio and Adj08TS and TeachDay are both significant to the $p<.01$ level. The relationship between T_Pratio and TeachDay is negative (Pearson correlation = -.141), and is not significant ($p=.109$).

The strength of the relationships between the independent variables and intervening variables varies. The relationships between TeachDay and the intervening variables PerH, PostGrad, Chang5yr, and LimitEng are positive. The relationships between TeachDay and intervening variables PerAA, PerW, FRLunch, and Dropout are negative. The relationship between TeachDay and PerW is significant to the $p<.05$ level, and the relationship between TeachDay and the intervening variables PerH, FRLunch, PostGrad, Chang5yr, and LimitEng are significant to the $p<.01$ level. The strength of the relationships between TeachDay and the intervening variables PostGrad, PerH, and LimitEng are strong with Pearson correlations of .708, .596, and .594 respectively. The relationship between TeachDay and FRLunch is negative, yielding a

Pearson correlation of -.304. The relationships between Adj08TS and the intervening variables PerAA, FRLunch, and Dropout are positive. The relationships between Adj08TS and the intervening variables PerH, PerW, PostGrad, Chang5yr, and LimitEng are negative. The relationship between Adj08TS and PerAA is significant at the $p<.05$ level, and the relationships between Adj08TS and the intervening variables FRLunch, Dropout, PostGrad, and Chang5yr are significant at the $p<.01$. Adj08TS relates most strongly with FRLunch, yielding a Pearson correlation of .658. Adj08TS relates most negatively with Chang5yr, yielding a Pearson correlation of -.466. The relationships between T_Pratio and PerW and FRLunch are positive. The relationships between T_Pratio and the intervening variables PerAA, PerH, Dropout, PostGrad, Chang5yr, and LimitEng are negative. The relationships between T_PRatio and the intervening variables PerAA, PerH, FRLunch, PostGrad, and Chang5yr are significant to the $p<.05$ level. The relationship between T_Pratio and PerW is significant to the $p<.01$ level.

Intervening Variables

The intervening variables vary in their correlation with one another. The race/ethnicity variables are negatively correlated with each other. The relationships between PerAA and PerW and PerH and PerW are negative. The relationship between of PerAA and PerW is strong (Pearson correlation = -.916) and is significant to the $p<.01$ level. The relationship between PerH and PerW is significance to the $p<.01$ level, but the relationship (Pearson correlation = -.336) is weaker than the relationship between PerAA and PerW. The relationships between PerAA and FRLunch and PerAA and Dropout are positive, but the relationships between PerAA and PostGrad, PerAA and Chang5yr, and PerAA and LimitEng are negative. The relationships between PerAA and FRLunch and PerAA andDropout are significant to the $p<.01$ level. While

PerAA is negatively correlated with all three division characteristics variables, only the relationship between PerAA and Chang5yr is significant, p<.01. The relationships between PerH and PerW, PerH and PostGrad, and PerH and LimitEng are significant to the p<.01 level. The relationship between PerH and LimitEng is strong (Pearson correlation = .967). PerW has a positive relationship with Chang5yr and negative relationships with FRLunch, Dropout, PostGrad, and LimitEng. The relationships between PerW and FRLunch, PerW and Dropout and PerW and LimitEng are significant to the p<.01 level. The relationship between PerW and Chang5yr is significant to the p<.05 level. The relationship between PerW and PostGrad is not significant.

The relationship between FRLunch and Dropout is positive and significant to the p<.01 level. The relationships between FRLunch and PostGrad, FRLunch and Chang5yr and FRLunch and LimitEng are negative. The relationships between Dropout and PostGrad, Dropout and Chang5yr, and Dropout and LimitEng are negative. The relationship between FRLunch and Chang5yr is significant to the p<.01, and the relationship between FRLunch and PostGrtad is significance to the p<.05 level. The relationship between FRLunch and Chang5yr is fairly strong and negative (Pearson correlation = -.526). The relationship between Dropout and Chang5yr is negative and significant to the p<.01 level.

The relationship between PostGrad and Chang5yr, PostGrad and LimitEng and Chang5yr and LimitEng are positive. The relationship between PostGrad and LimitEng is significant to the p<.01 level. The relationshp between PostGrad and Chang5yr is significant to the p<.05 level. The relationship between Chang5yr and LimitEng is not significant.

Variables Included in Modeling

To test the six hypotheses posited for this research, nine models were run. For testing hypotheses 1a, 2a, and 3a a GLM model including the five dependent variables and one independent variable, stated in each hypothesis, was created. These models do not include any intervening variables as they test the relationships between independent variables and the dependent variables. These models are referred to as the simple models. Hypotheses 1a, 2a, and 3a are stated below with their corresponding null hypotheses.

Hypothesis 1a: High teacher salaries will lead to high student achievement as measured by AYP.

Hypothesis 1a (0): High teacher salaries will not lead to high student achievement as measured by AYP.

Hypothesis 2a: When adjusted for cost of living, an inverse relationship between teacher salaries and student achievement as measured by AYP will occur.

Hypothesis 2a (0): When adjusted for cost of living, an inverse relationship between teacher salaries and student achievement as measured by AYP will not occur.

Hypothesis 3a: Student achievement, as measured by AYP, will be higher in school divisions where the difference between teacher salaries and principal salaries is narrow.

Hypothesis 3a (0): Student achievement, as measured by AYP, will not be higher in school divisions where the difference between teacher salaries and principal salaries is narrow.

For testing hypotheses 1b, 2b, and 3b, two GLM models were run for each hypothesis. The first model in each grouping includes the independent variable from the corresponding hypothesis with all five dependent variables and all the intervening variables. These models are referred to as the whole models. The second model in each grouping includes the corresponding independent variable to each hypothesis, the five dependent variables, and selected intervening variables identified as having the greatest influence on the outcome of hypothesis testing. These models are referred to as the reduced models. Hypotheses 1b, 2b, and 3b are stated below with their corresponding null hypotheses.

Hypothesis 1b: In the presences of intervening variables, high teacher salaries will lead to high student achievement as measured by AYP.

Hypothesis 1b (0): In the presences of intervening variables, high teacher salaries will not lead to high student achievement as measured by AYP.

Hypothesis 2b: In the presence of intervening variables, an inverse relationship between teacher salaries, adjusted for cost-of-living, and student achievement as measured by AYP will occur.

Hypothesis 2b (0): In the presence of intervening variables, an inverse relationship between teacher salaries, adjusted for cost-of-living, and student achievement as measured by AYP will not occur.

Hypothesis 3b: In the presence of intervening variables, student achievement, as measured by AYP, will be higher in school divisions where the difference between teacher salaries and principal salaries is narrow.

Hypothesis 3b (0): In the presence of intervening variables, student achievement, as measured by AYP, will not be higher in school divisions where the difference between teacher salaries and principal salaries is narrow.

The simple models do not include any intervening variables, but the whole models and reduced models do include intervening variables and how those models are built is described below. Though the whole models include all the intervening variables, the variables that relate to the percentage of African-Americans in the student population and percentage of Hispanics/Latinos in the student population have been combined into one variable. The education literature provides evidence that the African-American student population and the Hispanic/Latino population often have shared experiences within primary and secondary education (Roderick, Jacob, & Byrk, 2002; Gill & Meier, 2001; Winfield, 1990; Edmunds, 1979; Good & Brophy, 1986; Kyle, 1985; Mackenzie, 1983; Purkey & Smith, 1983; Stedman, 1987; Stringfield & Teddlie, 1988). As evidenced by Table 6, PerAA and PerH have negative relationships with PerW. The relationships between PerAA and PerW and PerH and PerW are significant at the

p<.01 level. Table 7 is a correlation matrix with the new combined African-American and Hispanic/Latino variable (PerAA_H).

The relationship between the new variable PerAA_H and all five dependent variables is negative. The strongest relationship is between PerAA_H and AllGeo (Pearson correlation = -.482). The relationship between PerAA_H and all five dependent variables is significant at the p<.01 level. The relationships between PerAA_H and TeachDay and PerAA_H and Adj08TS are positive, but the relationship between PerAA_H and T_Pratio is negative. The relationship between PerAA_H and T_Pratio is significant at the p<.01 level. The relationship between PerAA_H and PerW is strong and negative (Pearson correlation = -.988), and the relationship is significant at the p<.01 level. Of all the intervening variables, only the relationship between PerAA_H and Chang5yr is negative. The relationship between PerAA_H and the intervening variables is significant at the p<.01 level, except PostGrad with which PerAA_H is not significantly related.

In the reduced models, only the intervening variables PerAA_H, Dropout, and FRLunch are included with the independent variable identified in the hypothesis and the dependent variables. The reduced models are built to reduce the degrees of freedom in modeling to produce a more focused determination of which predictive variables have the strongest relationships with the dependent variables (Tabachnick & Fidell, 2001). While PostGrad, Chang5yr, and LimitEng have influence on the independent variables and other intervening variables, they have relative little influence on the dependent variables.

However, when presenting the results, these variables will be mentioned as having an indirect influence on the dependent variables due to their influence on other variables in the reduced models. PerW is also removed from the reduced model because of it high collinearity with PerAA_H. All intervening variables were tested with each dependent variable separately to identify variables with high collinearity. In every case, PerAA_H and PerW were highly collinear. In each case, PerAA_H produced a higher correlation with the dependent variable than PerW. The results of collinearity testing are included in appendix B. The following section includes results of nine GLMs and analyses of the models. Table 7, a correlation matrix including the new variable PerAA_H is presented on the next page.

Table 7: Correlation Matrix with Combined African-American and Hispanic/Latino Variable

		All Read	All Write	All Alg1	All geo	All Alg2	Teac hDay	Adj08 TS	T_P ratio	Per AA_H	Per W	FRL unch	Drop out	Post Grad	Chan g5yr	Limit Eng
AllRead	Pearson	1	.671**	.271**	.465**	.285**	.089	-.216*	.101	-.444**	.411**	-.339**	-.365**	.074	.162	-.031
	Sig. (2-tailed)		.000	.002	.000	.001	.313	.014	.249	.000	.000	.000	.000	.401	.064	.727
	N	131	131	131	131	131	131	129	131	131	131	131	131	131	131	131
AllWrite	Pearson	.671**	1	.303**	.421**	.137	.117	-.266**	-.023	-.282**	.244**	-.300**	-.297**	.128	.108	-.050
	Sig. (2-tailed)	.000		.000	.000	.117	.182	.002	.797	.001	.005	.000	.001	.144	.220	.573
	N	131	131	131	131	131	131	129	131	131	131	131	131	131	131	131
AllAlg1	Pearson	.271**	.303**	1	.536**	.372**	.041	.003	.104	-.310**	.299**	-.066	-.253**	.016	.101	.044
	Sig. (2-tailed)	.002	.000		.000	.000	.645	.971	.237	.000	.001	.452	.004	.854	.250	.619
	N	131	131	131	131	131	131	129	131	131	131	131	131	131	131	131
Allgeo	Pearson	.465**	.421**	.536**	1	.494**	.085	-.208*	.005	-.482**	.453**	-.301**	-.350**	.157	.280**	.024
	Sig. (2-tailed)	.000	.000	.000		.000	.333	.018	.956	.000	.000	.000	.000	.074	.001	.785
	N	131	131	131	131	131	131	129	131	131	131	131	131	131	131	131
ALLAlg2	Pearson	.285**	.137	.372**	.494**	1	-.021	.057	-.007	-.299**	.292**	-.006	-.127	.036	.010	.053
	Sig. (2-tailed)	.001	.117	.000	.000		.813	.521	.937	.001	.001	.947	.149	.681	.908	.550
	N	131	131	131	131	131	131	129	131	131	131	131	131	131	131	131
TeachDay	Pearson	.089	.117	.041	.085	-.021	1	-.342**	-.141	.112	-.22*	-.304**	-.140	.708**	.273**	.594**
	Sig. (2-tailed)	.313	.182	.645	.333	.813		.000	.108	.204	.011	.000	.110	.000	.002	.000
	N	131	131	131	131	131	131	129	131	131	131	131	131	131	131	131
Adj08TS	Pearson	-.216*	-.266**	.003	-.21*	.057	-.342**	1	.371**	.155	-.08	.658**	.263**	-.310**	-.466**	-.106
	Sig. (2-tailed)	.014	.002	.971	.018	.521	.000		.000	.080	.367	.000	.003	.000	.000	.233
	N	129	129	129	129	129	129	129	129	129	129	129	129	129	129	129
T_Pratio	Pearson	.101	-.023	.104	.005	-.007	-.141	.371**	1	-.272**	.297**	.222*	-.104	-.209*	-.179*	-.129
	Sig. (2-tailed)	.249	.797	.237	.956	.937	.108	.000		.002	.001	.011	.239	.016	.041	.143
	N	131	131	131	131	131	131	129	131	131	131	131	131	131	131	131
PerAA_H	Pearson	-.444**	-.282**	-.310**	-.48**	-.299**	.112	.155	-.272**	1	-.99**	.455**	.489**	.060	-.247**	.246**
	Sig. (2-tailed)	.000	.001	.000	.000	.001	.204	.080	.002		.000	.000	.000	.499	.005	.005
	N	131	131	131	131	131	131	129	131	131	131	131	131	131	131	131
PerW	Pearson	.411**	.244**	.299**	.453**	.292**	-.220*	-.080	.297**	-.988**	1	-.390**	-.461**	-.155	.194*	-.314**
	Sig. (2-tailed)	.000	.005	.001	.000	.001	.011	.367	.001	.000		.000	.000	.078	.026	.000
	N	131	131	131	131	131	131	129	131	131	131	131	131	131	131	131
FRLunch	Pearson	-.339**	-.300**	-.066	-.30**	-.006	-.304**	.658**	.222*	.455**	-.39**	1	.344**	-.223*	-.526**	-.009
	Sig. (2-tailed)	.000	.000	.452	.000	.947	.000	.000	.011	.000	.000		.000	.011	.000	.923
	N	131	131	131	131	131	131	129	131	131	131	131	131	131	131	131
Dropout	Pearson	-.365**	-.297**	-.253**	-.35**	-.127	-.140	.263**	-.104	.489**	-.46**	.344**	1	-.114	-.286**	-.018
	Sig. (2-tailed)	.000	.001	.004	.000	.149	.110	.003	.239	.000	.000	.000		.193	.001	.836
	N	131	131	131	131	131	131	129	131	131	131	131	131	131	131	131
PostGrad	Pearson	.074	.128	.016	.157	.036	.708**	-.310**	-.209*	.060	-.15	-.223*	-.114	1	.210*	.397**
	Sig. (2-tailed)	.401	.144	.854	.074	.681	.000	.000	.016	.499	.078	.011	.193		.016	.000
	N	131	131	131	131	131	131	129	131	131	131	131	131	131	131	131
Chang5yr	Pearson	.162	.108	.101	.280**	.010	.273**	-.466**	-.179*	-.247**	.194*	-.526**	-.286**	.210*	1	.099
	Sig. (2-tailed)	.064	.220	.250	.001	.908	.002	.000	.041	.005	.026	.000	.001	.016		.262
	N	131	131	131	131	131	131	129	131	131	131	131	131	131	131	131
LimitEng	Pearson	-.031	-.050	.044	.024	.053	.594**	-.106	-.129	.246**	-.31**	-.009	-.018	.397**	.099	1
	Sig. (2-tailed)	.727	.573	.619	.785	.550	.000	.233	.143	.005	.000	.923	.836	.000	.262	
	N	131	131	131	131	131	131	129	131	131	131	131	131	131	131	131

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Section III

Teacher Day Rate Salary

Hypothesis 1a: High teacher salaries will lead to high student achievement as measured by AYP.

Hypothesis 1a (0): High teacher salaries will not lead to high student achievement as measured by AYP.

Teacher day rate salary as an independent variable in the simple, whole, and reduced model has little influence on the dependent variables. In the simple model, the multivariate tests, found on Table 8, produce an F-value of .503 and no significance with a p-value of .774 for all four tests of effect. In the tests of between-subjects effects, found on Table 9, teacher day rate salary is a relatively weak predictor of student achievement having no significant relationships with any of the dependent variables. Since the influence of teacher day rate on student achievement is weak, the null hypothesis cannot be rejected.

Hypothesis 1b: In the presences of intervening variables, high teacher salaries will lead to high student achievement as measured by AYP.

Hypothesis 1b (0): In the presences of intervening variables, high teacher salaries will not lead to high student achievement as measured by AYP.

In the whole model, the multivariate tests, found on Table 10, produce an F-value of .427 and no significance with a p-value of .829 for teacher day rate salary for all four tests of effect. In the presence of all the identified intervening variables, teacher day rate salary has little influence on student achievement as evidenced in tests of between-subjects effects found on Table 11. In the reduced model, the multivariate tests, found on Table 12, produce an F-value of .436 and no significance for teacher day rate with a p-value of .823 for all four tests of effect. In the presence of selected intervening variables, entered in the order of PerAA_H, Dropout, and FRLunch,

teacher day does not have a significant relationship with any of the dependent variables as evidenced by the tests of between-subjects effects found on Table 13. Since the relationships between the independent variable and the dependent variables in the whole and reduced models are weak, the null hypothesis cannot be rejected.

The findings in the simple model as well as the whole and reduced models confirm the findings of Gill and Meier's (2001) research that teacher salaries are not necessarily a strong indicator of student achievement. Their research reported that there was a positive relationship between teacher salaries and student achievement (i.e. higher salaries translated to higher student achievement), but that teacher salaries are not one of the major factors that predict student achievement (Gill & Meier, 2001).

Table 8: Multivariate Tests – Teacher Day Rate

Effect		Value	F	Hypothesis df	Error df	Sig.
Intercept	Pillai's Trace	.953	507.249[a]	5.000	125.000	.000
	Wilks' Lambda	.047	507.249[a]	5.000	125.000	.000
	Hotelling's Trace	20.290	507.249[a]	5.000	125.000	.000
	Roy's Largest Root	20.290	507.249[a]	5.000	125.000	.000
TeachDay	Pillai's Trace	.020	.503[a]	5.000	125.000	.774
	Wilks' Lambda	.980	.503[a]	5.000	125.000	.774
	Hotelling's Trace	.020	.503[a]	5.000	125.000	.774
	Roy's Largest Root	.020	.503[a]	5.000	125.000	.774

a. Exact statistic

Table 9 Tests of Between-Subjects Effects – Teacher Day Rate

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	AllRead	.001[a]	1	.001	1.024	.313
	AllWrite	.003[b]	1	.003	1.800	.182
	AllAlg1	.000[c]	1	.000	.214	.645
	Allgeo	.006[d]	1	.006	.946	.333
	ALLAlg2	.000[e]	1	.000	.056	.813
Intercept	AllRead	1.795	1	1.795	1870.056	.000
	AllWrite	1.647	1	1.647	1017.613	.000
	AllAlg1	1.768	1	1.768	892.406	.000
	Allgeo	1.377	1	1.377	221.946	.000
	ALLAlg2	1.784	1	1.784	448.712	.000
TeachDay	AllRead	.001	1	.001	1.024	.313
	AllWrite	.003	1	.003	1.800	.182
	AllAlg1	.000	1	.000	.214	.645
	Allgeo	.006	1	.006	.946	.333
	ALLAlg2	.000	1	.000	.056	.813
Error	AllRead	.124	129	.001		
	AllWrite	.209	129	.002		
	AllAlg1	.256	129	.002		
	Allgeo	.800	129	.006		
	ALLAlg2	.513	129	.004		
Total	AllRead	115.801	131			
	AllWrite	110.209	131			
	AllAlg1	112.482	131			
	Allgeo	96.887	131			
	ALLAlg2	107.905	131			
Corrected Total	AllRead	.125	130			
	AllWrite	.212	130			
	AllAlg1	.256	130			
	Allgeo	.806	130			
	ALLAlg2	.513	130			

a. R Squared = .008 (Adjusted R Squared = .000)

b. R Squared = .014 (Adjusted R Squared = .006)

c. R Squared = .002 (Adjusted R Squared = -.006)

d. R Squared = .007 (Adjusted R Squared = .000)

e. R Squared = .000 (Adjusted R Squared = -.007)

Table 10: Multivariate Tests – Teacher Day Rate with Intervening Variables

Effect		Value	F	Hypothesis df	Error df	Sig.
Intercept	Pillai's Trace	.483	22.254[a]	5.000	119.000	.000
	Wilks' Lambda	.517	22.254[a]	5.000	119.000	.000
	Hotelling's Trace	.935	22.254[a]	5.000	119.000	.000
	Roy's Largest Root	.935	22.254[a]	5.000	119.000	.000
TeachDay	Pillai's Trace	.018	.427[a]	5.000	119.000	.829
	Wilks' Lambda	.982	.427[a]	5.000	119.000	.829
	Hotelling's Trace	.018	.427[a]	5.000	119.000	.829
	Roy's Largest Root	.018	.427[a]	5.000	119.000	.829
FRLunch	Pillai's Trace	.073	1.861[a]	5.000	119.000	.106
	Wilks' Lambda	.927	1.861[a]	5.000	119.000	.106
	Hotelling's Trace	.078	1.861[a]	5.000	119.000	.106
	Roy's Largest Root	.078	1.861[a]	5.000	119.000	.106
Dropout	Pillai's Trace	.044	1.098[a]	5.000	119.000	.365
	Wilks' Lambda	.956	1.098[a]	5.000	119.000	.365
	Hotelling's Trace	.046	1.098[a]	5.000	119.000	.365
	Roy's Largest Root	.046	1.098[a]	5.000	119.000	.365
PostGrad	Pillai's Trace	.035	.858[a]	5.000	119.000	.511
	Wilks' Lambda	.965	.858[a]	5.000	119.000	.511
	Hotelling's Trace	.036	.858[a]	5.000	119.000	.511
	Roy's Largest Root	.036	.858[a]	5.000	119.000	.511
Chang5yr	Pillai's Trace	.049	1.215[a]	5.000	119.000	.306
	Wilks' Lambda	.951	1.215[a]	5.000	119.000	.306
	Hotelling's Trace	.051	1.215[a]	5.000	119.000	.306
	Roy's Largest Root	.051	1.215[a]	5.000	119.000	.306
PerAA_H	Pillai's Trace	.038	.943[a]	5.000	119.000	.456
	Wilks' Lambda	.962	.943[a]	5.000	119.000	.456
	Hotelling's Trace	.040	.943[a]	5.000	119.000	.456
	Roy's Largest Root	.040	.943[a]	5.000	119.000	.456
PerW	Pillai's Trace	.029	.709[a]	5.000	119.000	.618
	Wilks' Lambda	.971	.709[a]	5.000	119.000	.618
	Hotelling's Trace	.030	.709[a]	5.000	119.000	.618
	Roy's Largest Root	.030	.709[a]	5.000	119.000	.618

a. Exact statistic

Table 11: Tests of Between-Subjects Effects – Teacher Day Rate with Intervening Variables

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	AllRead	.033[a]	7	.005	6.216	.000
	AllWrite	.037[b]	7	.005	3.757	.001
	AllAlg1	.034[c]	7	.005	2.712	.012
	Allgeo	.235[d]	7	.034	7.216	.000
	ALLAlg2	.063[e]	7	.009	2.451	.022
Intercept	AllRead	.069	1	.069	92.260	.000
	AllWrite	.082	1	.082	57.737	.000
	AllAlg1	.050	1	.050	27.592	.000
	Allgeo	.051	1	.051	10.882	.001
	ALLAlg2	.054	1	.054	14.619	.000
TeachDay	AllRead	8.51E-006	1	8.51E-006	.011	.915
	AllWrite	.001	1	.001	.486	.487
	AllAlg1	.001	1	.001	.627	.430
	Allgeo	.001	1	.001	.168	.683
	ALLAlg2	4.44E-006	1	4.44E-006	.001	.972
FRLunch	AllRead	.001	1	.001	1.219	.272
	AllWrite	.004	1	.004	2.480	.118
	AllAlg1	.005	1	.005	2.893	.091
	Allgeo	.000	1	.000	.070	.792
	ALLAlg2	.012	1	.012	3.229	.075
Dropout	AllRead	.002	1	.002	3.321	.071
	AllWrite	.005	1	.005	3.561	.061
	AllAlg1	.003	1	.003	1.591	.210
	Allgeo	.006	1	.006	1.280	.260
	ALLAlg2	7.57E-005	1	7.57E-005	.021	.886
PostGrad	AllRead	7.09E-005	1	7.09E-005	.095	.759
	AllWrite	8.53E-005	1	8.53E-005	.060	.807
	AllAlg1	.000	1	.000	.170	.681
	Allgeo	.010	1	.010	2.100	.150
	ALLAlg2	.001	1	.001	.378	.540
Chang5yr	AllRead	.000	1	.000	.586	.445
	AllWrite	.002	1	.002	1.561	.214
	AllAlg1	.000	1	.000	.270	.604
	Allgeo	.010	1	.010	2.059	.154
	ALLAlg2	4.42E-005	1	4.42E-005	.012	.913
PerAA_H	AllRead	.003	1	.003	3.384	.068
	AllWrite	.005	1	.005	3.712	.056
	AllAlg1	.001	1	.001	.500	.481
	Allgeo	.004	1	.004	.779	.379
	ALLAlg2	.003	1	.003	.893	.346
PerW	AllRead	.002	1	.002	2.076	.152
	AllWrite	.005	1	.005	3.180	.077
	AllAlg1	.000	1	.000	.099	.753
	Allgeo	.001	1	.001	.117	.732
	ALLAlg2	.001	1	.001	.223	.638
Error	AllRead	.092	123	.001		
	AllWrite	.174	123	.001		
	AllAlg1	.222	123	.002		
	Allgeo	.571	123	.005		
	ALLAlg2	.450	123	.004		
Total	AllRead	115.801	131			
	AllWrite	110.209	131			
	AllAlg1	112.482	131			
	Allgeo	96.887	131			
	ALLAlg2	107.905	131			
Corrected Total	AllRead	.125	130			
	AllWrite	.212	130			
	AllAlg1	.256	130			
	Allgeo	.806	130			
	ALLAlg2	.513	130			

a. R Squared = .261 (Adjusted R Squared = .219)
b. R Squared = .176 (Adjusted R Squared = .129)
c. R Squared = .134 (Adjusted R Squared = .084)
d. R Squared = .291 (Adjusted R Squared = .251)
e. R Squared = .122 (Adjusted R Squared = .072)

Table 12: Multivariate Tests – Teacher Day Rate Reduced Model

Effect		Value	F	Hypothesis df	Error df	Sig.
Intercept	Pillai's Trace	.940	384.467[a]	5.000	122.000	.000
	Wilks' Lambda	.060	384.467[a]	5.000	122.000	.000
	Hotelling's Trace	15.757	384.467[a]	5.000	122.000	.000
	Roy's Largest Root	15.757	384.467[a]	5.000	122.000	.000
TeachDay	Pillai's Trace	.018	.436[a]	5.000	122.000	.823
	Wilks' Lambda	.982	.436[a]	5.000	122.000	.823
	Hotelling's Trace	.018	.436[a]	5.000	122.000	.823
	Roy's Largest Root	.018	.436[a]	5.000	122.000	.823
PerAA_H	Pillai's Trace	.186	5.570[a]	5.000	122.000	.000
	Wilks' Lambda	.814	5.570[a]	5.000	122.000	.000
	Hotelling's Trace	.228	5.570[a]	5.000	122.000	.000
	Roy's Largest Root	.228	5.570[a]	5.000	122.000	.000
Dropout	Pillai's Trace	.043	1.097[a]	5.000	122.000	.366
	Wilks' Lambda	.957	1.097[a]	5.000	122.000	.366
	Hotelling's Trace	.045	1.097[a]	5.000	122.000	.366
	Roy's Largest Root	.045	1.097[a]	5.000	122.000	.366
FRLunch	Pillai's Trace	.087	2.330[a]	5.000	122.000	.046
	Wilks' Lambda	.913	2.330[a]	5.000	122.000	.046
	Hotelling's Trace	.095	2.330[a]	5.000	122.000	.046
	Roy's Largest Root	.095	2.330[a]	5.000	122.000	.046

a. Exact statistic

Table 13: Tests of Between-Subjects Effects – Teacher Day Rate Reduced Model

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	AllRead	.031[a]	4	.008	10.293	.000
	AllWrite	.030[b]	4	.008	5.276	.001
	AllAlg1	.033[c]	4	.008	4.711	.001
	Allgeo	.212[d]	4	.053	11.249	.000
	ALLAlg2	.060[e]	4	.015	4.165	.003
Intercept	AllRead	1.173	1	1.173	1570.773	.000
	AllWrite	1.121	1	1.121	779.395	.000
	AllAlg1	1.038	1	1.038	587.062	.000
	Allgeo	.949	1	.949	201.398	.000
	ALLAlg2	.957	1	.957	266.018	.000
TeachDay	AllRead	.000	1	.000	.589	.444
	AllWrite	.001	1	.001	.401	.528
	AllAlg1	.002	1	.002	1.386	.241
	Allgeo	.007	1	.007	1.476	.227
	ALLAlg2	.003	1	.003	.887	.348
PerAA_H	AllRead	.008	1	.008	10.164	.002
	AllWrite	.002	1	.002	1.514	.221
	AllAlg1	.017	1	.017	9.492	.003
	Allgeo	.083	1	.083	17.676	.000
	ALLAlg2	.050	1	.050	14.016	.000
Dropout	AllRead	.002	1	.002	2.988	.086
	AllWrite	.004	1	.004	2.966	.087
	AllAlg1	.003	1	.003	1.785	.184
	Allgeo	.008	1	.008	1.705	.194
	ALLAlg2	9.13E-005	1	9.13E-005	.025	.874
FRLunch	AllRead	.001	1	.001	1.566	.213
	AllWrite	.004	1	.004	2.656	.106
	AllAlg1	.005	1	.005	2.561	.112
	Allgeo	.001	1	.001	.170	.681
	ALLAlg2	.014	1	.014	3.810	.053
Error	AllRead	.094	126	.001		
	AllWrite	.181	126	.001		
	AllAlg1	.223	126	.002		
	Allgeo	.594	126	.005		
	ALLAlg2	.453	126	.004		
Total	AllRead	115.801	131			
	AllWrite	110.209	131			
	AllAlg1	112.482	131			
	Allgeo	96.887	131			
	ALLAlg2	107.905	131			
Corrected Total	AllRead	.125	130			
	AllWrite	.212	130			
	AllAlg1	.256	130			
	Allgeo	.806	130			
	ALLAlg2	.513	130			

a. R Squared = .246 (Adjusted R Squared = .222)

b. R Squared = .143 (Adjusted R Squared = .116)

c. R Squared = .130 (Adjusted R Squared = .102)

d. R Squared = .263 (Adjusted R Squared = .240)

e. R Squared = .117 (Adjusted R Squared = .089)

Adjusted Teacher Day Rate Salary

Hypothesis 2a: When adjusted for cost of living, an inverse relationship between teacher salaries and student achievement as measured by AYP will occur.

Hypothesis 2a (0): When adjusted for cost of living, an inverse relationship between teacher salaries and student achievement as measured by AYP will not occur.

Adjusted teacher day rate salary as an independent variable in the simple model does have significant relationships with three of the dependent variables: performance as measured by AYP in reading, writing, and geometry. However, adjusted day rate salary does not have a significant relationship with any of the dependent variables in the whole and reduced models. In the simple model, the multivariate tests, found on Table 14, produce an F-value of 3.686 and is significant to the $p<.01$ level for all four tests of effect. In the tests of between-subjects effects, found on Table 15, the adjusted teacher day rate salary is significantly related to performance in writing to the $p<.01$ level, and is significantly related to performance in reading and geometry to the $p<.05$.

Three linear regressions were run including adjusted teacher day rate as the independent variable with achievement in reading in the first linear regression, with achievement in writing in the second linear regression, and with achievement in geometry in the third linear regression. In all three linear regression models, the coefficient was negative. The results of the three linear regressions are included in Appendix C. Since there are relatively significant relationships between the IV and three of the DVs, and inverse relationships occur, the null hypothesis is rejected.

Hypothesis 2b: In the presence of intervening variables, an inverse relationship between teacher salaries, adjusted for cost-of-living, and student achievement as measured by AYP will occur.

Hypothesis 2b (0): In the presence of intervening variables, an inverse relationship between teacher salaries, adjusted for cost-of-living, and student achievement as measured by AYP will not occur.

In the whole model, the multivariate tests found on Table 16 produce an F-value of .560 and no significance with a p-value of .730 for adjusted teacher day rate salary for all four tests of effect. In the presence of all the identified intervening variables, adjusted teacher day rate salary has little influence on the student achievement as evidenced in tests of between-subjects effects found on Table 17. In the reduced model, the multivariate tests found on Table 18 produce an F-value of .749 and no significance for teacher day rate with a p-value of .588 for all four tests of effect. In the presence of selected intervening variables, entered in the order of PerAA_H, Dropout, and FRLunch, adjusted teacher day does not produce a significant relationship with any of the dependent variables as evidenced by the tests of between-subjects effects found on Table 19. The relationships between the IV and the DVs are weak, therefore the null hypothesis cannot be rejected.

These findings contradict the findings of Gill and Meier (2001) in showing a positive relationship between teacher salaries and student achievement. In the simple model where significant relationships between adjusted teacher salaries and performance in reading, writing, and geometry existed, an inverse relationship occurred. In this research, higher salaries after adjustment for cost-of-living do not translate to higher student achievement, but in Gill & Meier's research, salaries were not adjusted to geographic location or for cost-of-living. However, in the whole and reduced models, where intervening variables (Lomax et al., 1995;

Madaus, 1991) are present, teacher salaries do not have significant influence on student achievement, which confirms Gill and Meier's findings on the significance of the relationship between teacher salaries and student achievement.

Table 14: Multivariate Tests – Adjusted Teacher Day Rate

Effect		Value	F	Hypothesis df	Error df	Sig.
Intercept	Pillai's Trace	.985	1612.927[a]	5.000	123.000	.000
	Wilks' Lambda	.015	1612.927[a]	5.000	123.000	.000
	Hotelling's Trace	65.566	1612.927[a]	5.000	123.000	.000
	Roy's Largest Root	65.566	1612.927[a]	5.000	123.000	.000
Adj08TS	Pillai's Trace	.130	3.686[a]	5.000	123.000	***.004***
	Wilks' Lambda	.870	3.686[a]	5.000	123.000	***.004***
	Hotelling's Trace	.150	3.686[a]	5.000	123.000	***.004***
	Roy's Largest Root	.150	3.686[a]	5.000	123.000	***.004***

a. Exact statistic

Table 15: Tests of Between-Subjects Effects – Adjusted Teacher Day Rate

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	AllRead	.006[a]	1	.006	6.216	.014
	AllWrite	.015[b]	1	.015	9.685	.002
	AllAlg1	2.63E-006[c]	1	2.63E-006	.001	.971
	Allgeo	.034[d]	1	.034	5.732	.018
	ALLAlg2	.002[e]	1	.002	.413	.521
Intercept	AllRead	5.944	1	5.944	6538.004	.000
	AllWrite	5.874	1	5.874	3879.059	.000
	AllAlg1	5.430	1	5.430	2775.591	.000
	Allgeo	5.456	1	5.456	921.376	.000
	ALLAlg2	5.035	1	5.035	1352.244	.000
Adj08TS	AllRead	.006	1	.006	6.216	***.014***
	AllWrite	.015	1	.015	9.685	***.002***
	AllAlg1	2.63E-006	1	2.63E-006	.001	.971
	Allgeo	.034	1	.034	5.732	***.018***
	ALLAlg2	.002	1	.002	.413	.521
Error	AllRead	.115	127	.001		
	AllWrite	.192	127	.002		
	AllAlg1	.248	127	.002		
	Allgeo	.752	127	.006		
	ALLAlg2	.473	127	.004		
Total	AllRead	113.918	129			
	AllWrite	108.365	129			
	AllAlg1	110.893	129			
	Allgeo	95.388	129			
	ALLAlg2	106.446	129			
Corrected Total	AllRead	.121	128			
	AllWrite	.207	128			
	AllAlg1	.248	128			
	Allgeo	.786	128			
	ALLAlg2	.474	128			

a. R Squared = .047 (Adjusted R Squared = .039)

b. R Squared = .071 (Adjusted R Squared = .064)

c. R Squared = .000 (Adjusted R Squared = -.008)

d. R Squared = .043 (Adjusted R Squared = .036)

e. R Squared = .003 (Adjusted R Squared = -.005)

Table 16: Multivariate Tests – Adjusted Teacher Day Rate with Intervening Variables

Effect		Value	F	Hypothesis df	Error df	Sig.
Intercept	Pillai's Trace	.590	33.674[a]	5.000	117.000	.000
	Wilks' Lambda	.410	33.674[a]	5.000	117.000	.000
	Hotelling's Trace	1.439	33.674[a]	5.000	117.000	.000
	Roy's Largest Root	1.439	33.674[a]	5.000	117.000	.000
Adj08TS	Pillai's Trace	.023	.560[a]	5.000	117.000	.730
	Wilks' Lambda	.977	.560[a]	5.000	117.000	.730
	Hotelling's Trace	.024	.560[a]	5.000	117.000	.730
	Roy's Largest Root	.024	.560[a]	5.000	117.000	.730
FRLunch	Pillai's Trace	.033	.808[a]	5.000	117.000	.546
	Wilks' Lambda	.967	.808[a]	5.000	117.000	.546
	Hotelling's Trace	.035	.808[a]	5.000	117.000	.546
	Roy's Largest Root	.035	.808[a]	5.000	117.000	.546
Dropout	Pillai's Trace	.044	1.077[a]	5.000	117.000	.377
	Wilks' Lambda	.956	1.077[a]	5.000	117.000	.377
	Hotelling's Trace	.046	1.077[a]	5.000	117.000	.377
	Roy's Largest Root	.046	1.077[a]	5.000	117.000	.377
PostGrad	Pillai's Trace	.030	.715[a]	5.000	117.000	.613
	Wilks' Lambda	.970	.715[a]	5.000	117.000	.613
	Hotelling's Trace	.031	.715[a]	5.000	117.000	.613
	Roy's Largest Root	.031	.715[a]	5.000	117.000	.613
Chang5yr	Pillai's Trace	.048	1.189[a]	5.000	117.000	.319
	Wilks' Lambda	.952	1.189[a]	5.000	117.000	.319
	Hotelling's Trace	.051	1.189[a]	5.000	117.000	.319
	Roy's Largest Root	.051	1.189[a]	5.000	117.000	.319
PerAA_H	Pillai's Trace	.037	.911[a]	5.000	117.000	.476
	Wilks' Lambda	.963	.911[a]	5.000	117.000	.476
	Hotelling's Trace	.039	.911[a]	5.000	117.000	.476
	Roy's Largest Root	.039	.911[a]	5.000	117.000	.476
PerW	Pillai's Trace	.027	.658[a]	5.000	117.000	.656
	Wilks' Lambda	.973	.658[a]	5.000	117.000	.656
	Hotelling's Trace	.028	.658[a]	5.000	117.000	.656
	Roy's Largest Root	.028	.658[a]	5.000	117.000	.656

a. Exact statistic

Table 17: Tests of Between-Subjects Effects – Adjusted Teacher Day Rate with Intervening Variables

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	AllRead	.031[a]	7	.004	5.922	.000
	AllWrite	.036[b]	7	.005	3.608	.001
	AllAlg1	.035[c]	7	.005	2.869	.008
	Allgeo	.235[d]	7	.034	7.379	.000
	ALLAlg2	.065[e]	7	.009	2.726	.012
Intercept	AllRead	.100	1	.100	133.961	.000
	AllWrite	.107	1	.107	75.264	.000
	AllAlg1	.086	1	.086	48.734	.000
	Allgeo	.059	1	.059	12.964	.000
	ALLAlg2	.073	1	.073	21.631	.000
Adj08TS	AllRead	.000	1	.000	.145	.704
	AllWrite	.002	1	.002	1.358	.246
	AllAlg1	.001	1	.001	.296	.588
	Allgeo	.001	1	.001	.316	.575
	ALLAlg2	.000	1	.000	.110	.741
FRLunch	AllRead	.000	1	.000	.297	.587
	AllWrite	.000	1	.000	.297	.587
	AllAlg1	.002	1	.002	1.323	.252
	Allgeo	.002	1	.002	.507	.478
	ALLAlg2	.008	1	.008	2.483	.118
Dropout	AllRead	.002	1	.002	3.002	.086
	AllWrite	.003	1	.003	2.434	.121
	AllAlg1	.005	1	.005	3.096	.081
	Allgeo	.007	1	.007	1.544	.216
	ALLAlg2	.000	1	.000	.125	.724
PostGrad	AllRead	8.36E-005	1	8.36E-005	.112	.738
	AllWrite	9.53E-006	1	9.53E-006	.007	.935
	AllAlg1	8.82E-006	1	8.82E-006	.005	.944
	Allgeo	.011	1	.011	2.398	.124
	ALLAlg2	.003	1	.003	.799	.373
Chang5yr	AllRead	.000	1	.000	.440	.509
	AllWrite	.002	1	.002	1.696	.195
	AllAlg1	.001	1	.001	.363	.548
	Allgeo	.009	1	.009	2.026	.157
	ALLAlg2	1.82E-006	1	1.82E-006	.001	.982
PerAA_H	AllRead	.003	1	.003	3.361	.069
	AllWrite	.004	1	.004	2.476	.118
	AllAlg1	.002	1	.002	1.176	.280
	Allgeo	.001	1	.001	.314	.576
	ALLAlg2	.003	1	.003	.792	.375
PerW	AllRead	.001	1	.001	1.962	.164
	AllWrite	.003	1	.003	1.875	.173
	AllAlg1	.001	1	.001	.530	.468
	Allgeo	1.18E-005	1	1.18E-005	.003	.960
	ALLAlg2	.001	1	.001	.156	.694
Error	AllRead	.090	121	.001		
	AllWrite	.171	121	.001		
	AllAlg1	.213	121	.002		
	Allgeo	.551	121	.005		
	ALLAlg2	.410	121	.003		
Total	AllRead	113.918	129			
	AllWrite	108.365	129			
	AllAlg1	110.893	129			
	Allgeo	95.388	129			
	ALLAlg2	106.446	129			
Corrected Total	AllRead	.121	128			
	AllWrite	.207	128			
	AllAlg1	.248	128			
	Allgeo	.786	128			
	ALLAlg2	.474	128			

a. R Squared = .255 (Adjusted R Squared = .212)
b. R Squared = .173 (Adjusted R Squared = .125)
c. R Squared = .142 (Adjusted R Squared = .093)
d. R Squared = .299 (Adjusted R Squared = .259)
e. R Squared = .136 (Adjusted R Squared = .086)

Table 18: Multivariate Tests – Adjusted Teacher Day Rate Reduced Model

Effect		Value	F	Hypothesis df	Error df	Sig.
Intercept	Pillai's Trace	.988	1917.083[a]	5.000	120.000	.000
	Wilks' Lambda	.012	1917.083[a]	5.000	120.000	.000
	Hotelling's Trace	79.878	1917.083[a]	5.000	120.000	.000
	Roy's Largest Root	79.878	1917.083[a]	5.000	120.000	.000
Adj08TS	Pillai's Trace	.030	.749[a]	5.000	120.000	.588
	Wilks' Lambda	.970	.749[a]	5.000	120.000	.588
	Hotelling's Trace	.031	.749[a]	5.000	120.000	.588
	Roy's Largest Root	.031	.749[a]	5.000	120.000	.588
PerAA_H	Pillai's Trace	.173	5.027[a]	5.000	120.000	.000
	Wilks' Lambda	.827	5.027[a]	5.000	120.000	.000
	Hotelling's Trace	.209	5.027[a]	5.000	120.000	.000
	Roy's Largest Root	.209	5.027[a]	5.000	120.000	.000
Dropout	Pillai's Trace	.049	1.233[a]	5.000	120.000	.298
	Wilks' Lambda	.951	1.233[a]	5.000	120.000	.298
	Hotelling's Trace	.051	1.233[a]	5.000	120.000	.298
	Roy's Largest Root	.051	1.233[a]	5.000	120.000	.298
FRLunch	Pillai's Trace	.030	.751[a]	5.000	120.000	.587
	Wilks' Lambda	.970	.751[a]	5.000	120.000	.587
	Hotelling's Trace	.031	.751[a]	5.000	120.000	.587
	Roy's Largest Root	.031	.751[a]	5.000	120.000	.587

a. Exact statistic

Table 19: Tests of Between-Subject Effects – Adjusted Teacher Day Rate Reduced Model

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	AllRead	.029[a]	4	.007	9.770	.000
	AllWrite	.030[b]	4	.008	5.309	.001
	AllAlg1	.033[c]	4	.008	4.746	.001
	Allgeo	.209[d]	4	.052	11.219	.000
	ALLAlg2	.058[e]	4	.014	4.314	.003
Intercept	AllRead	5.764	1	5.764	7759.938	.000
	AllWrite	5.674	1	5.674	3981.397	.000
	AllAlg1	5.322	1	5.322	3062.776	.000
	Allgeo	5.489	1	5.489	1179.381	.000
	ALLAlg2	5.005	1	5.005	1490.272	.000
Adj08TS	AllRead	.000	1	.000	.481	.489
	AllWrite	.003	1	.003	2.083	.152
	AllAlg1	7.23E-005	1	7.23E-005	.042	.839
	Allgeo	.006	1	.006	1.284	.259
	ALLAlg2	2.59E-006	1	2.59E-006	.001	.978
PerAA_H	AllRead	.008	1	.008	10.196	.002
	AllWrite	.003	1	.003	2.109	.149
	AllAlg1	.012	1	.012	6.683	.011
	Allgeo	.079	1	.079	16.946	.000
	ALLAlg2	.040	1	.040	11.891	.001
Dropout	AllRead	.002	1	.002	3.112	.080
	AllWrite	.003	1	.003	2.347	.128
	AllAlg1	.007	1	.007	3.760	.055
	Allgeo	.012	1	.012	2.528	.114
	ALLAlg2	.001	1	.001	.251	.618
FRLunch	AllRead	.000	1	.000	.410	.523
	AllWrite	.000	1	.000	.222	.639
	AllAlg1	.001	1	.001	.763	.384
	Allgeo	.000	1	.000	.025	.876
	ALLAlg2	.007	1	.007	2.203	.140
Error	AllRead	.092	124	.001		
	AllWrite	.177	124	.001		
	AllAlg1	.215	124	.002		
	Allgeo	.577	124	.005		
	ALLAlg2	.416	124	.003		
Total	AllRead	113.918	129			
	AllWrite	108.365	129			
	AllAlg1	110.893	129			
	Allgeo	95.388	129			
	ALLAlg2	106.446	129			
Corrected Total	AllRead	.121	128			
	AllWrite	.207	128			
	AllAlg1	.248	128			
	Allgeo	.786	128			
	ALLAlg2	.474	128			

a. R Squared = .240 (Adjusted R Squared = .215)

b. R Squared = .146 (Adjusted R Squared = .119)

c. R Squared = .133 (Adjusted R Squared = .105)

d. R Squared = .266 (Adjusted R Squared = .242)

e. R Squared = .122 (Adjusted R Squared = .094)

Teacher-to-Principal Salary Difference

Hypothesis 3a: Student achievement, as measured by AYP, will be higher in school divisions where the difference between teacher salaries and principal salaries is narrow.

Hypothesis 3a (0): Student achievement, as measured by AYP, will not be higher in school divisions where the difference between teacher salaries and principal salaries is narrow.

The difference between teacher salaries and principal salaries as an independent variable in the simple and whole models has little influence on the dependent variables. However, there is evidence in the reduced model that the difference between teacher salaries and principal salaries does have a relationship with one of the dependent variables. In the simple model, the multivariate tests, found on Table 20, produce an F-value of 1.220 and no significance with a p-value of .303 for all four tests of effect. In the tests of between-subjects effects, found on Table 21, the difference between teacher salaries and principal salaries is a relatively weak predictor of student achievement with no significance produced with any of the dependent variables. Since the relationships between the teacher-to-principal salary difference variable and the DVs are weak, the null hypothesis cannot be rejected.

Hypothesis 3b: In the presence of intervening variables, student achievement, as measured by AYP, will be higher in school divisions where the difference between teacher salaries and principal salaries is narrow.

Hypothesis 3b (0): In the presence of intervening variables, student achievement, as measured by AYP, will not be higher in school divisions where the difference between teacher salaries and principal salaries is narrow.

In the whole mode, the multivariate tests found on Table 22 produce an F-value of 1.220 and no significance with a p-value of .304 for teacher-to-principal salary difference for all four tests of effect. In the presence of all the identified intervening variables, the difference between teacher salaries and principal salaries has little influence on the student achievement as evidenced in tests

of between-subjects effects found on Table 23. In the reduced model, the multivariate tests found on Table 24 produce an F-value of 1.387 and a weak significance for the difference between teacher salaries and principal salaries with a p-value of .234 for all four tests of effect. In the presence of selected intervening variables, entered in the order of PerAA_H, Dropout, and FRLunch, the difference between teacher salaries and principal salaries does not produce a significant relationship with four of the dependent variables as evidenced by the tests of between-subjects effects found on Table 25. However, the difference between teacher salaries and principal salaries does have a significant relationship with algebra 2 to the $p<.05$ level. Since the relationships between the IV and the DVs are relatively weak, the null hypothesis cannot be rejected. However there is evidence that in the presence of intervening variables that the difference between teacher salaries and principal salaries does have a relationship with algebra 2.

These findings confirm the findings of Patrick, Mahoney and Petrosko (2008) and Kalleberg, Marsden, Reynold and Knoke (2006) suggesting that individuals working in the public (Perry, 2003) and non-profit sectors (Kalleberg et al., 2006) are not primarily motivated by extrinsic rewards (Herzberg, 1966). According to Patrick et al. (2008), organizations that are less corporate in structure follow a more equality driven rewards format as opposed to an equity rewards format where contribution is used to determine the amount or level of rewards distributed by organizations. Though the relationship between the teacher-to-principal salary difference and student achievement is weak, it supports the findings of Kalleberg et al. (2006) and Patrick et al. (2008) that public sector employees might not be as driven by extrinsic rewards

as their private sector counterparts might be (Perry 2003; Perry & Wise, 1990; Perry, Hondeghem & Wise, 2008; Perry, Hondeghem & Wise, 2010) .

Table 20: Multivariate Tests – Teacher-to-Principal Salary Difference

Effect		Value	F	Hypothesis df	Error df	Sig.
Intercept	Pillai's Trace	.913	262.795[a]	5.000	125.000	.000
	Wilks' Lambda	.087	262.795[a]	5.000	125.000	.000
	Hotelling's Trace	10.512	262.795[a]	5.000	125.000	.000
	Roy's Largest Root	10.512	262.795[a]	5.000	125.000	.000
T_Pratio	Pillai's Trace	.047	1.220[a]	5.000	125.000	.303
	Wilks' Lambda	.953	1.220[a]	5.000	125.000	.303
	Hotelling's Trace	.049	1.220[a]	5.000	125.000	.303
	Roy's Largest Root	.049	1.220[a]	5.000	125.000	.303

a. Exact statistic

Table 21: Tests of Between-Subjects Effects – Teacher-to-Principal Salary Difference

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	AllRead	.001[a]	1	.001	1.343	.249
	AllWrite	.000[b]	1	.000	.067	.797
	AllAlg1	.003[c]	1	.003	1.411	.237
	Allgeo	1.91E-005[d]	1	1.91E-005	.003	.956
	ALLAlg2	2.48E-005[d]	1	2.48E-005	.006	.937
Intercept	AllRead	.941	1	.941	982.909	.000
	AllWrite	.982	1	.982	599.094	.000
	AllAlg1	.880	1	.880	448.381	.000
	Allgeo	.832	1	.832	133.199	.000
	ALLAlg2	.949	1	.949	238.558	.000
T_Pratio	AllRead	.001	1	.001	1.343	.249
	AllWrite	.000	1	.000	.067	.797
	AllAlg1	.003	1	.003	1.411	.237
	Allgeo	1.91E-005	1	1.91E-005	.003	.956
	ALLAlg2	2.48E-005	1	2.48E-005	.006	.937
Error	AllRead	.124	129	.001		
	AllWrite	.212	129	.002		
	AllAlg1	.253	129	.002		
	Allgeo	.806	129	.006		
	ALLAlg2	.513	129	.004		
Total	AllRead	115.801	131			
	AllWrite	110.209	131			
	AllAlg1	112.482	131			
	Allgeo	96.887	131			
	ALLAlg2	107.905	131			
Corrected Total	AllRead	.125	130			
	AllWrite	.212	130			
	AllAlg1	.256	130			
	Allgeo	.806	130			
	ALLAlg2	.513	130			

a. R Squared = .010 (Adjusted R Squared = .003)

b. R Squared = .001 (Adjusted R Squared = -.007)

c. R Squared = .011 (Adjusted R Squared = .003)

d. R Squared = .000 (Adjusted R Squared = -.008)

Table 22: Multivariate Tests – Teacher-to-Principal Salary Difference with Intervening Variables

Effect		Value	F	Hypothesis df	Error df	Sig.
Intercept	Pillai's Trace	.559	30.161[a]	5.000	119.000	.000
	Wilks' Lambda	.441	30.161[a]	5.000	119.000	.000
	Hotelling's Trace	1.267	30.161[a]	5.000	119.000	.000
	Roy's Largest Root	1.267	30.161[a]	5.000	119.000	.000
T_Pratio	Pillai's Trace	.049	1.220[a]	5.000	119.000	.304
	Wilks' Lambda	.951	1.220[a]	5.000	119.000	.304
	Hotelling's Trace	.051	1.220[a]	5.000	119.000	.304
	Roy's Largest Root	.051	1.220[a]	5.000	119.000	.304
FRLunch	Pillai's Trace	.078	2.008[a]	5.000	119.000	.082
	Wilks' Lambda	.922	2.008[a]	5.000	119.000	.082
	Hotelling's Trace	.084	2.008[a]	5.000	119.000	.082
	Roy's Largest Root	.084	2.008[a]	5.000	119.000	.082
Dropout	Pillai's Trace	.044	1.083[a]	5.000	119.000	.373
	Wilks' Lambda	.956	1.083[a]	5.000	119.000	.373
	Hotelling's Trace	.046	1.083[a]	5.000	119.000	.373
	Roy's Largest Root	.046	1.083[a]	5.000	119.000	.373
PostGrad	Pillai's Trace	.023	.559[a]	5.000	119.000	.731
	Wilks' Lambda	.977	.559[a]	5.000	119.000	.731
	Hotelling's Trace	.024	.559[a]	5.000	119.000	.731
	Roy's Largest Root	.024	.559[a]	5.000	119.000	.731
Chang5yr	Pillai's Trace	.049	1.229[a]	5.000	119.000	.300
	Wilks' Lambda	.951	1.229[a]	5.000	119.000	.300
	Hotelling's Trace	.052	1.229[a]	5.000	119.000	.300
	Roy's Largest Root	.052	1.229[a]	5.000	119.000	.300
PerAA_H	Pillai's Trace	.043	1.080[a]	5.000	119.000	.375
	Wilks' Lambda	.957	1.080[a]	5.000	119.000	.375
	Hotelling's Trace	.045	1.080[a]	5.000	119.000	.375
	Roy's Largest Root	.045	1.080[a]	5.000	119.000	.375
PerW	Pillai's Trace	.031	.772[a]	5.000	119.000	.572
	Wilks' Lambda	.969	.772[a]	5.000	119.000	.572
	Hotelling's Trace	.032	.772[a]	5.000	119.000	.572
	Roy's Largest Root	.032	.772[a]	5.000	119.000	.572

a. Exact statistic

Table 23: Tests of Between-Subjects Effects – Teacher-to-Principal Salary Difference with Intervening Variables

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	AllRead	.033[a]	7	.005	6.257	.000
	AllWrite	.037[b]	7	.005	3.712	.001
	AllAlg1	.033[c]	7	.005	2.613	.015
	Allgeo	.239[d]	7	.034	7.423	.000
	ALLAlg2	.076[e]	7	.011	3.039	.006
Intercept	AllRead	.088	1	.088	118.163	.000
	AllWrite	.102	1	.102	71.575	.000
	AllAlg1	.080	1	.080	43.980	.000
	Allgeo	.071	1	.071	15.369	.000
	ALLAlg2	.092	1	.092	26.003	.000
T_Pratio	AllRead	.000	1	.000	.221	.639
	AllWrite	.000	1	.000	.227	.635
	AllAlg1	4.30E-005	1	4.30E-005	.024	.878
	Allgeo	.006	1	.006	1.196	.276
	ALLAlg2	.013	1	.013	3.609	.060
FRLunch	AllRead	.001	1	.001	1.420	.236
	AllWrite	.002	1	.002	1.641	.203
	AllAlg1	.005	1	.005	2.512	.116
	Allgeo	.002	1	.002	.409	.524
	ALLAlg2	.019	1	.019	5.468	.021
Dropout	AllRead	.002	1	.002	3.226	.075
	AllWrite	.005	1	.005	3.386	.068
	AllAlg1	.003	1	.003	1.861	.175
	Allgeo	.006	1	.006	1.330	.251
	ALLAlg2	8.65E-006	1	8.65E-006	.002	.961
PostGrad	AllRead	9.31E-005	1	9.31E-005	.124	.725
	AllWrite	2.90E-005	1	2.90E-005	.020	.887
	AllAlg1	7.00E-006	1	7.00E-006	.004	.951
	Allgeo	.008	1	.008	1.700	.195
	ALLAlg2	.001	1	.001	.230	.632
Chang5yr	AllRead	.000	1	.000	.528	.469
	AllWrite	.002	1	.002	1.722	.192
	AllAlg1	.001	1	.001	.284	.595
	Allgeo	.008	1	.008	1.755	.188
	ALLAlg2	.000	1	.000	.078	.780
PerAA_H	AllRead	.003	1	.003	3.666	.058
	AllWrite	.005	1	.005	3.373	.069
	AllAlg1	.002	1	.002	1.304	.256
	Allgeo	.004	1	.004	.800	.373
	ALLAlg2	.005	1	.005	1.500	.223
PerW	AllRead	.002	1	.002	2.352	.128
	AllWrite	.004	1	.004	2.772	.098
	AllAlg1	.001	1	.001	.566	.453
	Allgeo	.000	1	.000	.054	.816
	ALLAlg2	.001	1	.001	.372	.543
Error	AllRead	.092	123	.001		
	AllWrite	.175	123	.001		
	AllAlg1	.223	123	.002		
	Allgeo	.567	123	.005		
	ALLAlg2	.437	123	.004		
Total	AllRead	115.801	131			
	AllWrite	110.209	131			
	AllAlg1	112.482	131			
	Allgeo	96.887	131			
	ALLAlg2	107.905	131			
Corrected Total	AllRead	.125	130			
	AllWrite	.212	130			
	AllAlg1	.256	130			
	Allgeo	.806	130			
	ALLAlg2	.513	130			

a. R Squared = .263 (Adjusted R Squared = .221)
b. R Squared = .174 (Adjusted R Squared = .127)
c. R Squared = .129 (Adjusted R Squared = .080)
d. R Squared = .297 (Adjusted R Squared = .257)
e. R Squared = .147 (Adjusted R Squared = .099)

Table 24: Multivariate Tests – Teacher-to-Principal Salary Difference Reduced Model

Effect		Value	F	Hypothesis df	Error df	Sig.
Intercept	Pillai's Trace	.921	284.731[a]	5.000	122.000	.000
	Wilks' Lambda	.079	284.731[a]	5.000	122.000	.000
	Hotelling's Trace	11.669	284.731[a]	5.000	122.000	.000
	Roy's Largest Root	11.669	284.731[a]	5.000	122.000	.000
T_Pratio	Pillai's Trace	.054	1.387[a]	5.000	122.000	.234
	Wilks' Lambda	.946	1.387[a]	5.000	122.000	.234
	Hotelling's Trace	.057	1.387[a]	5.000	122.000	.234
	Roy's Largest Root	.057	1.387[a]	5.000	122.000	.234
PerAA_H	Pillai's Trace	.178	5.283[a]	5.000	122.000	.000
	Wilks' Lambda	.822	5.283[a]	5.000	122.000	.000
	Hotelling's Trace	.217	5.283[a]	5.000	122.000	.000
	Roy's Largest Root	.217	5.283[a]	5.000	122.000	.000
Dropout	Pillai's Trace	.050	1.296[a]	5.000	122.000	.270
	Wilks' Lambda	.950	1.296[a]	5.000	122.000	.270
	Hotelling's Trace	.053	1.296[a]	5.000	122.000	.270
	Roy's Largest Root	.053	1.296[a]	5.000	122.000	.270
FRLunch	Pillai's Trace	.100	2.716[a]	5.000	122.000	.023
	Wilks' Lambda	.900	2.716[a]	5.000	122.000	.023
	Hotelling's Trace	.111	2.716[a]	5.000	122.000	.023
	Roy's Largest Root	.111	2.716[a]	5.000	122.000	.023

a. Exact statistic

Table 25: Tests of Between-Subjects Effects – Teacher-to-Principal Salary Difference Reduced Model

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	AllRead	.031[a]	4	.008	10.193	.000
	AllWrite	.030[b]	4	.008	5.204	.001
	AllAlg1	.031[c]	4	.008	4.331	.003
	Allgeo	.214[d]	4	.054	11.405	.000
	ALLAlg2	.071[e]	4	.018	5.028	.001
Intercept	AllRead	.850	1	.850	1135.822	.000
	AllWrite	.870	1	.870	603.609	.000
	AllAlg1	.836	1	.836	467.743	.000
	Allgeo	.975	1	.975	207.573	.000
	ALLAlg2	.981	1	.981	279.338	.000
T_Pratio	AllRead	.000	1	.000	.286	.594
	AllWrite	.000	1	.000	.155	.694
	AllAlg1	9.08E-005	1	9.08E-005	.051	.822
	Allgeo	.009	1	.009	1.939	.166
	ALLAlg2	.014	1	.014	3.955	***.049***
PerAA_H	AllRead	.005	1	.005	7.041	.009
	AllWrite	.002	1	.002	1.316	.254
	AllAlg1	.013	1	.013	7.284	.008
	Allgeo	.085	1	.085	18.161	.000
	ALLAlg2	.061	1	.061	17.370	.000
Dropout	AllRead	.003	1	.003	3.523	.063
	AllWrite	.005	1	.005	3.517	.063
	AllAlg1	.004	1	.004	2.467	.119
	Allgeo	.012	1	.012	2.542	.113
	ALLAlg2	1.82E-005	1	1.82E-005	.005	.943
FRLunch	AllRead	.002	1	.002	3.030	.084
	AllWrite	.004	1	.004	2.856	.094
	AllAlg1	.003	1	.003	1.501	.223
	Allgeo	.000	1	.000	.093	.761
	ALLAlg2	.020	1	.020	5.750	.018
Error	AllRead	.094	126	.001		
	AllWrite	.182	126	.001		
	AllAlg1	.225	126	.002		
	Allgeo	.592	126	.005		
	ALLAlg2	.442	126	.004		
Total	AllRead	115.801	131			
	AllWrite	110.209	131			
	AllAlg1	112.482	131			
	Allgeo	96.887	131			
	ALLAlg2	107.905	131			
Corrected Total	AllRead	.125	130			
	AllWrite	.212	130			
	AllAlg1	.256	130			
	Allgeo	.806	130			
	ALLAlg2	.513	130			

a. R Squared = .244 (Adjusted R Squared = .220)

b. R Squared = .142 (Adjusted R Squared = .115)

c. R Squared = .121 (Adjusted R Squared = .093)

d. R Squared = .266 (Adjusted R Squared = .243)

e. R Squared = .138 (Adjusted R Squared = .110)

Summary

An analysis of the 131 school divisions in Virginia that comprised the dataset found that the relationship between teacher salaries and student achievement in the areas of English and mathematics is of little significance. Absent any intervening variables, the relationship between teacher salaries adjusted for cost-of-living and student achievement in the subjects of reading, writing and geometry is significant and negative. However, when intervening variable are introduced into the model, the relationship weakens. These results support the earlier findings of Gill and Meier (2001) that teacher salaries should be considered when looking at student achievement, but the influence of teacher salaries on student achievement is weak.

CHAPTER 5: CONCLUSIONS AND RECOMMENDATIONS

A number of research projects conducted in the field of education have looked at theories of motivation (Odden and Kelley, 2002), but there is little research on the relationship between teacher salaries and student achievement. The purpose of this research is to answer the question, what is the relationship between teacher salaries and student achievement as measured by adequate yearly progress (AYP)? Student achievement, in this context, is relative to the minimum passing requirements for students in English subjects and mathematics subjects. Based on the results of nine general linear models, the relationship between teacher salaries and student achievement is weak. According to research conducted by Gill and Meier (2001), there is a positive relationship between teacher salaries and student achievement, but that high teacher salaries are not among the leading characteristics of high achieving school districts.

This research is framed utilizing an equity theory (Adams, 1965) and distributive justice (Greenberg, 1987, 1989, 1990) perspective. Equity theory posits that individuals evaluate an organization's fairness based on how well they are rewarded for their inputs relative to another individual (Adams, 1965). These evaluations might lead to one of three potential outcomes: equitable payment, overpayment inequality or underpayment inequality (Greenberg & Baron, 2007). The consequences of underpayment inequity could lead to individual impropriety consisting of reduced effort, indifference, and possibly corporate theft (Greenberg, 1989). In this

context, if an individual feels they are not adequately compensated for their job duties, their performance might influence organizational outcomes (Greenberg, 1987, 1989, 1990).

Distributive justice, one of the four elements of organizational justice, posits that individuals will feel satisfied when they perceive that organizational resources, including compensation, are distributed fairly (Greenberg & Baron, 2007; Greenberg, 1987). According to Deutsch (1975), there are three perceived forms of fairness in the distribution of organizational resources: needs based fairness, equality based fairness, and equity based or contribution based needs. School divisions, like most public and non-profit organizations, are likely to follow the equality model (Patrick et al., 2008) embodied by the single-schedule pay system (Odden & Kelley, 1997, 2002). While there have been research projects and articles dedicated to alternative pay schedules, such as merit-based pay, evidence has shown that school divisions are not likely to move away from the current single-schedule pay scale that is used by a majority of school divisions in the United States (Odden & Kelley, 2002). The results of nine general linear models built for this research support Odden and Kelley's position that the current compensation model is likely to remain in continuous use.

This chapter is divided into three sections with a summary at the end of the chapter. The first section presents a brief discussion of the findings from chapter four. The second section presents the limitations of this research and recommendations for future research. The third section presents conclusions and policy recommendations based on the results of the data analysis found in chapter four. A summary follows after the third section of this chapter.

Discussion

The rejection of five of the six posited hypotheses suggests that the general relationship between teacher salaries and student achievement as measured by AYP is weak. Though the relationship between the salaries teachers receive from their school divisions and student achievement relative to the requirements of AYP is generally positive, it is a weak relationship. As Gill and Meier (2001) suggest from their study of school districts in Texas, the relationship between teacher salaries and student achievement is positive, in that as teacher salaries increase so does student achievement. However, Gill and Meier also note that teacher salaries are not one of the factors that separate superior achieving school districts from average or high achieving school districts.

In the absence of intervening variables such as high racial minority presence, the drop-out rate and percentage of students receiving free or reduced lunches, there is a significant inverse relationship between teacher salaries adjusted for cost-of-living and student achievement. In this case, the null hypothesis for hypothesis 2a was rejected as the model showed that there was a significant inverse relationship between teacher salaries adjusted for cost-of-living and achievement as measured by AYP in reading, writing and geometry. The rejection of the null hypothesis for hypothesis 2a when intervening variables are excluded does expose a need for certain school divisions, especially in the northern region of the state, to consider revaluating how teachers are compensated such that teachers do not leave the classroom or the profession. The caveat is that this relationship does not hold when intervening variables are introduced into the mode.

The relatively weak relationship between teacher salaries and student achievement, in general, might be relative to the dependent variables used in this research. This research used adequate yearly progress (AYP) as a measure of student achievement. AYP represents the minimal standards for which students are to meet in order to be labeled "proficient" by the United States Department of Education (2010a). Since these standards require minimal proficiency and all schools and school divisions are expected to meet the standards of AYP by 2014 (U.S. Department of Education, 2010a, 2010b, 2010c), it is difficult to determine how strong the relationship between teacher salaries and student achievement is when the standards for proficiency are required by the NCLBA (U.S. Department of Education 2010a).

Another factor possibly influencing the relationship between teacher salaries and student achievement is public service motivation (Perry & Hondeghem, 2008; Perry, Hondeghem, & Wise, 2010). As Odden & Kelley (2002) explain, teachers are often motivated to teach for reasons other than monetary compensation. It is possible that altruistic motivation to contribute to organizationally defined goals (Perry & Hondeghem, 2008) mediates the desire of individuals in the teaching field to leave. Civic duty and compassion are often identified as elements of public service motivation (Perry & Wise, 1990), which fit well with the teaching profession (Odden & Kelley, 1997, 2002). These findings are confirmed by the POINT program in Nashville, Tennessee that found little difference in achievement between students in classes where the teachers were incentivized with financial rewards to increase student achievement in mathematics and classes where teachers were not receiving incentives (Springer et al., 2010).

The teacher-to-principal salary difference does not have a strong relationship with student achievement. Only one model produced evidence that the teacher-to-principal salary difference might influence student achievement in algebra 2, but there is not enough evidence to suggest that resources should be reallocated to ameliorate teacher salaries in relationship to principal salaries. This finding confirms the work of Patrick et al. (2008), who suggest that organizations that are more reflective of the public and non-profit sector follow a more equality based (Deutsch, 1975) approach to distributing resources, meaning that individuals are paid based on the position they hold. The single-salary pay schedule is often perceived as fair because it does not differentiate between race, sex, or physical capability. Since the single-salary pay schedule is widely used throughout the United States, teachers are familiar with it and generally accept it as fair (Odden & Kelley, 2002).

Limitations and Recommendations for Future Research

This research is bound by the limitations inherent in performing analyses of secondary data. According the Frankfort-Nachmias and Nachmias (2000), there are three major caveats to performing secondary data analysis: insufficient or missing data, errors conveyed from the initial collection, and utilizing data that are not suitable for the proposed project. For this research, the major limitation is the level at which the data were analyzed.

The data that comprise the data set for this research are school division level data culled from the Virginia Department of Education. Though there are data by high school building for achievement in reading, writing, algebra 1, geometry, and algebra 2 as defined by AYP, there are insufficient data regarding salaries, principal salaries in particular. While these data exist, and

are available upon request, collecting the data might be time prohibitive. Also, the collection of these data might be inconsistent from school division to school division.

For the purposes of conducting this research, school division level data are appropriate for testing the hypotheses posited. In previous research, Gill and Meier (2001) utilized school district level data for testing organizational behavior based hypotheses. While school division level data pertinent to high schools provides confidentiality for people holding certain positions such as principal or assistant principal, differences between high school buildings are muted. As evidenced by Table 26, the school division level data analyzed in this research do not reflect the differences between high school buildings. Table 26 provides teacher and principal salaries; average years of teacher experience; and, AYP in English and mathematics for high schools in one of the school divisions located in Virginia for school year 2007-2008. The high school names are replaced with numbers to provide confidentiality to those in positions where there is only one incumbent.

Table 26: Salaries and AYP Results for high schools in a Virginia School Division

Virginia School Division for School Year 2007-2008				
School Building (Average Teacher Experience in parentheses)	Average Teacher Salary	Principal Salary	English AYP	Mathematics AYP
HS-1 (12)	$47,668	$78,222	95%	86%
HS-2 (12)	$47,665	$105,117	95%	84%
HS-3 (12)	$47,458	$116,671	99%	96%
HS-4 (13)	$48,086	$118,697	96%	89%
HS-5 (13)	$47,652	$110,531	92%	86%
HS-6 (10)	$45,716	$106,061	94%	81%
HS-7 (10)	$46,101	$77,330	90%	76%
HS-8 (17)	$51,258	$104,851	98%	95%
HS-9 (15)	$49,294	$82,788	92%	88%
HS-10 (12)	$47,185	$107,295	96%	84%

Table 26 elucidates some of the challenges of working with aggregate level data. The data in the dataset are an average of averages, which might mask differences between individual units. In the context of this research, differences between school buildings might be muted such that underachieving school buildings benefit from the success of other school buildings within the same school division. In terms of achievement according to table 26, HS-7 benefits from the other high schools in the school division in the area of achievement in English according to the standards of AYP. For achievement in mathematics according to the standards of AYP, high achievement scores posted by HS-3 and HS-8 help raise the overall achievement in mathematics for all high schools in the school division. The differences between schools are not limited to achievement.

According to table 26, school building HS-8 has the highest average teacher salary in the school division, and building HS-8 has the highest average number of years of teaching experience. It is reasonable to expect that the school which has the most experienced teachers would also have the highest average teacher salaries. Though HS-8 has an average salary of just over $51,000, the school with the lowest average teacher salary is paying its teachers on average almost $46,000. The difference between average principal salaries among the high schools according to table 26 is much wider than the difference between average teacher salaries. The principal with the lowest salary in the school division is making just over $77,000, and the principal with the highest salary in the school division is making nearly $119,000. An aggregate study, such as the one performed for this research, would mask the relationship between teacher-to-principal salary differences and student achievement. As shown in table 26, HS-4 performed better in English and mathematics than HS-7, though the difference between average teacher salaries and the

principal's salary is about $70,000 for HS-4 compared to a $30,000 difference between average teacher salaries and the principal's salary at HS-7. Though HS-4 out-performs HS-7 despite the higher teacher-to-principal salary difference, intervening factors such as the dropout rate and the number of students (Lomax et al., 1995) receiving free or reduced lunches are likelier to predict the differences in student achievement between HS-4 and HS-7.

There are two potential projects for future research that can build upon the research presented here. One potential research project is to collect data from every high school in the state of Virginia and compare the results from using school building level data to the data presented in this research. As Table 26 suggests, executing an analysis of secondary data at the school building level might elucidate nuances that this research could not because these analyses are performed with school division level data. A second potential research project is a mixed-methods approach combing quantitative and qualitative techniques. In the mixed-methods approach, a researcher could concentrate on a particular division or sample several school divisions and compare the results gained from a quantitative analysis to data gathered from individual interviews with teachers and principals. Mixed-methods approaches are often considered stout because they allow the researcher to triangulate findings to confirm hypotheses (Frankfort-Nachmias & Nachmias, 2000).

The approach recommended above expands on the research done for this project, which is limited to looking at salary as a motivator for performance. As Herzberg (1966, 1969) suggests, salary can be as much an inhibitor for motivation as it is for motivation. An alternative to looking at pay as a motivator is to construct a research project focused on testing several types of

motivation, which might include salary. As noted by Odden and Kelley (1997, 2002), teachers are motivated when they are invested in the schools and school divisions where they work. Herzberg (1966, 1969) outlined three motivators that allowed employees to feel more invested in the organizations for which they work: ownership, autonomy, and pride. Individuals who have ownership of their projects are motivated to produce high quality outcomes. When individuals are allowed to work on their projects without much interference or supervision, these employees are freer to express their creativity and ingenuity. Generally, according to Herzberg (1966), individuals who have ownership over projects and are allowed to work independently of supervision derive a sense of pride from their work.

Utilizing a theoretical framework consisting of participative-management theory and goal-setting theory, a project could be constructed to test whether other motivators, as outlined by Herzberg, are better predictors of organizational success than salary. As Odden and Kelley (2002) observe, when teachers are a part of the goal setting process (Locke, 1968) and the procedural management team (Lawler, 1990) for reaching organizational goals, they are more invested and have ownership in the schools and school divisions for which they work. In order to collect data relative to measuring individual autonomy and project ownership as they relate to motivation, a survey would likely need to be constructed to effectively represent the different types of motivation as they relate to organizational success. Once constructed, the survey can be administered to a sample of teachers from a cross-section (Frankfort-Nachmias & Nachmias, 2000) of school divisions in the state. A mixed-methods approach that includes in-depth interviews or focus groups will help triangulate the motivators that the best predictors of organizational success (Creswell, 2003; Frankfort-Nachmias & Nachmias, 2000).

The main limitation of this research is that it focuses on salary as a motivator. While conducting the research recommended above might not reveal the most significant motivator for organizational success, it would provide insight into where salaries stand as a motivator for organizational success when it comes to the teaching profession. It is likely, with respect to public service motivation (Perry, 2003; Perry & Wise, 1990), that salary is not the most significant motivator of teachers, and that there is a point where too much salary can inhibit motivation in the way that too little salary can inhibit motivation (Herzberg, 1966, 1969). In a future research project, several types of motivation can represent the independent variables.

For the dependent variables, future research should consider the limitations of AYP. While standardized tests are accepted as measures of organizational success or failure (Gill & Meier, 2001) for schools and school districts, AYP might not be the best indicator or success. It is difficult to discern true achievement in education because there are differences between schools and school districts (Odden & Kelley, 2002; Tuck, Berman & Hill, 2009). As the education literature suggests, high incidents of concentrated poverty and racial isolation can negatively influence achievement as measured by standardized testing (Lomax et al., 1995). Several measurements are used to formulate AYP including student attendance, but AYP might not be able to detect individual student improvement. As a measurement of student achievement, AYP is appropriate for the study performed in this research, but might not be a true indicator of student achievement in future studies.

Conclusion and Policy Recommendations

The results of general linear modeling suggest that alternative pay structures might not have significant influence on student achievement relative to the requirements of adequate yearly progress (AYP). These results confirm Odden and Kelley's (2002) concerns that finding an effective alternative to the single-salary pay schedule might be elusive. However, as Kalleberg et al. (2006) have suggested, individuals working in the public and non-profit sector might not be motivated by strictly by monetary rewards. According to Kalleberg et al. (2006), individuals in the public and non-profit sectors might feel they are justly compensated if they are given opportunities to increase their knowledge base or skill set through access to free or reduced continuing education or training seminars. These auxiliary benefits might allow individuals to prepare themselves for higher paying positions in the future (Kalleberg et al., 2006), which in the education field means that teachers might feel justly compensated if they are able to prepare themselves for jobs in administration later in their careers (Odden & Kelley, 2002).

In light of Liu et al.'s (2004) research with signing bonuses, as well as the observations of Odden and Kelley (2002), it is unlikely that school divisions in Virginia or school districts throughout the United States will abandon the single-salary pay schedule. The benefit of the current salary construct is that it is considered fair and most employees employed within the school districts that use this system are familiar with it. However, as Odden and Kelley (2002) note, teachers are no less interested in extrinsic rewards than those who work in the private sector where performance bonuses and merit pay are widely used incentives. The caveat for public and non-profit organizations is that they are often unable to employ these incentives due to budget

constraints and limited revenue streams compared to organizations in the private sector (Kalleberg et al., 2006).

Based on the findings of this research and those from Gill and Meier's (2001) research, the relationship between teacher salaries and student achievement is relatively weak in comparison to other factors like: the concentration of racial minorities in school districts, the drop-out rate, and the percentage of students receiving free or reduced lunches. While these findings and others do not suggest that the single-salary pay scale should be replaced, the findings do suggest that the single-salary pay scale should be maintained in a manner such that it reflects the cost-of-living in the area where it is used. As this research shows, when adjusted to the cost-of-living for the state of Virginia, teachers who work in the northern part of the state make less income for producing high organizational outcomes.

Though the rigors of AYP might not be demanding, AYP is the standard utilized in making a lot of organizational decisions. When isolated, teacher pay adjusted for cost-of-living does have a significant inverse relationship with student achievement. In light of equity theory (Adams, 1965), teachers in some school divisions, especially in Northern Virginia, are producing higher results with lesser individual rewards in comparison to teachers in other school divisions in Virginia. This underpayment inequity (Greenberg & Baron, 2007) suggests that certain school divisions, most notably school divisions located in Northern Virginia, should consider revising their pay scales such that they do not incur situations where gifted teaches are leaving the classroom to take administrative positions (Odden and Kelley, 2002).

Another policy recommendation is for school divisions in Virginia to consider constructing customized definitions for what student achievement is. While AYP provides a standardized format for school districts to measure student achievement, it is likely that AYP does not provide a comprehensive description of what student achievement is. School divisions in urban areas, such as Richmond, Norfolk and Hampton, are facing different issues than school divisions in suburban areas like Chesterfield, Loudoun and Prince William. In order to find an appropriate method to reward teachers for achievement, school divisions might need to develop student achievement indicators that are not as restrictive as standardized testing. Indicators of student success should be weighted differently from one school division to the next to reflect the different challenges that each school division faces. For some school divisions, lowering the dropout rate might increase student achievement; whereas, other divisions might make few or no changes because those changes might negatively influence student achievement where achievement is currently high. Customizing the definition of student achievement allows school divisions to determine student achievement based on the challenges they face and the resources they have.

Summary

The rejection of five of the six hypotheses posited for this research suggests that there is a weak relationship between teacher salaries and student achievement as measured by the requirements of AYP. But, there is evidence to suggest that certain school divisions in the Commonwealth of Virginia might want to reconsider how their pay scales are fashioned in light of the rejection of the null hypothesis that there is not an inverse relationship between teacher salaries and student achievement, absent of intervening variables, when salaries are adjusted for cost-of-living. The

policy implications of this research are limited, but indicate that school divisions in the northern part of the state might want to examine and possible revise their pay scales to reflect the high achievement by students in their districts relative to the requirements of AYP.

LITERATURE CITED

Adams, J. S. (1963). Toward an understanding of inequity. *Journal of Abnormal and Social Psychology*, 67, 422-436.

Adams, J. S. (1965). Inequity in social exchanges. In L. Berkowitz (Ed.), *Advances in Experimental Social Psychology* (Vol. 2, p. 267-299). New York: Academic Press.

Adams, J. S., & Jacobsen, P. R. (1964). Effects of wage inequities on work quality, *Journal of Abnormal Social Psychology*, 69, 19-25.

Airasian, P. (1987). State mandated testing and educational reform: Contexts and consequences. *American Journal of Education*, 95, p. 393-412.

Appelbaum, E. & Batt, R. (1994). The new American workplace: *Transforming Work Systems in the United States*. Ithaca, New York: ILR Press.

Appelbaum, E., Bailey, T. Berg, P., & Kalleberg, A. L. (2000). *Manufacturing Advantage: Why High Performance Work Systems Pay Off*. Ithaca, New York: Cornell University Press.

Asgari, A., Silong, A. D., Ahmad, A., & Samah, B. A. (2008). The relationship between transformational behaviors, organizational justice, leader-member exchange, perceived organizational support, trust in management and organizational citizenship behaviors. *European Journal of Scientific Research*, 23 (2), 227-242.

Beth Curran, L., Wolman, H., Hill, E. W., & Furdell, K. (2006). Economic wellbeing and where we live: Accounting for geographical cost-of-living differences in the U.S. *Urban Studies (Routledge)*, 43 (13), 2443-2466.

Blau, P. M. (1964). *Exchange and Power in Social Life*. New York: Wiley.

Clay-Warner, J., Hegtvedt, K. A., & Roman, P. (2005). Procedural justice, distributive justice: How experiences with downsizing condition their impact on organizational commitment. *Social Psychology Quarterly*, 68 (1), 89-102.

Clotfelter, C. T., Ladd, H. F., & Vigdor, J. L. (2006). Teacher-student matching and the assessment of teacher effectiveness. *The Journal of Human Resources*, 41 (4), 778-820.

Cochran-Smith, M., & Fries, K. M. (2005). The AERA panel on research teacher education: Context and goals. In *Studying Teacher Education: The report of the AERA panel on research and teacher education*, edited by M. Cochran-Smith & K. Zeichner. Washington D.C.: American Education Research Association.

Colquitt, J. C. & Chertkoff, J. M. (2002). Explaining injustice: The interactive effect of explanation and outcome on fairness perceptions and task motivation. *Journal of Management*, 28 (5), 591-610.

Colquitt, J. A. & Greenberg, J. (2003). Organizational justice: A fair assessment of the state of the literature. In *Organizational Behavior: The State of the Science*, edited by J. Greenberg. New Jersey: Lawrence Erlbaum Associates.

Corbo, A. & Kleiner, B.H. (1991). How to effectively link compensation with performance. *Industrial Management*, 33(3), 21-22.

Corpanzano, R., & Ambrose, M. L. (2001). Procedural and distributive justice are more similar than you think: A monistic perspective and a research agenda. *In Advances in Organizational Justice*, edited by J. Greenberg & R. Corpanzano. Stanford, California: Stanford University Press

Creswell, J. W. (2003). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*, 2nd ed. Thousand Oaks, California: Sage.

Deci, E. L., & Ryan, R. M. (2000). The "what" and "why" of goal pursuits: Human needs and the self-determination of behavior. *Psychological Inquiry*, 11, 227-268.

Diesing, P. (1991). *How Does Social Science Work? Reflections on Practice*. Pittsburgh, PA.: University of Pittsburgh Press.

Deutsch, M. (1975). Equity, equality, and need: What determines which will be used as the basis for distributive justice? *The Journal of Social Issues*, 31, 137-149.

Edmunds, R. R. (1979). Effective schools for the urban poor. *Educational Leadership*, 37, 15-24.

Fadil, P.A., Williams, R. J., Limpaphayom, W., & Smart, C. (2005). Equity or equality? A conceptual examination of the influence of individual/collectivism on cross-cultural application of equity theory. *Cross Cultural Management*, 12, 17-35.

Folger, R. (1984). Perceived injustice, referent cognitions, and the concept of comparison level. *Representative Research in Social Psychology*, 14, 88-108.

Folger, R. (1986). Rethinking equity theory: A referent cognitions model. In *Justice in Social Relations*, edited by H. W. Bierhoff, R. L. Cohen, & J. Greenberg (pp. 145-162). New York: Plenum Press.

Frankfort-Nachmias, C., and Nachmias, D. (2000). *Research Methods in the Social Sciences,* 6th ed. New York: Worth Publishers.

Gill, J., & Meier, K. J. (2001). Ralph's pretty-good grocery versus Ralph's Super Market: Separating excellent agencies from the good ones. *Public Administration Review,* 61 (1), 9-17.

Godard, J., & Delaney, J.T. (2000). Reflections on the "high performance" paradigm's implications for industrial relations as a field. *Industrial & Labor Relations Review*, 53 (3), 482-502.

Goldhaber, D. D., & Brewer, D. J. (1997). Why don't schools and teachers seem to matter? Assessing the impact of unobservables on educational productivity. *The Journal of Human Resources*, 32 (3), 505-523.

Goldhaber, D. D., Anthony, E. A. (2007). Can teacher quality be effectively assessed? *The Review of Economics and Statistics*, 89 (1), 134-150.

Good T. L., & Brophy, J. E. (1986). School effects. In *Handbook of research on teaching* (p. 570-602). M. C. Wittrock, editor. New York: MacMillan.

Goslin, D. A., & Glass, D. C. (1967). The social effects of standardized testing in American elementary and secondary schools. *Sociology of Education*, 40 (2), 115-131.

Greenberg, J. (1987). A taxonomy of organizational justice theories. *Academy of Management Review*, 12, 9-22.

Greenberg, J. (1989). Cognitive reevaluation of outcomes in response to underpayment inequality. *Academy of Management Journal*, 32, 176-184.

Greenberg, J. (1990). Organizational justice: Yesterday, today and tomorrow. *Journal of Management*, 16, 399-432.

Greenberg, J., (1996). *The Quest for Justice on the Job: Essays and Experiments*. Thousand Oaks, California: Sage Publications.

Greenberg, J., & Baron, R. A. (2007). *Behavior in Organizations*. Upper Saddle River, New Jersey: Prentice Hall

Harmon, M.M. & Mayer, R.T. (1986). *Organization Theory for Public Administration*. Burke, Virginia: Chatelaine Press.

Hart, A. W. (1994). Work feature values of today's and tomorrow's teachers: Work redesign as an incentive and school improvement policy. *Educational Evaluation and Policy Analysis*, 16, 458-473.

Hart, A. W. (1995). Reconceiving school leadership: Emergent views. *Elementary School Journal*, 96, 9-28.

Heneman, R. L., Ledford, G. E., Jr., & Gresham, M. T. (2000). The changing nature of work and its effects on compensation design and delivery. In *Compensation in Organizations: Current research and practice*, edited by S. L. Rynes & B. Gerhart. San Francisco: Jossey-Bass.

Hegtvedt, K. A. (1988). Social determinnats of perception: Power, equity, and status effects in an exchange situation. *Social Psychology Quarterly*, 51 (2), 141-153.

Hegtvedt, K. A. (1990). The effects of relationship structure on emotional response to inequity. *Social Psychology Quarterly*, 53, 214-228.

Hegtvedt, K. A. (1993). Approaching distributive and procedural justice: Are separate routes necessary? In *Advances in Group Processes*, Vol. 10, edited by E. J. Lawler, B. Markovsky, K. Heimer, & J. O'Brien. Greenwich, Connecticut: JAL.

Herzberg, F. (1966). *Work and the Nature of Man*. Cleveland: World Publishing.

Herzberg, F. (1969). One more time: How do we motivate employees? *Harvard Business Review*, 46 (1), 53-62.

Hill, J., & Johnson, F. (2005). *Revenues and expenditures for public elementary and secondary education: School year 2002–03 (NCES 2005-353R)*. Washington, DC: National Center for Education Statistics.

Homans, C. G. (1961). *Social Behavior: Its Elementary Forms*. New York: Harcourt, Brace and World.

Hums, M. A., & Chelladurai, P. (1994). Distributive justice in intercollegiate athletics: The views of NCAA coaches and administrators. *Journal of Sports Management*, 8, 200-217.

Jacques, E. (1961). *Equitable Payment*. London: Heinemann Educational Books.

Jasso, G. (1980). A new theory of distributive justice. *American Sociological Review*, 45 (1), 3-32.

Jasso, G. (1986). A new representation of the just term in distributive justice theory: Its properties and operation in theoretical derivation and empirical estimations. *Journal of Mathematical Sociology*, 12, 251-274.

Jepsen, C. (2005). Teacher characteristics and student achievement: Evidence from teacher surveys. *Journal of Urban Economics*, 57 (2), 302-319.

Jupp, B. (2005). The uniform salary schedule: A progressive leader proposes differential pay. Education Next, (5) 1, 10-12.

Justice, L. M., Breit-Smith, A., Rogers, M. (2010). Data recycling: Using existing databases to increase research capacity in speech-language development and disorders. *Language, Speech, & Hearing Services in Schools*, 41 (1), 39-43.

Kahneman, D. & Tversky, A. (1982). Availability and the simulation heuristic. In *Judgment under Uncertainty: Heuristics and Biases*, edited by D. Kahneman, P. Slovic, & A. Tversky (pp. 201-208). New York: Oxford University Press.

Kalleberg, A. L., Marsden, P. V., Reynold, J. R., & Knoke, D. (2006). "Beyond profit? Sectoral differences in high-performance work practices." *Work and Occupations*, 33 (3), 271-302.

Katz, D. (1964). The motivational basis of organizational behavior. *Behavior Science*, 9 (April) 131-146.

Kelley, C., & Protsik, J. (1997). Risk and reward: Perspectives on the implementation of Kentucky's school-based performance reward program. *Educational Administration Quarterly*, 33 (4), 474-505.

Kelley, C. (1998). The Kentucky school-based performance award program: School-level effects. *Educational Policy*, 12 (3), 305-324.

Kukla-Acevedo, S. (2009). Do teachers characteristics matter? New results on the effects of teacher preparation on student achievement. *Economics of Education Review*, 28 (1), 49-57.

Krueger, A. B. (1999). Experimental estimates of education production functions. *The Quarterly Journal of Economics*, 114 (2), 497-532.

Kyle, R. M. J. (Ed.). (1985). *Research for excellence: An effective schools sourcebook*. Washington D.C.: U.S. Government Printing Office

Lawler, E. E., III. (1971). *Pay and Organizational Effectiveness: A Psychological View*. New York: McGraw-Hill.

Lawler, E. E., III. (1981). *Pay and Organizational Development*. Reading, MA.: Addison-Wesley.

Lawler, E. E., III. (1990). *Strategic Pay: Aligning Organizational Strategies and Pay Systems*. San Francisco: Jossey-Bass.

Lawler, E. E., III. (1992). *The Ultimate Advantage: Creating the High Involvement Organization*. San Francisco: Jossey-Bass Publishers.

Lawler, E. E., III (2000). Pay strategy: New thinking for the new millennium. *Compensation and Benefits Review*, Jan./Feb., 7-12.

Linn, R. L., Baker, E. L., & Betebenner, D. W. (2002). Accountability systems: Implications of requirements of the No Child Left Behind Act of 2001. *Educational Researcher*, 31 (6), 3-16.

Liu, E., Johnson, S. M., & Peske, H. G. (2004). New teachers and the Massachusetts signing bonus: The limitations of inducements. *Educational Evaluation and Policy Analysis*, 26 (3), p. 217-236.

Locke, E. A. (1968). Towards a theory of task motivation and incentives. *Organizational Behavior and Human Performance*, 3, 157-189.

Lomax, R. G., West, M. M., Harmon, M. C., Viator, K. A., & Madaus, G. F. (1995). The impact of mandated standardized testing on minority students. *The Journal of Negro Education*, 64 (2), 171-185.

Loseman, A., Miedema, J., Van Den Bos, K. & Vermunt, R. (2009). Exploring how people respond to conflicts between self-interest and fairness: Influence of threats to the self on affective reactions to advantageous inequity. *Australian Journal of Psychology*, 61 (1), 13-21

Mackenzie, D. E. (1983). Research for school improvement: An appraisal of some recent trends. *Educational Researcher*. 12 (4), 5-17.

Madaus, G. F. (1991). The effects of important tests on students: Implications for a national or system of examinations. Paper presented at the AERA Invitational Conference on Accountability as a State Reform Instrument: Impact on Teaching, Learning, Minority Issues and Incentives for Improvement; Washington D. C.

Madaus, G. F., & Kellaghan, T. (1992). Curriculum evaluation and assessment. In P. W. Jackson (Ed.) *Handbook of research on Curriculum* (p. 119-154). New York: Macmillan.

Mahoney, D. F., Hums, M. A., & Riemer, H. A. (2002). Distributive justice in intercollegiate athletics: Perceptions of athletic directors and athletic board chairs. *Journal of Sports Management*, 16, 331-357.

Mahoney, D. F., Riemer, H. A., Breeding, J. L., & Hums, M. A. (2006). Organizational justice in sport organizations: Perceptions of students-athletes and other college students. *Journal of Sport Management*, 20, 159-188.

Mardia, K. V., Kent, J. T., & Bibby, J. M. (1979). *Multivariate Analysis*. Oxford: Academic Press.

Maslow, A. H. (1970). *Motivation and Personality*, 2nd Ed. New York: Harper & Row.

Massachusetts State Legislature. (1998). *Chapter 260, Section 4 of the Acts of 1998*. Located at http://www.mass.gov/legis/laws/seslaw98/sl980260.htm.

McGregor, D.C. (1960). *The human Side of Enterprise*. New York: McGraw-Hill.

Miedema, J. Van den Bos, K., & Vermunt, R. (2006). The influence of self-threats on fairness judgments and affective measures. *Social Justice Research*, 19, 228-253.

Nardi, R. M. (2006). Doing survey research: A guide to quantitative methods, 2nd Edition. Boston: Allyn and Bacon.

The National Commission on Excellence in Education. (1983). *A Nation at Risk: The Imperative of Educational Reform*, Washington, D.C.: U.S. Department of Education.

National Commission on Teaching and America's Future. (1996). *What Matters Most: Teaching for America's Future*.

National Commission on Testing and Public Policy. (1990). *From gatekeeper to gateway: Transforming testing in America*. Chestnut Hill, MA.: Author.

O'Conner, R. E., Bocian, K., Beebe-Frankenberger, M., & Linlater, D. (2010). *Responsiveness of students with language difficulties to early intervention in reading*. The Journal of Special Education, 43 (4), 220-235.

Odden, A., & Kellye, C. (1997). *Paying Teachers for What They Know and Do: New and Smarter Compensation Strategies to Improve Schools*. Thousand Oaks, CA: Corwin Press.

Odden, A., & Kellye, C. (2002). *Paying Teachers for What They Know and Do: New and Smarter Compensation Strategies to Improve Schools*, 2nd Edition. Thousand Oaks, CA: Corwin Press.

Organization for Economic Cooperation and Development (OECD). (1995) Education at a glance: OECD indicators (Paris: OECD). In *Using What We Have To Get the Schools We Need: A Productivity Focus for American Education* New York: The Consortium on Productivity in the Schools.

Paarlberg, L. E., & Lavigna, B. (2010). Transformation leadership and public service motivation: Driving individual and organizational performance. *Public Administration Review*, 70 (5), 710-718.

Paris, S. G., Lawton, T. A., Turner, J. C., Roth, J. L. (1991). A developmental perspective on standardized achievement testing. *Educational Researcher*, 20 (5), 12-40.

Patrick, I. S. C., Mahoney, D. F., & Petrosko, J. M. (2008). Distributive justice in intercollegiate athletics: An examination of equality, revenue production, and need. *Journal of Sports Management*, 22, 165-183.

Perry, J. L. (2003). Compensation, merit pay, and motivation. In *Public Personnel Administration: Problems and Prospects* 4th ed., edited by Steven W. Hays and Richard C. Kearney. Upper Saddle, NJ: Prentice Hall.

Perry, J. L., & Wise, L. R. (1990). *The motivational bases of public service*. Public Administration Review, 50 (3), 367-373.

Perry, J. L., & Hondeghem, A., eds. (2008). *Motivation in Public Management: The Call of Public Service*. Oxford: Oxford University Press.

Perry, J. L., Hondeghem, A., & Wise, L. R. (2010). *Revisiting the motivational bases of public service: Twenty years of research and an agenda for the future*. Public Administration Review, 70 (5), 681-690.

Pipho, C., & Hadley, C. (1984). *Clearinghouse notes, state activity: Minimum competency testing as of December 1984*. Denver, CO.: Education Commission of the States.

Purkey S. C., & Smith, M. S. (1983). Effective schools: A review. *The Elementary School Journal*, 83 (4), 427-452.

Randall, C. S. & Mueller, C. W. (1995). Extensions of justice theory: Justice evaluations and employee's reactions to in a natural setting. *Social Psychology Quarterly*, 58 (3), 178-194.

Report of the National Commission on Teaching and America's Future. (1996). *What Matters Most: Teaching for America's Future*. New York: The National Commission on Teaching and America's future.

Rivkin, S. G., Hanushek, E. A., & Kain, J. F. (2005). Teachers, schools and academic achievement. *Econometrica*, 73 (2), 417-458.

Rockoff, J. E. (2004). The impact of individual teachers on student achievement: Evidence from panel data. *American Economic Review*, 94 (2), 247-252.

Roderick, M., Jacob, B. A., & Bryk, A. S. (2002). The impact of high-staked testing in Chicago on student achievement in promotional gate grades. *Educational Evaluation and Policy Analysis*, 24 (4), 333-357.

Romzek, B. S. & Hendricks, S. J. (1982). Organizational involvement and representative bureaucracy: Can we have it both ways? *The American Political Science Review*, 76 (1), 75-82.

Rose, D. & Sullivan, O. (1996). *Introducing Data Analysis for Social Scientist*, 2^{nd} Ed. Philadelphia: Open University Press.

Rosenholtz, S. J. (1989). *Teacher's Workplace: The social organization of schools*. New York: Longman.

Runge, C. F. (1984). Institutions and the free ride: The assurance problem in collective action. *Journal of Politics*, 46 (1), 154-181.

Salamon, L. M. (2002). *The Tool of Government: A Guide to the New Governance*. Oxford: Oxford University Press

Schuster, J. R., & Zingheim, P. (1992). *The New Pay: Linking Employee and Organizational Performance*. New York: Lexington Books.

Scott, C., (2009). *Improving low-performing schools: Lessons from five years of studying school restructuring under No Child Left Behind*. Washington D.C.: Center on Education Policy.

Solomon, L.C. (2005). Recognizing differences. *Education Next*, 5 (1), 16-20.

Springer, M.G., Ballou, D., Hamilton, L., Le, V., Lockwood, J.R., McCaffrey, D., Pepper, M., and Stecher, B. (2010). Teacher Pay for Performance: Experimental Evidence from the Project on Incentives in Teaching. Nashville, TN: National Center on Performance Incentives at Vanderbilt University.

Stedman, L. C. (1987). It's time we changed the effective schools formula. *Phi Delta Kappan*, 69, 215-224.

Stringfield S., & Teddlie, C. (1988). A time to summarize: The Louisiana school effectiveness study. *Educational Leadership*, 46, 43-49.

Stronge, J. H., Gareis, C. R., & Little, C. A. (2006). *Teacher pay & teacher quality: Attracting, developing, and retaining the best teachers*. Thousand Oaks, CA: Corwin Press.

Tabachnick, B. G. & Fidell, L. S. (2001). *Using Multivariate Statistics*, 4^{th} Ed. Boston: Allyn and Bacon.

Tinmar, T., & Kirp, D. (1989). Education reform in the 1980s: Lessons from the states. *Phi Delta Kappan*, 70, p. 504-511.

Tuck, B., Berman, M., & Hill, A. (2009). Local amenities, unobserved quality, and market clearing: Adjusting teacher compensation to provide equal education opportunities. *Economics of Education Review*, 28 (1), 58-66.

U.S. Department of Education. (1995). National center for education statistics, statistics of state school systems, common core of data. *The Condition of Education* 1993, p. 148-149 and *The Digest of Education Statistics*, 1995, p.89

U.S. Department of Education (2010a). *Overview: Four pillars of No Child Left Behind*. Retrieved on January 29, 2010, from www.ed.gov/nclb/overview/intro/4pillars.html.

U.S. Department of Education (2010b). *An exploratory analysis of Adequate Yearly Progress, identification for improvement, and student achievement in two states and three students.* A report from the National Longitudinal Study of *No Child Left Behind* (NLS-*NCLB*) Retrieved on January 30, 2010, from www2.ed.gov/rschstat/eval/disadv/rd-ayp/report.pdf.

U.S. Department of Education (2010c). *Lead and manage my school: Approved State Accountability Plans (Virginia).* Retrieved on January 30, 2010, from www2.ed.gov/admins/lead/account/stateplans03/index.htm

Van den Bos, K., Peters, S., Bobocel, D. R., & Ybema, J. F. (2006). On preferences and doing the right thing: Satisfaction with advantageous inequity when cognitive processing is limited. *Journal of Experimental Social Psychology*, 42, 273-289.

Virginia Department of Education. (2010). *Testing and Standards of Learning*. Retrieved on January 29, 2010, from www.doe.virginia.gov.

Virginia General Assembly, Legislative Information System, State Budget. (2005)

The Volcker Commission. (2005). Urgent business for America: Revitalizing the federal government for the 21st century. In *High Performance Government: Structure, Leadership, Incentives*. R. Klitgaard, & P. C. Light, editors. Washington D.C.: RAND Corporation.

Vroom, V.H. (1964). *Work and Motivation*. New York: John Wiley.

Walster, E., Bersheid, E., & Walster, G. W. (1973). New directions in equity research. *Journal of Personality and Social Psychology*, 25, 151-76.

Weick, K. E. (1966). The concept of equity in the perception of pay. *Administrative Science Quarterly*, 11 (3), 414-439.

Winfield, L. F. (1990). School competency testing reforms and student achievement: Exploring a national perspective. *Educational Evaluation and Policy Analysis*, 12 (2), 157-173.

Wood, S. (1999). Human resource management and performance. *International Journal of Management Reviews*, 1 (4), 367-413.

APPENDICES

APPENDIX A – DIVISION DATA

The tables listed below contain the data that were included in this research. The data come from the Virginia Department of Education and are related to the 2007-2008 school year. The tables include data for all school divisions in Virginia. However, in the analysis, data for Lexington, Virginia are excluded because the Lexington School Division does not offer high school instruction. There are four tables in this appendix labeled A-1, A-2, A-3, and A-4.

Table A-1: Adequate Yearly Progress by Division for English and Mathematics for School Year 2007-2008

2007-2008 AYP By School Division					
School Division	*English*		*Mathematics*		
Counties	*Reading*	*Writing*	*Algebra I*	*Geometry*	*Algebra II*
Accomack County Public Schools	94%	91%	97%	89%	93%
Albemarle County Public Schools	96%	93%	97%	93%	93%
Alleghany County Public Schools	92%	89%	90%	84%	91%
Amelia County Public Schools	96%	85%	94%	93%	94%
Amherst County Public Schools	90%	89%	96%	92%	96%
Appomattox County Public Schools	97%	94%	87%	83%	90%
Arlington County Public Schools	95%	95%	95%	86%	92%
Augusta County Public Schools	93%	91%	95%	94%	96%
Bath County Public Schools	100%	94%	88%	86%	87%
Bedford County Public Schools	95%	92%	93%	93%	87%
Bland County Public Schools	99%	91%	91%	89%	94%
Botetourt County Public Schools	95%	91%	96%	87%	89%
Brunswick County Public Schools	89%	91%	91%	90%	79%
Buchanan County Public Schools	96%	90%	96%	92%	96%
Buckingham County Public Schools	90%	89%	97%	85%	100%
Campbell County Public Schools	96%	95%	98%	88%	91%
Caroline County Public Schools	86%	85%	88%	71%	81%
Carroll County Public Schools	95%	92%	97%	95%	95%
Charles City County Public Schools	98%	97%	81%	68%	94%
Charlotte County Public Schools	97%	97%	93%	89%	99%
Chesterfield County Public Schools	95%	87%	92%	84%	88%
Clarke County Public Schools	96%	95%	84%	89%	89%
Craig County Public Schools	98%	95%	96%	75%	95%
Culpeper County Public Schools	95%	83%	94%	92%	88%
Cumberland County Public Schools	88%	83%	96%	84%	90%
Dickenson County Public Schools	94%	93%	94%	95%	99%
Dinwiddie County Public Schools	89%	91%	94%	84%	87%
Essex County Public Schools	89%	83%	92%	64%	94%
Fairfax County Public Schools	96%	96%	95%	92%	92%
Fauquier County Public Schools	91%	93%	95%	92%	89%
Floyd County Public Schools	97%	97%	97%	86%	95%
Fluvanna County Public Schools	98%	95%	96%	93%	88%
Franklin County Public Schools	94%	92%	97%	86%	97%
Frederick County Public Schools	95%	91%	96%	89%	87%
Giles County Public Schools	94%	86%	93%	86%	91%
Gloucester County Public Schools	95%	93%	95%	84%	83%
Goochland County Public Schools	99%	98%	86%	92%	80%
Grayson County Public Schools	87%	87%	91%	79%	99%
Greene County Public Schools	93%	91%	97%	94%	99%
Greensville County Public Schools	97%	95%	94%	84%	96%
Halifax County Public Schools	92%	91%	94%	91%	92%
Hanover County Public Schools	95%	93%	96%	92%	93%
Henrico County Public Schools	95%	89%	94%	87%	94%
Henry County Public Schools	96%	94%	96%	85%	89%
Highland County Public Schools	93%	97%	100%	92%	77%
Isle Of Wight County Public Schools	94%	94%	95%	85%	88%
King George County Public Schools	92%	92%	86%	91%	89%
King And Queen County Public Schools	90%	89%	90%	59%	64%

Table A-1 (Continued): Adequate Yearly Progress by Division for English and Mathematics for School Year 2007-2008

AYP By School Division					
School Division	*English*		*Mathematics*		
Counties	*Reading*	*Writing*	*Algebra I*	*Geometry*	*Algebra II*
King William County Public Schools	94%	93%	91%	82%	81%
Lancaster County Public Schools	93%	88%	98%	71%	93%
Lee County Public Schools	95%	91%	96%	95%	88%
Loudoun County Public Schools	96%	96%	96%	91%	93%
Louisa County Public Schools	91%	86%	92%	82%	89%
Lunenburg County Public Schools	95%	88%	91%	82%	96%
Madison County Public Schools	98%	95%	87%	83%	95%
Mathews County Public Schools	96%	98%	95%	88%	91%
Mecklenburg County Public Schools	95%	91%	94%	94%	93%
Middlesex County Public Schools	93%	97%	97%	90%	95%
Montgomery County Public Schools	93%	90%	90%	88%	83%
Nelson County Public Schools	96%	96%	97%	96%	95%
New Kent County Public Schools	93%	92%	94%	92%	98%
Northampton County Public Schools	89%	89%	91%	86%	92%
Northumberland County Public Schools	98%	94%	96%	94%	93%
Nottoway County Public Schools	94%	93%	90%	78%	91%
Orange County Public Schools	92%	87%	84%	81%	86%
Page County Public Schools	93%	89%	92%	87%	92%
Patrick County Public Schools	96%	91%	98%	93%	97%
Pittsylvania County Public Schools	94%	95%	93%	90%	92%
Powhatan County Public Schools	96%	94%	93%	86%	90%
Prince Edward County Public Schools	93%	92%	91%	88%	97%
Prince George County Public Schools	94%	96%	94%	92%	96%
Prince William County Public Schools	94%	94%	92%	86%	91%
Pulaski County Public Schools	92%	88%	92%	85%	95%
Rappahannock County Public Schools	95%	87%	77%	83%	93%
Richmond County Public Schools	95%	94%	97%	87%	93%
Roanoke County Public Schools	97%	97%	95%	93%	93%
Rockbridge County Public Schools	93%	92%	84%	86%	88%
Rockingham County Public Schools	96%	95%	96%	95%	98%
Russell County Public Schools	98%	96%	98%	91%	93%
Scott County Public Schools	96%	94%	99%	98%	93%
Shenandoah County Public Schools	93%	92%	96%	90%	92%
Smyth County Public Schools	95%	89%	96%	81%	88%
Southampton County Public Schools	97%	96%	96%	94%	89%
Spotsylvania County Public Schools	94%	92%	89%	88%	86%
Stafford County Public Schools	96%	95%	93%	88%	88%
Surry County Public Schools	94%	94%	96%	88%	90%
Sussex County Public Schools	94%	91%	87%	73%	99%
Tazewell County Public Schools	96%	95%	90%	78%	89%
Warren County Public Schools	89%	85%	83%	82%	93%
Washington County Public Schools	97%	94%	92%	87%	88%
Westmoreland County Public Schools	91%	90%	96%	81%	89%
Wise County Public Schools	94%	93%	97%	88%	95%
Wythe County Public Schools	97%	92%	89%	87%	96%
York County Public Schools	97%	95%	94%	96%	87%

Table A-1 (Continued): Adequate Yearly Progress by Division for English and Mathematics for School Year 2007-2008

AYP By School Division					
School Division	*English*		*Mathematics*		
Cities	*Reading*	*Writing*	*Algebra I*	*Geometry*	*Algebra II*
Alexandria City Public Schools	90%	90%	85%	76%	90%
Bristol City Public Schools	99%	97%	92%	85%	99%
Buena Vista City Public Schools	94%	97%	96%	78%	90%
Charlottesville City Public Schools	85%	85%	88%	77%	82%
Colonial Heights City Public Schools	96%	93%	92%	80%	84%
Covington City Public Schools	96%	89%	92%	89%	89%
Danville City Public Schools	91%	93%	88%	72%	83%
Falls Church City Public Schools	97%	96%	97%	95%	96%
Fredericksburg City Public Schools	93%	90%	94%	83%	91%
Galax City Public Schools	94%	79%	92%	77%	93%
Hampton City Public Schools	90%	92%	89%	80%	91%
Harrisonburg City Public Schools	94%	91%	94%	95%	95%
Hopewell City Public Schools	93%	92%	79%	73%	82%
Lynchburg City Public Schools	92%	91%	92%	90%	86%
Martinsville City Public Schools	89%	88%	89%	77%	93%
Newport News City Public Schools	92%	92%	92%	76%	78%
Norfolk City Public Schools	94%	92%	86%	80%	85%
Norton City Public Schools	87%	85%	95%	84%	94%
Petersburg City Public Schools	87%	81%	85%	47%	64%
Portsmouth City Public Schools	88%	88%	91%	82%	90%
Radford City Public Schools	96%	90%	97%	87%	99%
Richmond City Public Schools	89%	79%	87%	82%	89%
Roanoke City Public Schools	86%	79%	81%	74%	89%
Staunton City Public Schools	93%	91%	91%	79%	91%
Suffolk City Public Schools	95%	94%	88%	77%	75%
Virginia Beach City Public Schools	97%	95%	96%	90%	92%
Waynesboro City Public Schools	96%	90%	92%	87%	96%
Williamsburg Public Schools	95%	94%	96%	92%	91%
Winchester City Public Schools	94%	94%	94%	82%	90%
Franklin City Public Schools	92%	92%	89%	80%	81%
Chesapeake City Public Schools	93%	93%	96%	94%	96%
Lexington City Public Schools	.	.	100%	.	.
Salem City Public Schools	97%	95%	97%	93%	96%
Poquoson City Public Schools	98%	96%	97%	95%	98%
Manassas City Public Schools	93%	90%	91%	82%	86%
Manassas Park City Public Schools	98%	94%	98%	90%	97%
Towns					
Colonial Beach Public Schools	94%	94%	84%	76%	72%
West Point Public Schools	100%	98%	94%	96%	97%

Table A-2: Teacher Compensation and Comparisons to Principals for School Year 2007-2008

2007-2008 Compensation by School Division			
Counties	*Teacher Day Rate*	*Adjusted Teacher Day Rate*	*Teacher-to-Principal Ratio*
Accomack County Public Schools	$197.88	$321.96	71.8%
Albemarle County Public Schools	$256.12	$239.84	71.2%
Alleghany County Public Schools	$227.90	$326.93	81.5%
Amelia County Public Schools	$221.74	$252.01	73.0%
Amherst County Public Schools	$214.08	$290.59	80.1%
Appomattox County Public Schools	$205.14	$297.43	76.6%
Arlington County Public Schools	$338.71	$218.51	69.1%
Augusta County Public Schools	$220.31	$257.92	79.6%
Bath County Public Schools	$210.19	$295.91	83.1%
Bedford County Public Schools	$204.14	$225.95	69.9%
Bland County Public Schools	$198.81	$310.25	96.1%
Botetourt County Public Schools	$239.52	$242.91	72.8%
Brunswick County Public Schools	$192.98	$326.99	67.9%
Buchanan County Public Schools	$197.60	$407.03	84.0%
Buckingham County Public Schools	$210.48	$345.30	71.6%
Campbell County Public Schools	$211.02	$288.07	64.0%
Caroline County Public Schools	$216.50	$250.46	71.8%
Carroll County Public Schools	$184.69	$307.14	68.6%
Charles City County Public Schools	$192.55	$238.43	71.3%
Charlotte County Public Schools	$210.20	$365.40	89.3%
Chesterfield County Public Schools	$240.90	$206.25	69.8%
Clarke County Public Schools	$227.01	$210.82	64.1%
Craig County Public Schools	$212.15	$261.57	83.9%
Culpeper County Public Schools	$241.74	$238.67	74.6%
Cumberland County Public Schools	$195.54	$299.06	79.7%
Dickenson County Public Schools	$199.79	$405.94	80.9%
Dinwiddie County Public Schools	$225.90	$283.96	78.3%
Essex County Public Schools	$214.06	$292.24	75.6%
Fairfax County Public Schools	$312.29	$177.21	69.2%
Fauquier County Public Schools	$275.89	$201.91	77.3%
Floyd County Public Schools	$209.48	$316.12	77.0%
Fluvanna County Public Schools	$254.96	$266.30	73.9%
Franklin County Public Schools	$219.18	$288.65	75.3%
Frederick County Public Schools	$235.43	$218.49	67.2%
Giles County Public Schools	$204.52	$295.83	73.4%
Gloucester County Public Schools	$229.29	$243.39	71.0%
Goochland County Public Schools	$226.79	$180.76	55.9%
Grayson County Public Schools	$185.54	$354.79	83.1%
Greene County Public Schools	$180.28	$183.67	67.8%
Greensville County Public Schools	$216.59	$344.01	81.2%
Halifax County Public Schools	$202.59	$371.47	73.1%
Hanover County Public Schools	$225.01	$178.62	63.5%
Henrico County Public Schools	$243.88	$249.67	69.5%
Henry County Public Schools	$200.91	$338.60	74.4%
Highland County Public Schools	$201.68	$329.00	86.7%
Isle Of Wight County Public Schools	$248.71	$251.81	74.5%
King George County Public Schools	$230.86	$199.84	72.6%
King And Queen County Public Schools	$212.83	$293.56	79.5%

Table A-2 (Continued): Teacher Compensation and Comparisons to Principals for School Year 2007-2008

2007-2008 Compensation by School Division			
Counties	*Teacher Day Rate*	*Adjusted Teacher Day Rate*	*Teacher-to-Principal Ratio*
King William County Public Schools	$226.57	$217.53	75.7%
Lancaster County Public Schools	$220.93	$310.48	77.6%
Lee County Public Schools	$204.34	$414.55	86.5%
Loudoun County Public Schools	$287.59	$159.83	65.1%
Louisa County Public Schools	$241.52	$273.99	70.3%
Lunenburg County Public Schools	$200.62	$353.85	73.9%
Madison County Public Schools	$221.26	$262.93	71.6%
Mathews County Public Schools	$196.31	$214.87	74.2%
Mecklenburg County Public Schools	$203.16	$333.74	83.6%
Middlesex County Public Schools	$198.33	$259.21	76.5%
Montgomery County Public Schools	$218.36	$309.52	79.0%
Nelson County Public Schools	$222.11	$287.65	72.2%
New Kent County Public Schools	$216.49	$188.45	65.4%
Northampton County Public Schools	$192.03	$336.98	61.8%
Northumberland County Public Schools	$236.31	$312.26	86.4%
Nottoway County Public Schools	$210.12	$335.82	75.1%
Orange County Public Schools	$209.00	$233.88	71.6%
Page County Public Schools	$219.78	$324.94	80.8%
Patrick County Public Schools	$200.60	$355.86	82.1%
Pittsylvania County Public Schools	$204.62	$316.47	71.3%
Powhatan County Public Schools	$228.18	$190.76	73.1%
Prince Edward County Public Schools	$217.54	$355.25	74.3%
Prince George County Public Schools	$234.98	$234.17	76.5%
Prince William County Public Schools	$298.28	$205.92	78.0%
Pulaski County Public Schools	$214.38	$315.92	75.8%
Rappahannock County Public Schools	$226.56	$222.95	73.8%
Richmond County Public Schools	$226.21	$335.27	74.9%
Roanoke County Public Schools	$238.49	$240.57	70.5%
Rockbridge County Public Schools	$203.10	$277.18	79.6%
Rockingham County Public Schools	$222.42	$268.53	72.7%
Russell County Public Schools	$185.03	$327.27	75.1%
Scott County Public Schools	$217.71	$417.79	81.8%
Shenandoah County Public Schools	$224.18	$277.85	66.1%
Smyth County Public Schools	$214.93	$355.97	73.3%
Southampton County Public Schools	$215.39	$294.38	80.4%
Spotsylvania County Public Schools	$261.45	$209.43	68.1%
Stafford County Public Schools	$261.26	$179.18	66.3%
Surry County Public Schools	$223.23	$291.27	79.3%
Sussex County Public Schools	$227.60	$378.38	63.5%
Tazewell County Public Schools	$227.60	$390.74	86.6%
Warren County Public Schools	$219.11	$236.21	66.9%
Washington County Public Schools	$212.99	$324.13	74.0%
Westmoreland County Public Schools	$216.93	$270.24	79.4%
Wise County Public Schools	$220.65	$408.55	80.0%
Wythe County Public Schools	$213.59	$334.57	74.9%
York County Public Schools	$240.68	$183.28	70.2%

Table A-2 (Continued): Teacher Compensation and Comparisons to Principals for School Year 2007-2008

2007-2008 Compensation by School Division			
Cities	*Teacher Day Rate*	*Adjusted Teacher Day Rate*	*Teacher-to-Principal Ratio*
Alexandria City Public Schools	$341.57	$258.35	76.6%
Bristol City Public Schools	$218.03	$388.56	74.0%
Buena Vista City Public Schools	$212.30	$329.22	80.9%
Charlottesville City Public Schools	$264.93	$424.33	74.5%
Colonial Heights City Public Schools	$250.79	$312.18	74.7%
Covington City Public Schools	$223.55	$381.53	89.7%
Danville City Public Schools	$220.98	$445.47	76.2%
Falls Church City Public Schools	$314.38	$177.60	78.3%
Fredericksburg City Public Schools	$233.93	$324.45	62.2%
Galax City Public Schools	$210.81	$384.35	88.1%
Hampton City Public Schools	$191.60	$245.68	64.7%
Harrisonburg City Public Schools	$228.29	$366.41	73.2%
Hopewell City Public Schools	$223.43	$333.85	70.0%
Lynchburg City Public Schools	$224.29	$367.35	73.4%
Martinsville City Public Schools	$221.56	$414.78	63.0%
Newport News City Public Schools	$227.55	$302.01	76.3%
Norfolk City Public Schools	$230.81	$341.24	63.4%
Norton City Public Schools	$223.31	$434.00	84.4%
Petersburg City Public Schools	$203.99	$350.92	70.4%
Portsmouth City Public Schools	$184.62	$256.14	60.1%
Radford City Public Schools	$232.12	$418.89	72.3%
Richmond City Public Schools	$243.34	$378.50	72.3%
Roanoke City Public Schools	$236.22	$379.29	81.8%
Staunton City Public Schools	$213.30	$324.45	69.3%
Suffolk City Public Schools	$240.64	$249.13	78.3%
Virginia Beach City Public Schools	$262.03	$254.93	76.5%
Waynesboro City Public Schools	$227.38	$316.71	78.5%
Williamsburg Public Schools	$262.72	$357.54	79.2%
Winchester City Public Schools	$242.49	$322.41	70.1%
Franklin City Public Schools	$224.69	$363.87	68.7%
Chesapeake City Public Schools	$264.43	$249.99	72.7%
Lexington City Public Schools	*$209.50*	*N/A*	*N/A*
Salem City Public Schools	$260.43	$330.87	72.5%
Poquoson City Public Schools	$232.87	$177.43	82.0%
Manassas City Public Schools	$302.28	$243.84	74.0%
Manassas Park City Public Schools	$302.09	$282.61	66.0%
Towns			
Colonial Beach Public Schools	$205.16	*N/A*	100.0%
West Point Public Schools	$208.65	*N/A*	76.2%

Table A-3: Student Ethnicity and Socioeconomic Characteristics for School Year 2007-2008

2007-2008 Student Characteristics by School Division					
School Division	*Ethnicity*			*Socioeconomic*	
Counties	*Percentage African-American*	*Percentage Hispanic/Latino*	*Percentage White*	*Free/Reduced Lunch*	*Drop-out Rate*
Accomack County Public Schools	38.7%	14.7%	45.3%	62.3%	2.8%
Albemarle County Public Schools	13.5%	5.6%	74.3%	20.4%	1.6%
Alleghany County Public Schools	7.6%	1.1%	90.6%	40.2%	1.4%
Amelia County Public Schools	30.8%	2.6%	65.4%	40.1%	1.9%
Amherst County Public Schools	26.0%	2.0%	69.1%	44.0%	1.3%
Appomattox County Public Schools	30.4%	0.7%	67.9%	40.4%	2.4%
Arlington County Public Schools	12.9%	27.2%	47.0%	31.1%	1.8%
Augusta County Public Schools	3.2%	2.6%	93.1%	31.0%	2.5%
Bath County Public Schools	2.1%	0.3%	95.1%	30.5%	1.0%
Bedford County Public Schools	8.8%	1.5%	87.1%	30.9%	0.8%
Bland County Public Schools	0.4%	0.1%	98.9%	35.5%	0.2%
Botetourt County Public Schools	3.2%	0.8%	93.8%	15.7%	0.8%
Brunswick County Public Schools	78.8%	1.3%	19.6%	75.6%	2.2%
Buchanan County Public Schools	0.1%	0.0%	99.8%	66.9%	1.0%
Buckingham County Public Schools	42.7%	1.1%	55.7%	55.2%	4.0%
Campbell County Public Schools	18.0%	1.6%	78.1%	33.3%	1.5%
Caroline County Public Schools	37.7%	4.1%	54.7%	38.6%	1.9%
Carroll County Public Schools	0.5%	4.3%	94.7%	50.6%	1.7%
Charles City County Public Schools	60.1%	1.4%	27.7%	43.5%	3.3%
Charlotte County Public Schools	34.9%	2.0%	61.4%	50.6%	1.0%
Chesterfield County Public Schools	27.7%	7.9%	59.5%	23.5%	2.4%
Clarke County Public Schools	6.4%	5.4%	86.2%	13.6%	0.0%
Craig County Public Schools	0.1%	0.0%	99.4%	33.7%	0.9%
Culpeper County Public Schools	18.8%	11.9%	64.5%	30.8%	1.8%
Cumberland County Public Schools	44.9%	2.5%	49.2%	56.5%	0.4%
Dickenson County Public Schools	0.8%	0.2%	98.8%	52.8%	1.2%
Dinwiddie County Public Schools	38.7%	3.2%	55.9%	48.4%	4.4%
Essex County Public Schools	56.1%	2.3%	40.7%	56.5%	1.6%
Fairfax County Public Schools	10.6%	17.8%	46.4%	20.5%	1.5%
Fauquier County Public Schools	11.1%	7.6%	79.1%	16.6%	0.9%
Floyd County Public Schools	2.3%	2.8%	93.5%	36.8%	2.2%
Fluvanna County Public Schools	17.9%	2.4%	77.0%	21.7%	1.4%
Franklin County Public Schools	11.2%	3.6%	84.3%	41.0%	2.7%
Frederick County Public Schools	5.6%	8.7%	81.8%	22.7%	1.3%
Giles County Public Schools	2.3%	1.0%	96.3%	36.9%	3.2%
Gloucester County Public Schools	10.2%	2.2%	84.8%	26.6%	3.4%
Goochland County Public Schools	25.0%	3.0%	70.2%	20.2%	1.4%
Grayson County Public Schools	2.7%	3.3%	93.7%	54.1%	5.7%
Greene County Public Schools	11.2%	4.9%	81.9%	29.1%	2.1%
Greensville County Public Schools	72.3%	2.0%	24.2%	63.8%	1.3%
Halifax County Public Schools	47.2%	1.9%	50.5%	56.9%	1.5%
Hanover County Public Schools	9.9%	1.8%	84.6%	12.4%	0.8%
Henrico County Public Schools	36.0%	4.5%	46.0%	25.5%	2.5%
Henry County Public Schools	24.2%	8.1%	66.3%	50.3%	3.1%
Highland County Public Schools	0.0%	1.8%	98.2%	48.6%	0.0%
Isle Of Wight County Public Schools	32.0%	1.6%	62.4%	30.4%	1.2%
King George County Public Schools	23.5%	3.3%	67.4%	21.2%	2.9%

Table A-3 (Continued): Student Ethnicity and Socioeconomic Characteristics for School Year 2007-2008

2007-2008 Student Characteristics by School Division					
School Division	*Ethnicity*			*Socioeconomic*	
Counties	*Percentage African-American*	*Percentage Hispanic/Latino*	*Percentage White*	*Free/Reduced Lunch*	*Drop-out Rate*
King And Queen County Public Schools	45.8%	3.4%	49.8%	53.1%	0.8%
King William County Public Schools	20.1%	0.7%	72.5%	25.2%	0.5%
Lancaster County Public Schools	51.2%	0.7%	46.8%	54.9%	2.5%
Lee County Public Schools	0.5%	0.7%	98.0%	59.6%	2.8%
Loudoun County Public Schools	8.0%	13.0%	62.7%	13.6%	0.7%
Louisa County Public Schools	21.2%	2.0%	72.2%	41.9%	1.7%
Lunenburg County Public Schools	42.9%	3.1%	52.0%	60.5%	4.1%
Madison County Public Schools	12.9%	1.9%	81.6%	26.1%	1.4%
Mathews County Public Schools	11.1%	1.0%	85.7%	24.7%	0.9%
Mecklenburg County Public Schools	46.8%	2.1%	49.5%	54.5%	2.1%
Middlesex County Public Schools	25.9%	2.3%	71.2%	34.4%	2.7%
Montgomery County Public Schools	5.9%	2.5%	85.9%	36.8%	2.2%
Nelson County Public Schools	17.2%	4.4%	75.6%	55.2%	0.8%
New Kent County Public Schools	14.6%	1.9%	80.9%	13.2%	1.8%
Northampton County Public Schools	48.4%	12.8%	37.4%	66.8%	2.1%
Northumberland County Public Schools	39.6%	4.1%	55.9%	47.2%	2.0%
Nottoway County Public Schools	44.9%	4.2%	49.6%	53.4%	2.6%
Orange County Public Schools	18.9%	3.9%	74.0%	32.6%	1.2%
Page County Public Schools	2.4%	1.6%	94.9%	40.6%	1.1%
Patrick County Public Schools	7.8%	4.1%	87.1%	48.8%	1.4%
Pittsylvania County Public Schools	26.6%	2.4%	70.5%	42.3%	1.8%
Powhatan County Public Schools	9.6%	1.6%	87.3%	11.8%	0.6%
Prince Edward County Public Schools	57.6%	1.5%	38.9%	60.2%	2.0%
Prince George County Public Schools	36.0%	5.5%	53.3%	33.7%	2.5%
Prince William County Public Schools	22.8%	24.1%	40.5%	29.9%	1.4%
Pulaski County Public Schools	6.9%	1.1%	90.0%	42.6%	0.5%
Rappahannock County Public Schools	5.8%	2.8%	90.6%	20.2%	0.4%
Richmond County Public Schools	31.4%	6.2%	60.1%	41.6%	2.1%
Roanoke County Public Schools	6.4%	2.0%	87.1%	17.9%	0.9%
Rockbridge County Public Schools	4.1%	1.4%	92.9%	34.2%	2.1%
Rockingham County Public Schools	2.2%	8.4%	88.4%	32.6%	1.5%
Russell County Public Schools	0.8%	0.4%	98.6%	52.1%	1.3%
Scott County Public Schools	1.1%	1.1%	97.2%	51.1%	0.9%
Shenandoah County Public Schools	2.8%	10.2%	85.7%	31.2%	2.0%
Smyth County Public Schools	1.9%	1.9%	95.4%	51.0%	0.7%
Southampton County Public Schools	44.4%	1.0%	53.4%	42.1%	3.1%
Spotsylvania County Public Schools	19.8%	8.1%	65.9%	20.2%	1.7%
Stafford County Public Schools	20.6%	8.9%	63.4%	16.5%	1.1%
Surry County Public Schools	60.2%	0.9%	33.9%	50.2%	4.1%
Sussex County Public Schools	75.3%	2.9%	21.1%	73.5%	4.8%
Tazewell County Public Schools	2.9%	0.3%	95.3%	47.9%	1.7%
Warren County Public Schools	6.9%	4.2%	86.9%	27.8%	1.5%
Washington County Public Schools	1.6%	1.4%	96.0%	40.5%	1.5%
Westmoreland County Public Schools	49.1%	10.1%	39.1%	55.6%	1.3%
Wise County Public Schools	1.7%	0.6%	97.0%	52.7%	1.9%
Wythe County Public Schools	4.8%	1.1%	92.6%	41.9%	0.9%
York County Public Schools	15.5%	4.5%	70.9%	15.0%	0.7%

Table A-3 (Continued): Student Ethnicity and Socioeconomic Characteristics for School Year 2007-2008

2007-2008 Student Characteristics by School Division					
School Division	*Ethnicity*			*Socioeconomic*	
Cities	*Percentage African-American*	*Percentage Hispanic/Latino*	*Percentage White*	*Free/Reduced Lunch*	*Drop-out Rate*
Alexandria City Public Schools	38.6%	26.9%	24.2%	51.4%	2.5%
Bristol City Public Schools	10.1%	1.7%	86.8%	54.9%	2.4%
Buena Vista City Public Schools	5.0%	1.0%	91.5%	34.3%	1.4%
Charlottesville City Public Schools	44.2%	5.5%	41.0%	53.8%	2.8%
Colonial Heights City Public Schools	15.1%	4.8%	74.8%	28.6%	3.0%
Covington City Public Schools	18.2%	0.9%	78.7%	44.1%	4.3%
Danville City Public Schools	70.2%	3.7%	24.6%	68.0%	3.5%
Falls Church City Public Schools	5.4%	8.7%	74.3%	63.8%	0.1%
Fredericksburg City Public Schools	47.0%	11.6%	38.2%	45.8%	0.6%
Galax City Public Schools	9.9%	21.4%	66.0%	55.5%	1.7%
Hampton City Public Schools	63.6%	3.3%	30.4%	44.1%	2.3%
Harrisonburg City Public Schools	12.1%	37.8%	46.5%	54.4%	3.6%
Hopewell City Public Schools	55.2%	6.2%	37.3%	65.4%	4.7%
Lynchburg City Public Schools	52.8%	2.1%	40.2%	51.1%	3.0%
Martinsville City Public Schools	59.7%	6.0%	33.1%	60.6%	0.1%
Newport News City Public Schools	57.3%	6.8%	30.3%	49.8%	2.3%
Norfolk City Public Schools	63.5%	4.0%	23.4%	58.3%	3.9%
Norton City Public Schools	11.9%	0.8%	86.7%	50.3%	1.3%
Petersburg City Public Schools	94.4%	2.7%	2.1%	60.2%	6.4%
Portsmouth City Public Schools	73.6%	2.0%	23.3%	52.1%	5.2%
Radford City Public Schools	13.4%	1.0%	83.9%	34.8%	0.3%
Richmond City Public Schools	86.5%	4.7%	7.8%	70.9%	4.3%
Roanoke City Public Schools	47.7%	5.5%	44.4%	62.3%	3.9%
Staunton City Public Schools	24.1%	1.9%	72.1%	45.1%	1.9%
Suffolk City Public Schools	58.0%	1.9%	36.7%	38.8%	2.7%
Virginia Beach City Public Schools	27.8%	6.0%	55.5%	27.2%	1.2%
Waynesboro City Public Schools	16.6%	10.1%	72.2%	45.9%	0.8%
Williamsburg Public Schools	20.3%	5.7%	68.7%	22.8%	2.0%
Winchester City Public Schools	18.6%	20.0%	57.3%	45.2%	0.2%
Franklin City Public Schools	78.8%	1.0%	18.9%	62.4%	2.7%
Chesapeake City Public Schools	35.3%	3.2%	54.9%	25.3%	2.3%
Lexington City Public Schools	9.2%	4.1%	79.6%	16.1%	0.0%
Salem City Public Schools	10.8%	*2.3%*	*82.8%*	21.9%	0.9%
Poquoson City Public Schools	0.6%	0.9%	94.5%	89.9%	0.4%
Manassas City Public Schools	17.1%	42.0%	35.1%	28.2%	1.9%
Manassas Park City Public Schools	13.3%	41.2%	33.8%	40.6%	1.0%
Towns					
Colonial Beach Public Schools	27.8%	2.6%	67.0%	41.7%	0.0%
West Point Public Schools	13.3%	2.5%	79.3%	16.6%	1.1%

Table A-4: Teacher Education and School Division Characteristics for School Year 2007-2008

2007-2008 School Division Characteristics			
Counties	*Teachers with Post-Graduate Degrees*	*Population Change Over a 5-Year Period*	*Participation in Limited English Programs*
Accomack County Public Schools	42%	-4.4%	9.9%
Albemarle County Public Schools	57%	4.4%	6.2%
Alleghany County Public Schools	52%	-0.5%	0.3%
Amelia County Public Schools	41%	8.9%	0.6%
Amherst County Public Schools	42%	2.6%	0.3%
Appomattox County Public Schools	42%	-2.0%	0.0%
Arlington County Public Schools	65%	-2.1%	26.6%
Augusta County Public Schools	41%	3.4%	2.1%
Bath County Public Schools	40%	-4.7%	0.1%
Bedford County Public Schools	37%	0.8%	0.7%
Bland County Public Schools	38%	0.2%	0.0%
Botetourt County Public Schools	45%	5.6%	0.4%
Brunswick County Public Schools	42%	-0.9%	0.7%
Buchanan County Public Schools	39%	-13.8%	0.0%
Buckingham County Public Schools	34%	-4.7%	0.1%
Campbell County Public Schools	39%	-0.5%	0.9%
Caroline County Public Schools	41%	10.8%	1.6%
Carroll County Public Schools	41%	0.6%	3.9%
Charles City County Public Schools	39%	-0.5%	0.9%
Charlotte County Public Schools	39%	-0.4%	1.0%
Chesterfield County Public Schools	60%	9.2%	3.6%
Clarke County Public Schools	48%	7.3%	2.1%
Craig County Public Schools	32%	7.0%	0.0%
Culpeper County Public Schools	40%	23.9%	6.2%
Cumberland County Public Schools	31%	12.1%	2.2%
Dickenson County Public Schools	23%	-6.8%	0.0%
Dinwiddie County Public Schools	36%	6.0%	0.9%
Essex County Public Schools	31%	2.2%	2.0%
Fairfax County Public Schools	67%	1.9%	19.8%
Fauquier County Public Schools	58%	12.4%	3.5%
Floyd County Public Schools	43%	1.4%	1.7%
Fluvanna County Public Schools	45%	14.5%	0.5%
Franklin County Public Schools	43%	3.9%	1.9%
Frederick County Public Schools	41%	18.5%	4.3%
Giles County Public Schools	36%	-0.6%	0.1%
Gloucester County Public Schools	41%	-3.9%	0.3%
Goochland County Public Schools	43%	16.7%	1.4%
Grayson County Public Schools	26%	-7.5%	1.0%
Greene County Public Schools	40%	4.4%	3.4%
Greensville County Public Schools	35%	-4.6%	1.7%
Halifax County Public Schools	43%	3.2%	0.6%
Hanover County Public Schools	52%	8.8%	0.8%
Henrico County Public Schools	47%	11.3%	5.4%
Henry County Public Schools	43%	-9.9%	5.5%
Highland County Public Schools	24%	-0.1%	1.8%
Isle Of Wight County Public Schools	38%	7.9%	0.6%
King George County Public Schools	42%	30.5%	1.3%
King And Queen County Public Schools	23%	-5.5%	1.3%
King William County Public Schools	38%	11.7%	0.3%

Table A-4 (Continued): Teacher Education and School Division Characteristics for School Year 2007-2008

2007-2008 School Division Characteristics			
Counties	*Teachers with Post-Graduate Degrees*	*Population Change Over a 5-Year Period*	*Participation in Limited English Programs*
Lancaster County Public Schools	39%	-4.9%	0.4%
Lee County Public Schools	34%	-2.9%	0.1%
Loudoun County Public Schools	58%	43.8%	7.9%
Louisa County Public Schools	45%	9.6%	0.9%
Lunenburg County Public Schools	43%	-2.5%	2.0%
Madison County Public Schools	42%	4.3%	1.5%
Mathews County Public Schools	34%	-1.4%	0.0%
Mecklenburg County Public Schools	34%	0.1%	0.7%
Middlesex County Public Schools	30%	0.9%	0.9%
Montgomery County Public Schools	54%	4.7%	2.4%
Nelson County Public Schools	46%	3.9%	3.0%
New Kent County Public Schools	40%	13.3%	0.4%
Northampton County Public Schools	35%	-7.7%	7.5%
Northumberland County Public Schools	34%	1.9%	2.3%
Nottoway County Public Schools	40%	-3.4%	1.6%
Orange County Public Schools	39%	29.3%	2.0%
Page County Public Schools	33%	1.4%	1.1%
Patrick County Public Schools	33%	0.2%	4.3%
Pittsylvania County Public Schools	32%	3.3%	1.5%
Powhatan County Public Schools	45%	15.7%	0.7%
Prince Edward County Public Schools	39%	-4.7%	0.5%
Prince George County Public Schools	36%	4.3%	0.7%
Prince William County Public Schools	54%	20.6%	18.4%
Pulaski County Public Schools	44%	-0.8%	0.6%
Rappahannock County Public Schools	38%	-10.0%	0.3%
Richmond County Public Schools	29%	-2.4%	4.1%
Roanoke County Public Schools	45%	6.1%	2.1%
Rockbridge County Public Schools	46%	-5.8%	0.2%
Rockingham County Public Schools	36%	6.5%	6.5%
Russell County Public Schools	37%	6.5%	0.0%
Scott County Public Schools	35%	7.9%	0.3%
Shenandoah County Public Schools	46%	10.3%	4.1%
Smyth County Public Schools	38%	0.0%	1.0%
Southampton County Public Schools	34%	3.5%	0.0%
Spotsylvania County Public Schools	45%	13.6%	3.3%
Stafford County Public Schools	49%	10.7%	3.9%
Surry County Public Schools	47%	-10.9%	0.0%
Sussex County Public Schools	39%	-5.1%	0.7%
Tazewell County Public Schools	39%	-1.3%	0.1%
Warren County Public Schools	37%	5.0%	2.5%
Washington County Public Schools	41%	5.4%	0.5%
Westmoreland County Public Schools	39%	-7.6%	7.3%
Wise County Public Schools	30%	-1.0%	0.3%
Wythe County Public Schools	34%	2.2%	0.2%
York County Public Schools	52%	5.2%	1.3%

Table A-4 (Continued): Teacher Education and School Division Characteristics for School Year 2007-2008

2007-2008 School Division Characteristics			
Cities	*Teachers with Post-Graduate Degrees*	*Population Change Over a 5-Year Period*	*Participation in Limited English Programs*
Alexandria City Public Schools	70%	-3.7%	22.9%
Bristol City Public Schools	46%	1.3%	0.3%
Buena Vista City Public Schools	46%	4.9%	0.2%
Charlottesville City Public Schools	56%	-8.2%	8.8%
Colonial Heights City Public Schools	39%	5.3%	4.4%
Covington City Public Schools	47%	5.8%	0.1%
Danville City Public Schools	46%	-10.0%	2.5%
Falls Church City Public Schools	76%	5.6%	9.9%
Fredericksburg City Public Schools	45%	14.2%	9.2%
Galax City Public Schools	33%	3.9%	17.0%
Hampton City Public Schools	42%	-2.9%	2.2%
Harrisonburg City Public Schools	47%	13.2%	37.5%
Hopewell City Public Schools	36%	7.7%	2.4%
Lynchburg City Public Schools	47%	-2.6%	1.3%
Martinsville City Public Schools	41%	-7.1%	5.9%
Newport News City Public Schools	49%	-4.0%	1.6%
Norfolk City Public Schools	48%	-4.4%	1.5%
Norton City Public Schools	56%	14.8%	0.2%
Petersburg City Public Schools	36%	-12.7%	0.9%
Portsmouth City Public Schools	48%	-3.6%	0.3%
Radford City Public Schools	56%	1.4%	0.5%
Richmond City Public Schools	43%	-9.1%	2.9%
Roanoke City Public Schools	40%	-5.7%	6.2%
Staunton City Public Schools	45%	2.6%	1.0%
Suffolk City Public Schools	44%	10.6%	0.2%
Virginia Beach City Public Schools	51%	-4.5%	1.4%
Waynesboro City Public Schools	44%	5.7%	4.2%
Williamsburg Public Schools	58%	21.7%	2.1%
Winchester City Public Schools	56%	5.4%	14.3%
Franklin City Public Schools	43%	-5.0%	0.3%
Chesapeake City Public Schools	60%	1.6%	1.2%
Lexington City Public Schools	52%	4.3%	3.0%
Salem City Public Schools	49%	0.2%	1.1%
Poquoson City Public Schools	58%	-0.4%	0.6%
Manassas City Public Schools	52%	-3.0%	33.4%
Manassas Park City Public Schools	49%	8.1%	28.3%
Towns			
Colonial Beach Public Schools	46%	2.7%	3.8%
West Point Public Schools	42%	2.0%	1.4%

APPENDIX B – ASSUMPTIONS OF LINERARITY AND TESTS OF COLLINEARITY

All dependent, independent and intervening variables included in the analysis are linear. Five scatter plots of the dependent variables showed a linear pattern in each case. Scatter plots performed on the independent and intervening variables produced linear results as well. The linear nature of the variables allows for GLM to be incorporated in this research. Below are five tests of collinearity to allow for the exclusion of certain variables from the reduced model. In all five cases, PerAA_H and PerW are collinear. For the purpose of inclusion in the reduced models in chapter four, PerAA_H is included and PerW is excluded.

Table B-1: Reading - Coefficients

		Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
Model		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	1.116	.099		11.269	.000		
	PerAA_H	-.189	.098	-1.431	-1.926	.056	***.011***	91.891
	PerW	-.144	.095	-1.121	-1.518	.132	***.011***	90.951
	FRLunch	-.022	.021	-.114	-1.078	.283	.535	1.868
	Dropout	-.421	.230	-.168	-1.827	.070	.712	1.404
	PostGrad	-.013	.035	-.039	-.383	.702	.591	1.693
	Chang5yr	-.025	.033	-.071	-.765	.446	.694	1.442
	LimitEng	-.006	.045	-.013	-.138	.890	.697	1.435

Table B-2: Reading – Collinearity Diagnostics

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions (Constant)	PerAA_H	PerW	FRLunch	Dropout	PostGrad	Chang5yr	LimitEng
1	1	5.549	1.000	.00	.00	.00	.00	.01	.00	.00	.01
	2	1.050	2.299	.00	.00	.00	.00	.01	.00	.46	.01
	3	.760	2.702	.00	.00	.00	.00	.00	.00	.00	.55
	4	.392	3.761	.00	.00	.00	.00	.07	.00	.26	.13
	5	.159	5.905	.00	.00	.00	.03	.89	.00	.00	.07
	6	.067	9.116	.00	.00	.00	.64	.00	.10	.25	.05
	7	.022	15.811	.00	.02	.01	.26	.03	.57	.01	.09
	8	.000	***123.117***	1.00	***.97***	***.99***	.06	.00	.33	.01	.09

Table B-3: Reading - Correlations

		AllRead	PerAA_H	PerW	FRLunch	Dropout	PostGrad	Chang5yr	LimitEng
AllRead	Pearson	1	-.444**	.411**	-.339**	-.365**	.074	.162	-.031
	Sig. (2-tailed)		.000	.000	.000	.000	.401	.064	.727
	N	131	131	131	131	131	131	131	131
PerAA_H	Pearson	***-.444***	1	-.988**	.455**	.489**	.060	-.247**	.246**
	Sig. (2-tailed)	.000		.000	.000	.000	.499	.005	.005
	N	131	131	131	131	131	131	131	131
PerW	Pearson	***.411***	-.988**	1	-.390**	-.461**	-.155	.194*	-.314**
	Sig. (2-tailed)	.000	.000		.000	.000	.078	.026	.000
	N	131	131	131	131	131	131	131	131
FRLunch	Pearson	-.339**	.455**	-.390**	1	.344**	-.223*	-.526**	-.009
	Sig. (2-tailed)	.000	.000	.000		.000	.011	.000	.923
	N	131	131	131	131	131	131	131	131
Dropout	Pearson	-.365**	.489**	-.461**	.344**	1	-.114	-.286**	-.018
	Sig. (2-tailed)	.000	.000	.000	.000		.193	.001	.836
	N	131	131	131	131	131	131	131	131
PostGrad	Pearson	.074	.060	-.155	-.223*	-.114	1	.210*	.397**
	Sig. (2-tailed)	.401	.499	.078	.011	.193		.016	.000
	N	131	131	131	131	131	131	131	131
Chang5yr	Pearson	.162	-.247**	.194*	-.526**	-.286**	.210*	1	.099
	Sig. (2-tailed)	.064	.005	.026	.000	.001	.016		.262
	N	131	131	131	131	131	131	131	131
LimitEng	Pearson	-.031	.246**	-.314**	-.009	-.018	.397**	.099	1
	Sig. (2-tailed)	.727	.005	.000	.923	.836	.000	.262	
	N	131	131	131	131	131	131	131	131

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table B-4: Writing - Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	1.203	.136		8.870	.000		
	PerAA_H	-.283	.134	-1.642	-2.102	.038	***.011***	91.891
	PerW	-.257	.130	-1.538	-1.980	.050	***.011***	90.951
	FRLunch	-.039	.028	-.152	-1.367	.174	.535	1.868
	Dropout	-.611	.315	-.187	-1.937	.055	.712	1.404
	PostGrad	.004	.047	.008	.078	.938	.591	1.693
	Chang5yr	-.056	.045	-.121	-1.235	.219	.694	1.442
	LimitEng	-.079	.062	-.125	-1.282	.202	.697	1.435

Table B-5: Writing – Collinearity Diagnostics

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions							
				(Constant)	PerAA_H	PerW	FRLunch	Dropout	PostGrad	Chang5yr	LimitEng
1	1	5.549	1.000	.00	.00	.00	.00	.01	.00	.00	.01
	2	1.050	2.299	.00	.00	.00	.00	.01	.00	.46	.01
	3	.760	2.702	.00	.00	.00	.00	.00	.00	.00	.55
	4	.392	3.761	.00	.00	.00	.00	.07	.00	.26	.13
	5	.159	5.905	.00	.00	.00	.03	.89	.00	.00	.07
	6	.067	9.116	.00	.00	.00	.64	.00	.10	.25	.05
	7	.022	15.811	.00	.02	.01	.26	.03	.57	.01	.09
	8	.000	***123.117***	1.00	***.97***	***.99***	.06	.00	.33	.01	.09

Table B-6: Writing - Correlations

		AllWrite	PerAA_H	PerW	FRLunch	Dropout	PostGrad	Chang5yr	LimitEng
AllWrite	Pearson	1	-.282**	.244**	-.300**	-.297**	.128	.108	-.050
	Sig. (2-tailed)		.001	.005	.000	.001	.144	.220	.573
	N	131	131	131	131	131	131	131	131
PerAA_H	Pearson	***-.282***	1	-.988**	.455**	.489**	.060	-.247**	.246**
	Sig. (2-tailed)	.001		.000	.000	.000	.499	.005	.005
	N	131	131	131	131	131	131	131	131
PerW	Pearson	***.244***	-.988**	1	-.390**	-.461**	-.155	.194*	-.314**
	Sig. (2-tailed)	.005	.000		.000	.000	.078	.026	.000
	N	131	131	131	131	131	131	131	131
FRLunch	Pearson	-.300**	.455**	-.390**	1	.344**	-.223*	-.526**	-.009
	Sig. (2-tailed)	.000	.000	.000		.000	.011	.000	.923
	N	131	131	131	131	131	131	131	131
Dropout	Pearson	-.297**	.489**	-.461**	.344**	1	-.114	-.286**	-.018
	Sig. (2-tailed)	.001	.000	.000	.000		.193	.001	.836
	N	131	131	131	131	131	131	131	131
PostGrad	Pearson	.128	.060	-.155	-.223*	-.114	1	.210*	.397**
	Sig. (2-tailed)	.144	.499	.078	.011	.193		.016	.000
	N	131	131	131	131	131	131	131	131
Chang5yr	Pearson	.108	-.247**	.194*	-.526**	-.286**	.210*	1	.099
	Sig. (2-tailed)	.220	.005	.026	.000	.001	.016		.262
	N	131	131	131	131	131	131	131	131
LimitEng	Pearson	-.050	.246**	-.314**	-.009	-.018	.397**	.099	1
	Sig. (2-tailed)	.573	.005	.000	.923	.836	.000	.262	
	N	131	131	131	131	131	131	131	131

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table B-7: Algebra I – Coefficients

		Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
Model		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	.985	.153		6.425	.000		
	PerAA_H	-.117	.152	-.618	-.770	.443	***.011***	91.891
	PerW	-.052	.147	-.281	-.352	.726	***.011***	90.951
	FRLunch	.048	.032	.172	1.499	.136	.535	1.868
	Dropout	-.448	.356	-.125	-1.258	.211	.712	1.404
	PostGrad	-.010	.053	-.021	-.191	.849	.591	1.693
	Chang5yr	.026	.051	.051	.511	.610	.694	1.442
	LimitEng	.077	.070	.110	1.096	.275	.697	1.435

Table B-8: Algebra I – Collinearity Diagnostics

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions							
				(Constant)	PerAA_H	PerW	FRLunch	Dropout	PostGrad	Chang5yr	LimitEng
1	1	5.549	1.000	.00	.00	.00	.00	.01	.00	.00	.01
	2	1.050	2.299	.00	.00	.00	.00	.01	.00	.46	.01
	3	.760	2.702	.00	.00	.00	.00	.00	.00	.00	.55
	4	.392	3.761	.00	.00	.00	.00	.07	.00	.26	.13
	5	.159	5.905	.00	.00	.00	.03	.89	.00	.00	.07
	6	.067	9.116	.00	.00	.00	.64	.00	.10	.25	.05
	7	.022	15.811	.00	.02	.01	.26	.03	.57	.01	.09
	8	.000	***123.117***	1.00	***.97***	***.99***	.06	.00	.33	.01	.09

Table B-9: Algebra I - Correlations

		AllAlg1	PerAA_H	PerW	FRLunch	Dropout	PostGrad	Chang5yr	LimitEng
AllAlg1	Pearson	1	-.310**	.299**	-.066	-.253**	.016	.101	.044
	Sig. (2-tailed)		.000	.001	.452	.004	.854	.250	.619
	N	131	131	131	131	131	131	131	131
PerAA_H	Pearson	***-.310****	1	-.988**	.455**	.489**	.060	-.247**	.246**
	Sig. (2-tailed)	.000		.000	.000	.000	.499	.005	.005
	N	131	131	131	131	131	131	131	131
PerW	Pearson	***.299****	-.988**	1	-.390**	-.461**	-.155	.194*	-.314**
	Sig. (2-tailed)	.001	.000		.000	.000	.078	.026	.000
	N	131	131	131	131	131	131	131	131
FRLunch	Pearson	-.066	.455**	-.390**	1	.344**	-.223*	-.526**	-.009
	Sig. (2-tailed)	.452	.000	.000		.000	.011	.000	.923
	N	131	131	131	131	131	131	131	131
Dropout	Pearson	-.253**	.489**	-.461**	.344**	1	-.114	-.286**	-.018
	Sig. (2-tailed)	.004	.000	.000	.000		.193	.001	.836
	N	131	131	131	131	131	131	131	131
PostGrad	Pearson	.016	.060	-.155	-.223*	-.114	1	.210*	.397**
	Sig. (2-tailed)	.854	.499	.078	.011	.193		.016	.000
	N	131	131	131	131	131	131	131	131
Chang5yr	Pearson	.101	-.247**	.194*	-.526**	-.286**	.210*	1	.099
	Sig. (2-tailed)	.250	.005	.026	.000	.001	.016		.262
	N	131	131	131	131	131	131	131	131
LimitEng	Pearson	.044	.246**	-.314**	-.009	-.018	.397**	.099	1
	Sig. (2-tailed)	.619	.005	.000	.923	.836	.000	.262	
	N	131	131	131	131	131	131	131	131

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table B-10: Geometry - Coefficients

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.	Collinearity Statistics Tolerance	Collinearity Statistics VIF
1	(Constant)	.833	.246		3.384	.001		
	PerAA_H	-.127	.244	-.379	-.521	.603	***.011***	91.891
	PerW	.021	.235	.064	.089	.929	***.011***	90.951
	FRLunch	.012	.051	.024	.228	.820	.535	1.868
	Dropout	-.582	.572	-.091	-1.017	.311	.712	1.404
	PostGrad	.112	.086	.129	1.308	.193	.591	1.693
	Chang5yr	.114	.082	.127	1.393	.166	.694	1.442
	LimitEng	.089	.112	.072	.792	.430	.697	1.435

Table B-11: Geometry – Collinearity Diagnostics

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions (Constant)	PerAA_H	PerW	FRLunch	Dropout	PostGrad	Chang5yr	LimitEng
1	1	5.549	1.000	.00	.00	.00	.00	.01	.00	.00	.01
	2	1.050	2.299	.00	.00	.00	.00	.01	.00	.46	.01
	3	.760	2.702	.00	.00	.00	.00	.00	.00	.00	.55
	4	.392	3.761	.00	.00	.00	.00	.07	.00	.26	.13
	5	.159	5.905	.00	.00	.00	.03	.89	.00	.00	.07
	6	.067	9.116	.00	.00	.00	.64	.00	.10	.25	.05
	7	.022	15.811	.00	.02	.01	.26	.03	.57	.01	.09
	8	.000	***123.117***	1.00	***.97***	***.99***	.06	.00	.33	.01	.09

Table B-12: Geometry – Correlations

		Allgeo	PerAA_H	PerW	FRLunch	Dropout	PostGrad	Chang5yr	LimitEng
Allgeo	Pearson	1	-.482**	.453**	-.301**	-.350**	.157	.280**	.024
	Sig. (2-tailed)		.000	.000	.000	.000	.074	.001	.785
	N	131	131	131	131	131	131	131	131
PerAA_H	Pearson	***-.482***	1	-.988**	.455**	.489**	.060	-.247**	.246**
	Sig. (2-tailed)	.000		.000	.000	.000	.499	.005	.005
	N	131	131	131	131	131	131	131	131
PerW	Pearson	***.453***	-.988**	1	-.390**	-.461**	-.155	.194*	-.314**
	Sig. (2-tailed)	.000	.000		.000	.000	.078	.026	.000
	N	131	131	131	131	131	131	131	131
FRLunch	Pearson	-.301**	.455**	-.390**	1	.344**	-.223*	-.526**	-.009
	Sig. (2-tailed)	.000	.000	.000		.000	.011	.000	.923
	N	131	131	131	131	131	131	131	131
Dropout	Pearson	-.350**	.489**	-.461**	.344**	1	-.114	-.286**	-.018
	Sig. (2-tailed)	.000	.000	.000	.000		.193	.001	.836
	N	131	131	131	131	131	131	131	131
PostGrad	Pearson	.157	.060	-.155	-.223*	-.114	1	.210*	.397**
	Sig. (2-tailed)	.074	.499	.078	.011	.193		.016	.000
	N	131	131	131	131	131	131	131	131
Chang5yr	Pearson	.280**	-.247**	.194*	-.526**	-.286**	.210*	1	.099
	Sig. (2-tailed)	.001	.005	.026	.000	.001	.016		.262
	N	131	131	131	131	131	131	131	131
LimitEng	Pearson	.024	.246**	-.314**	-.009	-.018	.397**	.099	1
	Sig. (2-tailed)	.785	.005	.000	.923	.836	.000	.262	
	N	131	131	131	131	131	131	131	131

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Table B-13: Algebra II – Coefficients

		Unstandardized Coefficients		Standardized Coefficients			Collinearity Statistics	
Model		B	Std. Error	Beta	t	Sig.	Tolerance	VIF
1	(Constant)	.892	.217		4.108	.000		
	PerAA_H	-.124	.215	-.461	-.574	.567	***.011***	91.891
	PerW	-.005	.208	-.020	-.025	.980	***.011***	90.951
	FRLunch	.075	.045	.191	1.667	.098	.535	1.868
	Dropout	.141	.505	.028	.279	.781	.712	1.404
	PostGrad	.037	.076	.053	.489	.626	.591	1.693
	Chang5yr	-.012	.072	-.016	-.164	.870	.694	1.442
	LimitEng	.140	.099	.142	1.418	.159	.697	1.435

Table B-14: Algebra II – Collinearity Diagnostics

Model	Dimension	Eigenvalue	Condition Index	Variance Proportions (Constant)	PerAA_H	PerW	FRLunch	Dropout	PostGrad	Chang5yr	LimitEng
1	1	5.549	1.000	.00	.00	.00	.00	.01	.00	.00	.01
	2	1.050	2.299	.00	.00	.00	.00	.01	.00	.46	.01
	3	.760	2.702	.00	.00	.00	.00	.00	.00	.00	.55
	4	.392	3.761	.00	.00	.00	.00	.07	.00	.26	.13
	5	.159	5.905	.00	.00	.00	.03	.89	.00	.00	.07
	6	.067	9.116	.00	.00	.00	.64	.00	.10	.25	.05
	7	.022	15.811	.00	.02	.01	.26	.03	.57	.01	.09
	8	.000	***123.117***	1.00	***.97***	***.99***	.06	.00	.33	.01	.09

Table B-15: Algebra II - Correlations

		ALLAlg2	PerAA_H	PerW	FRLunch	Dropout	PostGrad	Chang5yr	LimitEng
ALLAlg2	Pearson Correlation	1	-.299**	.292**	-.006	-.127	.036	.010	.053
	Sig. (2-tailed)		.001	.001	.947	.149	.681	.908	.550
	N	131	131	131	131	131	131	131	131
PerAA_H	Pearson Correlation	***-.299***	1	-.988**	.455**	.489**	.060	-.247**	.246**
	Sig. (2-tailed)	.001		.000	.000	.000	.499	.005	.005
	N	131	131	131	131	131	131	131	131
PerW	Pearson Correlation	***.292***	-.988**	1	-.390**	-.461**	-.155	.194*	-.314**
	Sig. (2-tailed)	.001	.000		.000	.000	.078	.026	.000
	N	131	131	131	131	131	131	131	131
FRLunch	Pearson Correlation	-.006	.455**	-.390**	1	.344**	-.223*	-.526**	-.009
	Sig. (2-tailed)	.947	.000	.000		.000	.011	.000	.923
	N	131	131	131	131	131	131	131	131
Dropout	Pearson Correlation	-.127	.489**	-.461**	.344**	1	-.114	-.286**	-.018
	Sig. (2-tailed)	.149	.000	.000	.000		.193	.001	.836
	N	131	131	131	131	131	131	131	131
PostGrad	Pearson Correlation	.036	.060	-.155	-.223*	-.114	1	.210*	.397**
	Sig. (2-tailed)	.681	.499	.078	.011	.193		.016	.000
	N	131	131	131	131	131	131	131	131
Chang5yr	Pearson Correlation	.010	-.247**	.194*	-.526**	-.286**	.210*	1	.099
	Sig. (2-tailed)	.908	.005	.026	.000	.001	.016		.262
	N	131	131	131	131	131	131	131	131
LimitEng	Pearson Correlation	.053	.246**	-.314**	-.009	-.018	.397**	.099	1
	Sig. (2-tailed)	.550	.005	.000	.923	.836	.000	.262	
	N	131	131	131	131	131	131	131	131

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

APPENDIX C: LINEAR REGRESSION RESULTS

Below are linear regression results for analysis for Adjusted Teacher Day Rate Salary and Teach-to-Principal Salary Difference. In tables C-1, C-2 and C-3, the coefficient is negative suggesting an inverse relationship. As teacher salaries adjusted for cost-of-living increase, student achievement as measured by AYP decreases. In table C-4, the coefficient is negative, suggesting that as the higher teacher salaries are in relationship to principal salaries, student achievement as measured by AYP decreases. Tables C-1, C-2 and C-3 are related to hypothesis 2a (When adjusted for cost of living, an inverse relationship between teacher salaries and student achievement as measured by AYP will occur). Table C-4 is related to hypothesis 3b (In the presence of intervening variables, student achievement, as measured by AYP, will be higher in school divisions where the difference between teacher salaries and principal salaries is narrow).

Table C-1: Linear Regression – Reading Achievement and Adjusted Teacher Day Rate Salary

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	.968	.012		80.858	.000
	Adj08TS	-9.9E-005	.000	-.216	-2.493	.014

a. Dependent Variable: AllRead

Table C-2: Linear Regression – Writing Achievement and Adjusted Teacher Day Rate Salary

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.963	.015		62.283	.000
	Adj08TS	.000	.000	-.266	-3.112	.002

a. Dependent Variable: AllWrite

Table C-3: Linear Regression – Geometry Achievement and Adjusted Teacher Day Rate Salary

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.928	.031		30.354	.000
	Adj08TS	.000	.000	-.208	-2.394	.018

a. Dependent Variable: Allgeo

Table C-4: Multiple Regression – Algebra II Achievement and Teacher-to-Principal Salary Difference with Reduced Model Intervening Variables

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.028	.062		16.713	.000
	T_Pratio	-.167	.084	-.187	-1.989	.049
	PerAA_H	-.123	.029	-.458	-4.168	.000
	Dropout	-.035	.488	-.007	-.072	.943
	FRLunch	.097	.041	.246	2.398	.018

a. Dependent Variable: ALLAlg2

Vita

Matthew Garrison Steele was born on July 5, 1972 in Richmond, Virginia, and is an American citizen. He graduated from John Marshall High School, Richmond, Virginia in 1990. He received his Bachelor of Arts in History from Mary Washington College, Fredericksburg, Virginia in 1994. He received his Master of Science in Sociology from Virginia Commonwealth University in 2003 and worked in the field of marketing research for seven years.