STUDENT TO TEACHER RACIAL/ETHNIC RATIOS AS CONTRIBUTORS TO
REGIONAL ACHIEVEMENT GAPS, 1999-2008

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With the advent of No Child Left Behind legislation in 2002 and its mandates for annual yearly progress for all students, many districts and schools in Texas have had difficulty elevating African American and Hispanic students’ scores. The current study examined these students’ achievement on the annual Texas high-stakes measure as a function of a numerical construct that aligns the race/ethnicity of students when the teacher race is White. Earlier studies have shown that racial/ethnic compatibility between students and teachers improves student achievement in the primary grades.

The study, which was set in 10 north Texas school districts and 30 high schools, middle schools, and elementary schools, examined African American and Hispanic students’ achievement on the Texas state assessments in reading and mathematics over a 10-year period. District performance data came from 4,664,192 African American, Hispanic, and White students and 222,834 White teachers. Campus level data encompassed 188,839 10th graders, 93,573 eighth graders, and 40,083 fourth graders, and 20,471 White teachers.

Analysis revealed that, as the ratios of African American and Hispanic students to White teachers increased, the percentages of these two student groups passing the Texas assessments decreased. These patterns differed for White students whose passing percentages increased as these students’ numbers increased relative to White teachers in all settings except in elementary schools. These preliminary findings suggested that racial alignment at the high school and middle school levels might elevate African American and Hispanic achievement. Implications may lead to shifting focus on teacher quality and class size as the primary determinants of
student achievement. Findings need validation with further study using larger data sets and sequential grade levels. If validated through further studies involving larger samples, contiguous grade levels, and more sophisticated statistical analysis, this study’s findings may have implications for teacher education curriculum, recruitment of minority teacher candidates, workforce retention, and state policy on class size limits.
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by

James M. Hays
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This has been an incredibly long journey for this post middle-aged fellow who barely graduated high school. I can only attribute my small success and encouragement to a very generous and benevolent God, Yahweh, who should have struck me down many years ago. He has been gracious, and I would like to think His expectations are revealed through the words of the Lord Christ, Jesus of Nazareth: “Go do likewise.” This, now, is the task before me: Put this education to work for His glory and the betterment of our society.

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I wish my parents, Nig and ‘Ritta Hays, could share in this moment. They did not have the opportunity to enjoy the benefits and rewards of education, having to choose survival over education. Although they did not understand the pretense and context of school, their blind faith and support for me was always there. This work is dedicated to their memory.
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CHAPTER 1
INTRODUCTION

The interaction of race, ethnicity, social class, and gender on student achievement has received major attention from educators, policymakers, and social scientists over the past five decades. Untangling these relationships is difficult in a complex and evolving educational and social landscape where diversity in kindergarten (K) through Grade 12 classrooms reflect the enormous growth in the race, ethnic, economic, linguistic, and culture confluences occurring in America (College Board, 2006; United States [U.S.] Department of Commerce, 1996). According to the 2000 U.S. Census, diversity in the U.S. population is accelerating. These demographic shifts were underscored in the U.S. Census 2008 abstract (U.S. Census Bureau, 2008). Many school districts across Texas and the nation have been transitioning to minority majority student populations. The demand to close the disparity in achievement between student race/ethnic groups has captured the attention of politicians, policymakers, teachers, stakeholders, and the federal government. With the reauthorization of the 1965 Elementary and Secondary Education School Act (ESEA) as the No Child Left Behind Act of 2001 (No Child Left Behind Act [NCLB], 2002), the struggle for equity in educational achievement has shifted toward quantitatively measured accountability (Cohn, 2006; Resnick, 2010). The Texas teaching force remains primarily White (66%), female (77%; Texas Education Agency [TEA], 2010c), and mobile and is charged with attaining the rigorous achievement benchmarks set forth by the NCLB, irrespective of expanding student race/ethnic diversity. Student achievement as an outcome of proportional changes in race/ethnicity between students and teachers is little understood (Bishop, Dudley, Mihaly, & Murphy, 2005; Dee 2004, 2005) and is the subject of this dissertation. Exploring this topic has illuminated rudimentary incompatibilities that must be
pondered by policy makers, district leaders, parents, and stakeholders if student achievement is to be elevated and a proficient workforce secured or maintained.

As classroom diversity increases, closure of the academic achievement gap of African American and Hispanic students compared to White students has not improved at the national or the state levels (Montoya, 2010; National Center for Education Statistics [NCES], 1995, 2000, 2008a, 2009e; Texas Education Agency [TEA], 2010c). Frequently missing in this discourse is a clear statement of what the achievement gap is.

The “achievement gap” has been described by some as a matter of race and class (National Governors Conference, n.d.) as well as by the quantitative differentials in academic attainment on specific assessment protocols. Across the U.S., persistent academic achievement disparity exists throughout Grades K through 12 between minority students and their White peers (NCES, 2010b; National Governors Conference, n.d.). In light of school finance reform and the goal of providing a ready and capable future workforce, eliminating the achievement gap for all race/ethnic student groups in all grades is one of the most pressing education policy challenges that states currently face as diversity within the classroom accelerates.

The race/ethnic distribution of students in public schools continues to change. Between 2000-2001 and 2007-2008, the percentage of students enrolled in public school who were White decreased from 61% to 56% (NCES, 2010c). During this same time period, the percentages of African American (17%) and American Indian/Alaska Native students (1%) remained unchanged. However, the percentage of Hispanic students increased from 17% to 21%, and the percentage of Asian/Pacific Islander students increased from 4% to 5% (NCES, 2010c).

Researchers have tried to identify why the variables of race and class are such strong predictors of students’ educational attainment (Coleman et al., 1966; Dee, 2004; Goe, 2008). In
the controversial *Equality of Educational Opportunity* report (EEOR) of 1966, Coleman et al. (1966) found that African American children started school already trailing behind their White counterparts and essentially never caught up--even when their schools were as well equipped and staffed as those with predominantly White enrollments. Coleman et al. concluded that what mattered more than the effects of school in determining children's academic success was family expectations and peer relationships. In essence, the EEOR replied to its sponsor, the U.S. Congress, that student achievement is not a direct linear function of educational spending (i.e., higher funding equals higher achievement for all student groups). This conclusion was a response to the 1965 authorization of the Elementary and Secondary School Act passed at the behest of President Johnson (U.S. Congress, 1965).

In the 1990s, the controversial *The Bell Curve* claimed that student achievement disparities were the natural result of variation in students’ genetic makeup and natural ability (Viadero & Johnston, 2000). These finding were contested by assertions that achievement gaps were the result of more subtle environmental factors. One well studied environmental factor is teacher quality. While it is difficult to isolate the variables that directly impact student achievement, researchers have consistently demonstrated that good teaching matters in raising students’ test scores (Darling-Hammond, 1999; Educational Testing Service, 2002; Hanushek, Kain, & Rivkin, 2004; Haycock, 2003; Kennedy, 2010; Kukla-Acevedo, 2009; National Science Foundation, 2002a; Rivkin, Hanushek, & Kain, 2005; U.S. Department of Education, 2002; Wayne & Youngs, 2003; Zumwalt & Craig, 2005). However, consistently absent in the “good” and “quality” teaching literature are explanations of the impact of racial/ethnic compatibility between student and teacher. The role played by racial/ethnic compatibility in the context of “good teaching” and closing the achievement gap of minority students is not understood.
While the student population becomes increasingly diverse nationally, the teacher cadre has not changing appreciably. The majority of teachers remain White, even though growth is observed in the number of non-White teachers during the past decade (Banks, 2004; Cochran-Smith & Zeichner, 2005; Flores et al., 2010; Morrell, 2010). NCES (2000) reported that 90% of public school teachers were White, 6% were Black, and less than 5% were of other races.

This same racially/ethnically homogenous instructional workforce is found in Texas. Although minority presence is increasing, White teachers remain in the majority. In 1999, for example, 74% of the teachers in Texas were White, but 10 years later, 66% of the teachers in Texas were White (TEA, 2010c). The growth of non-White students has not been matched by increasing numbers of non-White teachers. During the same 10-year period, the representation of non-White students grew to 66% (TEA, 2010c). While 2 out of 3 teachers continue to be White, the proportion of students who are not White has grown to 2 out of 3 students. Given that African American and Hispanic students in Texas have higher failure rates on annual state outcome measures, quantitative studies are not abundant that investigate the relationship of achievement to student teacher racial ratios (STRRs).

Frequently suggested in the literature are calls for increasing the non-White teacher workforce to serve as positive role models for minority students (Darling-Hammond, 1990; National Governors Conference, n.d.; Roscigno, 1998; Zumwalt & Craig, 2005). Ferguson (1998) concluded that racial dynamics between students and teachers appear to influence educational attainment. Although consensus appears to emerge regarding the social and emotional importance of race/ethnicity in student-teacher interactions, definitive evidence of implications for student achievement is absent. Some studies demonstrate that African American teachers are associated with improved test scores among African American students (Coleman et
al., 1966; Dee, 2004). However, Coleman’s evidence also indicated that lower score gains among White students with African American teachers is more robust (Coleman et al., 1966). Howsen and Trawick (2007) found that race had no effect on student achievement once student innate ability and teacher gender were taken into account. They suggested that increasing the number of high-quality African American teachers might hold promise as a lever of change. A longitudinal quantitative study examining student achievement specifically by student teacher race ratios has potential to answer this question.

The few research studies available (e.g., Bishop et al., 2005; Dee 2004, 2005) do not consider the potential impact of numeric ratio variations on student achievement. The ratio of minority students in each White teacher’s classroom may have a quantitative relationship to academic successes. Annually, classrooms experience demographic changes. With students coming and going between schools for various reasons during the school year, the ratios of the numbers and types of students to each teacher change. Additionally, the numbers of students from various racial/ethnic and linguistic backgrounds can change between classrooms and teachers affecting the instructional ratio. However, the state continues to raise passing standards on its mandated testing measure without regard for annual changes in students’ demographics and proportional representation (TEA, 1990, 1994, 2009c). NCLB and the TEA take the view that all children to be instructed and assessed are racially/ethnically, linguistically, and economically neutral students taught by racially/ethnically neutral highly qualified teachers. With the present crisis in state funding, it is increasingly important to acquire a higher level of understanding of STRRs and if these ratios impact student achievement.

Theoretical Framework

Concern about social, economic, and achievement inequity in education has drawn the
attention of policy makers, government officials, and school administrators since the implementation of Brown vs. Board of Education. Inequities manifested in discrimination and segregation have created and perpetuated achievement disparity between student groups as a coefficient of race/ethnicity. Two dichotomous social-based theories guide this study. The first is social capital. The second is the Cardenas-Cardenas (1977) theory of incompatibilities. When viewed through these lenses, the complexities occurring within the domains of teacher and student interaction associated with race, ethnicity, socioeconomics, persona, and self-efficacy can be synthesized for understanding student achievement based on teacher race/ethnicity. The sections that follow explore these two theories from a starting point of social equilibrium and go on to consider the constructs of race and ethnicity that underlie the study.

Social Equilibrium

Both students and teachers generally desire balance, a state of equilibrium where the energy exerted to produce work is equal to the output reward (Ogbu, 2008). However, students have little control over where they find themselves being educated. Due to circumstances of mobility, economic alteration, parental changes, and the like, students may find themselves in environments of social and educational incompatibility, being taught by teachers who are likely not to share any demographic commonality. African American and Hispanic students continue to find themselves in classrooms led by teachers who do not look like them and have limited understanding and appreciation of their cultures and learning preferences (Banks, 2004; Gay, 2002; Nieto, 2000). Understanding that both students and teachers, as independent individuals, seek high levels of personal equilibrium while avoiding environments of incompatibility is important in understanding where social and intellectual capital will be invested.
Social Capital

The term “social capital” originated in the 1920s. The original development of the term is attributed to both Pierre Bourdieu and James Coleman by Dika and Singh (2002). Social capital can be viewed as the interaction of three sources of generalized capital allocation: economic, cultural, and social (Dika & Singh, 2002).

Pierre Bourdieu (1986), a French sociologist, was interested in the ways in which society is replicated and how the empowered classes retain their position. His theoretical ideas on class dominance centered on three forms of capital, each having its own unique relationship to class: economic, cultural, and social capital. Although social capital is distinct from economic capital, it is inseparable from it (Bourdieu, 1986). Bourdieu proposed that social capital is another appliance at the deposal of the elite, utilized in a variety of formal and informal ways to ensure segregation fulfills its intended purpose of excluding the wrong kinds of people (Bourdieu, 1986).

Thus social capital has two components. It is, first, a resource that is connected with group membership and social networks. "The volume of social capital possessed by a given agent . . . depends on the size of the network of connections that he can effectively mobilize" (Bourdieu, 1986, p. 249). Unlike economic capital, social capital has no specific material form, and its rules are malleable to fit necessity. If its order, protocols, and membership criteria were defined and tangible, it would be simply a series of nonmarket transactions. Along with exclusivity of membership, participation in a group provides each entitled member with the support and assets of the whole and its collectivity-owned capital; thus, each member becomes a stockholder in the enterprise. Second, stewardship and reproduction of social capital require a conscious effort of a group to cultivate and invest in sociability. This cultivation requires
repeated contacts and self-justification, during which mutual recognition by group members is validated to sustain group cohesion. Both Bourdieu and Coleman considered the family a basic purveyor and guardian of social capital among the socially powerful to ensure social networks for future generations.

Social capital is sometimes viewed as a heartwarming investiture in networking and generating social connections for the benefit of all, especially for elevating the less privileged (Bourdieu, 1986). Bourdieu (1986), rather, used the concept to explain the cruel realities of social inequality. From this perspective, social capital reflects the idea of “It’s not what you know, it’s who you know,” and the delineation between us and them is well understood.

Conversely, Coleman (1988) used social capital as a vehicle to give a humane and collective social face to rational choice theory and as a way of making sense of the overly individualistic and rational models of traditional economics. In this broader view of social capital, Coleman saw social capital not only as a capital asset held and guarded by powerful elites but also as an asset having value and presence within all kinds of communities, including those populated by the powerless and marginalized. Coleman focused on the role of social capital in the creation of human capital: The investment of a child’s culture from those in oversight roles molds the child according to the standards of the community. Lynchpins for this transference of community standards and expectations into students are schools, teachers and the curriculum. The community expects the school and the teacher not only to educate students in curricula-based knowledge but also to impart social skills and customs aligned with community standards and interpretations (Coleman, 1961). This emphasis on “local control” over public education is seen in numerous states as a virtue and a right. However, as the community undergoes demographic changes and student demographics change, little is known about whether
or not a teachers social investiture in their campus’ communities remain intact or if they fulfill their own needs when they exit to less diverse districts and schools.

Teachers, like any other professionals, work in environments in which they feel socially and intellectually comfortable. If teachers experience incompatibility in their classrooms, their students may not perform at necessary levels on state assessments (Garmon, 2004; McNalley, 2005).

Students and teachers operate in a unique and dynamic environment that is influenced by social, curricular, economic, and political tenets. The state, stakeholders, and students are dependent upon competent teachers to deliver the curriculum designated by the state. Likewise teachers are free-will contracted employees of the district, seeking the employment that best aligns with their personal objectives. A Texas teaching certificate affords employment opportunities across a wide panorama of schools in over 1,300 districts (TEA, 2010c). A Texas teacher’s job is to deliver the state’s mandated curriculum, the Texas Essential Knowledge and Skills (TEKS; TEA, 1999b). A teacher’s willingness to share intellectual resources and social capital with students depends on appropriate levels of social capital flowing into the teacher’s personal domain to maintain a state of social equilibrium (Coleman, 1988; Crane, 1992; Dika & Singh, 2002).

Students are not generally afforded the same level of choice as teachers to engage in at-will movement or to expend high levels of social or intellectual capital toward adults. Until students are old enough to obtain a Texas driver’s license and afford a car, fuel, housing, and sustenance, they are dependent upon their parents, guardians, and caretakers for their mobility (Cardenas, 1974; Education Week, 2004). Many students, for adult-related reasons, find themselves in situations incongruous with a mentality of “education first.” In the present, as well
as in the past, more and more students find themselves in public schools where no adults share commonality with them, speak their first language, look like them, or understand their culture and background. It is challenging for students to be beneficiaries of social capital when placed in environments where social and cultural compatibility are not shared.

Theory of Incompatibilities

The lack of social, cultural, and economic alignment between students and teachers is the core tenant proposed by Cardenas and Cardenas (1977) in their theory of incompatibilities. Cardenas and Cardenas posited that students experience academic failure not as a function of absent skills but because the educational environment has been structured for and by individuals who are knowledgeable of the setting (i.e., what the two authors termed the “White order”). This theory postulates that the dominant White emphasis of the TEKS, teacher workforce, and state achievement assessments is best understood by students, teachers, parents, and stakeholders who are members of the dominant White population responsible for creating and supporting these phenomena. Through this lens, the Texas education system fosters a high degree of racial, ethnic, cultural, economic, and social incompatibility within which non-White students’ academic achievement is affected.

The theory of incompatibilities is based on Cardenas and Cardenas’ (1977) belief that failures by African American, Hispanic, and economically disadvantaged students can be attributed to lack of compatibility with and social capital investiture in some of the students at whom the curriculum is directed. Cardenas and Cardenas argued that five interrelated domains need to be internalized by those in control, or authority, to better understand, per Delpit (2003), who the children are: (a) poverty, (b) culture, (c) language, (d) mobility, and (e) students’ social identities. In the classroom, those in control are teachers. Cardenas and Cardenas suggested that
the curriculum needs to be inclusive and sensitive toward students who may not be perceived by teachers as the traditional students, the White, Anglo-Saxon, English speaking students.

Although social capital is a theorem and non-tangible, the federal courts have recognized the theory of incompatibilities. The 10th Circuit agreed with the plaintiffs in Keyes v. School District No. 1, Denver, Colorado, that the district’s existing curricular offerings or methods of instruction constituted illegal segregated conduct (Keyes v. School District No. 1, Denver, Colorado, 1973). In a similar manner, students who remain in classrooms in which they do not feel compatible and in which they may not receive the benefits of their teachers’ social capital do not receive the desired outcome of schooling serving as a threshold to social, economic, and educational equity.

Race and Ethnicity

Race and ethnicity are complex and changing social constructs. Metaphors and misnomers alluding to race/ethnicity such as “Black race,” “White race,” “Jewish race,” “Mexican,” and “Hispanic” have not only resulted in substantial suffering and oppression in psychological and economic terms for certain populations, but have also been used to organize a frame of “Whiteness” which encompasses the school curriculum and the curriculum field (Pinar, Reynolds, Slattery, & Taubman, 2004). Racially/ethnically based silos are illustrated in the degrees of student disparity manifested on state outcome measures of the school curriculum. Student achievement and teacher ethnographic pairings in these disciplines intertwine with the concept of critical race theory, and by extension with the concept of ethnicity.

Although critical race theory (CRT) originated in legal scholarship resulting from the social consternation of Derrick Bell (1995), it has relevance and application in an education curriculum context. CRT has been defined as the dominate order’s attempt to “distort the
realities of the Other in an effort to maintain power relations that continue to disadvantage those who are excluded from that ‘order’” (Ladson-Billings & Donner, 2005, p. 281). This mentality is not readily accepted by minorities and peoples external to the dominant culture, as Nobel Laureate Toni Morrison (1989) contended, “We are not, in fact, ‘other’” (p. 9).

Race/ethnic identity (also known as ethnonationalism) follows along the lines proposed by Delpit (2003). Delpit proposed that African-American, and by extension all non-White, children must be educated according to the following rationale: “We must learn who the children are, and not focus on what we assume them to be . . . developing relationships with our students and understanding their political, cultural and intellectual legacy” (Delpit, 2003, p. 18). Delpit’s perspective of conceptual identity parallels Vygotsky’s theory of spontaneous concepts. The Vygotskian example of what conceptualizes a grandmother transfers equally well to defining what African American, Hispanic, Asian, and White are. Ng (1993) suggested race, class, and gender are relations that have to do with how people define themselves and how they participate in social life. They are not “mere theoretical categories” (Ng, 1993, p. 51).

Race has become metaphorical – a way of referring to and disguising forces, events, classes, and expressions of social decay and economic division far more threatening to the body politic then biological “race” ever was. (Morrison, 1992, p. 63)

Although student groups are not theoretical categories, they are achievement measurement categories. Educational sociology offers some assistance in bridging between who students “are” and their academic achievement within the context of teacher race/ethnicity alignment. Foster (1990) suggested that teachers’ race interacts with that of their students, arguing that African American teachers are particularly effective teachers of African American students because of the political messages they convey to their students. For Foster, the
suggestion is teachers from repressed groups are committed to extolling the political importance of education to undo the status quo by focusing on the causes and consequences of racial inequality and the unequal power relations in society. Even though Foster studied only African American teachers, it is likely that teachers from other race/ethnic groups share similar political perspectives. Ladson-Billings (2006) contended that culturally relevant schools tend to have higher numerical proportions of African American students and teachers. Perhaps for political messages or ethnographic compatibility some studies have found positive correlations between a school’s proportion of minority teachers and the achievement of the school’s minority students (Dee, 2004; Hunter & Bartee, 2003; Meier, Wrinkle, & Polinard, 1999; Miller, 1995; Weiher, 2000).

Statement of the Problem

In Texas, the majority of public school teachers are White, and the majority of students enrolled in public schools are Hispanic and African American. Substantial achievement disparity has been consistently demonstrated among African American, Hispanic, and White students on the Texas annual outcome measure. Racial/ethnic compatibility between students and teachers compared to passing rates on the state assessment has not been investigated.

Although Dee’s (2004) regression analysis using Tennessee STAR (Student Teacher Achievement Ratio) data (HEROS, Inc., 2009) is the most current race-based achievement report, Dee’s focus was on race alone and did not include examine student achievement as a function of numerical student teacher racial/ethnic ratios studied over an extended time period. Further, all of the Tennessee Project STAR students and teachers were African American or non-Hispanic Whites, and almost all of the teachers were female (Dee, 2004). These factors suggested need for further study of the relationship between student and teacher racial/ethnic
alignment and student achievement outcomes.

Texas teacher retention rates remain low in high poverty, high mobility, and high diversity settings where student achievement is a concern. Often low teacher attrition rates are attributed to large, minority majority urban districts. However, this phenomenon is also exhibited in maturing suburban districts, such as Garland, Mesquite, and Plano ISDs, with each ISD having campuses that reflect high student racial/ethnic diversity and low SES (TEA, 2010a, 2010b). As suburban and urban districts mature and the diversity of the student population continues to evolve, while maintaining a majority White teaching force, the relationship between student achievement and the racial/ethnic compatibility of students and teachers needs to be better understood.

Purpose of the Study

The purpose of this study was to determine over a 10-year period whether changes in the student teacher racial ratios (STRRs) between African American and Hispanic and White students and White teachers exhibit a meaningful relationship to these students’ reading and mathematics passing rates on the annual Texas state assessment. Data representing a 10-year period at the campus and district levels were examined. Archived achievement data from the TEA’s Academic Excellence Indicator System (AEIS), 1999-2008, were used for this study. Data were examined at both the district and campus levels.

Research Question and Hypotheses

The research question used to fulfill the purpose of this study was as follows:

For the time period between 1999 and 2008, does a correlation exist between the proportions of African American, Hispanic, and White students to White teacher, the student to teacher racial ratios (STRRs) (for a definition of STRR, see page 17) and the passing percentages...
of these student groups on the reading and math sections of Texas’ state assessment instruments among 10 identified school districts and 30 elementary, middle, and high school campuses randomly selected from within the 10 identified school districts?

From the research question, the following two null hypotheses were tested:

H$_1$ Over the 10-year period from 1999 through 2008, in 10 identified school districts, changes in STRRs for African American, Hispanic, and White students will not exhibit a relationship to these students’ reading and math scores on the Texas mandated state assessment instrument.

H$_2$ Over the 10-year period from 1999 through 2008, in 10 selected high schools, 10 middle schools, and 10 elementary schools from within the 10 identified school districts, changes in the STRR for African American, Hispanic, and White students will not exhibit a relationship to these students’ reading and math scores on the Texas mandated state assessment instrument.

Methodology

This study employs a correlation design in an attempt to understand the relationship between variables referred to in the research question and hypotheses. Although a correlation design cannot prove causation, it can be useful in predicting one variable based on another and building a theory about a phenomenon (Gall, Gall, & Borg, 2007). However, the converse is equally true: “If correlation cannot prove causation, then the absence of correlation cannot prove the absence of causation” (Jencks, 1972, p. 84).

The correlation methodology used in this study is Pearson’s product-moment correlation coefficient. Pearson’s $r$ correlation coefficients assist in describing the magnitude of relationship between two variables. The dependent variable is the passing percentages of African American, Hispanic, and White students on the Texas outcome measure in reading and mathematics.
independent variables are the annual population of each of these student groups and the annual population of Whites. These two populations were used to create a STRR, which is correlated to annual student group achievement measures in reading and mathematics. STRRs were calculated annually for each student group. Annual STRRs were generated for each student groups dividing the total number of African American, Hispanic, and White students, as the numerator, by the total number of White teachers, the denominator, in the designated setting. Settings were confined to 10 districts and 10 elementary, 10 middle, and 10 high schools within the same districts over a 10-year period. The 10 districts were selected on the basis of historical hiring patterns reported by Center for Research Evaluation and Advancement of Teacher Education (CREATE, 2009). CREATE (2009) reported employment data from the Texas State Board for Educator Certification. Campuses were randomly selected. Strengths of the bi-variable relationships were examined with $r^2$. Chapter 3 provides an expanded view of the methodology.

Precedents for the Method

Precedents for analysis of correlation coefficients of variables from large datasets are common in educational, sociological, and epidemiological literature. Two earlier studies, described below, provided support for the methodology of this study by applying a similar method to similarly constructed demographic variables. Goldsmith (2004) examined how a campus’ ethnographic mix of students and teachers influences African American, Hispanic and White students’ aspirations beliefs, and subsequent reduction in campus wide achievement gap. Goldsmith used National Education Longitudinal Study (NELS; NCES, 1992) data collected in the base year 1988 and used a stratified-random sample of 24,599 eighth graders in 1,052 public and private schools. Goldsmith’s analysis showed that attitudes and beliefs of African American
and Hispanics students in segregated-minority schools (i.e., similar ethnographic ratios) are associated with improved student achievement and elevated beliefs for future academic success. Goldsmith suggested that students in ethnographically aligned educational settings likewise display greater optimism about their future educational opportunities and desired occupations and that these students were inclined to profess positive attitudes about their teachers and classes.

From the economist view, Dee (2004) conducted regression analysis using student achievement scores from the Tennessee STAR project database (HEROS, Inc., 2009). Dee provided the most recent precedent related to this study’s focus on student achievement as a function of student-teacher racial/ethnicity compatibility. Dee examined state level achievement data for a kindergarten through Grade 3 cohort from 1985-1989. These achievement data, n of 11,600, reflected elevated student achievement as a function of commonality in student-teacher race. Because of the limitations of the sample set, Dee examined the data only for the achievement relationships between African American and White students and teachers. Student outcome measures were the annual state mandated reading and mathematics scores. Although the study focus was on student achievement as an outcome of racial compatibility, Dee did not examine student achievement as a function of STRRs, but Dee's and Goldsmith’s methodology set the precedent for this study.

Core to the methodology of the current study is student-teacher racial/ethnic compatibility. Using student-teacher race/ethnicity ratios as a context, examining student achievement can be accomplished, and has been previously demonstrated in the sociological, economic, and education disciplines. In the educational literature, quantitative studies examining student achievement using large, Texas specific datasets emerged as recently as 2005. Rivkin et al. (2005) reported using matched panel data from the Texas Schools Project database hosted at
the University of Texas at Dallas per Kain (2001). Subsequently, Heiling and Darling-Hammond (2008) employed Texas PEIMS data examine student achievement on TAKS scores at the elementary, middle, and high school levels longitudinally. However, neither Rivkin nor Heiling and Darling-Hammond incorporated teacher race as an independent variable.

More research in this area was needed in order to understand if students sharing like racial/ethnic characteristics with their teachers demonstrate higher academic achievement. The current study has added to that understanding by examining student achievement over time using STRRs based on methodologies accepted in educational sociology and economic research.

Definition of Terms

The terms that follow are used in a particularly way in the development of this study.

_Baccalaureate teacher education graduate (BTEG)._ The term refers to a student who has completed required teacher certification courses while enrolled in a baccalaureate degree program and awarded a college degree (University of North Texas, n.d.).

_Elementary school._ For the purpose of this study elementary school refers specifically to the fourth grade.

_High school._ For the purpose of this study, high school refers specifically to the 10th grade level in the selected districts.

_Incompatibility._ The theory of incompatibility proposed by Cardenas and Cardenas (1977) that academic failures by African American, Hispanic, and economically disadvantaged students are attributed to lack of compatibility with their White structured and dominated educational environments. Cardenas and Cardenas suggested that achievement disparity can be attributed to incompatibilities associated with (a) poverty, (b) culture, (c) language, (d) mobility,
and (e) students’ social identities. In this study the use of the term incompatibility denotes disparities within the framework of this theory (Cardenas & Cardenas, 1977).

Middle school. For the purpose of this study, high school refers specifically to the eighth grade level in the selected districts.

Race/ethnicity or racial/ethnic. The TEA has adopted nomenclature to identify and report student demographic and achievement data. In October 2007, the TEA adopted the new federal guidelines for the collection of ethnicity and race information that were employed beginning with PEIMS data collected for the 2009-2010 school year. Under the former student race/ethnicity categories, five reporting categories were available four specific to race and one ethnic group Hispanic (TEA, 2010d). For this study, the term race/ethnicity refers to the data that pertain to one racial group, African American, and one ethnic group, Hispanic, unless otherwise noted.

Student teacher racial ratios (STRRs). For the purpose of the study and its associated data analysis, STRRs refers to the proportional ratio of the total number of African American, Hispanic, or White, students, as the numerator, in a defined setting (district or campus) divided by the total number of White teachers in those specific settings. The STRR was operationalized as part of the methodology employed in this study. Dee’s (2004) regression analysis of the Tennessee’s Project STAR data (HEROS, Inc., 2009) set the stage for the development of the STRR and its application in this study. Each racial/ethnic student group has its own unique annual STRR calculation.

Significance of the Study

A study of students’ academic outcomes in relationship to student-teacher demographic ratios in the context of racial/ethnic compatibility is necessary and important for several reasons.
The value of this study is twofold: (a) documenting achievement patterns between and among students who are African American, Hispanic, and White as a function of fluctuating student-teacher race-ethnicity ratios; (b) determining if meaningful correlations emerge over a 10 year period as measured at district and campus levels. The focus of this investigation was the nature of the relationship between diverse students’ performances on state mandated tests in relation to the extent to which the students are being taught by White teachers at the classroom level. Understanding how the teaching force responds to changing student demographics and population increases with promoting student success is important.

Investigating if STRRs relate to student achievement may help administrators and educational agencies to understand the extent to which the implementation of NCLB has had a successful role in diminishing the achievement gap among African American and Hispanic students being taught by a majority White teaching force. The findings may be used by policy makers to implement legislation that encourages teacher preparation programs to recruit more African American and Hispanic candidates into teacher education programs and may subsequently close the achievement gap for all students. Administrators and teachers may use these findings to understand and explore alternative venues for serving students from diverse ethnic and racial groups.

Previous researchers reached mixed conclusions regarding the effectiveness of the NCLB Act in terms of closing the gap between racially/ethnically diverse students and their White peers (Bali & Alvarez, 2004; Battle & Pastrana, 2007; Hurley, Chamberlin, Slavin, & Madden, 2000; Yeung & Conley, 2008). Becker and Luther (2002), Beecher and Sweeney (2008), Hurley et al. (2000), Walpole, Justice, and Invernizzi (2004) supported achievement parity based on specialized education programs (e.g., America's Choice, 2011; Co-nect by Education
Connection, 2011; Onward to Excellence by Blum & Butler, 1987; Success for All, 2010) via the application of research-based methodologies. Other researchers argue the achievement gap has diminished due to increased availability of fiscal resources to school districts, increasing academic standards, intervention strategies established within schools, and desegregation (Cooley, 2006; Lee & Wong, 2004; Schiller & Muller, 2003; Walpole et al., 2004). Others contend that little or no equality has occurred in the achievement gap between White and non-Whites students (Abedi, 2002; Morales & Saenz, 2007; Packer, 2007). Gandara and Contreras (2009), Heubert and Hauser (1999), Hunter and Bartee (2003), Jencks and Phillips (1998), Lee (2002), and NCES (2010b, 2010c) have provided ongoing evidence of African American and Hispanic students continuing to score lower than their grade level White peers on reading and math standardized tests. Educational sociologists recommend a sociological-based exploration of whether the community’s ethnographic influences outweigh the effects of academic environments (Bronfenbrenner, 1979; Coleman et al., 1966; Jencks, 1972; Kahlenberg, 2001; McLaren, 1989; Mosteller & Moynihan, 1972; Moynihan, 1972; Passow, 1984; Rosenholtz, 1987).

Since the early 1980s, proponents of the assessment-based movement have suggested that teacher quality and curriculum are critical to student achievement. Many believe that if the student achievement gap can be reduced, it will be accomplished singularly through teachers’ influence at the classroom level (Darling-Hammond & Sclan, 1996; Delpit, 2003; Ehrenberg & Brewer, 1995; Elkind, 1988; Feistritzer, 1996; Haycock, 2003; Kukla-Acevedo, 2009; Rivkin et al., 2005). However, all major arguments omit any ancillary investigation of the possible relationship between racial incompatibility and students and teachers in student academic performance. This was the purpose of this study.
Limitations

Limitations are conditions that restrict the scope of the study or may affect the outcome and cannot be controlled by researchers. There are several limitations on the generalizations that can be made from the findings in this study. First, longitudinal data collected on school district student and teacher characteristics are confined to the data elements accessible in the TEA AEIS database for the 10-year period. Data collected through AEIS were available as prescribed by the state definitions of these terms, which might have changed during any time period in question. Also beyond the control of researchers is the variety of teacher characteristics referred to as measures of teacher “quality.” This study bridges a period of time predating NCLB. Thus, the possibility exists some of the teachers included may not have met current quality standards. Second, because of the limits of PEMIS reporting and confidentiality, this study did not associate a particular teacher with a certain race/ethnicity of student. Third, in some time periods all student groups might not have been represented at the campus level in sufficient numbers to allow TEA AEIS reporting. Therefore, the data might not always generalize to all student demographic groups. Fourth, the assessment instruments were not consistent throughout the study period. Student achievement data were derived from both the TAAS and the TAKS, which were the two assessments used by the TEA for the 10 years from 1999 through 2008.

Delimitations

Delimitations are restrictions imposed prior to the inception of the study to narrow its scope. First, this study is limited to the academic performance of African Americans, Hispanics, and Whites in 10 selected districts and randomly selected campuses for Grades 4, 8, and 10. This investigation is confined exclusively to students’ scores in 10 individual school districts in the state of Texas. School districts were selected based on the 2009 CREATE data identifying the
sample university’s Proximal Zone of Professional Impact (PZPI). The rationale for this selection is amplified in Chapter 3. The generalizability of these analyses to other geographic locales was not known. Second, Campuses housing Grades 4, 8, and 10 were screened to ensure an enrollment requirement was not required, thus excluded the participation of magnet or academically select campuses.

A delimitation, and also a limitation, was that this study involved no exploration of teacher quality or teacher preparation. Along this strand, teacher race/ethnicity was restricted to White teachers. The possible influence of teachers from other groups was considered.

Summary and Organization of Following Chapters

This chapter presented an overview and background of the study and the need to explore changing student demographics and academic achievement from the perspective of the ratio of racial/ethnic diversity of students to White classroom teachers. There is a gap in the research about student achievement in relationship to student-teacher race compatibility. The nature of the relationship between the student to teacher race/ethnicity ratio and student achievement had not been studied, but this relationship might be important in closing or eliminating measured achievement gaps.

In Chapter 2, a review of the literature pertaining to demographics and student achievement is presented. In Chapter 3, the research design is outlined, and information about the data to be obtained from the 10 school districts, 10 high schools, 10 middle schools, and 10 elementary schools selected for this study is provided. Chapter 4 includes the results of the study based on the correlations across 10 years of data for the selected districts and campuses. Finally, in Chapter 5, the relevance of the findings is discussed, and suggestions are offered for future study.
CHAPTER 2

REVIEW OF LITERATURE

Introduction

This chapter presents the literature surrounding the conversations on disparity in student achievement between racial/ethnic groups. The story of concerns about gaps in student achievement in Texas cannot be told apart from its inception in the womb of economic resources allocation and Texas school finance reform. Although this is an abridged presentation of turbulent times in Texas education, this study owes more to the economic travails of this state than to the mandates of NCLB (2002). The ebb and flow of legislatively-created racial/ethnic classifications, financial resources redistributions, and stewardship accountability measures contributes to a widening and deepening delta of literature and theory on student achievement disparity. In this chapter, the racial/ethnic context of student achievement are discussed and are followed by a short review of historical highlights of racial/ethnic events that set the stage for current conceptualization of these issues. Historical artifacts are sometimes omitted from the reviewed literature, but those artifacts are included in this review because of a context that includes events surrounding the first authorization of Elementary and Secondary Education Act (ESEA). Brief, but important, forays into pre-No Child Left Behind (NCLB) judicial and economic considerations are presented. The chapter then situates the body of literature surrounding NCLB’s mandates to use taxpayer money prudently while eliminating racial/ethnic achievement disparity through application of an economic concept, accountability, to student outcomes of the school curriculum. Next, the effects of student achievement and teacher factors of compatibility and race are discussed, concluding with a discussion of achievement as framed by the student teacher race ratio (STRR) construct developed for this study.
Racial/Ethnic Context of Student Achievement

Student achievement is not a chance occurrence. It is the outcome of a highly sophisticated orchestration of tangible and intangible resources. Teachers and parents are unique in that they serve in both capacities. Although parents are not within the auspice of the State education system, teachers are. With the passage of Texas school finance reform (Acosta, n.d., p. 11), *Edgewood Independent School District et al. v. William Kirby et al.* (1989), and the ensuing accountability and performance mandates of NCLB (2002), the correlation between teacher quality and student achievement have been on the forefront of educational, political, and economical agendas (Darling-Hammond, 1999; Goe & Stickler, 2008; Rivkin et al., 2005; U.S. Department of Education, 2002; Wayne & Youngs, 2003; Weaver, 1983; Wise, 2000). There is no doubt that quality teaching can make measurable differences in student achievement. A rub to this noble belief, however, is longitudinal, quantifiable evidences that achievement disparity falls neatly along racial/ethnic partitions (Center on Education Policy, 2010; D’Amico, 2001; National Center for Education Statistics [NCES], 2008b, 2008c; Texas State Board of Education, 1991). Much of the educational literature on policy determinates of student achievement has focused on reducing class sizes, measures of quality teacher characteristics, and teacher education (Goldhaber & Hansen, 2010; Harris, 2002; Ingersoll, 2001; Kennedy, 2010). However, external to the educational field, sociological, and economic literature briefly explore the student achievement benefits of student-teacher racial/ethnic alignment. Few studies have been conducted that offer definitive answers as to the interaction, if any, between these seemingly incongruent approaches and whether a relationship emerges between exposure to own-race teachers and subsequent student achievement outcomes. Some evidences that emerge suggest that there is little association between student achievement and the racial match between
students and teachers (Darling-Hammond, 1997; Ehrenberg, Goldhaber, & Brewer, 1995; Haycock, 2003; Howsen & Trawick, 2007). Yet, other literature demonstrated that commonality in race or ethnicity elevates student achievement (Bishop, Dudley, Mihaly, & Murphy, 2005; Dee, 2004; Ehrenberg & Brewer, 1995; Goldhaber & Hansen, 2010). Although there is not a clear understanding about the relationship of these variables, it is clear which students are most affected: African American and Hispanic students.

African American and Hispanic students have not achieved the same plateau of academic achievement as their White contemporaries on state assessment outcomes (NCES, 2009e). The disparity in achievement outcomes between student groups has been of concern to Texas policy makers, state agencies, local districts, and stakeholders/taxpayers for decades (Texas State Board of Education, 1991). Parity in student achievement is especially important in Texas because Hispanic pupils dominate the state’s public classrooms (Texas Education Agency [TEA], 2009c). This a trend that is likely to continue based on state birth rates (Texas Department of State Health Services, 2005) and projections by the former state demographer (Murdock, Hoque, Michael, White, & Pecotte, 1997) and the United States [U.S.] Census Bureau (2004). As the Texas public school system continues to move toward educating a minority majority, the teaching workforce has remained White and has not been effective in attenuating the achievement gap in the critical subjects of reading and math.

Historical Review of Student Diversity in U.S. Public Education

In 2011, it was 57 years since the U.S. Supreme Court heard the State of Texas argue in Hernandez v. Texas that Mexican Americans were of the White class and not due special class-base considerations, such as ethnic representation on juries. Since Mexican Americans were White, the State argued, the 14th Amendment only applied only to Whites and African
Americans. The Supreme Court did not concur with the state’s logic (Allsup, n.d.b). Fifteen days later the Warren Court struck down *Plessey v Ferguson* finding the ideology of separate but equal to be incompatible with the 14th Amendment. It has been 56 years since the Warren Supreme Court ordered states to integrate their publically funded schools "with all deliberate speed” in the 1970 *Brown II* (1955) case (Baliles, n.d.).

It has been 54 years since President Eisenhower signed the Civil Rights Act of 1957, the first civil rights bill since Reconstruction. Sixteen days later, September 24, 1957, President Eisenhower sent paratroopers from the 101st Airborne Division to safeguard the “Little Rock 9” African American students attempting to attend schools that had previously enrolled only White students in Little Rock, Arkansas (Baliles, n.d.). Ten days after that event on October 4, 1957, *Sputnik* was launched by the Soviet Union, and the demand for greater effort toward attaining American achievement erupted. It has been 53 years since Ernest Green, an African American student, received his high school diploma from Central High School in Little Rock under the watchful eye of 602 White classmates and 125 federalized Arkansas National Guardsmen (Bates, 1962).

It has been 47 years since the Civil Rights Act of 1964 became law and was used to ensure all Americans had equal access to voting booths, employment opportunities, housing, and classrooms (Civil Rights Act of 1964, 88 U.S.C. § 88-35, 1964). In that same year, the U.S. Congress mandated that the Commissioner of Education conduct a survey on the equality of educational opportunity for all students as a result of the legislation. In the 46 years since President Lyndon Johnson signed the ESEA into law, billions of dollars have continued to flow into public education to close the student achievement gap between racial/ethnic and low SES populations (U.S. Congress, 1965).
It has been 45 years since James S. Coleman and colleagues reported to the U.S. Congress on the educational accessibility and equality of educational opportunity for all students (see Coleman et al., 1966). Although the authors’ conclusions are not universally embraced this mammoth report remains the seminal benchmark on student racial/ethnic accessibility to the curriculum and achievement. Although the goal of equal access has been for the most part realized, demonstrated equality of achievement has not been. A major intention of the 2001 reauthorization of the ESEA by President George W. Bush was to rectify racial/ethnic achievement dissimilarities with a highly qualified teaching cadre.

Two years from 2011, all public school students, nationwide, are expected to reach a standard of “proficiency or better” in reading and mathematics per the mandates of the reauthorization of the ESEA, known as the No Child Left Behind Act of 2001 (NCLB, 2002). Ensuring this level of achievement for all students is likely to be challenging: From the appeal of the 1954 Brown v Board decision, a case known as Brown II (1955), to the present, not one year has passed in which African American and Hispanic students have demonstrated academic parity with their same-grade White contemporaries.

Each of the seminal events listed was focused on access to a state funded and supervised public education system created to ensure equality in attaining the “dream” for all American students. In A Nation at Risk, the National Commission on Excellence in Education (1983) stated well the nature of the parity:

Part of what is at risk is the promise first made on this continent: All, regardless of race or class or economic status, are entitled to a fair chance and to the tools for developing their individual powers of mind and spirit to the utmost. (p. 11)
Although access and equality in education focus on generalized student “achievement,” achievement carries with it economic and political benefit. In the early 1980s, the U.S. was in a substantial economy recession. On August 26, 1981, Secretary of Education Bell created the National Commission on Excellence in Education to examine the quality of education in the U.S. and to present a report within 18 months. On April 26, 1983, A Nation at Risk: The Imperative for Educational Reform emerged (National Commission on Excellence in Education, 1983). Although the report’s original intent was to motivate collective education reform, its thesis was appropriated by economic theorists as the reason for the U.S.’s lack of economic vitality compare to Japan, South Korea, and Germany. The National Commission on Excellence in Education warned that the U.S. was at risk because of students’ perpetuating lower skill levels than their international counterparts and trade competitors (Rossi & Montgomery, 1994).

Educational reform in the 1980 Reagan years was framed bluntly and unashamedly in economic terms. Students attending public school were viewed as not up to the challenges of competing in a global economy and supporting a retiring workforce. As Rossi and Montgomery (1994) noted in Education Reforms and Students at Risk: A Review of the Current State of the Art:

According to some projections, by the year 2020, about one-fourth of children will live in poverty, and children of color will comprise more than half of students in public schools. Already, in many districts, children of color comprise the majority of public school students. It is from this young, ethnically diverse population that the next generation of scientists, engineers, and mathematicians must be drawn to replace retiring professionals in the next century. And it is this young, ethnically diverse population that the aging Baby Boomers must depend upon to support the Social Security system. (p. Preface)
Economic Considerations of Achievement Disparity

Economic realities and demographic trends gave urgency to education reform efforts because poor children and children of color have been growing in proportion to the number of White children with whom they share classrooms (Murdock et al., 1997; Parkland Hospital, 2005; Rossi & Montgomery, 1994; Texas Department of State Health Services, 2005; U.S. Census Bureau, 2008). While the personal and social costs of school failure have been apparent for decades, huge disparities between the well-educated "haves" and the poorly skilled "have nots" have intensified the socioeconomic divisions of society and contributed to urban decay and violence (Aronowitz & Giroux, 1985; Chow, 2007; Rossi & Montgomery, 1994; National Commission on Excellence in Education, 1983).

The contributory roles of race, ethnic, and immigrant variation to educational achievement and attainment have become more important than ever as the U.S. population evolves into an increasingly diverse society. The increasing diversity in the general population is even more apparent among youth. The U.S. Census Bureau (2004) estimated for 2000 that 34% of all youth aged 15 to 19 years were from minority groups and, by 2025 this percentage will have increased to 46%. Also, at the beginning of the 21st century, approximately 1 in 5 school-age children were from immigrant families (Suarez-Orozco & Suarez-Orozco, 2001). In 2009, the proportion of Texas students who are not White has grown to 2 out of 3 students (TEA, 2009c, 2010c).

Understanding the educational patterns among immigrant youth, and especially for Hispanic youth, is important. In 2009, 47.9% of Texas public schools enrolled Hispanic students (TEA, 2010a). Of the four racial and one ethnic groups tracked by the Texas government, Hispanic and African American students had the lowest graduation rates, only 70.8% and 71.8%,
respectively (National Governors Association, 2008). Graduation rates are recognized barometers of state employment rates, social services, and economic futures.

The associated link between academic performance, educational attainment, and eventual labor market outcomes is known and extensively documented (Coleman, 1961; College Board, 2004; Institute for Public Policy, 2005; Jencks, 1972; Texas State Board of Education, 1991; Viadero & Johnston, 2000). Some of the relative disadvantages and advantages faced by racial/ethnic minorities can be traced to gaps in educational achievement and attainment (Hunter & Bartee, 2003; Jencks, 1972; Miller, 1995; NCES, 2008b, 2008c). Ensuring equality of participation in the economic fruits found in the U.S. has been difficult to realize and legislate. In conflict to the seemingly carte blanche mentality of a free and appropriate public education to all, is appreciating the tenuous relationship between individual students’ needs and investor or taxpayer expectations of public education.

The judgment rendered in the 1954 Brown decision was not based on academic achievement but on ensuring equality of educational opportunity for all children and their taxpaying parents. Coleman et al. (1966) argued that elevated educational attainment provides enhanced economic mobility (i.e., access to a better job). This argument remains fresh in today’s economic climate where economic mobility facilitates social assertion and status but only if educational achievement can be attained. However, some see educational attainment as rudimentary to a participatory form of government (Resnick, 2010). However, achievement is influenced by numerous economic variables that children, parents, and teachers cannot control.

Family income affects where children attend school and the subsequent socioeconomic and racial character of the schools they attend (Fass, 2009). From the mid-1960s, minorities have generally attended schools where the student body is composed primarily of minority
students (Cochran-Smith & Zeichner, 2005; Coleman, 1975; Coleman et al., 1966; Freire, 1970; Jencks, 1972; Mosteller & Moynihan, 1972; Nieto, 2000; Parsons, 1959). In more contemporary times, Goldsmith (2004) found that for 1994, 94% of White students attended separate White schools. Goldsmith argued racial/ethnic differences in achievement among students mirror the racial/ethnic differences among schools. Approximately 75% of African American and Hispanic students attended predominantly non-White schools (Ladson-Billings, 2006). The student demographic representation gap in school composition can have a significant impact on the resources found in the schools. Ladson-Billings concluded that financial resources follow White middle-class students. After studying the education systems in 49 states, the highest poverty schools in 27 of the states received fewer resources than schools located in affluent communities. In Ladson-Billings’ findings, 30 of the states’ highest minority districts received less revenue per child than the low minority districts. The distribution of financial resources can be directly translated to student achievement (Edgewood Independent School District et al. v. William Kirby et al., 1989). The reallocation of resources remains a turbulent topic in Texas.

In Texas during the socially and economically turbulent 1970s and 1980s, a great deal of economic and intellectual capital was gained or lost based on how well public school students demonstrated minimum competencies on achievement measurements. Texas was losing corporate relocations to California and Florida because of a poorly educated workforce (Elkind, 1988). One school district believed it was the state’s duty to provide equality in school financing if student achievement was to increase. A lawsuit filed by the Edgewood ISD forced the Texas legislature to address the incompatibilities of student achievement as a correlate of the state’s methodology of school financing.
The 1970s were an important decade for Texas’ history. Prior to 1970, Mexican Americans were classified as White and segregated not by race but by "pedagogical analysis" or language deficiency (Allsup, n.d.a). The landmark case Cisneros v. Corpus Christi ISD in 1970 ensured the status of Mexican American would be identified as a distinct minority group comparable to African American (Allsup, n.d.a). The Cisneros ruling invalidated the historic labeling of Mexican Americans in Texas as the “other Whites” (Allsup, n.d.a) that had allowed districts to educate these students in schools predominated by Mexican Americans. Districts circumvented integrating Mexican American students into White school under the guise that these students’ had “particular” educational needs specific to language and culture, and therefore were best served in segregated settings with their “own” (see Inhabitants of Del Rio Independent School District v. Jesus Salvatierra, 1931).

Although the U.S. Supreme Court held in San Antonio ISD v. Rodriguez (San Antonio Independent School District v. Rodriquez, 1973) that the right to a public education is not protected under the U.S. Constitution, the Texas Supreme Court later held that although education is not a right, the funding of state public schools must approximate parity. This was the outcome of the watershed school refinance case, Edgewood ISD v. Kirby (1989, Acosta, n.d.). The justices deemed public school funding across Texas school districts must be allocated in an equitable manner to promote and facilitate student success and achievement (Edgewood Independent School District et al. v. William Kirby et al., 1989). This ruling was the first mention that school funding levels were linked directly to student achievement. The Texas justices’ supposition to link district funding to achievement was counter to Coleman et al.’s
(1966) findings in their *Equality of Educational Opportunity* report (EEOR) published nine years earlier.

The *Edgewood ISD v. Kirby* ruling underscored the reality that property poor districts had the same right to provide a “compatible” and an equitable education to their students as property wealthy districts (*Edgewood Independent School District et al v. William Kirby et al.*, 1989). In other words, Edgewood ISD charged it was the States’ responsibility to eliminate the funding incompatibilities between property wealthy and property poor school districts (i.e., to close the financial gap). For example, at the time of the suit Edgewood ISD had $38,854 in property wealth per student while its next-door-district, Alamo Heights ISD, had $570,109 property wealth value per student (Acosta, n.d.). Property-poor districts had to set a tax rate that averaged 74.5 cents per $100 valuation to generate $2,987 per student, while richer districts could set a tax rate of one-half less, 37.5 cents per $100 in valuation, and could generate over twice the revenue per student, $7,233. The premise of having equality in per student funding was intended to translate into parity of student achievement. Edgewood argued that the existing funding formula produced disparities in the districts' abilities to hire good teachers, build appropriate facilities, offer a sound curriculum, and purchase such important equipment as computers (Acosta, n.d.).

In the early 1990s with advent of Texas school refinance and the state’s reapportioning district dollars, the public school agenda shifted from access to a free and appropriate public education to provision of public school curriculum that was equally funded. Texas also faced stiff taxpayer accountability as money flowed out of property wealthy districts to property poor districts. Taxpayers and businesses supported quantitative achievement measurements from all student groups for each dollar invested in public schooling (Elkind, 1988). As a result of these forces, the Texas legislature adopted quantitative accountability measures to monitor and report
the relationships between increasing revenue parity and declines in achievement disparity between racial/ethnic student groups.

These economic and achievement concerns by the citizenry were part of the Long Range Goals for Texas 1991-1995 set forth by the Texas State Board of Education. The nine goals were subsequently adopted by the Texas Legislature, codified into the Texas Education Code, and applied to nine institutional domains:

1. Student Learning: All students will achieve their full educational potential.
2. Curriculum and Programs: A well-balanced and appropriate curriculum will be provided to all students.
3. Personnel: Qualified and effective personnel will be attracted and retained.
4. Organization and Management: The organization and management of all levels of the educational system will be productive, efficient, and accountable.
5. Finance: The financing of public education will be adequate, equitable, and efficient.
6. Parent Responsibility: Parents will be full partners in the education of their children.
7. Community and Business Partnerships: Businesses and other members of the community will be partners in the improvement of schools.
8. Research, Development, and Evaluation: Instruction and administration will be improved through research that identifies creative and effective methods.
9. Communications: Communications among all public education interests will be consistent, timely, and effective. (Texas State Board of Education, 1991, pp. 5-8)
These goals ushered in the student accountability movement and transparency in reporting to the public through the Academic Excellence Indicator System (AEIS) and its associated AEIS reports.

### Standards Movement and Accountability

The Long Range Goals for Texas 1991-1995 ushered in a universal, state mandated curriculum, the Texas Essential Knowledge and Skills (TEKS); annual student assessment to measure academic progress; and teacher certification examinations. The state aggressively adopted the ideology that teachers and a prescribed curriculum could outweigh environmental and sociological influences on school performance as noted by Coleman et al (1966) along with other sociological researchers (Coleman, 1975; Counts, 1932; Mosteller & Moynihan, 1972; Moynihan, 1972). The state of Texas addressed the student achievement component based on a standardized, mandated state curriculum and an annual state assessment of that curriculum administered to all Texas public school students. In short, the state wanted to know if teachers were fulfilling their contractual obligations to teach all children well enough to pass the state competency assessment, particularly in the key areas of literacy, mathematics, and science.

The year of 1995 was pivotal to Texas education. That year signified the termination of the State Board of Education’s Long Range Plan and George W. Bush’s inauguration as governor. This year marked the beginning of Governor Bush’s career as an “education governor” whose state policies extended into his ascendance into the U.S. presidency in 2001.

Because of Texas’ beta testing student achievement through high-stakes assessment, the state’s educational policy served as a precursor to the NCLB (2002). The “high-stakes” consequence of these assessments is substantial. Students who do not pass the assessments are not awarded their high school diplomas, which impacts future income and employment.
opportunities. Politicians and economists praised quantitative accountability rubrics because measurement of student achievement in math and reading, through regular standardized tests, generates data to hold schools accountable for reducing academic achievement gaps between students of different racial and socioeconomic backgrounds (Spencer, 2010). These measures consider students and teachers as racial/ethnic and gender neutral. Using grade-level-appropriate instructional techniques and practices and following a standardized state curriculum, it fell to highly-qualified teachers to reduce substantially reduced the achievement gaps for African American and Latino students (Wenglinsky, 2004).

These gaps had long troubled Americans, especially those who hoped public schools and education could serve as a great equalizer in American society (Cohn, 2006). Educators tended to take an opposite view of NCLB, high stakes assessments, and accountability-based teaching by believing that these requirements downgraded the educational process, forced teachers to “teach to the test,” and led to blaming schools for social problems beyond their control, such as poverty, urban decay, racial inequalities, and disparities in health care (Hunter & Bartee, 2003; Spencer, 2010).

The dialogue as to the causes and effects of raising achievement for Texas’ racial/ethnic student groups has oscillated among many topics - accessibility, school funding, standardized assessments, punitive accountability measures, and teacher quality indices, to no successful resolution. It was hoped that the student assessment and district accountability mandates championed by Texas would garner achievement gains on the national stage under the watchful eye of the U.S. Department of Education as required by NCLB.
NCLB and the Achievement Gap

In 2001, President George Bush signed the reauthorization of the Elementary and Secondary Education Act (U.S. Congress, 1965) initiated by President Lyndon Johnson in 1965, under its new name of the No Child Left Behind Act of 2001 (NCLB, 2002). Johnson’s purpose in this educational complement to his War on Poverty agenda had been to plow financial resources, initially $11 billion annually, into minority majority and high poverty schools to support and undergird the hard-won gains in equal opportunity found in the passage of the Civil Rights Act of 1964 (Civil Rights Act of 1964, 88 U.S.C. § 88-35, 1964; U.S. Congress, 1965).

In the NCLB reauthorization provisos were added to complement the 45 programs associated with the act. Congress authorized specific 5-year funding levels for five of the 45 authorized NCLB programs, totaling $28.9 billion for fiscal year 2007. Another $25 billion was directly allocated for Title I, Part A schools. Title I schools have the highest percentages of students who are eligible for the free and reduced lunch program. The total authorized level for NCLB was cited at $39.4 billion in fiscal year 2007 (New America Foundation, 2010a). In 2009, Texas received $1.37 billion dollars in Title I aid (New America Foundation, 2010b). In 2008, 20.6% of Texas students, aged 5 to 17 years, were identified as living with families in poverty (U.S. Census Bureau, 2008). The TEA (2009c) reported that of the 4,728,204 students enrolled in public schools for the school year of 2008-2009, 56.7% were identified as economically disadvantaged.

Since 1965, Title I aid continues to funnel monies into schools having a high percentage of students in poverty in an effort to raise academic achievement. President Johnson’s original intent was to inject substantial financial resources into low income areas to attenuate and eventually eliminate achievement disparities between races and ethnicities (U.S. Congress,
President Johnson, a former Texas public school teacher, believed a correlation existed between student achievement and revenue flow. From the Johnson presidency to the George W. Bush presidency, ESEA revenues were not associated with student achievement.

This non-accountable revenue flow was later tweaked by President George W. Bush to include student performance on states’ standardized outcome measures for all recognized minority student groups and White students (NCLB, 2002). A second caveat introduced in the NCLB was the concept of academic accountability, previously noted as an offshoot of Texas public school refinance. Student academic performance was coupled with establishing higher accountability measures for all schools that accepted federal aid (NCLB, 2002). However, the achievement gap, as measured by standardized and criterion referenced measurements between African American, Hispanic, and White students, has not abated since Coleman et al. (1966) made the first sounding of the problem. The persistence of the achievement gap and its measurement under NCLB are considered in the next sections.

Racial/Ethnic Achievement Gap

The “achievement gap” is a matter of race and class (National Governors Conference, n.d.). Although the minority achievement gap is poised as a race related gap, it is not exclusive to race/ethnicity. Under examination a complex, interactive mixture of socio-cultural emerges as school related factors manifested as achievement shortfalls. Lee (2002) showed that Hispanic children are twice as likely and African American children are three times as likely as White children to be raised in low income homes. And, it is the poorest kids that often find themselves in classrooms lead by teachers with the weakest education and preparation (Grossman, Beaupre, & Rossi, 2001).
The importance of socio-cultural factors, independent of race, as influences on achievement, has been affirmed in numerous studies (Ainsworth, 2002; Aratani, 2009; Freire, 1970; Jencks, 1972; Kozol, 1991; Moynihan, 1972). Lee (2002) found that the African American-White fissure in socioeconomic status and family conditions narrowed from 1970 to 1990, but the pace slowed down in the late 1980s and 1990s. Although socioeconomic status has been found to be related to the achievement gap, it is not the only variable with this relationship.

Roscigno (1998) found achievement gaps associated with racial and economic inequalities and achievement. This study found a significant 6.7 point standardized test score difference in math between the achievement of Black and White students, but Roscigno argued 30% is accounted for by family differences. Although socioeconomic factors play a substantial role in the disparity between minority and White students, socioeconomics are only part of the problem because 14% of the racial gap in math scores could be accounted for by educational processes not tied to family attributes. While it is simplistic to cluster the causes of African American and Hispanic achievement gaps into two general paths, the socio-cultural and educational paths, these two paths are not independent, constantly intertwine, and are difficult for researchers to dissect into causal agents.

The gap in academic achievement between racial/ethnic and economically disadvantaged students compared to their White counterparts persists across the nation. This remains one of the most pressing equity challenges education-policy makers face. The premise of NCLB (2002) places all children and teachers on equal footing to attain equal achievement performance targets for children from economically disadvantaged families, with disabilities, with limited English proficiency, and inclusive of all student racial/ethnic groups.
Is closing the academic gap important? Yes, because academic disparities can be measured in current and future economic contexts. Miller (1995) argued:

The continued existence of substantial minority-majority educational gaps is prohibitively costly, not only for minorities, but for the nation as a whole. Among the most compelling reasons for seeking to eliminate these gaps as soon as possible are the following: 1) the achievement of significantly higher minority education levels is essential to the long-term productivity and competitiveness of the U.S. economy; 2) if minorities are to enjoy the full benefits of their recently won civil rights, they need formal-education-dependent knowledge and skills much closer in quantity and quality to those held by whites [sic]; and 3) the maintenance of a humane and harmonious society depends to a considerable degree on minorities’ reaching educational parity with whites [sic]. (p. 4)

The concern of closing the achievement gap is no longer a domestic civil rights issue, but has become a global economic reality. The economic well-being of the U.S. requires the intellectual and social capital of all citizens, irrespective of race, if the country is to compete in international markets and contribute to the national and state economies.

Accountability Measures

Although NCLB is not specific in its outcome measures, there are several ways to measure the achievement gap between student groups. One common method is to annually compare the academic performance among African-American, Hispanic, and White students on criterion-based standardized assessments. The state of Texas has elected to address student achievement and bring parity to all student groups based on a standardized, mandated state curriculum as measured by an annual state assessment of minimum competency of all public school students in
Texas. In short, the state has wanted to know first if schools, and increasingly, individual teachers have been fulfilling their contractual obligation to teach the TEKS to all children.

Another way to measure the achievement gap has been to compare the highest level of educational attainment for various groups. Hispanic and African-American students are more likely than White students to drop out of high school in every state (College Board, 2004; National Governors Conference, n.d.). Of high school graduates, college matriculation rates for African-American and Hispanic students remained below those of White counterparts, although they have risen in recent years. Furthermore, of those students enrolling in college, Hispanic and African American young adults are only half as likely to earn a college degree as White students (College Board, 2004; Texas Higher Education Coordinating Board, 2007).

Based on outcomes of the assessments, adequately yearly progress (AYP) reports are generated for each school. NCLB has prescribed that by the 2013-2014 school year, AYP as measured by state assessments, must be at 100% for all student groups. Accompanying NCLB accountability measures is the National Assessment of Educational Progress (NAEP), which is known as the "nation's report card" and offers an "extensive data collection system that includes achievement tests" (Yell & Drasgow, 2005, p. 27). These assessments are administered in alternating years to a random sample of students. The 2009 NAEP report indicated that 38% of Texas Grade 4 pupils were proficient in mathematics (NCES, 2009b) and 28%, in reading (NCES, 2009c).

Within a school, if any student minority subgroup persistently fails to meet performance targets, defined in NCLB as Annual Yearly Progress (AYP), districts must provide public school choice and supplemental services to this school’s students and if academic performance is not demonstrated, the option exists to restructure the school's governance (NCLB, 2002).
Supplemental services are required for identified student groups, even if the school performs well overall. Under the mandates of NCLB, schools now are considered successful only if they close the academic achievement gap between recognized racial/ethnic student groups and Whites. Hunter and Bartee (2003) suggested that for minority students, learning in this system is based totally on the use of standardized testing as the measure of institutional and instructional accountability.

Zhang and Cowen (2009) reported that campuses that were failing to meet the AYP in 2003-2004 also enrolled greater percentages of minority students and students living in poverty. Zhang and Cowen noted the presence of a substantial teacher turnover at these schools which affected the academic performance of students. Sunderman and Kim (2004) reported that schools with large minority populations were expected to make unrealistic yearly progress to avoid sanctions, which include furnishing parents the option to move their children to different schools and purchasing supplemental services with school funds. Research has supported the contention that a "one-size-fits-all accountability model does not work in all conditions" (p. 5).

Student Achievement Variables

Researchers have identified a number of factors that serve as barriers to academic achievement for racial/ethnic student groups of academic achievement compared to White students. Some these factors include: poverty, test bias, academic loss over the summer, racial stereotyping, access to childcare, parental involvement, qualified teachers, and high student mobility (Haycock, 2003; Lee, 2002; Education Week, 2004; U.S. Census Bureau, 2004; Viadero & Johnston, 2000). Finding suitable solutions to these complex social and economic variables is to the benefit of all students. Each of these factors can be interpreted as a variable that affects the compatibility of students with the educational system as it helps them attain
acceptable levels of achievement (Cardenas & Cardenas, 1977). Four variables, poverty, language, culture and social perception are explored in the following sections from the context of Cardenas and Cardenas’ theory of incompatibility.

Poverty

In every society and cultural setting, poverty affects the lives of families for generations. Poverty brings adversity and missed economic opportunities for families and their offspring. In Poverty and the Oppressed, Freire (1970) discussed the effects of poverty on the peasants of Brazil and illustrated the struggles the peasants faced as a result of economic impoverishment. Freire proposed that until the peasantry elevated themselves through educational venues, they would remain shackled to the ruling elite. Freire’s liberation pedagogy, as a patchwork quilt of Existentialism, ideological Marxism, and politically entrenched liberality was previously espoused by Frantz Fanon (1963) in the portrayal of the French occupation of Algeria with the ensuing class repression.

Freire (1970), Fanon (1963), Coleman (1961), Moynihan (1972), and contemporary authors such as Kozol (1991) and Allington (2002) have written about the inequities and ensuing struggles and oppression brought on by poverty. Kozol and Allington identified poverty as an expanding societal problem overlooked by the school systems, politicians, and policy makers. Allington (2002) believed the achievement gap was growing between the haves and have-nots with little intervention. He stated that poor children continue to lack proficiency in reading because of the "absence of reading materials, such as books and magazines" (p. 14).

Throughout the nation, the number of students identified as living in poverty is higher among minority students than White students. In 2009, the percentages of children who were living in poverty were higher for African Americans (34%), American Indians/Alaska Natives
(33%), Hispanics (27%), and Native Hawaiians or Other Pacific Islanders (26%), than for children of two or more races (18%), Asians (11%), and Whites (10%; NCES, 2010c). Using eligibility for free or reduced-price lunches in 2009 as a poverty indicator, 48% of all Grade 4 students in public schools were eligible for school meals (NCES, 2010c). As a percentage of total racial ethnic distribution, 77% of Hispanic, 74% of African American, 68% of American Indian/Alaska Native, 34% of Asian/Pacific Islander, and 29% of White fourth graders received free meal services (NCES, 2010c).

Poverty has been suggested as the primary contributor to the achievement gaps and lags in minority success (Ainsworth, 2002; Banks, 2002; Chow, 2007; Cochran-Smith & Zeichner, 2005; Coleman, 1968; Coleman et al., 1966; Darling-Hammond, 2007; Jackson, 2009; Mosteller & Moynihan, 1972; Murdock et al., 1997; Sampson, Morenoff, & Gannon-Rowley, 2002; Small & Newman, 2001; Viadero & Johnston, 2000; Wight & Chau, 2009; Zeichner et al., 1998). A number of researchers have reported Hispanic students as being twice as likely to be reared in households deemed economically “poor” compared to Whites and Asians (Douglas-Hall & Koball, 2004; Germeraad, 2009; Grossman et al., 2001; Viadero & Johnston, 2000; Wight & Chau, 2009). Other evidences point toward higher academic achievement in families that are considered to be of medium to high SES (Levin, 1995; Sirin, 2005; Viadero & Johnston, 2000).

Being raised in a household with medium to high socioeconomic status has been related to academic achievement (Coleman et al., 1966; Coleman & Marjoribanks, 1975; Henderson, 1981; Viadero & Johnston, 2000; Zimmerman, Khoury, Vegas, Gil, & Warheit, 1995). In Texas, Chow (2007) found TAKS scores of approximately 10,000 students across five school districts to be 50 to 100 points lower for students on free and reduced lunch programs than for other students. Student achievement researchers have consistently supported the direct relationship

Language

A foundational role in a student’s acquisition of literacy is his/her ethnicity and culture (Ogbu, 1990). If language is not securely rooted in the home ethnicity and culture of the student, the acquisition of a secondary language can be overwhelming for some children (Tabors & Snow, 2001). It is the acquisition of oral and written languages that are the predictors of future success and academic achievement in school (Kosmoski, Gay, & Vockell, 1990).

Language, both written and oral, is a significant element deeply intertwined within an individual’s culture. Lack of mastery in an English-based curriculum poses a fundamental incompatibility with state achievement measures. NCLB aimed to ensure that English language learners (ELL) and immigrant students could attain English language proficiency and meet student academic achievement standards as expected of all children. Limited English proficient (LEP) references a student whose primary language is other than English and whose English language skills are not developed enough to perform academic work in English (TEA, 2010e). LEP students and their teachers are accountable to the state assessment.

A challenge to the task of ELL education programs is the multiplicity of languages represented in Texas classrooms. In Texas, over 120 languages are represented in the classrooms, although Spanish is the dominant foreign language and represents 91% of non-English speaking students (TEA, 2010d). Even though the majority of non-English speaking students speak Spanish, the remaining student groups are due equal access to the TEKS curriculum whether their native tongue is Vietnamese, Arabic, Urdu, or Korean. For example, in the minority majority Dallas ISD, with a 2009 student population in excess of 157,000 students, over 70
different home languages are represented. Of its ELL population, 35% (55,025 students) are categorized as LEP (TEA, 2009a). Cardenas and Cardenas (1977) contended that demonstrating academic success in an English-based curriculum is substantially challenging when the student is unable to comprehend the curriculum linguistically and likely to indicate to teachers that the students’ native tongue and culture are inferior, for example, Spanish and Mexican.

Culture

Cultural influences also affect student achievement. Respect and appreciation of various cultures is part of the composite American culture. America is perceived as a melting pot, an amalgam of different cultures, languages, and religions within one host community. Each culture’s traditions influence the students, and the educational system is responsible for acknowledging those traditions while providing an equitable, quality education. Zimmerman et al. (1995) argued that in the past educators believed if minority students were to receive a quality, equitable education they must be taught by teachers who shared their same racial, ethnic, and cultural backgrounds. Banks (2002, 2004) suggested that teacher beliefs and attitudes about race and culture bear heavily on the academic success or failure of minority, urban educated students. However, these postulates have not been widely tested empirically.

Social Perception

Perceptions of students by teachers and educational institutions have been demonstrated to affect student achievement. Cohen (1988) states that society, stakeholders, and taxpayers, ultimately see teaching as being an attempt to change other human beings and that success in such collaborative enterprises is unlikely when the other humans in the equation are unwilling to cooperate. Teachers must see value in investing their social and intellectual capital in the educational task they face every day (Achinstein, Ogawa, & Speiglman, 2004; Coleman &
Duncan and Magnuson (2005) argued that socio-economic hardships for families have inadvertent consequences on students. Lee and Bowen (2006) supported the earlier findings of Henderson (1981) that familial home stability and economic circumstances play an important role in students’ academic success. Economic stability was expressed in Hispanic family involvement in their children’s schooling and classroom activities based on students earning higher grade point averages than their classmates who did not have such supports. Researchers found parents of low income (i.e., earning less than $10,000 per year) received less information from school personnel and administrators and faced a larger “information gap” than parents of incomes exceeding $10,000 per year (Teske, Fitzpatrick, & Kaplan, 2006, p. 969).

Pong, Hao, and Gardner (2005) determined that Hispanic students who were economically disadvantaged had less educated parents and lower grade point averages than similar students of high socio-economic status parents. Davis-Kean and Sexton (2009) reported statistically significant differences among parental educational attainment and ethnicity and children's academic achievement. As far back as the 1960s, Coleman et al. (1966) reported students' success as related to their home environments and their parents’ educational accomplishments.

Teacher expectations are likewise influenced by students’ family status. D’Amico (2001) found that teachers have lower expectations for their African American students than they do for White students. As a consequence, teachers’ African American and Hispanic students hold themselves to lower ability and performance expectations that ultimately lead to lower academic achievement. Roscigno (1998) found that students whose teachers believe they will attend college scored higher on standardized achievement assessments than their peers. Dee (2004)
found students with teachers of like race and ethnicity demonstrated improvements in academic achievement. Dee’s notion that no strong evidence supports the contention that students and teachers of the same ethnic background produce higher student achievement was countered by Zumwalt and Craig (2005). Zumwalt and Craig contended that the quality, not the race or ethnicity of the teacher, promoted students’ academic achievements. Again, the lack of empirical research into student achievement in relation to the races and ethnicities of students and teachers deserves further investigation.

Student Achievement Variables Summary

The achievement gap between African American, Hispanic, and White students is longstanding and numerous related variables have been explored since the mid-1950s. However, consistently absent throughout the lengthy discourse is substantive, empirically based data specifically relating to STRRs and student achievement.

Teacher Quality’s Effect on Student Achievement

Many fiscal and emotional resources have been expended on closing the achievement gap between students of varying racial, ethnic, and socioeconomic groups. Within a racial and ethnic frame, educational agencies serving majority populations of African American and Hispanic students have received the majority of these resources (Germeraad, 2009). Policy makers, state and federal accountability agencies, and local districts have struggled with identifying instructional strategies and securing and maintaining a teaching workforce capable of educating students from diverse racial and ethnic backgrounds and varying degrees of generational poverty. The complexity of these intertwined academic, social, and economic variables is not well understood, but a relationship emerges between African American and Hispanic compared to White students (Viadero & Johnston, 2000). Of interest in this equation is the rapid transition in
student racial/ethnic representation in public schools as the teaching workforce retains its White majority. In the recent past, the ability of the highly qualified teacher, as defined in NCLB (2002), to close the achievement gap has been debated.

NCLB (2002) mandated that states employ highly qualified teachers in every classroom by the beginning of the 2005-2006 academic school year. NCLB defined qualified teachers as individuals who have a bachelor's degree, are fully certified by the state in which they preside, and show competency (demonstrated by passing a state certification examination) in the subject they teach (NCLB, 2002). The literature is replete with evidence and commentary that teachers meeting the criterion of highly qualified contribute to closing the achievement gap between Whites and subgroups (Boyd, Loeb, Wyckoff, Lankford, & Rockoff, 2007; Cochran-Smith & Zeichner, 2005; Darling-Hammond, 1990; Educational Testing Service, 2002; Haycock, 2003; Wayne & Youngs, 2003; Wise, 2000). Researchers have indicated teacher quality has a measurable impact on student performance on standardized tests. As part of the Texas Schools Project (see Kain, 2001), Rivkin et al. (2005) indicate that teachers have measurable effects on student reading and math achievement outcomes. Using data from Prospects: The Congressionally Mandated Study of Educational Growth and Opportunity 1991-1994, Rowan, Correnti, and Miller (2002) documented that students learn differential amounts in a normal school year of nine months or more depending on the characteristics and qualities of the teacher.

Proponents argue that highly qualified teachers make an impact on the achievement gap for minority students and students who come from economically disadvantaged environments (Boyd et al., 2007; Haycock, 2003; Small & Newman, 2001; Smith, 2009; U.S. Department of Education, 2002; Viadero & Johnston, 2000). Resulting from the elevated teacher criterion of highly qualified mandated by NCLB (2002), the United States has some of the highest qualified
teachers in relation to certifications and standards when compared to 46 other industrialized nations (Akiba, LeTendre, & Scribner, 2007).

The strong relationship between student achievement and teacher quality does not hail from post-NCLB effects. Coleman et al. (1966) reported this correlation in the 1960s when civil rights and the effects of the Brown court were in their infancy. More importantly, Coleman et al. concluded that teacher quality had a cumulative effect on student achievement, and teacher quality appeared “more important to minority achievement than to that of the majority” (p. 22).

Coleman et al. (1966) argued for the importance of teacher quality in elevating student achievement and were supported by Marzano, Pickering, and Pollock (2001). Marzano et al. believed that 90% of factors responsible for student academic achievement are due to the direct influences of school and teacher quality. Marzano et al. argued in favor of the proposition that schools which are clean, safe, and organized employ quality teachers with high expectations for all students, practice fair policies for all students and create an environment more conducive to learning and higher student achievement. The converse inference is that chaotic, dirty, and unsafe schools staffed with poorly qualified teachers and unfair staff policies generate an environment likely to interfere with all students’ academic achievement.

Bembry, Jordan, Gomez, Anderson, and Mendro (1998) found similar results for the Dallas ISD. The reading scores of fourth graders, who were consecutively assigned to three “highly effective” teachers during this pre-NCLB study, rose from the 59th percentile in the fourth grade to the 75th percentile at the conclusion of the sixth. In comparison, a slightly higher achieving but similar group was assigned to three ineffective teachers. These ineffective teacher group students’ achievement fell from the 60th percentile in fourth grade to the 42nd percentile by the end of the sixth grade.
However, students who come from higher socio-economic statuses have greater access to qualified teachers than lower SES students (Akiba et al., 2007; Alliance for Excellent Education, 2005; Useem, Neild, & Farley, 2005; Wight & Chau, 2009). Gandara and Contreras (2009) stated that Hispanics are not historically taught by the highly qualified teachers necessary to achieve academic success (p. 105). Highly qualified teachers affect students’ academic achievements as a function of the level of expectation held for the students. High expectations and support are needed from preschool through college for many Hispanic and African American students who are unsure of the educational process, face more obstacles, and receive limited support from non-academic agents (Coleman, 1961; Gandara & Contreras, 2009; Hunter & Bartee, 2003; Lee, 2002; Miller, 1995). Unfortunately, many highly qualified teachers prefer not to remain on campuses with low achieving student.

Teachers and Environmental Compatibility

As noted in ecological systems theory (Bronfenbrenner, 1979), people seek levels of social and emotional stability. Teachers seek environments affording them social equilibrium. Similarly, teachers seek environments that are accommodating, rewarding, and akin to their points of reference. Coleman et al. (1966) noted these finding in the 1960s: “Only in the South does the average White attend a school in which a majority of the teachers express a preference for teaching Anglo-Saxons” (p. 166), and the same remains true today. Nationwide, teachers of all racial/ethnic backgrounds prefer to teach high-achieving students (Feng, 2006; Fong, 2006; Ingersoll, 2001; Plecki, Elfers, Loeb, Zahir, & Knapp, 2005), which according state and national data, are White students in non-poverty setting (NCES, 2009b, 2009c, 2010b, 2010d; TEA, 2010a).
Evidence that some teachers will work a few years in the hard-to-staff schools before transferring to schools serving students of higher socioeconomic status as these positions become available is not uncommon (Lankford, 1999). In New York state, Lankford, Wyckoff, and Papa (2000) found that teachers who migrate from New York City to other districts end up teaching fewer poor and minority students. On average, teacher transfer reduced the number of low income children faced in transfer teacher classrooms by about two thirds and reduced the proportion of non-White children they taught by approximately 50% (Lankford et al., 2000).

Ingersoll (2001) analyzed national survey data and found that 27% of teachers who moved to other schools and 25% of those who left teaching did so because of dissatisfaction. Numerous factors influenced these teachers’ decisions to terminate or relocate. Although low pay was the primary source of their dissatisfaction, school-level working conditions, such as inadequate administrative support, student discipline problems, lack of faculty influence in decision making, and lack of student motivation were cited as factors contributing to their dissatisfaction (Ingersoll, 2001). Ingersoll, however, did not have access to information about teachers’ relative weighting of the importance of these factors.

Johnson and Birkeland (2003) conducted a longitudinal interview study of 50 new teachers in Massachusetts and examined teachers’ reasons for staying in their schools, moving to new schools, or leaving public school teaching within their first 3 years of teaching. Mid-career entrants ($n = 24$) were more than three times as likely as their first-career counterparts to move from one school to another. Johnson and Birkeland concluded that those with prior career experience, often in higher-status and better-resourced lines of work, were less tolerant of schools that did not support good teaching. Having more experience than their colleagues afforded this group leverage and mobility, factors which led them to seek out desirable
environments. To reach a level of acceptable compatibility, the teachers often reported taking
cuts in pay and status or moving again in search of a work environment in which they could
succeed.

Fong (2006) studied data from the Schools and Staffing Survey Report, 1999-2000, and
found that a majority of employment-seeking teachers in the SASS pool sought jobs in districts
and campuses with low-poverty and low-minority pupil populations. Fong corroborated earlier
research that found teachers were looking for specific pupil population profiles that matched
their need for compatibility, meaning that they were looking for their own people and their own
culture codes and cues (NCES, 1995, 2007; National Commission on Teaching and America's
Future, 2002). Because the majority of teachers seek employment in districts and campuses with
low-poverty and low-minority student populations, districts with low-poverty and low-minority
pupil populations receive more teacher applicants having more instructional experience. Fong
noted that American Indian and African-American teachers are less likely than White teachers to
apply for teaching jobs in low-poverty schools.

In other studies, teachers have reported that their work is more difficult when they and
their students do not share characteristics such as social expectations, race, ethnicity, and
language (Johnson & Birkeland, 2003). In general, researchers have found that the majority of
teachers who migrate within districts or to other school districts attempt to secure employment in
schools with fewer poor and minority students and on campuses with higher student academic
achievement scores (Burnstein & Sears, 1998; Carroll, Reichardt, & Guarino, 2000; Cochran-
Smith & Zeichner, 2005; Coleman et al., 1966; Darling-Hammond, 2007, 2008; Darling-
Hammond & Sclan, 1996; Feistritzer, 1996; Hanushek et al., 2004; Morrell, 2010; Moynihan,
1972; NCES, 2007; National Commission on Teaching and America's Future, 2002; National
Student Achievement Affecting Teacher Attrition

As Johnson and Birkeland (2003) found, teachers report their work to be more difficult when they and their students do not share particular characteristics such as social expectations, race, ethnicity, and language. To attain an acceptable degree of compatibility, evidence has indicated that teachers seek out employment opportunities on campuses that historically demonstrate high student academic achievement. Student achievement is a high priority consideration for Asian and White teachers, although all teachers on average move to higher-performing schools over time (Darling-Hammond, 1999; Ehrenberg et al., 1995; Fong, 2006; Gamoran & Long, 2006; Hanushek et al., 2004; Plecki et al., 2005; Rivkin et al., 2005; Santillano, 2009). Evidence has supported the contention that most teachers look for employment settings in which students aspire to high academic, and limited academic remediation of students is required. Wenglinsky (2004) noted teachers who receive master’s degrees increase the student academic performance “gap by three points, suggesting that better educated teachers may be less responsive to the needs of low achieving students” (p. 7).

Fong (2006) found a considerable difference in the teacher attrition rates between low-performing and high-performing schools. Specifically, Fong noticed a substantial attrition gap between the top quartile and the bottom quartile of school achievement rankings, with the teacher retention rate being highest at high-performing schools and lowest at poor-performing schools. Fong found no evidence that teacher race or ethnicity were factors in teacher attrition rates. Evidence pointed toward the fact that teachers are most likely to leave lower-performing
schools and to stay at higher-performing schools over the long run regardless of the ethnic composition of the student body (Marvel et al., 2007).

In review of the EEOS data, Jencks (1972) concluded that schools who hired experienced teachers had students who were already identified as high achieving. Schools retaining the core base of teachers over extended periods lacked students who demonstrated across-the-board high proficiency on assessments (i.e., as the years of teaching experience went up for the collective group of teachers, student achievement mean scores did not increase). Jencks found teaching experience showed no association with effective teaching and student performance. Rather, Jencks concluded “teachers with more experience appear to have had more bargaining power than teachers who lacked experience, and experienced teachers appear to have used their bargaining power to transfer to schools with overachieving students” (p. 83). Jencks implied that teachers work to exit low performing schools, but once in a higher achieving environment their teaching experience is not used to raise student achievement further.

In sociological studies, as early as Becker’s (1952) report, teachers were observed to move (horizontally) through the profession by changing work environments in order to improve their working conditions, seeking campuses with higher achieving students. Most migration within the school system tends to be out of the schools in the lowest SES status neighborhoods and into schools located within better SES status neighborhoods. Because of very few requests for transferring into low SES schools in Chicago, novice teachers find themselves assigned to low SES schools. As these new teachers gain experience, they soon request to be transferred to schools nearer their homes or to better equipped and maintained schools. As one teacher shared, “I think that every teacher strives to get into a nicer neighborhood” (Becker, 1952, p. 473).

Greenberg and McCall (1974) found that the SES status of the students, rather than
monetary considerations, governs much of the internal mobility of teachers within a district. Akin to what Becker (1952) found 22 years earlier, Greenberg and McCall found that teachers were likely to be placed in low SES schools early in their careers and to move into higher SES schools later on in their careers. Teachers also tended to stay at the higher SES schools. Consequently, high SES schools have been characterized as housing a teaching force with greater experience and educational attainment (Greenberg & McCall, 1974).

Plecki et al. (2005) conducted a study conducted in Washington state to examine teacher retention in 421 public schools over a 5-year interval. Plecki et al. did not observe any significant correlations between race and ethnicity, pupil achievement, and teacher retention. However, when a fourth variable, poverty, was introduced, the relationship between both teacher retention and student achievement became significant. Campuses serving greater numbers of pupils in poverty retained fewer of their teachers at the end of 5 years and produced lower achievement scores, as measured on the Washington state achievement test in reading and math. Campuses that had higher percentages of White students had greater retention rates of teachers at the end of 5 years and higher achievement scores. Conversely, campuses having a majority representation of African Americans students had lower 5-year teacher retention and lower achievement scores. Schools with the greatest percentages either of White or of minority students, the highest and lowest poverty levels, and the highest and lowest achievement scores had identical teacher retention rates at 53% (Plecki et al., 2005). Those schools with the greatest teacher attrition rates fell into pupil poverty bands as a percent of total school enrollment at 10% to 19% and 50% to 59%. Both poverty bands held teacher attrition rates of 58%. The lower poverty band had a White student majority of 77%, whereas the higher poverty band still maintained a White student majority of 55%. What was not reported by Plecki et al. was the
racial/ethnic distribution of the teachers and if teachers moved to schools within the district’s boundaries or exited the district.

Johnson and Birkeland (2003) found that the average change in student eligibility for free or reduced-priced lunch from the transferring teachers’ first schools to their next schools was 46%. Sometimes these teachers’ intercampus transfers involved moving from diverse urban schools into more racially and economically homogeneous suburban schools. Teachers moved from racially diverse, low-income urban schools to schools serving less impoverished students. The rationale the transferring teachers offered involved the desire to work within a better organizational structure for the success of both students and teachers. Homogeneous settings provide support for new teachers’ learning and sufficient resources for good teaching. Schools effectively serving low-income students also assemble additional supports and services, affording teachers the opportunity to concentrate on instruction. Johnson and Birkeland (2003) argued the exodus of teachers from “less impoverished communities probably says more about the inadequacy and inequity of public education in the United States than it does about the preference of teachers to work with wealthier students” (p. 599).

Post NCLB (2002), all students in the nation’s public school systems have been instructed by highly qualified teachers, yet the achievement gap has not contracted. African American and Hispanic students continue to have lower academic attainment than their White counterparts. Teacher attrition and movement has not abated (Cochran-Smith & Zeichner, 2005; Herbert & Ramsay, 2004; Lankford et al., 2000; Plecki et al., 2005; Smith & Ingersoll, 2004; TEA, 1995; Useem et al., 2005). The causal agents for teacher transfer and attrition appear to be diverse. Although more African American and Hispanic students passed state mandated assessments, the achievement gap has not dissipated proportionally to the investment.
Federal, state, and local agency representatives have been keenly aware of where educational needs exist. However, they are powerless to mandate teachers to take positions in poor, minority majority, or low teacher pay settings. Unless teachers are remanded to specific campuses, either out of idealism or for student debt repayment as occurs in Teach for America or the federal TEACH Grant or Robert C. Noyce Scholars programs, teachers retain the option of working where they choose rather than teaching where they are needed. Teachers cannot be coerced into jobs they do not want to take.

The literature is prolific and replete with “teacher quality” as the linchpin to student success (Darling-Hammond, 1999; Darling-Hammond, Wise, & Klein, 1999; Haycock, 2003; Henke, Chen, Geis, & Knepper, 2000; Ingersoll, 2001; Jablonski, 2006; Kozol, 1991; Lanier & Little, 1986; Miller, 1995; National Science Foundation, 2002a, 2002b; Orphanos, 2008; Rivkin, et al., 2005; Smith, 2009; Weaver, 1983; Wise, 2000). Mary Kennedy (2010) suggested, with the rampage in defining terms and attributes, confusion abounds regarding two terms: “teaching quality” and “teacher quality.” Kennedy argued that educational pundits are likely to extend research into examining too much the characteristics of the teachers while avoiding the situational factors likely to have strong bearings on the quality outcomes of the actual teaching. More importantly, Kennedy noted that the most studied element of teacher quality is teaching credentialing exams, only because of the availability of the data. Researchers study the data they can access. One teacher characteristic overlooked, and little studied in relation to student achievement, is teacher race.

Racial Compatibility Between Students and Teachers

With the 1954 Brown decision as the precursor and the Civil Rights Act of 1964 as the reason behind much change, the racial and ethnic compositions of students in the public
classroom continue to evolve. Conversely, the racial and ethnic diversity of the instructional workforce has not maintained proportional pace with the shifts in the demographics of students. The litigation and lawmaking of the 1960s led to the examination not only of student segregation but also of the composition of the instructional workforce.

In historical reflection, up until the mid-1960s, African-American teachers were most likely to be teaching African-American students exclusively (Coleman et al., 1966; Foster, 1993; Gay, Dingus, & Jackson, 2003; Mosteller & Moynihan, 1972; Moynihan, 1972). In the post EEOR climate, Holmes (1990) noted that a cycle developed between 1960 and 1990 in which fewer and fewer students of color were taught by teachers of color. The percentage of African American public elementary school teachers in the U.S. dropped from 12.3% in 1982 to 8.7% in 2004 (Journal of Blacks in Higher Education, 2006). This reduction in African American educators has been noted with other non-White populations. Although the percentage of Hispanic teachers increased 86% over the 12-year period from 3% in 1987-1988 to 5.6% in 1999-2000, overall, “the public teaching force was essentially no more diverse in 1999-2000 than it was in 1987-1988. Minority teachers increased by a mere 0.4 points” (Shen, Wegenki, & Cooley, 2003, p. 5). Of the 8% of African Americans in education in 2004, only approximately 1% worked on elementary campuses and the remaining 7% worked at the middle and high schools (Ingersoll & Smith, 2004).

Prior to the accountability provisions of NCLB (2002), discourse about the growing numbers of students of color in the nation's schools was coupled with a call for teachers of color because children of color need role models. African-American teachers are of critical importance and not just because children need to see that teachers of color exist or that people of color can assume leadership positions. African-American teachers are needed because of the
many other roles, perspectives, and practices they bring to schools (King, 1993). Additionally, the premise emerged that role modeling transcends into academic achievement.

Positive role modeling and characterization are crucial for ensuring commitment of minority youngsters to schooling. Without sufficient exposure to minority teachers throughout their education, both minority and majority students come to characterize the teaching profession-and the academic enterprise in general as better suited to whites [sic]

.... As the proportion of minority teachers falls, the perceived importance of academic achievement to minority students also declines. (Loehr, 1988, p. 32)

Although racial/ethnic role modeling is admirable, does compatibility move the achievement of students? Numerous studies have been cited that teachers of all races and ethnic groups seek classrooms with high achieving students and prefer to work in schools with fewer poor and minority students (Burnstein & Sears, 1998; Carroll et al., 2000; Cochran-Smith & Zeichner, 2005; Coleman et al., 1966; Darling-Hammond, 2007, 2008; Darling-Hammond & Sclan, 1996; Feistritzer, 1996; Hanushek et al., 2004; Morrell, 2010; Moynihan, 1972; NCES, 2007; National Commission on Teaching and America's Future, 2002; National Science Foundation, 2002a; Neal, 2005; Rivkin et al., 2005; Rosenholtz, 1987; Thrupp et al., 2002; Useem et al., 2005; Villegas & Lucas, 2002; Waller, 1932; Zeichner et al., 1998; Zumwalt & Craig, 2005). The trend of White teachers seeking employment in schools with the greatest percentage of White students, African-American teachers seeking schools with African-American students, Hispanic teachers seeking schools with Hispanic students and Asian teachers seeking schools with Asian students has been observed into the 21st century (Banks, 2004; Fong, 2006; Freeman, Scafidi, & Sjoquist, 2002; Jackson, 2009), but does racial/ethnic compatibility move beyond the conventions of social equilibrium and closing the achievement
gap? Dee (2004) speculated in the analysis of the Tennessee STAR data (HEROS, Inc., 2009), as discussed below, that schools with relatively few disadvantaged, reduced lunch, and minority students are able to recruit teachers of higher and more uniform quality, whereas schools with homogenous student bodies are less able to recruit other-race teachers whose unobserved teacher quality was relatively low.

Much of the professional dialogue related to teacher-student racial compatibility and student achievement from the 1960s throughout the 1990s has been replaced by the NCLB’s (2002) generic call for student achievement and accountability to follow mandated standards, with race and ethnicity held neutral. Conventional wisdom has fostered the call for hiring more minority teachers due to arguments for non-White teachers being better equipped to deal with the unique and cultural needs of at-risk and minority students (Dee, 2004; Ferguson, 1998; Foster, 1993; King, 1993; NCES, 1997; Zimmerman et al., 1995). Foster (1993) argued that African-American teachers are better able to communicate with African-American students "about the personal value, the collective power and the political consequences of choosing academic achievement" (p. 15) than are White teachers. The intimation becomes then that racial segregation can be socially and academically beneficial for students and teachers.

Other researchers of teacher-student racial compatibility have found it influences how teachers allocate time in the classroom and the level of expectation and evaluation of their students (Casteel, 1998; Ehrenberg & Brewer, 1995; Ferguson, 1998; Zimmerman et al., 1995). White teachers hold more negative expectations for African-American students than for White students, African-American students to be more negatively affected by teacher expectations than White students (Banks, 2002; Davidson & Lang, 1960; Kukla-Acevedo, 2009; Morrell, 2010; Passow, 1984; Rosenthal & Jacobsen, 1968; Spencer, 2010). African-Americans students are
perceived less favorably than White students (D’Amico, 2001; Ferguson, 1998; Garmon, 2004; Kukla-Acevedo, 2009). A common characterization of an African-American teacher is that of a middle-class woman unable or unwilling to relate to or connect with students and the student communities composed usually of African-American and lower class students (Foster, 1990).

Against this social, race, and ethnic backdrop, relatively few researchers have attempted to quantify and identify the relationship between exposure to own-race teachers and the resulting effects on student achievement. What small evidence exists has not directly addressed the numerical relationship between student achievement and the racial match between teacher and students (Ehrenberg & Brewer, 1995; Ehrenberg et al., 1995). Many researchers and policy makers have contended that the power to accelerate learning and close the achievement gap lies in teacher preparation (Darling-Hammond, 1999; Darling-Hammond & Sclan, 1996; Feistritzer, 1996; Ford, 2002; Haycock, 2003; Jablonski, 2006; Kukla-Acevedo, 2009; Russell, 2009) and in state certification processes designed to comply with the NCLB mandate of each student being taught by a highly qualified teacher (Goldhaber & Hansen, 2010; McClendon, 2008; Texas State Board of Education, 1991; Wayne & Youngs, 2003). The question is presented as to the necessity of racial compatibility between student and teacher to promote academic success on state mandated competency based assessments.

Teacher Race and Student Achievement

There are numerous hypotheses regarding whether or not a teacher’s race could and can affect student performance. The most obvious hypothesis has been: if teachers treat students differently based on race, student achievement falters, thus more time on task or encouragement could be afforded by teachers of students of similar races. In a literature review, Ferguson (1998) reported evidence to support the notion that teachers pay more attention to and are more
comfortable with students of similar race backgrounds. Dee (2005) found teachers to be more likely to perceive students as disruptive or inattentive if students represented a different race (or sex) from that held by the teacher, and Dee’s results held strongly for students from the South and with lower SES. Also, minority teachers may have higher expectations for minority students, which may lead to higher achievement. Rosenthal and Jacobson (1968) found this phenomenon to occur during their examination of teachers’ perceptions of students with disabilities.

Teacher race could contribute to subtle effects in classrooms affecting student achievement. Student learning may be increased when the home and schooling environments are similar and when students can employ a common language, idiom, or culture as a benchmark between the two environments. Being the same race as a student may give credibility to teachers, and minority teachers display more active roles in mentoring minority students. These minority teachers may be the only role models the minority students know who encourage academic progress and are interested in their achievements (Allsup, n.d.a; Banks, 2004; Foster, 1990, 1993; King, 1993).

With respect to non-academic achievement, researchers have used the NELS 1988 data regarding teachers’ perceptions of minority students. Teachers’ perceptions might directly influence the expansion of the achievement gap during educational opportunities designed to reduce the achievement gap. Specifically, Oates (2003) used complicated statistical models to compare the effect between African American and White teachers’ perceptions of the norm-referenced test performance of African American and White students. The evidence supported the hypothesis that White teachers favor White students while African American teachers do not demonstrate partiality toward African American students. Using a race identification strategy with nonrandom sorting of students across and within schools, Dee (2005) found large effects
associated with race on teacher perceptions of student performance among poor students of the South.

Ouazad (2008) used a national child-teacher matched longitudinal dataset and carefully controlled for a range of confounding factors to conclude that non-African American teachers award lower assessments to African American children. Ouazad controlled for three confounding effects: (a) teachers may capture skills not captured by test scores, (b) children of different races and genders may react differently in the classroom and during examinations, and (c) veteran or “tough” teachers may be matched with specific races or genders. Ouazad (2008) concluded that teachers provide higher assessments to children of their own races but do not award significantly higher assessments to children of their own genders.

Overall, positive effects of African American teachers on African American students in non-academic achievement have been observed (Banks, 2002; Foster, 1993; Gay et al., 2003). Gay et al. (2003) reviewed the literature and suggested that African American teachers have higher performance expectations for own-race students, and improved student outcomes were seen for students’ personal identity, self efficacy, school attendance, disciplinary referrals, dropping out, and overall satisfaction with school. Gay et al. argued that need for hiring more African American teachers to serve as role models for African American students must be met. By taking on social and teaching roles, African American teachers can convey the knowledge and awareness of ethnic, racial, and cultural diversity among all students, and by doing so, the achievement gap can narrow. Gay et al. (2003) offered caution about aggressively adopting hiring practices based on these data as “surprisingly thin and sparse” (p. 2), since the data emanated from a small-scale qualitative analysis of single or multiple case studies.
Pre-NCLB research on the mechanics of how teacher race affects student performance was inconclusive and suffered from significant heterogeneity with independent variables. Hess and Leal (1997) found that higher percentages of minority teachers in urban school districts boost student achievement. However, their study relied on cross-sectional variation across school districts, which likely have significant unobserved heterogeneity, that is, pockets of higher family incomes, allowing for elevated levels of discretionary funding that could be related to student achievement. In this frame, if a particular school district were highly motivated, policies, such as hiring more minority teachers might be enacted. The observed effect of “own-race teachers” could then be driven by the other, unobserved policies.

Ehrenberg et al. (1995) used data from the NELS 1988 and found no significant benefit from own-race teachers. Ehrenberg et al. found that the alignment between teachers' races, genders, and ethnicities and those of the students had little association with how much the students learned, but in several instances alignment did relate to determinants of teachers' subjective evaluations of their students. Ehrenberg et al. reported this student benefit of own-race teachers, but the results are not robust when correlated to other teacher characteristics. The process that matches students to teachers and the economies of particular school locales might have biased these results. If poor-performing minority students are intentionally assigned minority teachers because administrators are limited by the applicant pool or feel minority students will benefit from same race, the estimate of own-race teachers will be downwardly biased (Bishop et al., 2005).

Surprising little evidence has emerged specific to the student and teacher race relationship as a variable of student achievement. The available evidence has demonstrated that African American teachers may boost African American students’ academic performance.
Goldhaber and Hansen (2010) found state licensure tests to offer different predictive validities for student achievement by teacher race. Goldhaber and Hanson also held student achievement to be impacted by the race and ethnicity match between teachers and their students, with African American students notably benefitting from being taught by African American teachers. As a consequence of intentional matching effects, the uniform application of licensure standards is likely to yield differential impacts on the academic achievement of White and minority students. Gay et al. (2003) found African American students to demonstrate higher achievement when taught by African American teachers and attending African American schools and programs.

In reviewing the 1985 to 1989 Tennessee STAR (Student Teacher Achievement Ratio) data ($n = 11,600$; HEROS, Inc., 2009), Dee (2004) concluded that same-race teacher status was associated with higher achievement in both math and reading for kindergarteners followed through the third grade. Students assigned to own-race teachers earned math scores that were statistically significantly higher by 3.6 percentile points ($p < .05$) than students assigned to different-race teachers. The estimated increase in reading scores of kindergartener was large (2.9 percentile points) but not statistically significant. The students were followed for four school years, according to the Tennessee Project STAR protocol (HEROS, Inc., 2009), and retained racial/ethnic compatibility between them and their teachers throughout the four-year period. Students’ achievement growth in math and reading scores throughout the four years ranged between 2% and 3% per year (Dee, 2004). Dee concluded that student achievement uniformly increased in years of exposure to own-race teachers. These results imply that exposure to teachers of similar racial/ethnic background does not simply confer a fixed, one-time achievement gain but also shows additive effects on student achievement as the students progressed from grade to grade. Dee’s observation of a cumulative affect was reported
previously by Coleman et al. (1966). At the end of the 20th century, Bemby et al. (1998)
demonstrated a similar cumulative effect in the opposite direction, specific to poor teacher
quality, in the Dallas Independent School District.

Interestingly the White students’ assignments to own-race teachers meant they were
taught by teachers with fewer years of classroom instruction experience, at minimum 1.2 years of
experience (Dee, 2004). As Dee noted, the extent this racial difference occurred in teacher
quality implies that the earlier results from the Project STAR data analyses understated the White
students’ achievement gains associated with being taught by own-race teachers. Overall, these
results showed that having an own race teacher in the early grades does not help the test scores of
White students in later years, but might help the scores of Black students, especially males.
Even for Black students, the evidence was not definitive (Bishop et al., 2005). Using the same
Project STAR data (HEROS, Inc., 2009), Bishop et al. (2005) found that having an African
American teacher in early elementary school improves African American students’ standardized
test scores in later grades and increases the probability that African American students will take a
college entrance exam.

Dee (2004) found earlier that having an African American teacher significantly improved
the math and reading achievement of African American students. Using a 1997-1998 sample of
100,000 Texas high school geometry students with 20% of the sample being African American,
Klopfenstein (2005) found the likelihood of African American geometry students enrolling in
subsequent rigorous math courses to increase as the percentage of African American math
teachers increased. Conversely, Bishop et al. (2005) did not find evidence that scores on
entrance exams improved when African American students are taught by African American
teachers. Howsen and Trawick (2007) extended Dee’s 2004 work but found no effect of teacher
race on student achievement once teacher gender and student ability were factored.

Dee (2004) suggested caution when interpreting the little available evidence as to the processes by which African American teachers affect African American achievement. Surprisingly little is known about the effect of an influx of African American teachers on students in general. Specific to own-race teacher and student achievement reflecting on findings of Coleman et al.’s (1966) report is necessary, even in the 21st century. Coleman et al. reported:

- Nationwide, African American elementary students attend a school in which 65 percent of the teachers are African American; the average White student attends school where 97 percent of teachers are White (p. 126)
- Nationwide, the trend is White teachers teach African American children, but African American teachers seldom teach White children (p. 316)
- Minority African American pupils attend predominately White schools, but almost never do a minority group of Whites attend largely African American schools (p. 126)
- Less than one percent of White elementary pupils attend a school with an African American principal: 56 percent of African American pupils have a White principal (p. 126)
- African American pupils attend schools where a greater number of teachers appear less able in certain “rough indicators of teacher quality” – types of colleges attended, years of experience, salary, education level of mother, and performance on a 30 word-vocabulary test (p. 148)
- Whites, as a group, are less affected one way or the other by the quality of schools (p. 317)
- Teacher quality shows a strong relationship to pupil achievement:
Teacher quality is more important to minority pupil achievement than students of majority status;

The level of teacher impact on student achievement can be correlated to teacher performance on a verbal skills inventory and academic level of attainment by the teacher’s mother;

Indicators of teacher quality for African American and other minority students are lower than Whites. (p. 317)

The achievement gap existed in 1966 in segregated schools, but it remains the same 57 years after the Brown II court’s admonition to correct "with all deliberate speed" this very gap.

Dee (2004) suggested strengthening specific policies of African American and Hispanic teacher recruitment with broader policies to improve teacher effectiveness, to encourage high expectations and challenge students, and to design effective professional development and performance incentive schemes. Dee argued that doing so could inform policies to encourage breaking the link in the gap between teacher race and student achievement, but these policies are difficult to devise because too little is known about the mechanisms of racial/ethnic compatibility, and its relationship to student achievement.

Literature Synopsis

Several streams of literature have been reviewed and examined that address the historical disparity of academic achievement between African American, Hispanic, and White student groups that augment this dissertation. An overview of the literature depicting the interpretations of case law and accessibility to the curriculum was presented by examining the effects of Brown II and the Johnson administration’s zeal to speed achievement parity with the infusion of massive financial resources into public schools via the Elementary and Secondary Education Act. With
the introduction of federal dollars and the mantle of the Civil Rights Act of 1964, lawsuits arose over the equitable distribution of financial resources (Acosta, n.d.; Allsup n.d.a, n.d.b; San Antonio Independent School District v. Rodriquez, 1973). An offshoot of the Texas legislature’s compliance to the Texas Supreme Court’s orders was school finance reform and the birth of school accountability with quantitative measurements to insure to stakeholders that their reallocated money was closing the student achievement gaps (Elkind, 1988; Kirby, Berends, & Naftel, 1999; Texas State Board of Education, 1991). The Texas accountability and assessment model ushered in an examination of the NCLB mandates of financial stewardship gauged by test scores and the expectation that all students will be on grade level by school year 2013-2014. Numerous national and state studies were cited revealing that reading and mathematics achievement scores for African American and Hispanic continue to lag behind Whites, irrespective of financial reallocations (NCES, 2008b, 2008c, 2009d, 2010b; TEA, 2010c). A contention of NCLB is that students and teachers are race/ethnicity and economically neutral. This increases the relevance of sociological studies of the measureable compatibility effects of race, ethnicity, and poverty on student achievement. Specific factors explored that have a demonstrated effect on student achievement are poverty, culture, language, and social perception (Bishop et al., 2005; Cardenas, 1974; Ladson-Billings & Donner, 2005; Mosteller & Moynihan, 1972).

The review then focused on the mandates of teacher quality expressed in NCLB (Banks, 2004; Cochran-Smith & Zeichner, 2005; Darling-Hammond, 1999; Educational Testing Service, 2002; Goe, 2007; Haycock, 2003; National Science Foundation, 2002a, 2002b; Rivkin et al., 2005; Rowan et al., 2002; U.S. Department of Education, 2002). The review intertwined studies of the intangibles of teacher “quality” to enhance student achievement, and those of the tendency
of teacher to find employment in settings that are environmentally compatible to their needs. This finding provides entrée into an examination on teacher mobility and the tendency to relocate into schools with high achieving students after initially “paying their dues” in low performing, low income, minority majority schools (Feng, 2006; Halladay, 2008; Jencks, 1972; Plecki et al., 2005). Studies were presented that teacher migration was witnessed in all teacher racial and ethnic groups.

These various streams of literature inform the topic of this study: student achievement as a function of racial compatibility between students and teachers. This review presented few studies that have examined this relationship and their conclusions that racial alignment does elevate student achievement (Dee, 2004; Goe & Stickler, 2008; Goldsmith, 2004; National Collaborative on Diversity in the Teaching Workforce, 2004). The review uncovered a paucity of educational research about the affect and effect of racial/ethnic compatible between students and teachers. It is in this spirit of academic honestly this dissertation is launched.
CHAPTER 3

METHODOLOGY

The purpose of this longitudinal study was to examine if changes in the student-teacher race/ethnic ratio (STRR) between African American, Hispanic, and White students and White teachers exhibited a meaningful relationship related to these students’ reading and mathematics passing rates on the annual Texas state assessment measure. African American and Hispanic passing rates on the state annual assessment within the selected 10 districts were examined at the district level and at the campus level for 10 elementary, 10 middle, and 10 high schools over a 10-year period. Archived data from the Texas Education Agency’s (TEA) Academic Excellence Indicator System (AEIS) were used for this study. The 10 districts selected have historically hired the greatest number of baccalaureate teacher education graduates (BTEG) from the regional teacher preparation university. BTEGs hiring patterns were used in district selection because they were the focal group in the CREATE employment data set, which reflected information from the Texas State Board for Educator Certification. This chapter provides a rationale for the research design; provides information about the research questions and hypotheses, variables, and sample; and describes the procedures for data collection and analysis.

Rationale for the Research Design

This study was conducted to examine if student achievement on the Texas mandated assessment varies student-teacher racial/ethnic compatibility. To answer this question a large dataset is needed that provided longitudinal achievement trends of African American, Hispanic, and White student groups and the demographic data needed to construct the STRRs. The TEA has an excellent dataset applicable for this study’s purpose: the Public Education Information Management System (PEIMS) captures and archives data required by the state agency from
Texas’ 1,300 plus public school districts. These data included student demographic and academic performance, personnel demographics, financial, and organizational information. Unique to the PEIMS dataset was its ability to compare relevant student-teacher district and campus level data to state average performance measures or counterpart data. A subset of the PEIMS data, the AEIS Accountability System, has existed since 1984. The AEIS reports were mandated by the Texas Legislature to ensure public school achievement transparency in the wake of school finance reform (TEA, 1990). These AEIS annual reports provided regional, district, and campus level information as well as comparison information. Although these data were presented in a report format, with effort, numerical data could be transposed into an Excel spreadsheet to facilitate hypothesis testing and analysis in SPSS.

AEIS annual reports were used for this study for two reasons. First, the host database, PEIMS, captured a wide array of data that were extraneous to this study, and the magnitude of data was too large for a solo researcher to navigate. Because of the lack of a research team, the investigator was limited in resources and expertise to extract information from the PEIMS dataset. As Mary Kennedy (2010) suggested, a study must feature the data a researcher can access efficiently and effectively and effectively. The AEIS annual reports were appropriate to use for this study’s purpose.

Second, the use of large datasets for educational research has historical precedent. As a result of Texas school finance reform and NCLB’s mandates for accountability across all student groups, the last few decades witnessed an unprecedented increase in the availability and quality of large-scale datasets that are suitable for use in education research. These data had the potential to improve the generalizability of educational research. The data mining methodology used in this study was well documented in educational, sociological, and epidemiological
literature. Although studies of student academic achievement delineated by ethnographic variables generally employed linear regression and mixed-methods (Bembry et al., 1998; Bishop et al., 2005; Dee, 2004, 2005; Feng, 2006; Goldsmith, 2004; Orfield, 1986; Plecki et al., 2005; Weiher, 2000), the utility of using large data sets for various analysis techniques, including correlation coefficients, are well recognized.

Within this geographic region, a similar methodology to the one employed in this study was used to examine student achievement in the Dallas ISD correlated to teacher quality (Bembry et al., 1998). In the Dallas ISD study Bembry et al. (1998) examined student cohort longitudinal data and selected teacher profiles to show the correlations of student achievement to specific teacher characteristics. Quantitative studies examining student achievement using Texas specific datasets emerged as recently as 2006. Rivkin et al. (2005) used matched panel data from the University of Texas at Dallas Texas Schools Project (i.e., Kain, 2001). Later, Texas PEIMS data was employed by Heiling and Darling-Hammond (2008) to examine longitudinal student achievement on TAKS scores at the elementary, middle, and high school levels. Their dataset included 2,500 variables and 270,000 students over a 7-year period from 1995 to 2002. Heiling and Darling-Hammond (2008) extracted selected PEIMS data elements containing information on students’ race-ethnicity and achievement scores for each year linked to teacher and school characteristics. However, they did not incorporate teachers’ race/ethnicity identifiers into their methods and analysis. Examining student achievement in the context of racial compatibility was the focus of Dee’s study of the data from Tennessee’s Project STAR (Student Teacher Achievement Ratio; HEROS, Inc., 2009).

Dee’s (2004) regression analysis of the Tennessee’s Project STAR data (HEROS, Inc., 2009) was the most current and only study to focus on student achievement as a function of
student-teacher racial compatibility. Dee examined state level achievement data captured for a kindergarten through Grade 3 cohort from 1985 to 1989. These student achievement data, \( n = 11,600 \), were analyzed by student-teacher racial alignment. Dependent variables were the annual state mandated reading and mathematics scores for the cohort. Although Dee’s focus was race alone, Dee did not examine student achievement as a function of student-teacher ratios or extend the time period beyond three years.

Although I did not utilize the full magnitude of the Texas student population over the 10-year period, an attempt to capture a reasonable sample of student outcomes over the decade of interest from 1999 through 2008 was made. The number of students considered in the study includes 56,700 at the high school level; 49,299 at the middle school level; and 11,153 at the elementary school level. This study’s uniqueness lay in the data element selection from the AEIS and numeric calculations based on elements within the dataset (i.e., STRRs). I investigated student achievement longitudinally in a race/ethnic context, along the lines of Dee (2004), using correlation coefficients to test whether or not a relationship existed between variables and if so, the strength of the relationship. The variables used in this study were not unique, and the methodology was well established, as was the use of the PEIMS database to conduct educational research.

**Research Question and Hypotheses**

The research question used to fulfill the purpose of this study was: For the time period between 1999 and 2008, does a correlation exist between the proportions of African American, Hispanic, and White students to White teachers, the student to teacher race ratios (STRRs), and the passing percentages of these student groups on the reading and math sections of Texas’ state assessment instruments in Grades 4, 8, and 10 among 10 identified school districts and, 30
elementary, middle, and high school campuses randomly selected from the 10 identified school
districts? (For a definition of STRRs, see Chapter 1’s definition of terms section.)

From the research question, the following two null hypotheses were tested:

\[ H_1 \] Over the 10-year period from 1999 through 2008, in 10 identified school districts,
changes in STRRs for African American, Hispanic, and White students will not exhibit a
relationship to these students’ reading and math scores on the Texas mandated state assessment
instrument.

\[ H_2 \] Over the 10-year period from 1999 through 2008, in Grades 4, 8, and 10 of the 10
identified school districts, changes in the STRR for African American, Hispanic, and White
students will not exhibit a relationship to these students’ reading and math scores on the Texas
mandated state assessment instrument.

Variables

The dependent variable in this study was represented by student pass rates by
race/ethnicity on state-wide academic achievement outcome measurements employed by the
TEA 1999 through 2008. Throughout this decade the TEA identified students in five reporting
demographic categories using the nomenclature of race/ethnicity: Native American, Asian or
Pacific Islander, Black or African American, Hispanic or White (TEA, 2010d). Of these
identifiers, Hispanic was the only ethnic category, whereas the remaining four were considered
individual race categories. The TEA’s definition of student categories was expanded to seven
reporting categories: one ethnic category, five individual race categories, and one multiple-race
category (TEA, 2010d). I used three of the state’s race/ethnicity categories in use during the
period of this study, selecting these because of the size and association with concerns about
achievement gaps.
During the 10-year period of this study, 1999-2008, the TEA employed two statewide measurements: (a) the Texas Assessment of Academic Skills (TAAS); (b) the Texas Assessment of Knowledge and Skills (TAKS). The TAKS replaced the TAAS in 2003. Although the dependent variable is comprised of two unique assessment instruments, these two tests were applied equally to all Texas students who were eligible to sit for them. These state mandated annual assessments were used to measure students’ reading and mathematics achievements on the Texas curriculum, the Texas Essential Knowledge and Skills (TEKS). For this study, the passing rates of both assessments were used as singular outcome measures of student achievement captured at the district and campus levels over the 10-year period.

Two independent variables, reading and mathematics outcome scores, were overlaid onto the three TEA race/ethnicity categories to calculate each STRR. Students’ race/ethnicity populations and the numbers of White teachers were used to determine the ratio of each student category per White teacher. The STRR were determined annually based on student sample numbers in one of three race/ethnicity categories, African American, Hispanic, or White and the number of White teachers reported per setting (i.e., district level; campus level via Grades 4, 8, or 10).

The three independent variables that result from the statistical transformations were (a) the numeric value for the STRR of African American students; (b) the numeric value for the STRR of Hispanic students; and (c) the numeric value for the STRR of White students. An example of an annual STRR calculation was: 150 African American fourth grade students divided by 47 campus level White teachers, equals a STRR of 3.19. This ratio was then paired with the percentage of fourth grade African American students passing the mathematics and reading assessments. The STRR changed annually in each setting. These changes resulted from
fluctuations in students’ race/ethnicity populations, the number of White teachers, and in student groups’ passing percentages. Each STRR was unique to a particular year, setting, and grade level.

Sample Selection

This study was conducted using the data available for the north central Texas geographic region, in which the majority of University of North Texas (UNT) baccalaureate teacher education graduates (BTEG) find employment. A state research consortium, the Center for Research, Evaluation, and Advancement of Teacher Education (CREATE, 2009) adopted the nomenclature Proximal Zone of Professional Impact (PZPI) to identify and described the geographic area within a 75-mile radius of any Texas teacher preparation entity. CREATE defined the PZPI as a professional academic community and area of influence for university based teacher preparation programs. This focus on the north central Texas region was important because of this region’s growth and its race/ethnicity proportionality and its demand for school teachers.

Regional Population Growth

The north central Texas area is comprised of 15 counties. Weinstein and Clower (2004) reported to the North Texas Futures Fund that the north Texas region serves in excess of 1-million public school students in 134 independent school districts. The future population growth for this area is projected to continue at an accelerated pace. The North Texas Central Council of Governments (2010) estimated the 2010 population to be approximately 6,729,800, with a projected 2030 population of 9,252,945. To accommodate this growth, an additional 640 schools will be required to accommodate the projected increase of 930,000 single family dwellings and 630,000 multi-family units (North Central Texas Council of Governments, 2006). Based on
these projections, a minimum of approximately 22,500 new teachers will be necessary to staff these facilities and replace the retiring workforce. Understanding the people who fill these homes and schools was important. It was highly probable Hispanic students’ representation as the majority minority through the north Texas region increased based on historical birth rates.

Birthing rates by race/ethnicity are important factors to consider in an educational context because Hispanic births are out pacing the presence of Hispanic teachers into north Texas classrooms. For example, Parkland Memorial Hospital, Dallas, has the highest obstetric delivery service in the nation. Over 16,000 live births occurred at Parkland in 2009, a decline of approximately 2,000 births from 2008. In 2003 Dallas and Tarrant Counties, reported a combined birth total of 69,873; 42,297 and 27,574, respectively, or an average of 191 infants per day (Parkland Hospital, 2005). Over 50% of these infants were Hispanic, and 2005 birth reports indicated the percentage differential for the Hispanic proportion as trending upward to a 60% to 62% distribution in these two counties (Texas Department of State Health Services, 2005). If these birthing rates are transposed to future pre-K and K classrooms, Dallas and Tarrant counties alone create a demand for 7.5 new classes (assuming 25 students per classroom) in each of 365 days per year. As of 2011, these 2003 babies are in the third grade and are preparing for their first TAKS assessment.

Relevance of CREATE Data

I used the CREATE 2009 data to select districts because the PZPI was useful for identifying districts that historically hire the majority of UNT BTEGs. The PZPI served as a source of geographic boundaries that correlate to a university’s primary sources of teacher education students. UNT’s PZPI encompassed 17,671 square miles and includes 211 school districts and charter schools. It was impossible to report the exact number of UNT BTEGs who
annually enter the workforce as teachers of record and where they find employment. However, based on UNT alumni surveys, Steele (2006) reported the majority of the UNT student population comes from within an 80-mile radius of the school, and 82% of graduates return to their point of origin. Thus, the assumption was made that most of UNT’s BTEGs originate from and return to the north central Texas area.

In the time period of 1999 through 2008, UNT graduated 7,028 BTEGS (CREATE, 2009). For its geographic region, UNT graduated approximately twice as many BTEGs as did either of its regional counterparts, Texas Woman’s University (TWU) and the University of Texas, Arlington (UTA) combined. During the same decade, UTA graduated 3,286 BTEGs, and TWU graduated 3,024 BTEGs (CREATE, 2009). From 2004 through 2008, the percentage of BTEGs, compared to the total number of baccalaureate degrees awarded, declined at each of these three universities. UNT’s pool of graduating BTEGs declined by 4.3%; TWU’s declined by 2.0%; and UTA’s declined by 3.1% (CREATE, 2009). A larger percentage of undergraduates were taking degrees outside of education than in the previous four years. With a lower proportion of BTEGs entering the workforce from traditional sources either class sizes increase or teachers certified by other means assume teaching roles.

District Selection

The public school districts found in UNT’s PZPI, as identified by CREATE in 2009, represented the population of available school districts from which data were drawn for the study. The data had limitations in both the time period of data captured, 1994 through 2008, and in the employment characteristics of BTEGs. The CREATE (2009) data included information only on whether the BTEGS remained employed by the district during the 2008-2009 school year. These data could not be disaggregated according to the personal characteristics of
employed teachers, such as by gender, ethnicity, or marital status. These data were used solely to identify the top 10 school districts known for hiring UNT’s BTEGs.

The 10 districts with the largest number of BTEG hires from UNT as reported by CREATE 2009 during the time period 1994-2009 were: (1) Lewisville ISD at 475 hired, (2) Dallas ISD at 372 hired, (3) Denton ISD at 294 hired, (4) Plano ISD at 292 hired, (5) Carrollton-Farmers Branch ISD at 224 hired, (6) Frisco ISD at 207 hired, (7) Keller ISD at 194 hired, (8) Fort Worth ISD at 161 hired, (9) Garland ISD at 159 hired, and (10) Irving ISD at 145 hired. These 10 school districts are geographically located in Collin, Dallas, Denton, and Tarrant counties. Collin County houses Plano ISD. Dallas County houses Dallas, Carrollton-Farmers Branch, Garland, and Irving ISDs. Denton County houses Lewisville, Denton, and Frisco ISDs. Tarrant County houses Keller and Fort Worth ISDs.

Quantitative descriptive data for both the student and White teacher population in the targeted 10 districts were captured through the publically accessible AEIS database. This information was included in each district’s annual AEIS report. Dallas, Ft. Worth, and Irving ISDs had a minority majority representation of students in 1999 (TEA, 2010c). White teachers were the majority among the 10 districts in 1999 and represented 84% of the 10 districts’ work force (TEA, 2010c). White teachers have historically represented the majority of teachers in all of these districts except Dallas ISD (TEA, 2010c).

The TEA annually reports an accountability ranking for each Texas ISD and each ISD’s campus. The 1999 accountability ranking was used as a basis for campus participation in this study. A requirement of selection for the study was that a campus had to be listed in the 1999 TEA Accountability System District Summary report as reporting the campus-level student outcomes for the reading and mathematics assessments (TEA, 1999a). The study was confined
to campuses housing Grades 4, 8, and 10. Each of the 10 district’s AEIS reports contributed scores from one elementary, one middle, and one high school campus.

Grade Selection

Test scores for students in Grades 4, 8, and 10 in the 10 identified school districts’ campuses were used. These specific grades were selected to represent students at elementary, middle, and high school campuses. Additionally, the Texas-mandated assessments of students’ reading and mathematics achievements were conducted with each of these grades from 1999 through 2008. These grade levels were represented in the National Assessment of Educational Progress (NAEP) under the oversight of the National Center for Education Statistics (NCES). Reading and math scores were captured at Grades 4 and 8 (NCES, 2009b, 2009c). Grade 4 was used specifically because this grade level’s data aligned with data studied in national studies (Dee, 2004; Feng, 2006; NCES, 2009a, 2010a; Rivkin et al., 2005; Viadero & Johnston, 2000).

Grade 8 was selected because it was identified as a critical grade in Texas. Students can be retained if they fail the state-mandated assessment in Grade 8. Such high-stakes failure prevents students from transitioning into high school. Student retention in Grade 8 due to failure on the state assessment was started under the Student Success Initiative (SSI) instituted in 1999 by the 76th Texas Legislature (TEA, 2010c). The SSI was legislated to provide a system of academic support for students in Texas public schools to ensure their achievement on grade level in both reading and mathematics.

Grade 10 assessment scores were used to represent students’ academic achievement in high school. Some larger Texas districts have adopted a demarcation of Grades 9 and 10 in lower division high schools while Grade 11 and 12 students can be housed in upper division senior high schools. Problematic in this arrangement has been that districts with high schools
housing Grades 9 through 12 have earned TEA accountability rankings based on completer status calculated on student cohorts from Grades 9 through 12. Districts with senior high schools containing Grades 11 and 12 have not been held to the same TEA cohort completion requirements. Senior high schools report only annual dropout rates specific to their campuses. Grade 10 was selected because this grade level represented the grade when state mandated exit exams had to be passed if students planned to achieve high school graduation, regardless of the type of high school in which Grade 10 was housed.

Campus Selection

Individual campuses were randomly selected for this study by stratifying districts’ accountability ranking designations from the TEA, including Exemplary, Recognized, Academically Acceptable, and Low Performing. The aim of this sampling strategy was to allow high schools, middle schools, and elementary schools to be proportionally represented by each TEA accountability ranking. A stratified random sampling method was used to select campuses from each district based on the ratio representation of each category. This sampling strategy enabled the resulting random sample to represent the four TEA designated accountability ranking categories.

An example of the random selection process can be illustrated by the high school category. Using the base year of 1999 in the 10 districts, a total of 60 high schools were reported in the AEIS database. Each campus was individually listed manually in an Excel spreadsheet. Of the 60 high school campuses, 8 (13.3%) were ranked Exemplary; 2 (3.3%) Recognized; 51 Academically Acceptable (85%), and 2 (3.3%) Low Performing. The total numbers of campuses per TEA category were multiplied by each category’s percentages to determine the number of schools to represent each category. These multiplication products yielded a representation of: 1
Exemplary, 1 Recognized, 7 Academically Acceptable, and 1 Low Performing. Campuses were sorted in Excel by TEA ranking hierarchy and assigned a number based upon the total in the category. A coin flip was used to select individual campuses for quantities less than two campuses (e.g., Recognized and Low Performing), a die roll for campuses less than seven, and a random number generator for campus quantities equal to or greater than seven (e.g., Exemplary and Academically Acceptable). The same procedure was followed for selection of middle and elementary schools.

The 30 campuses were drawn randomly, as described above, from the 10 districts with the largest number of BTEG hires from UNT (as discussed earlier) during the time period 1994-2009 come from: (1) Lewisville ISD, (2) Dallas ISD, (3) Denton ISD, (4) Plano ISD, (5) Carrollton-Farmers Branch ISD, (6) Frisco ISD, (7) Keller ISD, (8) Fort Worth ISD, (9) Garland ISD, and (10) Irving ISD (CREATE, 2009). These 10 school districts were located in Collin, Dallas, Denton, and Tarrant counties, as discussed above.

Data captured at the three campus levels from the districts listed in the above section included the campus’ names. However, campus names were masked in the final report. For the campuses to be included, AEIS reading and mathematics score data were required for the years 1999 through 2008. It was anticipated that all districts had all African American, Hispanic, and White representation in sufficient quantities to meet minimum TEA AEIS reporting standards. The TEA does not report group passing percentages if the student group population is small. Although TEA does not define small, these data are reported as “*” (i.e., as an asterisk) to protect the identities of students and to insure that individual students cannot be identified as either passing or not passing the TAAS or TAKS (TEA, 2009b).
Data Collection

Specific information was captured per year from the AEIS database and were cut and pasted into an Excel spreadsheet. These data included:

1. Campus TEA Ranking
2. Campus Pass Rates/Reading all student groups,
3. Total student per campus, per grade level of investigation
4. Total students, per setting, per grade
5. Total number of African American students per setting
6. Total number of Hispanic students per setting
7. Total number of White students per setting
8. Percentage of African American students passing reading
9. Percentage of Hispanic students passing reading
10. Percentage of White students passing reading
11. Percentage of African American students passing mathematics
12. Percentage of Hispanic students passing mathematics
13. Percentage of White students passing mathematics
14. Total teacher, per setting
15. Total White teachers, per setting
16. Total non-White teachers, per setting.

All data entries were checked by a third party to ensure accuracy. From these data elements, an Excel formula was created to calculate the STRRs per year. The annual total number of students in each race/ethnic category in each setting was divided by the corresponding annual number of White teachers, yielding 10 STRRs per student group, per year, per campus.
For each individual setting 60 STRRs were calculated. For the total group of 10 settings, 600 STRRs emerged so that 2,400 STRRs were calculated for this study. Once STRRs were calculated, the Pearson correlation coefficient functions in Excel were run. These calculations run in Excel served solely to serve as a baseline for comparison to compare against the outcomes generated by SPSS to assure data integrity. After the AEIS data were entered into Excel spreadsheets, checked, and basic calculations performed, these data were uploaded into an SPSS data file for performing the analyses of the two null hypotheses.

Data Analysis

Pre-Analysis Validation

Prior to performing the correlation calculations, I wanted to know if the student-only data were valid, that is, whether student achievement on the annual outcome as measured by race/ethnicity fell within a normal distribution for this time period. These procedures were used to reconfirm that the data were inputted correctly. To determine the answer this question, the one-factor within and one-factor between ANOVAs were used in all the analyses of the three student race/ethnic groups and four settings: districts, Grade 4, Grade 8, and Grade 10. The one-factor within consisted of the repeated measure year and was named “time,” and the one-factor between consisted of race/ethnicity and was named “set,” meaning student category. Initially, multivariate analyses were used. The appropriate effect size for these analyses was the partial eta-squared. Additionally, post-hoc multiple comparisons were run. Student achievement outcomes delineated by race/ethnicity groupings from 1999 to 2008 on the Texas outcome measure fell within the profile of normal distributions. This initial analysis validated student performance absent of teacher influence in the analysis. Results of this analysis are discussed in Chapter 4.
STRRs Analysis

The Pearson $r$ correlation coefficient was used to determine if the data indicated any relationship between student achievement and each of the three student group’s STRR variables. The relationships between the numerical proportions relating African American, Hispanic, and White student groups to White teachers and these students’ performance on the state-mandated reading and mathematics assessments for the years of 1999 through 2008 required the calculation of correlation coefficients. The Pearson's $r$ correlation coefficient was used when investigating the relationship between two interval, ratio, or continuous variables. Correlation was defined mathematically as the covariance of two variables divided by the product of the variables’ standard deviations. The correlation coefficients were tested to determine the magnitude, direction, and significance of the resulting values. The Pearson correlation coefficient was represented by the following formula:

$$
\rho_{X,Y} = \frac{\text{cov}(X,Y)}{\sigma_X \sigma_Y} = \frac{E[(X - \mu_X)(Y - \mu_Y)]}{\sigma_X \sigma_Y},
$$

When a correlation is found between two variables, the scores within a certain range on one variable are associated with scores within a certain range on the other variable. A positive correlation suggests that high scores on one variable tend to be associated with high scores on the other variable, while low scores on one tend to be associated with low scores on the other variable. A negative correlation, on the other hand, suggests high scores on one variable are associated with low scores on the other variable, and low scores on one are associated with high scores on the other variable (Fraenkel & Wallen, 1996).

Another measure of the strength of the relationship between two variables is the coefficient of determination, referred to as $r^2$. This is a measure of the proportion of variance, or
dispersion, shared by the two variables, and ranges from 0 to 1. The effect size ($r^2$) was calculated for each student category to determine the percentage of variance explained in one variable by the other (Salkind, 2010). For example an $r^2$ of 0.35 means that 35% of the total variation in one variable can be explained by the linear relationship between the two variables. The remaining 65% of the variance cannot be explained by the relationship. The two variables in this study were student group outcome scores and the STRR to White teachers.

Although the number of students was substantial, the number of individual settings was low, $n = 10$. Correlation studies are unstable with samples below 30 and can yield wide confidence intervals. The relationship between the sample size and the average correlation is a negatively increasing function. Thus, the increase is more dramatic at smaller sample sizes. As the size increases beyond 30 or 40 cases, there is little increase in the size or power of the correlation coefficient. That is to say, if resources were available for this study to sample 30 40 individual settings, the outcomes would be very similar to those derived from sampling all of the similar setting participants in Texas, all districts, Grades 4, 8, and 10. As a pilot study, this investigation was undertaken within the available boundaries and resources. Resources necessary to collect enough district and campus data to perform between 7,200 and 9,600 STRRs extended beyond my abilities. Thus, the reliance on effect size as $r^2$ could be used to support to the hypothesis results given the accessible sample size.

The research question is addressed by examining students’ performance on the state mandated reading and mathematics assessments at the district level as compared to the STRR for each of three student race/ethnic categories. The three STRRs were calculated for each student group’s targeted grade levels (i.e., Grades 4, 8, and 10) for each of the years 1999 through 2008. These calculations were made for each grade at the district and campus levels. Students’ scores
for the reading and mathematics assessments were expected to fluctuate over the 10 measured years. The student mathematics and reading achievement score variables involved the percentages of student groups in selected districts who passed these state assessments in 1999 through 2008.

The STRRs were correlated to the mathematics and reading passing score percentages for the Texas-mandated state-wide assessment at the district and campus levels. The first and second null hypotheses expectations were that as the STRR for each of the three student race/ethnic group variables attenuated, no relationship would exist between these variables and student achievement of any student race/ethnic group at any tested district or campus setting.

For the first null hypothesis test, the variables for the three STRR groups and student achievement scores for the reading and mathematics assessments for Grades 4, 8, and 10 were used to calculate the Pearson r correlation coefficient across the 10 districts during each year of 1999 through 2008. At the district level, nine correlation coefficients were generated and presented in a correlation matrix. Outcomes presented included the Pearson r correlation coefficient, and the coefficient of determination $r^2$. When the Pearson r correlation coefficient is squared ($r^2$), the resulting value is the coefficient of determination and represents the percentage of variance explained by the relationship of the two variables.

The second hypothesis will be tested using the same STRR calculation used for the district level, but the calculation will be made for the campus level Grades 4, 8, and 10 over the same period of 10 years (i.e., 1999 through 2008). The Pearson r correlation coefficient was used to determine if a positive or negative linear relationship existed at the campus level between the scores of the African American, Hispanic, and White students and their corresponding STRRs. The strength of the relationship was expressed in the coefficient of determination $r^2$. At each
grade level, Grade 4, 8, and 10, nine correlation coefficients were generated and presented in a correlation matrix.

The correlation coefficient is a single number that describes the magnitude and direction of the relationship between two variables. The correlation coefficient served to develop understanding of the relationship between the race-ethnicity ratio variables and students’ reading and mathematics assessment scores. The squared correlation coefficient led to understanding of the strength of the resulting relationships, if relationships existed.

Limitations of Methodology

Limitations exist within this methodology, as noted in Chapter 1, and are reviewed here. A limitation of the study related to the data available from the TEA AEIS reports for mathematics and reading assessment scores. Student achievement data in a single assessment format, TAAS or TAKS, was not available to facilitate instrument continuity. The TAAS data represented years 1999 to 2002, and TAKS data represented years 2003 through 2008. Because the campus selection pool was restricted to elementary, middle, and high schools classified as general education and fully accessible to all students within specific attendance boundaries, the results might not generalize for STRR at alternative education facilities, magnet schools, and senior high schools.

For this study, STRR was defined as the ratio of African American, Hispanic and White students to White teachers in defined settings. Results did not include any other student or teacher race/ethnic groups. The STRR was calculated solely at the respective setting level. It was impossible to obtain specific classroom level race/ethnic demographic data from the AEIS reports.
As described previously, the individual sample setting size was too small to facilitate substance in \( p \) values. This shortfall was addressed by calculating \( r^2 \) as an effect size measure. Finally, all students and teacher race/ethnic populations might be physically represented at the respective three grades in the sample for all 10 years but might not have been reported per TEA privacy mandates for each year. This limitation suggested that the results of the study might not generalize beyond the geographic region and historic demographics being studied.

Summary

This chapter outlined the methodology and procedures used for this relational study. The Pearson \( r \) correlation coefficient was used to answer the research question of whether three student ethnic groups’ academic success on the state outcome measure had any relationship with the student race/ethnicity by White teacher ratio variables in the 10 school districts, 10 high schools, 10 middle schools, and 10 elementary schools across the 10-year period from 1999 through 2008. The correlation coefficient analysis was used to determine, if over the 10-year period, significant relationships existed between student achievement on the Texas-mandated reading and mathematics assessments and the STRR variables. This study’s purpose, sample, data collection procedures, and data analysis plans were outlined in this third chapter. The findings are presented in Chapter 4.
CHAPTER 4
RESULTS OF THE STUDY

The purpose of this study was to examine if changes in the student to teacher race-ethnicity ratio (STRR) between African American and Hispanic students and White teachers exhibited meaningful relationships related to these students’ reading and mathematics passing rates on the annual Texas state assessment measure over a 10 year period. In the past, substantial research has been focused on student and teacher non-racial and non-ethnic characteristics and the ensuing affects on student achievement. A variable not well studied has been the influence of racial/ethnic compatibility between students and teachers and the impact on student achievement. This project was focused on this one relationship to African American and Hispanic student achievement in selected settings.

To operationalize this study, this chapter starts with a brief summary of the methodology. This is followed by presentation of descriptive statistics for the students and teachers that comprise the data set that was examined. These descriptive statistics illustrate the 10-year achievement performance of African American, Hispanic, and White students on reading and mathematics assessments. These descriptive summaries are devoid of any direct teacher influence. They capture only student performance. Third, outcomes of ANOVA analysis illustrate that the achievement gap between African American and Hispanic students as compared to Whites in this sample is representative of what has been reported nationally. The statistically significant main effects and interactions between the student groups’ performance level within the various settings are provided. Finally, the chapter presents the results of the data analysis as guided by the research questions and the two hypotheses posed in Chapter 1. Data are presented as correlations between student groups achievement as a function of the student
teacher race ratio (STRR) with White teachers. The strength of the associations between student performance and the affect of the STRRS are presented within each of the four settings.

**Summary of Methodology**

I utilized assessment and demographic data collected from the Texas Education Agency’s (TEA) Academic Excellence Indicator System (AEIS) database over the 10-year period of 1999-2008. The 10 school districts were selected that represented the largest employers of BTEGs from the UNT. Within each campus setting, 10 high schools, 10 middle schools, and 10 elementary schools were selected from within the districts for the sample based on the criteria explained in Chapter 3.

The passing rates of African American, Hispanic, and White students on the two Texas annual outcome measurements from 1999 to 2008 in reading and mathematics were used as achievement markers. During this period, the state of Texas employed two statewide measurements: the Texas Assessment of Academic Skills (TAAS) and the Texas Assessment of Knowledge and Skills (TAKS). Although the dependent variable was comprised of two unique instruments, these two tests were applied equally to all Texas students eligible for assessment. For this study these two assessments were considered as a single entity: the Texas outcome measure.

The independent variable was each student ethnic group’s calculated STRR in each setting (i.e., district, high school, middle school, and elementary school). The total individual student group within each setting served as the numerator for the ratio calculation. Each racial/ethnic student group represented a proportion of the total racial / ethnic student population within the defined setting. The total of White teachers within the same setting as the students served as the denominator to calculate the STRR. The three STRRs in the four instructional
settings were: (1) the ratio of the African American students to White teachers; (2) the ratio of the Hispanic students to White teachers; (3) the ratio of White students’ to White teachers. STRR calculations were made across 10 years, per setting, for reading and mathematics. Using the Pearson product-moment correlation coefficient formula, STRRs were correlated to student group achievement on the Texas annual outcome measure over the 10-year period. Per individual setting and year, the STRR remained the same for both reading and mathematics, only the students’ subject scores changed.

The composite and disaggregated student ns and White teacher ns over the 10-year period within the selected instructional settings are presented in Table 1.

Table 1

<table>
<thead>
<tr>
<th>Instructional Setting</th>
<th>Total Student n</th>
<th>African American</th>
<th>Hispanic</th>
<th>White</th>
<th>White Teacher</th>
</tr>
</thead>
<tbody>
<tr>
<td>District</td>
<td>4,664,192</td>
<td>1,047,272</td>
<td>2,014,336</td>
<td>1,602,584</td>
<td>222,834</td>
</tr>
<tr>
<td>High</td>
<td>188,839</td>
<td>28,156</td>
<td>58,579</td>
<td>102,104</td>
<td>11,624</td>
</tr>
<tr>
<td>Middle</td>
<td>93,573</td>
<td>16,774</td>
<td>32,338</td>
<td>44,461</td>
<td>5,474</td>
</tr>
<tr>
<td>Elementary</td>
<td>40,083</td>
<td>13,351</td>
<td>20,616</td>
<td>26,732</td>
<td>3,373</td>
</tr>
</tbody>
</table>

I employed a non-experimental correlation research design to examine the study’s hypotheses that a racial/ethnic compatible relationship did not exist between African American and Hispanic students’ success on the Texas annual assessment compared to the number of White teacher in each settings. The correlation coefficients provided an indication of whether a relationship existed and if so, an estimate of the strength between the two variables – STRR and student assessment outcomes. Numerically, the attribute of the relationship was reported as
either a positive or negative number. In other words, a positive correlation indicated that as student racial/ethnic ratios to White teachers increased, test scores increased. Negative correlation coefficients indicated an inverse relationship; that is as the student group STRR increased test scores declined.

Correlational research designs do not explain causal factors, but rather indicate the extent to which one variable may be associated with another variable (Gall, Gall, & Borg, 2007). However, the converse is equally true: the lack of correlation does not mean the absence of causation (Jencks, 1972). For this pilot study, correlation was deemed an appropriate analysis tool to determine existence of a relationship.

The purpose of this study was to attempt to ascertain whether African American and Hispanic students’ academic achievement was associated with STRRs. While relationships cannot be used to pinpoint causality, the first step in studying this phenomenon was to determine if a relationship existed and if it did exist, how strong the relationship appeared. Determining if a racial/ethnic compatible relationship existed between student groups was important for this study because numerous variables impact student achievement and the composition and mobility of the teacher workforce.

The research question was the following: For the time period between 1999 and 2008, does a correlation exist between the proportions of African American, Hispanic, and White students to White teachers, the student to teacher racial ratios (STRRs), and the passing percentages of these student groups on the reading and math sections of Texas’ state assessment instruments among 10 identified school districts and 30 elementary, middle, and high school campuses randomly selected from within the 10 identified school districts?

This question was expanded into the following two null hypotheses for testing:
H₁ Over the 10-year period from 1999 through 2008, in 10 identified school districts, changes in STRRs for African American, Hispanic, and White students will not exhibit a relationship to these students’ reading and math scores on the Texas mandated state assessment instrument.

H₂ Over the 10-year period from 1999 through 2008, in 10 selected high schools, 10 middle schools, and 10 elementary schools from within the 10 identified school districts, changes in the STRRs for African American, Hispanic, and White students will not exhibit a relationship to these students’ reading and math scores on the Texas mandated state assessment instrument.

Demographic and Achievement Data Collection

The data collected for this study were taken from the publically available TEA AEIS database. The TEA AEIS database was used because it provided ready access to the necessary student, teacher, and achievement data elements in all of the settings required by the study, as well as uniformity in data output. The AEIS system collects its selected data elements from the TEA’s master database, the Public Education Information Management System (PEIMS). Online access to these data is not available. I served as the single agent capturing and inputting the AEIS data into the study’s host database.

District data. Student demographic and academic data were collected from annual AEIS datasets that report district and campus level statistics. The TEA reports numerous district performance measures. For this study, composite district data for student group outcomes were collected from the category entitled TAKS, Met Standard (sum of all grades tested as standard accountability indicator). Two sets of student data were extracted. The first was the passing rates on the Texas outcome measurement in reading and mathematics for the district’s African
American, Hispanic, and White students. Second, demographic data were collected specific to total student population and individual populations of African Americas, Hispanics, and White students at the selected campus levels. Table 2 reports the demographic student representation for each district in the study, using 1999 as the base year.

The total number of White teachers, per setting, was captured from the same AEIS data set as the student demographic data, using the section entitled: Staff information. Table 3 illustrates teacher ethnicity for each of the 10 districts during the same time period.

Capturing student and teacher data in 1999 was helpful in illustrating the growth and decline of student groups and teachers. Not only did these data document the impressive growth of Hispanics within the 10 districts, but also the flattening of the African American census and declining trend of White students in the urban and mature suburban districts. These data likewise illustrate the predominance of White teachers within these 10 districts’ workforce.
Table 2

*Student Ethnicity Distribution for the 10 Sampled Districts in 1999*

<table>
<thead>
<tr>
<th>District</th>
<th>African American</th>
<th>Hispanic</th>
<th>White</th>
<th>Native American</th>
<th>Asian</th>
<th>Total Students</th>
<th>% White</th>
<th>% African American</th>
<th>% Hispanic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carrollton-Farmers Branch (FB)</td>
<td>2,093</td>
<td>6,489</td>
<td>10,807</td>
<td>114</td>
<td>2,917</td>
<td>22,420</td>
<td>48</td>
<td>9</td>
<td>29</td>
</tr>
<tr>
<td>Dallas</td>
<td>62,956</td>
<td>78,858</td>
<td>14,846</td>
<td>687</td>
<td>2,561</td>
<td>159,908</td>
<td>9</td>
<td>39</td>
<td>49</td>
</tr>
<tr>
<td>Denton</td>
<td>1,456</td>
<td>2,413</td>
<td>8,842</td>
<td>64</td>
<td>172</td>
<td>12,947</td>
<td>68</td>
<td>11</td>
<td>19</td>
</tr>
<tr>
<td>Ft. Worth</td>
<td>25,195</td>
<td>32,057</td>
<td>18,742</td>
<td>188</td>
<td>1,774</td>
<td>77,956</td>
<td>24</td>
<td>32</td>
<td>41</td>
</tr>
<tr>
<td>Frisco</td>
<td>190</td>
<td>693</td>
<td>3,483</td>
<td>31</td>
<td>76</td>
<td>4,473</td>
<td>78</td>
<td>4</td>
<td>15</td>
</tr>
<tr>
<td>Garland</td>
<td>7,695</td>
<td>11,711</td>
<td>25,412</td>
<td>293</td>
<td>2,856</td>
<td>47,967</td>
<td>53</td>
<td>16</td>
<td>24</td>
</tr>
<tr>
<td>Irving</td>
<td>3,911</td>
<td>11,553</td>
<td>10,349</td>
<td>156</td>
<td>1,682</td>
<td>27,651</td>
<td>37</td>
<td>14</td>
<td>42</td>
</tr>
<tr>
<td>Keller</td>
<td>562</td>
<td>1,010</td>
<td>12,513</td>
<td>36</td>
<td>632</td>
<td>14,753</td>
<td>85</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>Lewisville</td>
<td>2,199</td>
<td>3,521</td>
<td>27,889</td>
<td>148</td>
<td>1,113</td>
<td>34,870</td>
<td>80</td>
<td>6</td>
<td>10</td>
</tr>
<tr>
<td>Plano</td>
<td>2,802</td>
<td>3,582</td>
<td>32,834</td>
<td>127</td>
<td>4,884</td>
<td>44,229</td>
<td>74</td>
<td>6</td>
<td>8</td>
</tr>
<tr>
<td>Average</td>
<td>109,059</td>
<td>151,887</td>
<td>165,717</td>
<td>1,844</td>
<td>18,667</td>
<td>447,774</td>
<td>56</td>
<td>14</td>
<td>24</td>
</tr>
</tbody>
</table>

*Note.* Data obtained from the Texas Education Agency (Texas Education Agency, 1993-2009).
Table 3

*Teacher Race and Ethnicity Distribution for the 10 Sampled Districts for 1999*

<table>
<thead>
<tr>
<th>District</th>
<th>African American</th>
<th>Hispanic</th>
<th>White</th>
<th>Native American</th>
<th>Asian</th>
<th>Total Teachers</th>
<th>% White</th>
<th>% Non-White</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carrollton-FB</td>
<td>54</td>
<td>114</td>
<td>1,310</td>
<td>8</td>
<td>17</td>
<td>1,503</td>
<td>87</td>
<td>100</td>
</tr>
<tr>
<td>Dallas</td>
<td>3,483</td>
<td>1,037</td>
<td>4,122</td>
<td>65</td>
<td>101</td>
<td>8,808</td>
<td>47</td>
<td>53</td>
</tr>
<tr>
<td>Denton</td>
<td>55</td>
<td>70</td>
<td>798</td>
<td>2</td>
<td>6</td>
<td>931</td>
<td>86</td>
<td>14</td>
</tr>
<tr>
<td>Ft. Worth</td>
<td>949</td>
<td>506</td>
<td>2,912</td>
<td>14</td>
<td>34</td>
<td>4,415</td>
<td>66</td>
<td>34</td>
</tr>
<tr>
<td>Frisco</td>
<td>1</td>
<td>9</td>
<td>285</td>
<td>3</td>
<td>0</td>
<td>298</td>
<td>96</td>
<td>4</td>
</tr>
<tr>
<td>Garland</td>
<td>165</td>
<td>169</td>
<td>2,467</td>
<td>10</td>
<td>20</td>
<td>2,831</td>
<td>87</td>
<td>13</td>
</tr>
<tr>
<td>Irving</td>
<td>59</td>
<td>135</td>
<td>1,625</td>
<td>6</td>
<td>11</td>
<td>1,836</td>
<td>89</td>
<td>11</td>
</tr>
<tr>
<td>Keller</td>
<td>5</td>
<td>14</td>
<td>787</td>
<td>2</td>
<td>4</td>
<td>812</td>
<td>97</td>
<td>3</td>
</tr>
<tr>
<td>Lewisville</td>
<td>41</td>
<td>73</td>
<td>2,213</td>
<td>12</td>
<td>14</td>
<td>2,353</td>
<td>94</td>
<td>6</td>
</tr>
<tr>
<td>Plano</td>
<td>103</td>
<td>103</td>
<td>2,826</td>
<td>13</td>
<td>34</td>
<td>3,079</td>
<td>92</td>
<td>8</td>
</tr>
<tr>
<td>Total</td>
<td>4,915</td>
<td>2,230</td>
<td>19,345</td>
<td>135</td>
<td>241</td>
<td>26,866</td>
<td>84</td>
<td>16</td>
</tr>
</tbody>
</table>

*Note.* Date obtained from the Texas Education Agency (Texas Education Agency, 1993-2009).

During the study period, as the students’ demographics trended to a Hispanic majority, the instructional workforce remained White. The 10 sample districts reported employing an aggregate of 26,868 teachers in 1999: 72.0% of these teachers were White (TEA, 2009). In 2008, White teacher representation declined to 65.6% in these districts. Although the percentage of White teachers declined Whites retained their majority throughout the 10-year study period. As Figure 1 demonstrates, a redistribution of both students and teachers transpired in the districts over the 10-year study period. In Figure 1, the label Teach_White represents the aggregate total of White teachers, whereas the label Teach_D represents the aggregate of teachers reporting a non-White racial or ethnic background.
Additionally, Figure 1 is also helpful in illustrating the growth and decline occurring within each student groups’ population over the 10-year period. Alongside these population trends the disproportionally between racial/ethnic student to teacher ratios is evident. Although the Hispanic student population grew by 59% and African American enrollment declined by 7%, the representation of non-White teachers increased by 70% during the same period. Yet with this substantial growth, non-White teacher only represented 34% of the 2008 instructional workforce. Conversely, as the White student population declined by 9%, the White teacher presence increase by 27% and represented 66% of the classroom instructional staff in 2008.

Figure 1. Student and teacher redistribution figures for the 10 sampled districts from 1999 to 2008 with data obtained from the Texas Education Agency.

Campus selection and data collection. The TEA has established guidelines to measure district and campus performance on the annual state assessment as an accountability metric. These guidelines take into account a variety of factors including composite student group
academic performance, dropout percentages, percentage of students identified as economically
disadvantage, percentage of students identified as special education, percentage of students
identified as having limited English proficiency, etc. Based on consolidated performance in
defined, criteria, campuses and districts are ranked annually into four achievement categories:
Exemplary, Recognized, Academically Acceptable, and Low Performing. Each Texas public
school district, campus, and charter school receives an annual performance ranking, which is also
reported in the AEIS dataset.

For this study, campuses were chosen proportionally from the four achievement
performance indicator categories in the base year 1999. The number and distribution of
achievement ranking within the sample, disaggregated by high school, middle school, and
elementary campuses per sample districts, is provided in Table 4, Table 5, and Table 6. The
number of campuses selected within a specific TEA performance indicator was calculated based
on the proportion of that number of campuses within a defined TEA ranking category to the total
number of campuses in all TEA performance rankings. As noted in the tables, not all districts
had campuses that fell into all the defined TEA ranking bands over the 10-year period.

Once campuses were selected based on the criterion outlined in Chapter 3, demographic
and achievement data were captured from the AEIS database. Achievement outcome data for the
select student groups in reading and mathematics passing percentages, along with student and
teacher demographic information, were retrieved in the same manner as for district data. I
manually entered all data into an Excel spreadsheet. Initial loading into Excel facilitated
rudimentary calculations such as STRRs with campus settings, annual student population totals
by race/ethnicity, annual teacher population totals by race/ethnicity, etc. In addition to Excel’s
serving as the host to export data into SPSS, a social science statistical software program used in
this study for data analysis, the Excel dataset was also used to calculate the initial series of Pearson product moment correlations to double check the SPSS output.
Table 4

**Distribution of High School Campuses by 1999 TEA Rankings**

<table>
<thead>
<tr>
<th>District</th>
<th>Total High Schools</th>
<th>% of Total Schools</th>
<th>TEA Exemplary</th>
<th>% of Total for Exemplary</th>
<th>TEA Recognized</th>
<th>% of Total for Recognized</th>
<th>TEA Academically Acceptable</th>
<th>% of Total for Academically Acceptable</th>
<th>TEA Low Performing</th>
<th>% of Total for Low Performing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carrollton -FB</td>
<td>3</td>
<td>5.0</td>
<td>3</td>
<td>37.5</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>5.9</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Dallas</td>
<td>21</td>
<td>35.0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>19</td>
<td>37.3</td>
<td>2</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>Denton</td>
<td>2</td>
<td>3.3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>3.9</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Ft. Worth</td>
<td>12</td>
<td>2.0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>12</td>
<td>23.5</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Frisco</td>
<td>1</td>
<td>1.7</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>2.0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Garland</td>
<td>7</td>
<td>11.7</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>50</td>
<td>11.8</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Irving</td>
<td>3</td>
<td>5.0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>5.9</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Keller</td>
<td>2</td>
<td>3.3</td>
<td>1</td>
<td>12.5</td>
<td>0</td>
<td>1</td>
<td>2.0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Lewisville</td>
<td>4</td>
<td>6.7</td>
<td>1</td>
<td>12.5</td>
<td>1</td>
<td>50</td>
<td>2</td>
<td>3.9</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Plano</td>
<td>5</td>
<td>8.3</td>
<td>3</td>
<td>37.5</td>
<td>0</td>
<td>2</td>
<td>3.9</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td><strong>10 Districts Total</strong></td>
<td>60</td>
<td>100</td>
<td>8</td>
<td>100</td>
<td>2</td>
<td>100</td>
<td>51</td>
<td>100</td>
<td>2</td>
<td>100</td>
</tr>
<tr>
<td>% of 10 Districts</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Campus Chosen</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note. Data obtained from the Texas Education Agency (Texas Education Agency, 1993-2009).*
Table 5

**Distribution of Middle School Campuses by 1999 TEA Rankings**

<table>
<thead>
<tr>
<th>District</th>
<th>Total Middle Schools</th>
<th>% of Total Schools</th>
<th>TEA Exemplary</th>
<th>% of Total for Exemplary</th>
<th>TEA Recognized</th>
<th>% of Total for Recognized</th>
<th>TEA Academically Acceptable</th>
<th>% of Total for Academically Acceptable</th>
<th>TEA Low Performing</th>
<th>% of Total for Low Performing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carrollton -FB</td>
<td>7</td>
<td>6.9</td>
<td>1</td>
<td>5</td>
<td>3</td>
<td>18.8</td>
<td>3</td>
<td>4.5</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Dallas</td>
<td>27</td>
<td>26.5</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>23</td>
<td>34.8</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Denton</td>
<td>3</td>
<td>2.9</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>4.5</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Ft. Worth</td>
<td>23</td>
<td>22.5</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>6.3</td>
<td>22</td>
<td>33.3</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Frisco</td>
<td>2</td>
<td>2.0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>6.3</td>
<td>1</td>
<td>1.5</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Garland</td>
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*Note.* Data obtained from the Texas Education Agency (Texas Education Agency, 1993-2009).
Table 6

*Distribution of Elementary School Campuses by 1999 TEA Rankings*

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<thead>
<tr>
<th>District</th>
<th>Total Elem Schools</th>
<th>% of Total Schools</th>
<th>TEA Exemplary</th>
<th>% of Total for Exemplary</th>
<th>TEA Recognized</th>
<th>% of Total for Recognized</th>
<th>TEA Academically Acceptable</th>
<th>% of Total for Academically Acceptable</th>
<th>TEA Low Performing</th>
<th>% of Total for Low Performing</th>
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<tr>
<td>Carrollton-FB</td>
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<td>8.9</td>
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<td>15.2</td>
<td>129</td>
<td>57.8</td>
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<td>2.5</td>
<td>7</td>
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<td>0</td>
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<td>17.7</td>
<td>48</td>
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<td>7.6</td>
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<td>4.0</td>
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<td>Lewisville</td>
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<td>12.7</td>
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</tbody>
</table>

*Note.* Data obtained from the Texas Education Agency (Texas Education Agency, 1993-2009).
The Student Achievement Gap

An initial query I wanted to know was if the student data selected for this study reasonably reflected the achievement gap between African American and Hispanic students and Whites students reported in the literature (Dee, 2004; Goldsmith, 2004; Hunter & Bartee, 2003; Jencks & Phillips, 1998; National Center for Education Statistics, 2009b, 2009c; National Governors Conference, n/a). The purpose of initially validating the sample data was twofold. First, absent of White teacher influences, do these sample data reflect the reported underachievement of African American and Hispanic students in reading and mathematics when compared to their White counterparts in the same setting, over the same time period. Second, will an ANOVA analysis reflect and support that an achievement gap exists between these student groups in this sample? Performing these two rudimentary analyses provided core indications that the selected districts and campuses demonstrated achievement characteristics consistent with the literature.

Racial/Ethnic Achievement Outcomes by Frequency

To answer the first question, frequency distribution histograms for reading and mathematics score were calculated and constructed at the district levels and for high school, middle schools, and elementary school grades for African American, Hispanic, and White students. These histograms are important to the study because they graphically illustrate bands of passing score commonality, but more importantly, they illustrate student group movement toward achievement. Furthermore, the impact on all student groups as a result of changing from the TAAS to the TAKS in 2003 is evident.

The state of Texas used two annual assessments during the time period of this study, the TAAS and the TAKS. Both of these assessments are criterion referenced. With criterion-based
assessments, students either pass or fail the assessments and there are no incremental scores. If Texas elected to assess based on norm referenced protocols this would allow for distribution analysis. This is an important distinction when reviewing the histograms. Because criterion referenced assessments are scored as either “pass” or “fail,” a ceiling effect occurs when students successfully past the assessment and are subsequently ranked at 100%. This does not occur with norm-referenced tests. A student may “pass” with one correct answer or having gotten all the answers correct. There is no degree of separation between students’ performance. With criterion-referenced assessments, there are no delineations as to the degree the student passed (i.e., by a little or a lot) or how student groups compare to one another. This makes the degree of discrimination among student achievement among the top end of the scale impossible (i.e., ascertaining the degree of the achievement gap between and within student groups is impossible when only passing percentages are reported, and those are based solely on a pass/fail criterion)

Ceiling effects may also reduce the correlation between two variables. Ceiling effects affect measures of central tendency and measures of dispersion. However, since there were not a lot of top scorers, and since means and standard deviations are easier for readers to understand than medians and semi-interquartile ranges, the decision was made to report means and standard deviations. This ensures the ability to determine the central tendency of the data.

It is important to understand how to interpret these histograms and what they illustrate. The “x” axis represents the student percentage passing percentage ranges/bands within which the student groups fall. The “y” axis represents the districts. If summed, all of the “bars” in a given year equal 10, which is the number of districts in the sample. For example, across the 10 districts in 1999, African American reading scores demonstrate the following: in 4 districts 70-80% of African American students passed the TAAS; in 5 districts, 80-90% of African American
students passed in the TAAS; and in 1 district over 90% of the African American passed the assessment. Compare these African American outcomes to the White histogram for the same year and subject: 90-100% of White students in the 10 districts passed the TAAS.

Not only do these histogram reveal the district’s student percentage passing the assessment, but also provides an indication of who fails. In the 1999 example in the same reading sample for African Americans, in 4 districts, 20-30% of African American students failed the TAAS; in 5 districts, 10-20% failed: and in 1 district, 10% were unsuccessful. This means approximately 19% of the total African American student population across the 10 districts failed the TAAS in 1999. Based on population data in Table 3, percentage represents approximately 934 students. This is almost double the failure rate of Whites, 10%, across the 10 districts during the same time period. However, the White population was four times that of African American in 1999. Thus, a 10% failure rate equated to 1,934 White students.

Additionally noteworthy is the visual representation that districts were making significant progress in improving the number of African Americans and Hispanics passing the TAAS. In 2002, the 10 districts improved African America reading passing rates in excess of 80% upward to 95%. At the same time over 95% of Whites were passing. The implementation of the TAKS plummeted scores across all groups, but Whites exhibited the most resiliency.

Also to be noted is that although it appears in the graphic representation that some student groups scored in excess of 100% proficient in either reading or mathematics, this was not the case. Rather in these graphs the tick marks were placed at the left side of the column, that is to say no student group exceeded 100%, which is the ceiling, as previously explained. The mark for graph metric bar occurs at the front of the bar, but the width of the bar may give the appearance some scores were greater than 100%. The maximum score reported by the TEA is
“>99%”. However, the TEA also reports scores as 99%. In the data entry >99% was input as the value 100 and 99% as the value 99. This was done to illustrate the delineation between scores.

These data demonstrate outcomes that are consistent with the literature that demonstrate lower percentages of African American and Hispanics students pass outcome measures than their White counterparts (National Center for Education Statistics, 2009b, 2009d, 2009e, 2010a, 2010b).

District level outcomes in reading scores for African American, Hispanic, and White student are reported in Figure 2, Figure 3, and Figure 4. District level mathematics performance is shown in Figures 5 through 7. Histograms for high schools, middle schools, and elementary schools samples are located in Appendix A, Figures A.1 through A.6.

District Level Analysis

Reading and mathematics at district level. District level analysis is presented in Figures 2 through 7. Reading scores are presented first, followed by mathematics.
Figure 2. State reading assessment results for African American students in the 10 selected districts, 1999-2008 with Mean = 84.3, Std. Dev. = 6.9, and N = 100.
Figure 3. State reading assessment results for Hispanic students in the 10 selected districts, 1999-2008 with Mean = 81.7, Std. Dev. = 6.4, and N = 100.
Figure 4. State reading assessment results for White students in the 10 selected districts, 1999-2008, Mean = 94.4, Std. Dev. = 3.0, and N = 100.
Figure 5. State mathematics assessment results for African American students in the 10 selected districts, 1999-2008 with Mean = 73.0, Std. Dev. = 12.3, and N = 100.
Figure 6. State mathematics assessment results for Hispanic students in the 10 selected districts, 1999–2008, Mean = 75.7, Std. Dev. = 10.4, and $N = 100$. 
Figure 7. State mathematics assessment results for White students in the 10 selected district, 1999-2008 with Mean = 89.9, Std. Dev. = 6.5, and N = 100.

The data presented in Figures 2 through 7 are summarized in Table 7 and Table 8. These two tables also show the values for the performance gaps between the ethnic and racial groups.
Table 7

**Gap Summary of African American and Hispanic Student Groups Compared to White Student Performance on the Texas Assessment for Reading Scores, 1999-2008**

<table>
<thead>
<tr>
<th>Statistic</th>
<th>African American</th>
<th>Hispanic</th>
<th>White</th>
<th>African American</th>
<th>Hispanic</th>
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<td>Mean</td>
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<td>94.4</td>
<td>10.2</td>
<td>12.8</td>
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<td>6.4</td>
<td>3.0</td>
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<td><strong>High Schools</strong></td>
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<td><strong>Middle Schools</strong></td>
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Table 8

*Gap Summary of African American and Hispanic Student Groups Compared to White Student Performance on the Texas Assessment for Mathematics Scores, 1999-2008*

<table>
<thead>
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<th>Statistic</th>
<th>African American</th>
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<td><strong>High Schools</strong></td>
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<td><strong>Middle Schools</strong></td>
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<td><strong>Elementary Schools</strong></td>
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<td>90.0</td>
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</table>
ANOVA Analysis

To ascertain and confirm if these districts demonstrated achievement disparity between student groups analysis of variance (ANOVA) tests were calculated. The purpose of the one-way ANOVA was to find out whether data from several groups had a common mean and to determine whether the groups were actually different in some measured characteristics, such as student achievement across time absent teacher racial influences. The ANOVA measured student means between and within. The one factor within and one factor between ANOVAs were used in all of the analyses. The one-factor within consisted of the repeated measure-year and was named Time. The one factor between consisted of race and was named Set. Initially multivariate analyses were used. The appropriate effect size for these analyses was the partial eta-squared. Figures 8 and 9 pictorially demonstrate the achievement gaps occurring at the district level for reading and mathematics. Grade level ANOVAs are presented in Appendix B, Figures B.1 through B.6, for further review. In multiple post hoc analyses, White students were different from both African American and Hispanic students, but African American students were not different from Hispanics.
Figure 8. Estimated marginal means of measure: District reading for African American, Hispanic, and White students on the state measure, 1999-2008, where Time was $p < .001$ and partial eta-squared = .97; Set was $p < .001$ with the partial eta-squared = .62; Time by set was $p = .003$ with partial eta-squared = .56.
Achievement Gap for the Sample

The purpose of the previous analysis was to determine if the sample selected for this study was consistent with national historic trends. What was observed was that the selected sample demonstrated similar characteristics to those of national data in which achievement gaps existed between student groups (National Center for Education Statistics, 2009a, 2009b, 2009c). Additionally, outliers in the sample affected the normality of the distribution. These outliers

Figure 9. Estimated marginal means of measure: District mathematics for African American, Hispanic, and White students on the state measure, 1999-2008, where Time was \( p < .001 \) with partial eta-squared = .95; Set \( p < .001 \) with partial eta-squared = .67; Time by set was \( p = .0024 \) with partial eta-squared = .49.
occurred after 2003, illustrating the dramatic effect of the TEA’s change from the TAAS to the TAKS in 2003 had on African American and Hispanic students’ achievement in both reading and mathematics across all campus settings. These performance declines were not restricted to African and Hispanics. However, White students exhibited increased resiliency after steep performance declines in math. In most cases, they exhibited return to pre-2003 performance levels on the TAKS for reading within two years. Mathematics achievement continued to be troubling for all student groups where pre-TAKS levels of achievement had not been attained by the 2008 scores. Table 7 (presented previously) illustrates the levels of mean achievement disparity and the achievement gaps for the four levels of analysis by district and Grades 10, 8, and 4. The gaps exhibited in the frequency analysis were confirmed in the ANOVAs.

The one-way ANOVA was useful to determine whether data from several groups had a common mean and whether the groups were actually different in some measured characteristics, such as student achievement across time absent teacher racial influences. The ANOVA data reinforced the notion that achievement disparity existed between student groups in this sample. Whites were different from both African Americans and Hispanics, but African American were not different from Hispanics. This result could be attributed to possible sample bias. All of the effect sizes were small for race and for the race by time interaction. Time itself had a strong effect in most of the analyses.

In both frequency and percentage of students passing, African Americans and Hispanics demonstrated progress in closing the achievement gap when measured by the TAAS. With the adoption of the TAKS in 2003, considerable disparity arose. The setback due to assessment protocols was less notable in reading. In mathematics, no student group attained pre-TAKS levels. The TEA changed to the TAKS in an effort to increase rigor on the state assessment as a
result of stakeholder complaints that the TAAS was not challenging.

Issues arose in these analyses that were both expected and unexpected. The expected issues arose in the frequency distributions. By collating all of the years together, a loss of independence for the same campus across years occurred. An unexpected occurrence was the absence of particular student groups in the sample over time. As noted in Chapter 3, if a student group census fell below minimum levels, to protect students’ identities, TEA did not report assessment scores for that group. A problem arose that one middle school did not have any AEIS reported data for any student group in 2003. This was unusual and a satisfactory explanation could not be obtained from the TEA. In this same district, one elementary school did not have sufficient numbers of African American students to report scores in 2000, 2001, 2004, 2005, and 2006. The reason this school remained in the sample was because it was the second TEA Exemplary rated school in the campus selection in the base year of 1999 and was needed per the protocol for the analyses. It was not known at the time of sample selection that the ebb and flow of African American students’ enrollments would be an issue with this school. Finally, one elementary school in an urban setting did not have enough White students assessed in reading and mathematics within the 10-period to meet the TEA’s reporting threshold. In each of these cases, adjustments were made in the n to reflect 9 campuses rather than maintaining the base n of 10 campuses. Otherwise it would have been necessary to enter a score of zero (0) for the assessment for the subject by year. This would have skewed the distribution enormously.

In summary, the sample used in the study at the district, high school, middle school, and elementary grade levels, demonstrated similar achievement disparity gaps between African American and Hispanic as compared to White student achievement as reported by *The Nation’s Report Card, Reading 2009* (National Center for Education Statistics, 2009c), *The Nation’s*
Report Card, Math, 2009 (National Center for Education Statistics, 2009b), and other studies (Coleman, et al., 1966; Germeraad, 2009; Hunter & Bartee, 2003; Jencks & Phillips, 1998; Ladson-Billings, 2006). Based on the evidence, these datasets were deemed valid and represented the achievement gap for African American and Hispanic students as compared to White peers.

Results for the Research Question

The research question posed in Chapter 1 asked if a correlation existed between the fluctuation of the STRR between African American and Hispanic students and the subsequent passing percentages for these student groups on the reading and mathematics sections of Texas’ state assessment instruments. This question was used to frame the two hypotheses that define the inquiry settings at the district level and at the high school, middle, and elementary school levels in the 10 identified school districts. The districts were selected as having the highest hiring trends of baccalaureate teacher education graduates (BTEGS) from the University of North Texas. From these 10 districts, 10 elementary, 10 middle, and 10 high school campuses with varying TEA accountability performance ratings were selected. The first hypothesis was tested and the findings are presented below.

**H₁** Over the 10-year period from 1999 through 2008, in 10 identified school districts, changes in STRRs for African American, Hispanic, and White students will not exhibit a relationship to these students’ reading and math scores on the Texas mandated state assessment instrument.

Pearson’s $r$ correlation coefficient was used to evaluate the strength of the relationships between student achievement and the STRR over the 10-year period. Student outcomes on the Texas outcome measure were compared to student group ratios to White teachers in reading and
mathematics as they related to the Pearson $r$ correlation coefficient. Cohen (1988) offers the following guidelines for interpreting the Pearson $r$ in the social sciences: small correlation size, $r = .1$; medium, $r = .3$; large, $r = .5$. Another measure of the strength of the relationship between two variables is the coefficient of determination, referred to as $r^2$, and known also the effect size. This is a measure of the proportion of variance, or dispersion, shared by the two variables, and ranges from 0 to 1. The effect size ($r^2$) was calculated for each student category to determine the percentage of variance explained in one variable by the other (Salkind, 2010). An $r^2$ of .35 meant that 35% of the total variance was shared by the two variables. The two variables in this study were student group outcome scores and the student group to White teacher ratio (STRR). The effects size helped determine whether the difference observed is a difference of sufficient magnitude to warrant concern. The effect size illuminated the relative impact of the small sample size to the results.

Correlation coefficients are sensitive to sample size and $p$-values were also calculated. The $p$-values indicated whether the calculated correlation coefficient could have come from a distribution with zero correlation. The $p = .01$ value indicated a 1% chance that the relationship between student academic passing percentages on the state assessment, the dependent variable, compared to the STRR, the independent variable, did not exist (i.e., the smaller the $p$ value the stronger the evidence for rejecting the null hypothesis).

Significances in $p$-values were found at both the .01 and .05 levels. The frequency of significance was impressive. In 19 of the 20 years (i.e., 10 years per student group) significance was identified in reading achievement for African American and Hispanic students when correlated to the STRR. White students attained significance in reading achievement in 5 of the 10 years, and 80% of which occurred post-TAAS.
Minor oscillations within each of the student ethnicity groups were found through the analysis for reading, but the correlational disparities were more pronounced for African American and Hispanic students when compared to White students. Whereas the correlations for White students’ success in reading demonstrated positive values, these results did not transfer to other student ethnicities. The lowest $r$ value was .318 for White students, occurring in 1999’s reading outcome, but the degree of correlation strength progressively increased to .771 in 2008. In contrast, African American students showed negative correlation coefficients in reading that were observed as a low of -.667 in 1999 and a high of -.881 in 2002. Hispanic students demonstrated similar negative correlation coefficients in reading that ranged from a minimum of -.582 in 2004 to a maximum of -.840 in 1999.

A negative correlation between African American and Hispanic student academic performance on the state assessment and the STRR existed throughout the 10-year period at the district level for both students’ state reading and mathematics scores. Correlation coefficients for African American and Hispanic students’ reading scores were 100% negative with $r$ values as low as -.582 for Hispanic students in 2004 and as high as -.877 for African American students in 2008. The only non-significant correlation for either African American or Hispanic students occurred in year of 2004 for Hispanic students with $r = -.582$, but with $r^2 = .34$. This $r^2$ effect size, 34%, is notable. The negative relationships were more pronounced for African American and Hispanic students’ reading achievement when correlated with the STRR than mathematics.

Significance in mathematics was identified at .01 and .05 level in 13 of the 20 years for African American and Hispanic students, whereas only two years were significant for Whites.

After 2002, when Texas instituted the Texas Assessment of Knowledge and Skills (TAKS), Hispanic and African students’ reading scores exhibited slightly smaller correlation
coefficients when compared to the TAAS years. In 2003, district-level mathematics scores demonstrated a range of negative correlation coefficients for non-White students with $r$-values observed as -.342 for Hispanic students and as -.913 for African American students. Conversely, White students demonstrated positive correlations throughout the 10-year period. As reported in Tables 10 and 11, the $r^2$ values indicated the amount of variance accounted for between African American and Hispanic student achievement in reading and mathematics outcomes and the STRR to White teacher was notable.

For the 10 selected districts, over the 10-year period, the mean correlations for the state reading and mathematics scores as measured for African American and Hispanic students when correlated to the STRR was negative and statistically significant. Correlational significance was seen for reading, -.806 for African American students and -.766 for Hispanic students, and for mathematics, -.709 for African American students and -.635 for Hispanic students. White student scores demonstrated positive correlations with the ratio of students to White teachers. The mean correlation for White students was large at .594 in reading and .491 in mathematics.

The first hypothesis examined the relationship between district level student performance and the STRR and is presented in Table 9 for the state reading assessment and in Table 10 for the state mathematics assessment. Graphic representations of the district level results are presented in Figure 9 for the state reading assessment and in Figure 10 for the state mathematics assessment.

Due to the mean $r$ being negative and statistically significant for African American and Hispanic students, the null hypothesis that a relationship did not existed between African American students and Hispanic student performance on the state mandated outcome measure and the STRR at the district level was rejected.
Figure 10. Students’ state assessment results at district level by student ethnicity to White teacher ratio for reading scores.
Table 9

State Assessment Correlations for the District Level by Student Ethnicity and White Teacher Ratio for Reading Scores

<table>
<thead>
<tr>
<th>Year</th>
<th>Coefficients</th>
<th>All Students</th>
<th>African American</th>
<th>Hispanic</th>
<th>White</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>$r$</td>
<td>$-.939^{**}$</td>
<td>$-.667^*$</td>
<td>$-.840^{**}$</td>
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<tr>
<td></td>
<td>$p$</td>
<td>.000</td>
<td>.035</td>
<td>.002</td>
<td>.371</td>
</tr>
<tr>
<td></td>
<td>$r^2$</td>
<td>.880</td>
<td>.440</td>
<td>.710</td>
<td>.100</td>
</tr>
<tr>
<td>2000</td>
<td>$r$</td>
<td>$-.935^{**}$</td>
<td>$-.812^{**}$</td>
<td>$-.822^{**}$</td>
<td>.510</td>
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<tr>
<td></td>
<td>$p$</td>
<td>.000</td>
<td>.004</td>
<td>.004</td>
<td>.132</td>
</tr>
<tr>
<td></td>
<td>$r^2$</td>
<td>.870</td>
<td>.660</td>
<td>.680</td>
<td>.260</td>
</tr>
<tr>
<td>2001</td>
<td>$r$</td>
<td>$-.931^{**}$</td>
<td>$-.871^{**}$</td>
<td>$-.854^{**}$</td>
<td>.609</td>
</tr>
<tr>
<td></td>
<td>$p$</td>
<td>.000</td>
<td>.001</td>
<td>.004</td>
<td>.061</td>
</tr>
<tr>
<td></td>
<td>$r^2$</td>
<td>.870</td>
<td>.760</td>
<td>.730</td>
<td>.370</td>
</tr>
<tr>
<td>2002</td>
<td>$r$</td>
<td>$-.923^{**}$</td>
<td>$-.881^{**}$</td>
<td>$-.815^{**}$</td>
<td>.664*</td>
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<td>$p$</td>
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<td>.001</td>
<td>.004</td>
<td>.036</td>
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<td>$r^2$</td>
<td>.85</td>
<td>.780</td>
<td>.660</td>
<td>.440</td>
</tr>
<tr>
<td>2003</td>
<td>$r$</td>
<td>$-.913^{**}$</td>
<td>$-.777^{**}$</td>
<td>$-.689^*$</td>
<td>.416</td>
</tr>
<tr>
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<td>$p$</td>
<td>.000</td>
<td>.008</td>
<td>.027</td>
<td>.232</td>
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<td>$r^2$</td>
<td>.830</td>
<td>.600</td>
<td>.470</td>
<td>.170</td>
</tr>
<tr>
<td>2004</td>
<td>$r$</td>
<td>$-.873^{**}$</td>
<td>$-.736^*$</td>
<td>$-.582$</td>
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</tr>
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<td>.015</td>
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<td>.540</td>
<td>.340</td>
<td>.370</td>
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<td>$r$</td>
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<td>$-.821^{**}$</td>
<td>$-.736^*$</td>
<td>.653*</td>
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<td>.004</td>
<td>.015</td>
<td>.041</td>
</tr>
<tr>
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<td>$r^2$</td>
<td>.720</td>
<td>.670</td>
<td>.540</td>
<td>.430</td>
</tr>
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<td>2006</td>
<td>$r$</td>
<td>$-.852^{**}$</td>
<td>$-.856^{**}$</td>
<td>$-.719^*$</td>
<td>.660*</td>
</tr>
<tr>
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<td>$p$</td>
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<td>.002</td>
<td>.019</td>
<td>.038</td>
</tr>
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<td>$r^2$</td>
<td>.730</td>
<td>.730</td>
<td>.520</td>
<td>.440</td>
</tr>
<tr>
<td>2007</td>
<td>$r$</td>
<td>$-.848^{**}$</td>
<td>$-.766^{**}$</td>
<td>$-.766^{**}$</td>
<td>.728*</td>
</tr>
<tr>
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<td>$p$</td>
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<td>.010</td>
<td>.010</td>
<td>.017</td>
</tr>
<tr>
<td></td>
<td>$r^2$</td>
<td>.720</td>
<td>.590</td>
<td>.590</td>
<td>.530</td>
</tr>
<tr>
<td>2008</td>
<td>$r$</td>
<td>$-.891^{**}$</td>
<td>$-.877^{**}$</td>
<td>$-.780^{**}$</td>
<td>.771**</td>
</tr>
<tr>
<td></td>
<td>$p$</td>
<td>.001</td>
<td>.001</td>
<td>.008</td>
<td>.009</td>
</tr>
<tr>
<td></td>
<td>$r^2$</td>
<td>.790</td>
<td>.770</td>
<td>.610</td>
<td>.590</td>
</tr>
<tr>
<td>Mean $r$ for all years</td>
<td>-.895</td>
<td>-.806</td>
<td>-.766</td>
<td>.594</td>
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</tr>
<tr>
<td>Mean $r^2$ for all years</td>
<td>.800</td>
<td>.650</td>
<td>.587</td>
<td>.353</td>
<td></td>
</tr>
</tbody>
</table>

Note. $n = 10$ for all years and ethnic groups. *Correlation significant at .05. **Correlation significant at .01.
Figure 11. State assessment at district level for student ethnicity to White teacher ratio for mathematics scores.
Table 10

State Mathematics Assessment Correlations at District Level for Students by White Teacher Ratios

<table>
<thead>
<tr>
<th>Year</th>
<th>Coefficients</th>
<th>All Students</th>
<th>African American</th>
<th>Hispanic</th>
<th>White</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999</td>
<td>$r$</td>
<td>-.938**</td>
<td>-.588</td>
<td>-.721*</td>
<td>.395</td>
</tr>
<tr>
<td></td>
<td>$p$</td>
<td>.000</td>
<td>.074</td>
<td>.019</td>
<td>.259</td>
</tr>
<tr>
<td></td>
<td>$r^2$</td>
<td>.88</td>
<td>.350</td>
<td>.520</td>
<td>.160</td>
</tr>
<tr>
<td>2000</td>
<td>$r$</td>
<td>-.976**</td>
<td>-.850**</td>
<td>-.745*</td>
<td>.371</td>
</tr>
<tr>
<td></td>
<td>$p$</td>
<td>.000</td>
<td>.002</td>
<td>.014</td>
<td>.291</td>
</tr>
<tr>
<td></td>
<td>$r^2$</td>
<td>.950</td>
<td>.720</td>
<td>.560</td>
<td>.140</td>
</tr>
<tr>
<td>2001</td>
<td>$r$</td>
<td>-.978**</td>
<td>-.870**</td>
<td>-.680*</td>
<td>.308</td>
</tr>
<tr>
<td></td>
<td>$p$</td>
<td>.000</td>
<td>.001</td>
<td>.030</td>
<td>.387</td>
</tr>
<tr>
<td></td>
<td>$r^2$</td>
<td>.960</td>
<td>.760</td>
<td>.460</td>
<td>.090</td>
</tr>
<tr>
<td>2002</td>
<td>$r$</td>
<td>-.949**</td>
<td>-.913**</td>
<td>-.802**</td>
<td>.646*</td>
</tr>
<tr>
<td></td>
<td>$p$</td>
<td>.000</td>
<td>.000</td>
<td>.005</td>
<td>.043</td>
</tr>
<tr>
<td></td>
<td>$r^2$</td>
<td>.900</td>
<td>.830</td>
<td>.64</td>
<td>.420</td>
</tr>
<tr>
<td>2003</td>
<td>$r$</td>
<td>-.868**</td>
<td>-.541</td>
<td>-.342</td>
<td>.164</td>
</tr>
<tr>
<td></td>
<td>$p$</td>
<td>.001</td>
<td>.106</td>
<td>.334</td>
<td>.651</td>
</tr>
<tr>
<td></td>
<td>$r^2$</td>
<td>.750</td>
<td>.290</td>
<td>.120</td>
<td>.030</td>
</tr>
<tr>
<td>2004</td>
<td>$r$</td>
<td>-.812**</td>
<td>-.518</td>
<td>-.474</td>
<td>.578</td>
</tr>
<tr>
<td></td>
<td>$p$</td>
<td>.004</td>
<td>.125</td>
<td>.166</td>
<td>.080</td>
</tr>
<tr>
<td></td>
<td>$r^2$</td>
<td>.66</td>
<td>.270</td>
<td>.220</td>
<td>.330</td>
</tr>
<tr>
<td>2005</td>
<td>$r$</td>
<td>-.798**</td>
<td>-.642*</td>
<td>-.674*</td>
<td>.552</td>
</tr>
<tr>
<td></td>
<td>$p$</td>
<td>.006</td>
<td>.046</td>
<td>.033</td>
<td>.098</td>
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<td></td>
<td>$r^2$</td>
<td>.640</td>
<td>.410</td>
<td>.454</td>
<td>.300</td>
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<tr>
<td>2006</td>
<td>$r$</td>
<td>-.750*</td>
<td>-.678*</td>
<td>-.610</td>
<td>.577</td>
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<tr>
<td></td>
<td>$p$</td>
<td>.013</td>
<td>.031</td>
<td>.061</td>
<td>.081</td>
</tr>
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<td></td>
<td>$r^2$</td>
<td>.560</td>
<td>.460</td>
<td>.37</td>
<td>.330</td>
</tr>
<tr>
<td>2007</td>
<td>$r$</td>
<td>-.760*</td>
<td>-.723*</td>
<td>-.653*</td>
<td>.558</td>
</tr>
<tr>
<td></td>
<td>$p$</td>
<td>.011</td>
<td>.018</td>
<td>.041</td>
<td>.094</td>
</tr>
<tr>
<td></td>
<td>$r^2$</td>
<td>.580</td>
<td>.520</td>
<td>.430</td>
<td>.310</td>
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<tr>
<td>2008</td>
<td>$r$</td>
<td>-.786**</td>
<td>-.763*</td>
<td>-.582</td>
<td>.763*</td>
</tr>
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<td></td>
<td>$p$</td>
<td>.007</td>
<td>.010</td>
<td>.077</td>
<td>.010</td>
</tr>
<tr>
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<td>$r^2$</td>
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<td>Mean $r$ for all years</td>
<td>-.862</td>
<td>-.709</td>
<td>-.635</td>
<td>.491</td>
<td></td>
</tr>
<tr>
<td>Mean $r^2$ for all years</td>
<td>.743</td>
<td>.503</td>
<td>.403</td>
<td>.241</td>
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</tr>
</tbody>
</table>

Note. $n = 10$ for all years and ethnic groups. *Correlation significant at .05. **Correlation significant at .01.
Hypothesis 2 Results

The second hypothesis of the research question was the following:

\( H_2 \) Over the 10-year period from 1999 through 2008, in 10 selected high schools, 10 middle schools, and 10 elementary schools from within the 10 identified school districts, changes in the STRR for African American, Hispanic, and White students will not exhibit a relationship to these students’ reading and mathematics scores on the Texas mandated state assessment instrument.

Reading and mathematics scores on the state mandated assessment for African American, Hispanic, and White students were collected for high school, middle school, and elementary campuses defined on the selection protocols for the 10-year time period. White students were included to serve as a comparative student ethnicity measure. The first variable considered in this study was the academic performance of African American, Hispanic, and White students in reading on the state assessment over the 10-year study period. The second variable was student performance on the state assessment in mathematics for the same student population. The third variable was the ratio of students in each ethnic category per White teachers over the period. These variables were repeated for each campus levels represented in the study.

Student outcomes on the two Texas outcome measures were compared to the STRR in reading and mathematics and correlated using the Pearson \( r \) correlation coefficient to determine degree of relational strength. The \( p \)-values were reported as significance levels required for the .01 and .05 levels. These values were important in determining if the observed relationships occurred by chance. The \( p = .01 \) value indicated a 1% chance that the relationship between student academic passing percentages on the state assessment, dependent variable, compared to the student White teacher ratio, independent variable, did not occur (i.e., the smaller the \( p \) value
the stronger the evidence for rejecting the null hypothesis). Additionally, the effect size ($r^2$) was calculated for each student category to determine the percentage of variance explained in one variable by the other (Salkind, 2010).

High school data are presented first. Next, middle school results are presented. Finally, elementary school data are described.

*High schools.* As noted previously, the districts had a combined total of 60 high schools reported to TEA in 1999. Based on the TEA accountability ranking system, eight districts were classified as Exemplary, two as Recognized, 51 as Academically Acceptable, and two as Low Performing. From this sample of districts and based upon the percentage distribution, one Exemplary, one Recognized, seven Academically Acceptable, and one Low Performing Grade 10 campuses were selected for analysis. An issue arose, because not all of the sample districts had high schools ranked in each performance category. For example, only one district had high school campuses that qualified as Low Performing. As such, the district was selected by default to represent this category. Similarly, 60% of the districts did not have any high schools meeting criterion to be ranked as Exemplary, and 80% of the districts did not have high schools with a Recognized status. Figure 34 depicts the ratios for students’ ethnicities and White teachers.

The second hypothesis was initially tested with the sample’s high school students’ academic achievement on the Texas outcome measure. The findings are reported in Table 11 for the state reading assessment and in Table 12 for the state mathematics assessment. The graphic representations of the data analysis for the reading and mathematics outcomes for students in the high school of level analysis are shown in Figures 12 and 13.
Figure 12. Grade 10 student scores by student ethnicity to White teacher ratios for the reading assessment.
Table 11

*State Reading Assessment Correlation Results at the Grade 10 High School Level for the Student Ethnicity to White Teacher Ratios*

<table>
<thead>
<tr>
<th>Year</th>
<th>Coefficient</th>
<th>All Students</th>
<th>African American</th>
<th>Hispanic</th>
<th>White</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$r$</td>
<td>-.190</td>
<td>-.896**</td>
<td>-.788**</td>
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<td>.007</td>
<td>.973</td>
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<td>$r^2$</td>
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<td>.800</td>
<td>.620</td>
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*Note. n = 10 for all years and ethnic groups. *Correlation significant at .05. **Correlation significant at .01.*
Figure 13. Grade 10 student mathematics scores by student ethnicity to White teacher ratio for the years of 1999 through 2008.
Table 12

*State Mathematics Assessment Correlation Results for the Grade 10 High School Level for the Student Ethnicity to White Teacher Ratios*

<table>
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<tr>
<th>Year</th>
<th>Coefficient</th>
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<th>Hispanic</th>
<th>White</th>
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<td></td>
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<td>.060</td>
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<td></td>
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<td>$r^2$</td>
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</table>

Note. $n = 10$ for all years and ethnic groups. *Correlation significant at .05. **Correlation significant at .01.

Negative correlations between African American and Hispanic students’ academic performance on the state assessment and their ratios to White teachers existed throughout the
studied time period at the high school level and were displayed in reading and mathematics. Correlation coefficients for African American and Hispanic students’ reading scores were negative, with $r$ values ranging from a low of -.036 for African American in 2001 to a high of -.896, also for African American in 1998.

Only 7 years of data yielded significance at the $p = .01$ or $.05$ levels for either African American or Hispanic students. The negative relationship in reading scores occurred for 6 of the 10 years under study. Even though the campus level as a group exhibited some positive correlations, these results were not meaningful.

Disparities occurred between high school student groups in reading, but not to the extent demonstrated at the district level. The mean $r$ for all groups was negative for all student groups and ranged from moderate for Hispanic students at -.540 to mild for African American student at -.397 to no correlation with White students at -.050. District level mathematics scores also demonstrated mild to strong negative correlation coefficients with Pearson $r$ coefficients ranging from -.342 for Hispanic students in 2003 to -.913 for African American students in 2003. Conversely, White students demonstrated mild to moderate positive correlations throughout the time period under study.

Mathematics assessment correlations African American and White students were the only ones to demonstrate sporadic positive correlations. White students maintained positive correlations in mathematics for the last three years of the study: 2006, 2007, and 2008. Hispanic students’ mathematics outcomes demonstrated negative correlations. Hispanic students exhibited strong negative correlations with a mean of -.542 over the 10-years. The mean negative correlation in mathematics for Hispanic students was almost identical to what Hispanic students demonstrated in their mean reading score correlations, -.540. As the ratio of Hispanic
students to White teachers increased, these student’s achievement scores in reading and mathematics declined appreciably. Whereas the evidence indicated that the STRRs for African American and White students was not remarkably related to academic performance.

In summary, at the high school level, the mean $r$ correlation coefficients for African American and Hispanic students in reading and mathematics demonstrated negative correlations. Hispanic students demonstrated a strong negative correlation in both subject, >.5. African American students exhibited moderate, bordering on, large correlations, >.396, in both reading and mathematics outcomes. The strength of these negative correlations mandated that the null be rejected.

*Middle schools.* As noted previously, the districts held a combined total of 102 middle schools as reported to the TEA in 1999. Based on the TEA accountability ranking system, 20 schools were classified as Exemplary, 16 as Recognized, and 66 as Academically Acceptable. There were no middle schools from the representative districts classified as Low Performing. Based on the selection protocol, two Exemplary, two Recognized, and six Academically Acceptable middle schools campus were chosen for analysis.

The second hypothesis was tested for middle schools. Graphic illustrations of the data are presented in Figure 14 for reading scores and Figure 15 for mathematics scores. The findings are reported in Table 13 for the state reading assessment and in Table 14 for the state mathematics assessment.
Figure 14. Grade 8 student reading scores for the state assessment by student ethnicity to White teacher ratio for the years of 1999 through 2008.
Table 13

*State Reading Assessment Correlations for Grade 8 at Middle School Level by STRR*

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<tr>
<th>Year</th>
<th>Coefficient</th>
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<th>Hispanic</th>
<th>White</th>
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<td></td>
<td>.000</td>
<td>.520</td>
<td>.030</td>
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<td>.350</td>
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<tr>
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<td>.301</td>
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*Note. n = 10 for all years and ethnic groups. *Correlation significant at .05. **Correlation significant at .01*
Average Correlation between STRR and Student Group
Passing Percentages in Math on the Texas State Assessment
at the Middle School level

Figure 15. Grade 8 student mathematics scores by student ethnicity to White teacher ratio for the years 1999 through 2008.
Table 14

State Mathematics Assessment at Middle School Level Grade 8 by STRR

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<tr>
<th>Year</th>
<th>Coefficient</th>
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<th>Hispanic</th>
<th>White</th>
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<td>.733*</td>
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<td>.540</td>
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<td>$r$</td>
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<td>-.735*</td>
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<td>.138</td>
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<td>$r^2$</td>
<td>.160</td>
<td>.250</td>
<td>.540</td>
<td>.390</td>
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<td>$r$</td>
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<td>$p$</td>
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<td>.00</td>
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<td></td>
<td>$r^2$</td>
<td>.040</td>
<td>.460</td>
<td>.380</td>
<td>.340</td>
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<tr>
<td>Mean $r$ for all years</td>
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<td>-.611*</td>
<td>-.515</td>
<td>.402</td>
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<tr>
<td>Mean $r^2$ for all years</td>
<td>.103</td>
<td>.373</td>
<td>.265</td>
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Note. $n = 10$ for all years and ethnic groups. *Correlation significant at .05. **Correlation significant at .01.

Large negative correlations, > .5, were exhibited between the STRR and African American and Hispanic students for reading and mathematics for all years in the study. The negative correlations observed for African American and Hispanic students were consistent over
all years of the 10-year time period in both reading and mathematics. Conversely, White students’ achievement results demonstrated positive correlations to the STRR in 7 out of 10 years in reading and in all years in mathematics.

Correlation coefficients for African American and Hispanic students’ reading scores were negative in all years. Pearson $r$-values ranged from a minimum of -.268 for African American students in 2004 to a maximum of -.883, also for African American students, in 2000. African American and Hispanic students each demonstrated both negative and significant correlations for 8 out of the 10 years. Significance, p-values at .01 or .05, was observed in eight of the 20 year combine period for African American and Hispanic students.

The degree of strength in the negative correlations for African American and Hispanic students in reading -.598 and -.548 respectively, were larger than as those seen in the high school analysis, but larger than the high school outcomes. In comparison, the high school mean $r$ for all non-White students’ reading scores was negative. The degree of relationship was seen as large for Hispanic students -.540 and approximating large for African American students, -.397. There was no significant correlation to the STRR for White students with a 10-year correlation mean of -.050.

African American and Hispanic student’s mathematics correlations to the STRR demonstrated vast swings with $r$ coefficients ranging from a low of -.253 for Hispanic students in 1999 to -.790 for African American students in 2004. Mean $r$ correlations in mathematics marginally exceeded those found in reading for African American students, while Hispanic students demonstrated the converse. The degree for strength for both student groups in mathematics was large, in excess of .5. White students demonstrated a medium strength mean correlation, .402, throughout the same sample time period. Mean effect sizes were in the mid-
.30s for reading and at .28 for mathematics. Effect sizes were larger for African American students than Hispanic or White students.

One suburban middle school did not report any African American student scores to TEA in 2003 for either reading or mathematics. This same district, in compliance with TEA student privacy dictates, did not report elementary scores in either reading or mathematics for African American and Hispanic for several years. (This issue is discussed in the elementary outcome section.)

In summary, at the middle school level, African American and Hispanic students exhibited negative Pearson product moment correlations in reading and mathematics. As the African American and Hispanic students STRR increased, the percentage of these students passing the state assessment declined. The negative mean $r$ correlation coefficients for African American and Hispanic students in both assessment domains were similar. White students showed seven years of positive correlations in reading and 10 years in mathematics. Because the mean $r$ was negative by a substantial degree for African American and Hispanic students in both reading and mathematics, the null hypothesis was rejected.

*Elementary schools.* As previously stated, the 10 sampled districts reported in 1999 to TEA a total of 383 elementary schools. Based on the TEA accountability ranking system, 74 of these campuses in 1999 were classified as Exemplary, 80 as Recognized, 223 as Academically Acceptable, and 7 as Low Performing. Following the selection protocol two Exemplary, two Recognized, five Academically Acceptable, and one Low Performing campuses were selected for this study.

An issue arose in the elementary school that had not surfaced in either the high school or middle school populations. In the seven Low Performing schools, the White student population
was not sufficient throughout the study period to meet TEA student confidentially minimums in reporting student assessment outcomes in either reading or mathematics. Although all eligible students were required to sit for assessments, if the number of students in a particular student group did not meet TEA’s population threshold, that population group’s scores were not reported to protect student confidentiality. The lack of sufficient specific student representation throughout the study period was also the case for African Americans.

In 1999, one suburban district had three elementary schools; two of these schools were ranked as Exemplary and one Recognized. This district was selected to represent an Exemplary campus because its three campuses fell into a limited band for participation. However, the campus that was selected was later found during data collection not to have reported scores for all student groups throughout the study period. This campus reported no scores for African American students for the 5 years of 2000, 2001, 2004, 2005, and 2006. Hispanic students’ scores were not published for the same campus for the year of 2007. African American or Hispanic students were present on these campuses but they were not represented in such numbers to preclude the ability to identify the students who failed the assessment.

The lack of availability of assessment outcomes for all student populations for these two campuses was addressed in two ways. To adjust for the lack of student assessment scores being reported for African American, Hispanic, and White students, the \( n \) was reduced accordingly by year. Had I chosen to keep the \( n \) at a constant 10, achievement percentage for these absent student groups could have been artificially inputted as 0 or 100, or any arbitrary value in between. Such action would have invalidated the integrity the study. Throughout the analysis, the sample size was allowed to float depending on the student group populations reported to the
Taking this approach reduced the sample to an \( n \) of nine for selected years, but it ensured consistency in all students groups being compared fairly.

Figures 16 and 17 graphically illustrate theses outcomes. The findings for reading and mathematics assessments are reported in Tables 15 and 16. All correlations are based on the number of available cases. Of note, 73\% of the correlations for elementary reading and mathematics were negative even though they did not meet the criteria for being statistically significant. Mean correlation outcomes for African American and Hispanic students supported this observation.

![Average Correlation between STRR and Student Group](image)

*Figure 16. Grade 4 student reading scores by student ethnicity to White teacher ratio for the years 1999 through 2008.*
Table 15

State Reading Assessment at Elementary School Level Grade 4 by STRR with Adjusted Sample Sizes

<table>
<thead>
<tr>
<th>Year</th>
<th>Coefficient</th>
<th>All Students</th>
<th>African American</th>
<th>Hispanic</th>
<th>White</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>r</td>
<td>.458</td>
<td>.052</td>
<td>-.306</td>
<td>-.418</td>
</tr>
<tr>
<td></td>
<td>p</td>
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<td>.390</td>
<td>.263</td>
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<tr>
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<tr>
<td></td>
<td>n</td>
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<td>10</td>
<td>10</td>
<td>9</td>
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<td>-.553</td>
<td>-.616</td>
</tr>
<tr>
<td></td>
<td>p</td>
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<td>.747</td>
<td>.097</td>
<td>.077</td>
</tr>
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<td>.020</td>
<td>0.31</td>
<td>.380</td>
</tr>
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<td></td>
<td>n</td>
<td>10</td>
<td>9</td>
<td>10</td>
<td>9</td>
</tr>
<tr>
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<td>r</td>
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<td>-.310</td>
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<td>.417</td>
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<td>.480</td>
<td>.000</td>
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<td>r</td>
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<td>p</td>
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<td>.730</td>
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<td>.020</td>
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<td>n</td>
<td>10</td>
<td>10</td>
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<td>9</td>
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<td>9</td>
<td>10</td>
<td>9</td>
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<td>Mean r^2 for all years</td>
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Note. *Correlation significant at .05. **Correlation significant at .01.
Figure 17. Grade 4 student mathematics scores by student ethnicity to White teacher ratio for the years 1999 through 2008.
Table 16

State Mathematics Assessment at Elementary School Level Grade 4 by STRR with Adjusted Sample Sizes

<table>
<thead>
<tr>
<th>Year</th>
<th>Coefficient</th>
<th>All Students</th>
<th>African American</th>
<th>Hispanic</th>
<th>White</th>
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<td>.004</td>
<td>.580</td>
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<td>-.466</td>
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</tbody>
</table>

Mean $r$ for all years: -.583
Mean $r^2$ for all years: .311

Note. *Correlation significant at .05. **Correlation significant at .01.
Similarity was exhibited in reading and mathematics outcomes for all student groups. Mean correlations indicated some improvement for African American and Hispanic students compared to White students, but the correlations remained small, at best, and did not compare to those evidenced at the other three levels. The majority of negative correlations for African American, Hispanic, and White students in reading and mathematics occurred before 2004 and before the TEA adoption of TAKS. Some increase in strength of correlation, although negative, was noted for White students, prior to 2004. These tended to be positive after 2004 and shifted substantially by 2008.

In summary, at the elementary school level, African American and Hispanic student achievement on reading and mathematics outcomes did not exhibit a relationship with the STRRs. Based on the mean $r$ for all student groups, the null hypothesis failed to be rejected (i.e., was retained) for students’ reading and mathematics scores at the elementary level.

Summary of the Findings

The findings from this study were presented in the last part of Chapter 4 according to the research question and to the two hypotheses presented. The question in this study called for an examination of African American and Hispanic students’ academic success on 10 years of state assessment data as related to the STRR at the district, school, and classroom levels. At the district level, African American and Hispanic students’ achievement on the state mandated assessments were negatively correlated to the STRR, with a large degree of strength in the relationship. Effect size, $r^2$, were also large: .62 in reading and .45 in mathematics. As the proportion of African American and Hispanic students passing the Texas outcome measure increased, the STRR decrease, the passing percentage of these students on the state assessment declined over 10 years. White students demonstrated positive correlations throughout the study.
period. The as the STRR increased, the percentage of students passing the state assessment also increased, indicating greater tolerance to larger White student class sizes to White teachers.

Testing the second hypothesis revealed three outcomes. First, at the high school level African American, Hispanic, and White student data for reading exhibited a negative relationship over the 10-year period. In reading, Hispanic students demonstrated a large degree of relational strength, .54, and African American student were not as strong, but noteworthy, -.397. These strengths in reading approximated those in mathematics for the same student groups. Correlations for White students were weak in both reading and mathematics.

Second, middle school African American and Hispanic student data showed large negative correlations in reading and mathematics. These student’s correlations to the STRR were approximately the same in both reading and mathematics outcomes. Conversely, White student demonstrated medium positive correlations with the STRR. White students demonstrated negative correlations in reading achievement in only three years and no negative correlation in mathematics over the 10 years. Middle school African American and Hispanic students showed negative correlations consistently throughout the study period in reading and mathematics.

Third, due the absence of White students and African American students in some elementary schools during specific years of the 10-year study period, these data exhibited weak correlations to student achievement and the STRR in both reading and mathematics outcomes.

Findings presented in Chapter 4 are interpreted in Chapter 5. In Chapter 5, conclusions about the findings are discussed and recommendations for further review and study are provided.
CHAPTER 5
CONCLUSIONS AND RECOMMENDATIONS

The purpose of this study was to determine whether the numeric student teacher race ratio (STRR) constructed for this study was statistically related to African American and Hispanic student achievement in a select region of Texas. In this chapter the summary of the study, conclusions, recommendations for future research, recommendations for policy, and chapter summary are presented.

Summary of the Study

The commentary on closing the achievement gap between students of varying non-White races/ethnicities and economic backgrounds, as compared to White students, has occupied much of the educational agenda in excess of 50 years. From the first attempt to report equalization of access and student achievement in 1966 in the Equality of Educational Opportunity report of Coleman and Campbell to the present, not one year has passed in which African American or Hispanic students have attained achievement parity with their White grade level peers. A plethora of literature provides evidence that achievement disparity has existed for generations and continues into the second decade of the 21st century (Center on Education Policy, 2010; National Center for Education Statistics, 2009a, 2009b, 2009c, 2010a; Texas Education Agency, 2010). However, a lack of systematic, pervasive inquiry as to the possible contribution of racial compatibility between students and teachers to student achievement presents both a dilemma and an opportunity for educators and policy makers.

This study’s theoretical base was set in social capital and an extension of the Cardenas and Cardenas (1977) theory of incompatibilities. From the perspective of social capital, specific ethnic populations are more likely to invest tangible and intangible resources within their own
group based on shared perceptions, core similarities, beliefs, and values which are transported easily within their homogenous groupings. However, the public school enterprise does not often reflect homogeneity in its numerous settings. Cardenas and Cardenas suggested that the disparity in academic achievement by certain pupil groups is not predicated on a student’s inability to learn and master the curricular material; rather the instructional environment has been configured to reflect the cultural and educational framework of those in power who control and influence the curriculum whether by intention or perception of normality. Cardenas and Cardenas argued that this unilateral control results in a skewed interpretation and framing of “normal” by the empowered is not compatible with that of those external to the power base. Because those outside of the power base are unfamiliar with the norms and expectations, incompatibilities emerge that manifest as variances in achievement outcomes, thereby perpetuating the achievement gap.

In Texas public education, the curriculum, assessment instruments, and workforce are White dominated. The theory of incompatibilities posits that Whites are unable to interact appropriately with and teach non-White students, specifically African American and Hispanic students whose environments and experiences tend to be framed external to the White culture and socioeconomic lens. Cardenas and Cardenas (1977) focused their incompatibility thesis on constructs associated with poverty, culture, language, mobility, and perceptions of the social and political structure. The rationale of social and cultural group incompatibility has been recognized as legitimate by the judicial system. In 1975, the theory of compatibility served as the basis for development of a court ordered education plan for relieving the educational disparities of Hispanic and African American children in Denver Public Schools Denver, Colorado (Cardenas, 1974). The Tenth Circuit of Appeals ruled in Keyes et al. v. School District
No. 1, Denver, Colorado, et al. (1975) that the Denver school district’s system of gerrymandering and negating the educational opportunities of Hispanics and African American students was unconstitutional. The court found the theory of incompatibilities to be the best approach to address the causal attributes related to the poor school performance of minority and disadvantaged children. After this initial implementation the Cardenas and Cardenas (1977) theory, it faded from use. Although not often used in contemporary research, this theory has particular usefulness for studies investigating racial/ethnic compatibilities and student achievement.

Extending this theorem to student achievement as a variable of racial/ethnic compatibility between students and teachers has frequently been overlooked by policy makers. This historical lack of consideration is troubling because policy makers have invested billions of dollars in developing standardized curriculum and promoting the No Child Left Behind Act (NCLB, 2002) mandates in the hope of neutralizing these incompatibilities. At forefront of these policy decisions is the notion that highly qualified teachers should be the primary agents to reduce and eliminate the achievement gap for all students irrespective of any racial/ethnic compatibility variables.

Efforts to reduce the achievement disparity between African American and Hispanic students as compared to White students have not yielded fruit either nationally or in Texas over the past 50 years (Coleman et al., 1966; National Center for Education Statistics, 2009a, 2009b, 2010b; Texas Education Agency, 2010a). Dee (2004), Bishop et al. (2005), and Goldsmith (2004) examined student achievement in the context of student to teacher race/ethnic compatibility. Dee and Bishop et al. used the same Tennessee STAR data and came to differing conclusions. Whereas Bishop et al. did not find the level of relational strength as Dee found,
Bishop et al. reported that having a teacher of the same race improved standardized test scores of African American students in the later grades. Dee and Goldsmith reported that racial alignment between students and teachers resulted in higher achievement scores and improved attitudes toward school by students, but their studies were limited in scope. Notably absent from all studies was any examination of African American or Hispanic student achievement as an effect of the racial/ethnic proportionality between students and teachers (i.e., STRR). The gap in the literature examining student achievement as a dependent variable of the STRR for Hispanic and African American students prompted the present investigation.

A non-experimental design was utilized to investigate the relationships of student achievement to numerical racial/ethnic ratios between students and teachers in four academic settings: districts, high schools, middle schools, and elementary schools. Ten school districts were selected based upon their historical hiring pattern of baccalaureate teacher education graduates (BTEGs) from a regional teacher preparatory university. From each district, representative high school, middle school, and elementary school campuses were selected based upon defined protocols. From each of the three grade levels, 10 campuses were selected. A numeric proportion, the STRR, was constructed and correlated to student group achievement outcomes. The STRR was comprised of two unique variables. The numerator was the total number of students in a defined racial/ethnic group (i.e., African American, Hispanic, or White) in a specific campus or district setting and divided by the denominator, the total number of White teachers in the same setting. Numerical and demographic data were obtained from the Texas Education Agency’s (TEA) Academic Excellence Indicator System (AEIS) for years 1999-2008.

In this study, the research question was whether changes in STRR might affect student achievement on the Texas outcome measure. Two null hypotheses were established to test the
possibilities that the STRR was not related to student achievement in the various settings. The null hypotheses were tested using Pearson product-moment coefficient. Correlation coefficient threshold strengths were adopted from Cohen (1988) and were defined as: .1 - .30 as small, .31 - .40 as medium, and .50 or greater as large.

The first null hypothesis, which examined district level student achievement passing rates in reading and mathematics for African American, Hispanic, and White students as a function of the STRRs, was not accepted. Large negative correlations were observed in reading at -.806 for African American students and at -.766 for Hispanic students. Mean correlations for mathematics were slightly lower than those for reading but were still exceeding large at -.709 for African American students and at -.635 for Hispanic students. The negative correlations indicated that as one variable increased, the second variable decreased. In this case, as the percentage of African American and Hispanic students who passed the Texas assessment increased, the STRRs decreased. In contrast, large positive correlations of .594 in reading and .491 in mathematics were observed for White students. A positive correlation signaled that as the percentage of White students passing the Texas outcome measure increased, the STRR increased (i.e., the White student to White teacher ratio increased).

The district level effect sizes, $r^2$, were substantial at .65 and .59 for reading and .50 and .40 for mathematics, for African Americans and Hispanics students, respectively, over the study. These elevated effect sizes were not observed for the White students in the sample. The magnitude of these effect sizes was noteworthy. Effect size indicates the percentage of variance explained in one variable by the other (Salkind, 2010). In other words, for district level reading achievement, 65% of African American and 59% of Hispanic students’ achievement scores were explained by the STRR. Effect sizes for White students were approximately one-half, .35 for
reading and .24 for mathematics, of the effect sizes observed for African American and Hispanic students.

The second null hypothesis tested whether student achievement outcomes exhibited a relationship to the STRR for 10 high schools, 10 middle schools, and 10 elementary campuses within the 10 sampled school districts over a 10-year period. Outcomes were mixed at the three grade levels selected to represent campus-level data. The second null hypothesis was rejected at the high school and middle school levels and was not rejected at the elementary level.

High School Reading

At the high school level, negative mean $r$ relationships between African American and Hispanic student groups’ reading achievement and the STRRs were observed. The negative relationship was large at -.54 for Hispanic students, bordering on large at -.39 for African American students, and weak at -.05 for White students. Under the Texas Assessment of Academic Skills (TAAS), reading achievement scores of all student groups demonstrated negative relationships with the STRRs until 2003 when the state implemented the Texas Assessment of Knowledge and Skills (TAKS). In 2003 the White student correlation shifted from -.654 in 2002 to .104. The correlations for White students fell sharply to negative correlations in 2004 and 2005 and rebounded to the positive until 2008. Over the 10-year period, at the high school level, Hispanic students exhibited the largest mean effect size, .29, in reading.

High School Mathematics

African American and Hispanic student achievement in mathematics closely paralleled outcomes in reading at -.39 for African American and -.54 for Hispanic students. There was no correlation of STRR to White student achievement with the $r$ being .02. The effect size for
Hispanics was approximately two times larger than for African American students at .157 and 550 times greater than for White students at .0005.

Middle School Reading

The correlations for the percentages of middle school African American and Hispanic students passing the state reading outcome with the STRR were large and negative, while White student scores demonstrated medium positive corrections to the STRR. African American and White students demonstrated sharp declines in reading in 2003, the year of the shift from the TAAS to the TAKS, whereas Hispanic students’ scores declined in 2004, the following year. The correlation for African American students increased in negativity from -.528 to -.720, and the effect size nearly doubled from .28 to .52. The shift to TAKS likewise affected White students whose correlations declined from .653 in 2002 to -.016 in 2003 and rebounded to .468 in 2004. The average effect sizes were three times as large for African American and Hispanic students as for White students.

Middle School Mathematics

The large, negative mean $r$-values for African American and Hispanic students in mathematics were similar to what was observed in reading. The mean correlation for the 10-year period for the White students exhibited a medium positive correlation of .40. Effect sizes were greater for African American students at .37 than for Hispanic students at .27, and they were twice as large as for White students ($r^2 = .16$). White students demonstrated marginal to small effect sizes, which were also observed for this group’s reading achievement.
Elementary Schools

The strongly defined correlations, effect sizes, and achievement patterns demonstrated at the district, high school, and middle school levels were not seen at the elementary level. Throughout the 10-year period in both reading and mathematics, weak to mild correlations were found for all ethnic groups’ achievement as related to the STRRs. The strongest relationships were for White students and were found to be positive in reading and negative in mathematics. Weak negative relationships were demonstrated for Hispanic students in reading and mathematics; although correlations for African American students were positive, they were inconsequential.

Discussion

For the past five decades, the disparity in academic achievement between African American and Hispanic students as compared to White students has been discussed, and a variety of treatments has been attempted. Yet the differential in achievement success on standardized and criterion based assessments between African American students and Hispanic students as compared to White students remains substantial. However, the literature is largely silent on the role of racial/ethnic compatibilities between students and teachers as a variable influencing student achievement. Examination of this relationship for a sample of 10 districts, 10 high schools, 10 middle schools, and 10 elementary schools over a period of 10 years led to four tentative conclusions.

Student Achievement and Teacher Race

Earlier Bishop (2005) and Dee (2004, 2005) found that when minority students share the same race as their teachers, academic achievement is elevated to varying degrees. I found evidence of a relationship between African American and Hispanic students’ passing the Texas
outcome measures in reading and mathematics and the STRR in a variety of settings. In this sample, medium to large negative correlations between achievement and STRRs were observed for African American and Hispanic students at the district level, high school and middle school levels and not at the elementary school level. As the STRR increased for African American and Hispanic students, the percentages of these students passing the Texas assessment decreased. Conversely, White student achievement demonstrated a positive relationship with the STRR.

What do these correlations suggest about student and teacher racial/ethnic compatibility and student achievement on high-stakes assessment? During the 10-year study period, sizable demographic shifts occurred in relation to the STRR in 90% of the districts. African American students exhibited a flat profile, the Hispanic student population expanded rapidly, and the proportion of White students declined. The STRR was affected by the following three circumstances: (a) the White teacher denominator increasing or decreasing, (b) the student group numerator increasing or decreasing, or (c) changes in both the White teacher denominator and the specific student group numerator. These shifts in the STRR and subsequent student achievement represent important considerations to examine within the context of racial/ethnic compatibility.

The theory of incompatibilities postulates that the educational environment is framed around a White-based perception of what is “normal” and desirable (Cardenas & Cardenas, 1977). In such an educational setting, non-White students are less academically successful because of the inherent Whiteness of the curriculum, instructional workforce, and assessment protocols. While the theory of incompatibilities focuses on the impact of a White-defined environment on minority students, it is equally true that teachers seek out environments that are compatible to their needs. The implication is that teachers want to work with similar racial and
ethnic student groups because of social and emotional compatibility that results in elevated student achievement.

Cumulative Impact of Teacher Student Race Ratios

Evidence of increasingly strong relationships between the variables of interest cumulatively through the grades was found in this study. At the district level, correlations of STRRs to student achievement revealed the previously discussed trends. At the campus level, it is important again to review the graphic representations in Appendix C. As shown in Chapter 4’s presentation of the data, with the exception of the two elementary schools located in Dallas ISD and Frisco ISD, 8 out of 10 elementary schools had sufficient African American, Hispanic, and White student representation for statistical analysis throughout the study period. Because there were not consistently sufficient numbers of African American, Hispanic, and White students throughout the period, the n was reduced accordingly to analyze campuses having ample student populations to report to TEA. If the sample groups were to maintain a constant n of 10, this would necessitate placing a zero in that year’s student outcome. A zero would indicate the particular student group had adequate population, but all students failed the assessment. Because I could not impute a data value into the achievement outcome cell for each student group, these schools were omitted from the correlation and the n reduced per year accordingly. These reductions are noted in Table 15 and 16.

As these data were reviewed by campus, only the elementary campuses demonstrated relative consistency in their STRRs over the 10-year study period. Furthermore, elementary campuses did not exhibit any correlations between the percentages of students passing the Texas outcome measure and the STRRs. The elementary campus data indicated that achievement scores for African American, Hispanic, and White students were not affected by the STRR. For
this study, the elementary school level showed the greatest opportunity for demonstrating student achievement parity among African American, Hispanic, and White students. This conclusion mirrors Dee’s (2004) and Bishop et al.’s (2005) Tennessee STAR study finding that same-race teacher to student status was associated with higher achievement in both math and reading for kindergarteners, and this performance trend continued through the third grade. Unfortunately, the STAR study did not extend beyond the third grade.

In mathematics, as achievement increased for elementary Hispanic and White students, lower STRRs were observed. In reading, a negative relationship was demonstrated for Hispanic students. This finding might be link to language and reading acquisition through English as a second language instruction. White students were able to tolerate larger STRR ratios in reading based on their assessment scores. African American elementary level students did not exhibit a correlation, possibly suggesting these students had more flexibility in responding to their teachers, regardless of teacher race.

Between the fourth and eighth grades, a large decline occurred in student achievement for this sample. Correlations for students in the middle school and high school levels demonstrated a cumulative widening of the achievement gap such that scores of African American and Hispanic students displayed substantial negative relationships with the STRRs. The achievement differential in both reading and mathematics at the middle school level was dramatic for the 10-year period for African American and Hispanic students. This finding raises a question as to what transpired in Grades 5, 6, 7, and 8 for African American and Hispanic students who demonstrated the significant negative correlations. In the study, middle schools did show the highest STRR averages for any campus setting; perhaps, the STRR could be a major variable affecting the gap in student achievement by race.
The results of this study supported progressive disparity of achievement between students by racial/ethnic background through grade levels. Based on the evidence presented at the elementary school level, African American, Hispanic, and White student scores demonstrated comparable achievement levels in elementary school and the lack of a correlation to the STRRs was conspicuous. By middle school, White students’ scores demonstrated medium positive correlations with STRRs, while Hispanic and African American students demonstrated large negative correlations in reading and mathematics. By high school, Hispanic students continued with large negative correlations in reading and mathematics, whereas the degree of negative correlations in reading and mathematics abated for African American students to .40. These findings are based upon gross numerical constructs used to describe student groups and not to describe individual students or teachers in these specific settings. This lack of specificity in level of detail is a study concern with the TEA AEIS data set and is discussed later in this chapter.

The present findings support Dee (2004) who found exposure to same race/ethnicity teachers not only conferred a one-time achievement gain but also had additive effects on achievement as students moved from grade to grade. However, Dee’s study was confined to the kindergarten through Grade 3 elementary population. Bishop et al. (2005) used the same STAR data as Dee and reached a different conclusion. Bishop et al. concluded that having a teacher of the same race improves the standardized test scores of African American students in later grades and increases the probability that African American or White male students will take college entrance exams even though there was no evidence that scores on those entrance exams improved. Bishop concluded that the lasting impact of having a teacher of the same race is small or perhaps zero. This study did not explore longitudinal affects of racial/ethnic alignment beyond the high school level.
Historically, the suggestion to remedy the lag in minority student achievement has been to hire more minority teachers. If this remedy were sufficient, minority majority districts that have large African American and Hispanic teacher workforces would be faring as well as their suburban counterparts, but this is not generally the case. There is an interesting outlier in the current study data that clouds this topic. The selected elementary campus representing the largest urban ISD was identified as a Low Performing school in 1999 and did not have a sufficient White student population to meet TEA reporting minimums throughout all the 10 years included in the study. While this campus did have White teachers on its campus throughout the 10 years, the TEA AEIS data for the teacher racial/ethnic distribution showed that this campus was the only campus studied to have a minority majority teaching cadre. African American teachers represented the majority of teachers at this school until 2005, when a shift occurred, placing Hispanic teachers as the majority ethnicity in the instructional workforce. This campus had the lowest mean reading achievement percentages in the elementary category. For both African American and Hispanic students, correlation to the STRR approximated a perfect positive relationship at .973 and .950, respectively. The r for mathematics achievement was extraordinary for African American students at .955; and for Hispanics, it was .971. As the STRR increased, student achievement increased for this specific urban elementary school campus.

Negative correlations for middle school and high school African American and Hispanic students are troubling when considered in light of the high school dropout problems faced by Texas. The exact extent of the dropout problem is masked by TEA reporting standards, but each year, more than 130,000 Texas students do not graduate with their classes. The literature is replete with evidence that students drop out because of numerous variables, such as continual
low achievement, frustration, desperation, and the like (Bachmeier, 2009; Foundation for Educational Choice, 2007; National Center for Education Statistics, 2010d; Scharrer, 2010; Viadero & Johnston, 2000). In the EEO report, Coleman et al. (1966) indicated that once failure commences, it has a cumulative effect on student achievement up to the point of students dropping out of the educational system. Also troubling is the continuation of lower achievement performance by the African American and Hispanic students remaining in classrooms after their peers have dropped out of high school or middle school. The ANOVAs seen in Appendix B demonstrated that African American students’ and Hispanic students’ high school achievement scores were worse than their middle school achievement scores in the studied sample even without the scores of peers who had dropped out. This suggests a lack of relationship between student achievement as measured by test scores and the decision not to stay in school.

Student Teacher Race Ratios and Sample Size

The correlation between the STRR and student achievement appears to be especially strong at the district level and is likely a function of sample size. At the district level, large negative mean correlations were exhibited for African American and Hispanic students in both reading and mathematics. In this case, as the percentage of African American and Hispanic students who passed the Texas assessment increased, the STRRs decreased. Conversely, a positive correlation was demonstrated consistently over the 10-year period between White students and the STRR. These relationships by race were exhibited by White students at both the high school level and middle school level but not at the elementary level as previously discussed. At the campus level, these relationships were stronger at the middle school level than at either the high school level or elementary school level.
The Impact of Changing the Assessments

This study’s longitudinal observations have shown that changing the assessment employed from the TAAS to the TAKS impacted student achievement results. In every analysis of the study data, an interruption of achievement occurred for all students in the shift from TAAS to TAKS, but White students recovered from the change much more quickly than African American and Hispanic students did. The STRR might have been a factor in White students’ accelerated achievement recuperation. If the observable achievement gains demonstrated by African Americans and Hispanics students on the TAAS were further extended over time, these student groups likely could have closed the gap by approximately 2005. As greater percentages of African American and Hispanic students began passing the TAAS and closing the achievement gap, the state changed the assessment to the TAKS in 2003. As a result, the percentage of African American and Hispanic students passing the new measure decreased dramatically.

For African American and Hispanic students, the drop in mathematics scores was precipitous, falling 27% from approximately a 90% passing rate on the TAAS to a 63% passing rate on the TAKS. Approximately 37% of African American students and 37% of Hispanic students in the sampled districts failed the TAKS in its initial 2003 administration. Although White students’ scores fell by approximately 10% and all groups demonstrated progress toward recovery, White students demonstrated the fastest recovery from the declines in performance they suffered following the transition to the TAKS. The final conclusion here is that shifting statewide assessments every few years does not benefit minority students’ academic achievement levels.
Recommendations for Future Research

This study’s findings of what appear to be racially/ethnically related achievement differentials give rise to the need for further testing, validating, and scrutinizing from the perspective of incompatibilities. Four recommendations for future research emerged from the conclusions concern the need for larger samples to be acquired from data sets having greater detail, for consideration of the nature of achievement gaps for children developmentally by culture, for expansion of the variables studied, and for improved campus selection criterion.

Larger Samples and Data Sets

The results of this study need to be confirmed with use of a larger data set that enables greater variety in data elements. Because of resource limitations, I used the publically available TEA AEIS data set. Inasmuch as the AEIS data set is beneficial for exploratory work, it does not possess the detail that future and more definitive studies will require. The lowest layer of demography and achievement afford by the AEIS data is at the campus level. At this stratum, information is limited to summary compilations rather than individual classroom student to teacher pairings and assessment outcomes. This is not sufficient for understanding the relationships of interest in detail.

To test the validity and generalizability of these findings to other groups, future studies will need to utilize more complex and detailed student / teacher information at the grade and classroom levels. Current data sets appropriate for these levels of detail include the TEA PEIMS data set and the Texas Schools Project, which is based on the PEIMS. The Texas School Project is maintained by the University of Texas at Dallas, and its data are encrypted so that researchers may examine relationships among data elements without compromising confidentiality. These data sets could offer the future researcher more data driven specifically for the analysis of
teacher racial/ethnic alignment with student achievement at the individual, classroom, and school levels. Using the PEIMS or Texas School Project data, future researchers could access data from over 1,300 independent school districts and generate a larger sample.

Studying a larger sample would be beneficial in several ways. Using a larger data set would afford specificity in identifying classroom level racial/ethnic pairing of students to teachers and subsequent student outcomes. These results would build upon the findings of Dee (2004), Goldsmith (2004), and Bishop et al. (2005). Individualized student to teacher racial/ethnic pairings led to the claims presented by Dee and Bishop et al. Their findings at the K-3 level need to be examined for transference to grade levels up to Grade 11, the last year of assessments. Whereas the current study was restricted in its samples of district, high school, middle school, and elementary school levels, future studies need to explore how achievement disparities as related to student and teacher race expand incrementally by grade levels.

Use of larger data sets would provide a gateway to analyze consecutive grade outcomes, which is critical in formulating a casual theory. There is need to study student achievement longitudinally as opposed to taking incremental snapshots. Resources are now available to extend Dee’s and Bishop et al.’s findings and the findings of the current study by conducting a longitudinal study of a student cohort’s entire academic assessment career. Knowledge gained could help with determining at what grade disparities first emerge. Use of larger data sets would also enable use of more sophisticated analysis tools. This exploratory study utilized Pearson product moment correlation analysis, which was adequate for initial analysis. However, correlation studies are not well suited for critical analysis of larger data sets with additional variables. A larger sample of at least 45 to 50 units (i.e., districts and individual grade levels) would add robustness to the numerical premise of student achievement based on STRRs and ...
could allow for more sophisticated statistical procedures. For fidelity and confirmation, larger sample sizes require more sophisticated analysis techniques, such as designs employing linear or logistical regression, path analysis, or structural equation modeling.

Nature of Achievement Gaps for Children Developmentally by Culture

As the proportion of non-White students increases in schools and influences the STRRs, the impact of students’ family cultures on achievement could be further examined. While Dee (2004, 2005), Goldsmith (2004), Bishop et al. (2005), and even Coleman et al. (1966) focused on two specific student groups, African American and White students, the literature has lagged in exploring representative outcomes of Hispanic students in tandem with African American and White students. Because Hispanic students are the majority in Texas public schools, it is essential that these students and their cultural backgrounds be included in research queries. With the accelerating presence of Hispanic teachers in Texas classrooms, more comparative analysis is needed to optimize Hispanic student achievement. With larger data sets, the opportunity exists to know about the nature of achievement gaps for students developmentally by culture.

Family influences on student achievement have been studied widely (Coleman et al., 1966, Montoya, 2010; Yeung, 2008). However, from this perspective, with its emphasis on the relevance of the STRR, a variety of other variables such as family racial/ethnic background, head of household status, home language, and student gender and age could be reexamined in light of this and other related constructs to provide a glimpse of family affects. Having a better understanding of children’s development within their specific cultures as it relates to their academic achievement and the associated interface with teachers by gender, race, and ethnic background could be very insightful for teacher education programs and schools alike.
Expansion of Study Variables

This study incorporated a mathematical construct, STRR, and examined it in relation to student achievement. This construct was based on the well-known and understood concept of student to teacher ratio. The literature has embraced the notion that lower student to teacher ratios promote student achievement (e.g., Dee, 2004). In the current study, student and teacher race/ethnicity were identified as independent variables affecting the dependent variable of student achievement. Additional variables could be incorporated in future studies along with the STRR to determine influences on student achievement. Three variables that could be so considered are student socioeconomic status, gender, and teacher mobility.

Improving comprehension of the dynamic interplay between student socioeconomics, STRRs, and student achievement outcomes is critical. Many students in Texas are identified as economically disadvantaged based on family income. Economically disadvantaged children benefit from free and reduced breakfast and lunch programs. Qualifying for subsidized meals is the only current mechanism to identify the economic status of a student’s family. Low achieving campuses are typically associated with high populations of minority students who qualify for free and reduced meals. With the large negative correlation for African American and Hispanic students’ achievement found in this study, learning more about these students by socioeconomic status could be critical to efforts to improve student achievement and would be helpful for generating a better understanding of the role low income status has on student achievement and STRRs.

Student achievement as an outcome of gender alignment in concert with racial/ethnic alignment offers opportunities to expand the knowledge base. Although Dee (2004) briefly commented on gender alignment for role modeling, research continues to be needed regarding
student achievement and gender alignment by race, ethnicity, and culture. Some districts have established gender-specific campuses and the results have been encouraging. An example is Dallas ISD’s Irma Lerma Rangel Young Women’s Leadership. In its two years of existence, this all female campus has earned Exemplary accountability rankings from the TEA. Although this campus has been successful in its mission, the generalization of these outcomes to typical coeducational classrooms could be difficult. Is student achievement elevated due to gender alignment or the campus’ low student to teacher ratio of eight to one? Understanding the effects of gender alignment on student achievement would be helpful in assigning students to classes and possibly in constructing smaller, gender specific campuses.

The role student achievement has on teacher migration and retention, that is, teacher mobility, needs to be further explored. Teacher retention continues to be problematic in low performing schools, irrespective of student race/ethnicity (Borman & Dowling, 2008; Coleman et al., 1966; Greenberg & McCall, 1974; Hanushek, Kain, O’Brien, & Rivkin, 2005). Coleman et al. (1966) reported that teachers responding to the Equality of Educational Opportunity Survey actively sought to work at campuses with high achieving students without regard to students’ races or ethnicities. Fong (2006) reported considerable differences are present in the teacher attrition rate between low-performing and high-performing schools. Fong indicated a substantial attrition gap between the top quartile and the bottom quartile of school achievement rankings, with the teacher retention rate being highest at high-performing schools and lowest at poor-performing schools. Teachers are most likely to leave lower-performing schools and more likely to stay at higher-performing schools over the long run regardless of the ethnic composition of the student body (Marvel et al., 2007). Texas PEIMS data afford opportunities to track teacher
employment across the state and to determine if the STRR can help predict signals leading to teacher transfers or resignations.

Improved Campus Selection Criterion

For future studies, the design of the inquiry should be restricted to using only one TEA accountability-ranking category. While campuses were chosen for the current study based on representative proportionality, taking this approach made it difficult to ascertain whether movement in TEA accountability rankings was a function of the STRR on achievement or of other factors. An improved research design could restrict the sample to a single restrictive category: all Exemplary, all Recognized, all Acceptable, or all Low Performing. The optimum design would focus on either Exemplary or Low Performing campuses; schools in these categories can move in only one direction, either down or up. Factors influencing this unilateral movement could be isolated in future studies. A problem encountered with this study was there were not 10 Exemplary or 10 Low Performing high schools or middle schools available within the districts’ sample pool in 1999. This limitation could be easily eliminated with access to a larger data set.

A second recommendation is to use the most common TEA ranking, Academically Acceptable. This ranking has the potential for bilateral movement, either up or down. The schools included in this rating could provide researchers insight into factors associated with movement in both directions, and the data could be further studied for commonality in variables, possibly pointing toward causation.

Recommendations for Policy

One of the most difficult challenges facing Texas education is elevating African American and Hispanic students’ academic performance on the state’s high stakes assessment.
This task is complex because of numerous, dynamic independent variables that affect both students and teachers and their interactions to impact student achievement. Two frequently argued solutions have been increasing the amount of fiscal capital funneled into schools and hiring more African American and Hispanic teachers. The long term sustainability of these two recommendations remains questionable. Making causation assumptions about student achievement on the basis of the current study findings would be inappropriate; however, this study’s findings provide support for several recommendations pertinent to preparing and retaining the most influential agents in Texas public school students’ academic careers: their teachers.

Teacher Recruitment and Retention

Based on the current findings, aligning students and teachers on a racial/ethnic basis, particularly at the middle and high school levels, could serve as a catalyst to bring about achievement parity for all students. As found in this study, student to teacher racial/ethnic compatibility elevated achievement outcomes, complementing Dee’s (2004, 2005) and Bishop et al.’s (2005) findings. Dee suggested strengthening specific policies for African American and Hispanic teacher recruitment with broader policies to improve teacher effectiveness. Having additional African American and Hispanic teachers in classrooms is a noble idea; however, districts can hire only from an available and accessible workforce. The majority of the Texas teacher workforce remains White, and in this 10-district study, White teachers represented the majority of all teachers in Texas from 1999 through 2008. Although inroads have been made in recruiting Hispanic teachers, this effort needs to be accelerated as the growth in the Hispanic student population continues out pacing Hispanic teacher placement.

Teacher recruitment and retention are influenced by a number of factors, but major
considerations are student demography and student achievement. As this study illustrated, African American and Hispanic students have not scored as well on state outcome measures as do White students. The Texas demographic landscape continues to evolve, and Hispanic students are becoming the majority in the state’s schools. Retention of teachers on minority majority campuses is a continual concern for district leaders. Examining demographic growth and percentage distributions could be useful for securing, developing, and retaining an effective instructional workforce. It is instructive from a teacher preparation perspective to revisit demographic trends in the two regions used in this study.

The districts selected for this study were located in the north central region of Texas. Educational Service Centers (ESC) of Region X and Region XI serve as educational resource centers for the districts in this study. Based on TEA AEIS data (TEA, 2010) over a 12-year period, 1999-2010, both White and African student populations in Region X have declined, White students from 47% to 44% and African American students from 22% to 20%. In the same time period, Hispanic students increased in representation from 27% to 29%. In 2010, Region X became a student minority majority region.

Demographic shifts have also occurred in the teacher workforces. White teachers continue to occupy 70% of the teaching positions in Region X. At the same time, the presence of African American teacher was has been flat at 1%, and Hispanic teachers have increased by 100%, from 6% to 12% (TEA, 2010). Although the region’s student population is a majority minority, the teaching pool continues to be decidedly White.

Region XI experienced similar student and teacher realignments over the same time frame, but its shifts were not as great as Region X’s. The White student representation retained its majority but fell 6% over the 12-year period to 59%. Hispanic students grew by 3% to 22%,
and African American students remained constant at 13%. Hispanic and African American students together represent 35% of Region XI public school population. During this period, the presence of White teachers declined by 6% to 83%; the proportion of African American teachers experienced a slight decline from 5% to 4%; and the percentage of Hispanic teachers almost doubled, from 4% to 7% (TEA, 2010).

In summary, Region X is split with a majority minority student base and a White majority teaching force, whereas Region XI remains a White majority for teachers and students. These demographics are worthwhile for regional north Texas teacher preparation programs to consider in developing instructional curriculum because these are the regions in which their graduates are likely to find employment; a recommendation echoed by the Eduventures’ report *Outcomes of University-Based Teacher Education* (Anastasia et al., 2011).

Teacher Preparation Programs

Teacher preparation programs might find this study’s results, if supported by future research, useful in justifying more intense, practical, intercultural education experiences for their BTEGs. A constant recommendation from a diverse group of researchers including Coleman et al. (1966), Banks (2004), Dee (2004), Useem (2005), and Cochran-Smith (2005) has been to hire more minority teachers. Often omitted with the call to hire more minority teachers is the need to prepare more minority teachers. However, teacher preparation programs are as constrained as districts in working with those who enroll in their programs. Most preservice teachers are White, middle class, Christian women whose demographics do not align with the majority of students (Sherestha, 2001; Woolfolk Hoy, Davis, & Papa, 2006). Preparation programs face a substantial challenge in ensuring that their teacher candidates acquire the knowledge, skills, and dispositions to teach their future diverse students.
As student populations exhibit greater diversity, teacher preparation programs need to consider the cross-cultural training of their majority White candidates in classroom and field settings. If preparatory courses, including additional field experiences, could be offered prior to student teaching and during the first two years of college, teacher candidates could bolster their confidence and self-esteem for teaching students of color (Banks, 2002; Cochran-Smith & Zeichner, 2005). Addressing sensitive cultural, racial, and ethnic topics as part of field experiences could ensure collaborations between school districts and colleges of education to produce a more diverse and classroom savvy corps of teachers.

This study’s findings, if supported, could be used to justify more targeted recruitment of minority candidates by colleges of education (Dee, 2004, 2005). Rather than recruiting minority teachers *carte blanche*, the recruitment of African American and Hispanic preservice candidates could be targeted specifically to middle and high school teaching positions. Moving recruitment to the College of Arts and Sciences has been employed by some teacher education programs with success and should be pursued more aggressively for upper-division undergraduate and post-baccalaureate candidates.

Colleges of education might be wise to consider more formal and regular communication with graduates about their professional experiences as classroom teachers in Texas’ diverse classrooms. Improved levels of support from the state would help colleges of education in capturing and analyzing graduate data, including follow-up evaluation of the graduates’ preparation programs and the curriculum’s applicability in diverse settings in Texas. With these resources in place, colleges of education might develop greater sensitivity to meeting the demands of market conditions and the career-related challenges faced by their candidates and graduates.
Classroom Size Considerations

If the findings of this study are validated by larger samples, policy makers may assess whether same race teachers can instruct diverse classrooms filled with more students more efficiently and with higher passing rates. Policy makers should consider that if African American and Hispanic students are to attain achievement levels comparable to those of White students, African American and Hispanic students may require smaller student to teacher ratios when paired with White teachers. Meanwhile, racial/ethnic alignment between students and teachers might allow for increased class sizes. This would be helpful in an era of reduced school funding.

Accountability Instruments

As Coleman et al. (1966) noted about such assessments 45 years ago, assessments “are culture bound. What they measure are the skills which are among the most important in our society for getting a good job and moving up to a better one, and for full participation in an increasing technical world” (p. 20). This observation by Coleman et al. is important because it underscores the cultural and academic incompatibility argued by Cardenas and Cardenas (1977). In terms of racial/ethnic, cultural, and economic compatibility, the various assessments developed by the state to measure both student command of the curriculum and teacher effectiveness of delivery of the curriculum reflect the perspectives, attitudes, and cultural interpretations of White policy makers. These are the individuals in the position to define what education should be and what should be assessed.

Texas has long been the flagship of the accountability movement. As seen in Chapter 4, on both the TAAS and TAKS assessments, African American and Hispanic students demonstrated greater proportional academic improvements than White students. If the TAKS
were to have remained as the Texas outcome measure, it appears that parity would have been attained at or prior to 2015, which represents the NCLB target date for closing the achievement gap. However, the TAKS will be replaced in 2011-2012 in high schools by the STAAR, as mandated by Texas Senate Bill 1031(2007), and in Grade 3 through Grade 8 by new assessments mandated by HB 3 (2009). As a consequence of this high testing culture, students in the graduating Class of 2015 who finished the seventh grade in June of 2011 will be the first students who must both meet the end-of-course testing requirements and pass their courses to earn diplomas.

Texas will continue to sponsor and mandate state assessment instruments to gauge student progress. Based on the initial findings of this study, changes in assessment tools at best, hinder, and at worst, prevent, closing the achievement gap. Texas policymakers might consider committing to a longer cycle, using one assessment for approximately 15 years rather than for less than 10 years was has been done with the TAKS. Students in smaller, specialty schools with lower student to teacher ratios are taking the same assessment as peers who may find themselves in schools with double or triple this student to teacher ratio. The time for adaptation of new assessments may be longer for students in schools with greater diversity and higher student to teacher ratios.

Chapter Summary

The purpose of this chapter was to consolidate the rationale for and the findings emerging from this work. The chapter provided a summary of the study parameters, theoretical construct, research design, and study outcomes. Four conclusions were presented in this chapter. First, racial compatibility and student-to-teacher ratios have more influence in the post-elementary grades. Second, in this sample, student achievement disparity exhibited a cumulative effect. As
the achievement gap emerged at some point between fourth and eighth grades, the gap widened progressively through the high school level. Third, the negative correlations for African American and Hispanic students were most pronounced at the district level, indicating perseveration of disparity throughout grade levels not examined in the study. Finally, changing of the assessment from the TAAS to the TAKS impacted African American and Hispanic students more than White students. From these conclusions, recommendations were presented for future researchers to improve upon the present study. Recommendations included: larger samples and use of PEIMS or Texas School Project data sets; expansion of study variables to include cultural, socioeconomic, gender, and teacher mobility data; and adopting a study design that incorporates a single level of school TEA ranking in conjunction with data analysis using more sophisticated methods to offer insight into causation.

The chapter concluded with policy recommendations. First, districts were implored to actively recruit minority teachers and to better understand teacher migration and retention in minority majority schools. Second, colleges of education were encouraged to target African American and Hispanic preservice candidates for recruitment. Additionally, suggestions were offered to promote and provide practical cultural and economic learning opportunities to the White preservice candidates likely to find jobs on minority majority campuses. Two recommendations were targeted to state policy makers including keeping class sizes small since African American and Hispanic student achievement is hindered by large STRRs and reviewing the construction and cultural integrity of statewide assessments.

This exploratory study broke new ground in the field by illuminating the nature of student achievement in relationship to student-to-teacher racial alignment. Although the generalization
of this study is limited by its exploratory nature, the findings set the stage for future research into the influence of racial / ethnic compatibility on student achievement.
APPENDIX A

READING AND MATHEMATICS SCORES FOR ALL STUDENTS BY GRADE
Reading and Mathematics Scores for Grade 10

Analysis results from the 10th grade scores are presented in Figures A.1 through A.6. Reading scores are presented first, followed by mathematics.

**Distribution for African Americans of Proportions passing READING in High School on the Texas State Assessment**

*Figure A.1.* State reading assessment results for African American students in the 10 selected Grade 10 Schools, 1999-2008 (Mean = 83.1, Std. Dev. = 12.7, and N = 100).
Figure A.2. State reading assessment results for Hispanic students in the 10 selected Grade 10 schools, 1999-2008 (Mean = 80.1, Std. Dev. = 12.1, N = 100).
Figure A.3. State reading assessment results for White students in the 10 selected Grade 10 schools, 1999-2008 (Mean = 91.6, Std. Dev. = 7.8, and N = 100).
Figure A.4. State mathematics assessment results for African American students in the 10 selected Grade 10 schools, 1999-2008 (Mean = 66.2, Std. Dev. = 18.4, and N = 100).
Figure A.5. State mathematics assessment results for Hispanic students in the 10 selected Grade 10 schools, 1999-2008 (Mean = 69.6, Std. Dev. = 15.9, and N = 100).
Figure A.6. State mathematics assessment results for White students in the 10 selected Grade 10 schools, 1999-2008 (Mean = 85.4, Std. Dev. = 9.7, and $N = 100$).
Reading and Mathematics Scores for Grade 8

Analysis results from the 10 Grade 8 schools’ scores are presented in Figures A.7 through A.12. Reading scores are presented first, followed by mathematics.

Figure A.7. State reading assessment results for African American students in the 10 selected Grade 8 schools, 1999-2008 (Mean = 88.7, Std. Dev. = 9.2, and N = 99).
Figure A.8. State reading assessment results for Hispanic students in the 10 selected Grade 8 schools, 1999-2008 (Mean = 87.3, Std. Dev. = 8.33, and N = 99).
Figure A.9. State reading assessment results for White students in the 10 selected Grade 8 schools, 1999-2008 (Mean = 95.6, Std. Dev. = 5.4, and N = 99).
Figure A.10. State mathematics assessment results for African American students in the 10 selected Grade 8 schools, 1999-2008 (Mean = 70.2, Std. Dev. = 19.9, and N = 99).
Distribution for Hispanics of Proportions passing MATH in Middle School on the Texas State Assessment

Figure A.11. State mathematics assessment results for Hispanic students in the 10 Selected 8\textsuperscript{th} Grades, 1999-2008 (Mean = 74.4, Std. Dev. = 16.5, and N = 99).
Figure A.12. State mathematics assessment results for White students in the 10 Selected Grade 8 schools, 1999-2008 (Mean = 87.9, Std. Dev. = 11.6, and N = 99).
Reading and Mathematics Scores for Grade 4

Results from the 10 Grade 4 schools are presented in Figures A.13 through A.18.

Reading scores are presented first, followed by mathematics.

**Figure A.13.** State reading assessment results for African American students in the 10 selected Grade 4 schools, 1999-2008 (Mean = 81.0, Std. Dev. = 16.9, and N = 95).
Figure A.14. State reading assessment results for Hispanic students in the 10 selected Grade 4 schools, 1999-2008 (Mean = 85.7, Std. Dev. = 12.5, and N = 99).
Figure A.15. State reading assessment results for White students in the 10 selected Grade 4 schools, 1999-2008 (Mean = 92.9, Std. Dev. = 7.516, and N = 10).
Figure A.16. State mathematics assessment results for African American students in the 10 selected Grade 4 schools, 1999-2008 (Mean = 78.0, Std. Dev. = 7.5, and N = 95).
Figure A.17. State mathematics assessment results for Hispanic students in the 10 selected Grade 4 schools, 1999-2008 (Mean = 84.7, Std. Dev. = 13.5, and N = 99).
Figure A.18. State mathematics assessment results for White students in the 10 Selected Grade 4 schools, 1999-2008 (Mean = 93.3, Std. Dev. = 8.7, and N = 90).
APPENDIX B
ANOVA ANALYSIS READING AND MATHEMATICS HIGH SCHOOL, MIDDLE SCHOOL AND ELEMENTARY SCHOOL LEVELS
Figure B.1. Estimated marginal means of measure for Grade 10 reading scores for African American, Hispanic, and White students on the state assessment, 1999-2008, where time: $p < .001 (.91)$; Time*Set: $p < .001 (.65)$; Set: $p < .001 (.43)$; post-hoc multiple comparisons were performed and Whites were different from both AAs and Hispanics but AAs were not different from Hispanics.
Figure B.2. Estimated marginal means of measure for Grade 10 mathematics scores for African American, Hispanic, and White students on the state measure, 1999-2008, where Time: $p = <.001 (95)$; Time*Set: $p < .09 (.44)$; Set: $p < .001 (.53)$; post-hoc multiple comparisons were performed, and Whites were different from both AAs and Hispanics but AAs were not different from Hispanics.
Figure B.3. Estimated marginal means of measure for Grade 8 reading for African American, Hispanic, and White students on the state measure, 1999-2008, where Time: $p = <.01 (.86)$; Time*Set: $p = .33 (.40)$; Set: $p = .008 (.34)$; post-hoc multiple comparisons were performed, and Whites were different from both AAs and Hispanics but AAs were not different from Hispanics.
Figure B.4. Estimated marginal means of measure for Grade 8 mathematics for African American, Hispanic, and White students on the state measure, 1999-2008, where Time: $p < .001$ (.71); Time*Set: $p = .002$ (.21); Set: $p = .002$ (.42); post-hoc multiple comparisons were performed, and Whites were different from both AAs and Hispanics but AAs were not different from Hispanics.
Figure B.5. Estimated marginal means of measure for Grade 4 reading for African American, Hispanic, and White students on the state measure, 1999-2008, where Time: $p = .006 (.72)$; Time*Set: $p = .48 (.38)$; Set: $p = .043 (.24)$; post-hoc multiple comparisons were performed, and Whites were different from both AAs and Hispanics but AAs were not different from Hispanics.
Figure B.6. Estimated marginal means of measure for Grade 4 mathematics for African American, Hispanic, and White students on the state measure, 1999-2008, where Time: $p = .038$ (.63); Time*Set: $p = .68$ (.32); Set: $p = .008$ (.35); post-hoc multiple comparisons were performed, and Whites were different from both AAs and Hispanics but AAs were not different from Hispanics
APPENDIX C

READING AND MATHEMATICS SCORES IN RELATIONSHIP TO THE STRR WITHIN
THE 10 DISTRICTS, 10 HIGH SCHOOLS, 10 MIDDLE SCHOOLS,
AND 10 ELEMENTARY SCHOOLS
Reading Scores - Middle

Year


8th Pass-R %
AA Pass-R %
H Pass-R %
W Pass-R %

Math Scores - Middle

Year


8th Pass-M %
AA Pass-M %
H Pass-M %
W Pass-M %

Ratio of Pupils to White Teachers - Middle

Year


Ratio/T-AA
Ratio/T-H
Ratio/T-W
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