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A Quantitative Study of the Characteristics of Transient and Non-Transient Students in Nevada Elementary Schools

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by

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ABSTRACT

PARR, Andrew J. A Quantitative Study of the Characteristics of Transient and Non-Transient Students in Nevada Elementary Schools. (Under the direction of Dr. Bill W. Thornton.)

The purpose of this research was to determine whether transient or mobile students attain lower levels of academic achievement than non-transient students and to identify the characteristics distinguishing transient from non-transient students. The study analyzed the assessment results, student characteristics, and school factors for approximately 14,500 students from nearly 300 elementary schools across Nevada.

In addition to conducting standard descriptive statistics and measures of central tendency, t-tests and multivariate regression analyses were conducted. To achieve a parsimonious solution to the regression analyses, the school-level reading mean was regressed on one dichotomous predictor and nine continuous predictor variable measures of school characteristics to create standardized composite school factors for use in other statistical analyses. Reading and mathematics assessment results served as criterions, while transiency status, participation in special programs (IEP, LEP, and FRL), and composite school factors served as predictors in the analyses. Parallel analyses were also conducted using the combined reading and mathematics achievement score as a criterion.

The data analyses for this study revealed that, as a group, the mean scaled scores from CRT reading and mathematics assessments of the non-transient student group were significantly different from the mean scaled score for the transient student group. Regardless of the academic measure, the transient group scored lower than the non-transient group. The impact of student transiency on academic achievement was small in

comparison to other student characteristics associated with being at-risk for academic failure, such as low socioeconomic status, having an IEP, or participating in LEP programs. Further, the impact of student transiency was reduced with the addition of student characteristics and was reduced even further with the addition of school factors to the regression model. The predictor variables explained a modest 18 to 25 percent of the variance found in the criterion measures of 3rd and 5th grade student achievement, regardless of the academic measure utilized. The statistical tests provided evidence that attending multiple schools during 1st through 5th grades had a negative impact on student academic achievement during this educational period.

Student transience is not currently recognized as an at-risk subpopulation under NCLB, but transient students are more likely to fall into at least one of the other at-risk subpopulations that are recognized in NCLB legislation in comparison to non-transient students. Regardless of other at-risk factors or characteristics, transient students at some schools showed greater academic achievement than did transient or non-transient students at other schools. Attention to curriculum and school processes may prove to be important in serving the educational needs of transient or mobile students.

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CHAPTER 1

Introduction

Public education has been the focus of some type of reform since its inception. However, the origins of the modern standards reform movement can be traced back in time to the successful launch of *Sputnik* in 1957, the resulting political uneasiness, and the widely held view of American educational inferiority. The *Sputnik* launch served as the catalyst which focused a nationwide discussion on education. From this discussion and recommendations put forth by the Woods Hole Conference of 1959, the need for a uniform curriculum, higher quality of classroom instruction, and standardized test-driven accountability would be argued (Bruner, 1960).

The accountability-based reform of the Elementary and Secondary Educational Act (ESEA) of 1965 embodied many of the recommendations emanating from the Woods Hole Conference. The ESEA of 1965 served as the funding vehicle for numerous educational programs supporting the learning of at-risk populations. Jerome Bruner (1960) was amongst the first to publicly acknowledge the unique educational needs of transient students by arguing that a uniform curriculum was required to accommodate a mobile society. The negative educational consequences of transiency have been alleged for quite some time but were, for the most part dismissed or overlooked well into the 1980s (Kerbow, 1996). The Migrant Education – Basic Grant Program was first authorized under Title I of the ESEA to ensure that migrant students, which are defined by transiency, receive the same educational opportunity to learn as do non-migrant students. The Migrant Education – Basic Grant Program requires State Educational

Agencies (SEAs) and Local Educational Agencies (LEAs) to monitor and report on the academic achievement of Migrant Education participants (Kirby, Naftel, Berends, & McCombs, 2002). However, the ESEA did not target transient student populations *per se* even though transient and migrant student groups share several important characteristics.

Beginning in the 1960s and continuing through the present, millions of immigrants from Latin America entered the United States and their children entered the public school system in unprecedented numbers (Terrazas & Fix, 2008). The perception of failing schools and lack of international competitiveness in educational attainment was sharply focused by the 1983 publication of *A Nation at Risk* by the National Commission on Excellence in Education (NCEE, 1983). As was done in the 1960s, the nation supported education reform in the form of academic standards, standardized assessments, and high quality instruction (Berliner, 2006; Smyth, 2008).

To ensure that all children are provided a free and appropriate public education, the Stewart B. McKinney Homeless Assistance Act was enacted in 1987. The McKinney Homeless Assistance Act stipulates that SEAs and LEAs monitor and report on the academic achievement of homeless children, which are often highly transient (Phillips, Wodatch, & Kelliher, 2002). Children of homeless parents face a number of educational challenges and, as such, are closely monitored by state and local educational agencies.

The need for systemic educational reform was presented in *The Manufactured Crisis*, in which Berliner & Biddle (1995) describe public schools as fundamentally sound but functionally impaired on account of society's imperfections. In other words, perceived public school shortcomings were simply unintended consequences or byproducts of the American society. The underpinning of the ESEA and other legislative acts is that at-risk children, such as highly transient immigrant, migrant, or homeless subpopulations, are expected to receive a free and appropriate public education regardless of the school enrollment challenges thrust upon them.

Regardless of how or why the American educational system has come to be as it is, the American public consistently supports the need for school improvement because the public acknowledges the existence of an imperfect public educational system (Hart & Teeter, 2005; Rose & Gallup, 2005). In response to the nearly 50 years of the public's support of school reform, educators and politicians implemented educational changes aimed at improving student academic achievement that fall primarily into the categories of early childhood education reforms, teacher preparation reforms, and instructional reforms (Porter, 2007). While each of the three broad reform categories have arguably had a profound impact on educational outcomes for children and public education, this research study focused on student transiency and the broad context of instructional reform.

The current education reform movement is driven by the notion that students need to develop the skills necessary to compete for jobs in a new world economy; a global workplace. This notion is fueled by the prospect that the relocation and transiency prevalent in our modern society will continue to expand in scope well in the future (Iserbyt, 1999; Schoen & Fusarelli, 2008). Emphasizing these education-derived 21st Century skills in public schools would require substantial support and input from the federal government.

The most recent education reform movement was spearheaded by the 2001 reauthorization of the ESEA, better known as the No Child Left Behind (NCLB) Act. The

NCLB legislation triggered the development of enhanced academic standards, new curriculum, and new instruments to assess student learning in nearly every state. The overarching theme behind this assessment-driven reform or measurement-driven instruction is that educational outcomes for all students will be elevated if all children are taught the same content, in the same scientifically-based manner, and be assessed with the same instruments (Koretz, 2008).

Public accountability is one of the cornerstones of the NCLB legislation. As such, the legislation requires states to disaggregate assessment results for certain at-risk student populations for the purpose of monitoring changes in the achievement gap. The NCLB Act does not require the public reporting of academic achievement for transient, homeless, immigrant, or migrant student populations. In fact, very little information about the academic achievement of transiency-based at-risk groups is publicly available.

Central to the issue of educational attainment is the rarely studied variable of student transience, which varies considerably across school districts and schools. Student transiency is defined as unscheduled changes in school enrollment brought about for any reason (Strand & Demie, 2006). For purposes here, the definition of student transience is narrowed to mean the movement between or official attendance at more than three or more schools during grades one through five by a student in the study cohort. School and non-school factors force many students to move from school to school, which increases the likelihood of disjointed learning experiences. Student transience creates a complex interaction that involves student learning, classroom instruction, and the school as a system (Kerbow, 1996).

The Nevada Accountability Report Card (ARC) supports the notion that schools must be different in a combination of ways. Students at some schools consistently score higher on the Nevada CRTs than do similar students at other schools. The schools that are informally described as successful or effective on the basis of school-level proficiency rates often have a low percentage of students participating in the Free and Reduced Lunch Program, English Language Learning Programs, Special Education Programs, and other at-risk populations. However, the Nevada ARC does not provide disaggregated assessment results for the transient student subgroup nor are the results included in AYP determinations for schools, which means that very little information about the academic achievement of transient students is publicly available.

Theoretical Framework

Schools do not operate in a vacuum; rather, schools operate in an environment that contributes elements in such a manner to accentuate or attenuate the functionality of the school. Environmental factors are most strongly influenced or determined by society as a whole and some environmental elements are beyond the control of society. For example, environmental factors that have a profoundly impacted schools include judicial and legislative mandates, political policy, national and local economic factors, and public opinion. Inputs are resources put into the system for the specific purpose of producing the desired products or outcomes: children educated to the level deemed necessary to function within and for the greater good of our society.

Schools are systems that can be studied accordingly. Factors or throughput decisions made at the discretion of school-level personnel include the curriculum, targeted expenditures, class sizes, school staffing, and school leadership amongst others. Output is a measure of the quality or quantity of the product produced and, in the case of a school, the output is most often a measure of the educational achievement attained by a student or group of students. Output is typically represented by assessment results, AYP determinations, proficiency rates, graduation rates, and numerous other post-education variables (Hanushek, 2006). Feedback is the continuous flow of information between the outputs and the environment, in which conscious efforts and decisions are made to bring about product changes. In the case of public school education, school reforms are products of system feedback that are initiated either from within or outside of the school environment or school system based on the formative or summative analysis of outputs.

In the context of public education, the underlying premise is that the outputs (the academic achievement of individual students) are directly related to multiple inputs or resources, some of which include the qualities of schools, teachers, and curricula. Some educational research conducted over the previous 20 years (Hanushek, 1986; Picus, 2000; Rivkin, Hanushek, & Kain, 2005) has convincingly brought into question the validity of this underlying premise because these works argue that increases in resources have done little to increase student achievement. Regardless, most would agree that a combination of resources which include a range of teacher qualities, school qualities, and other factors do have significant affects on student academic achievement as do environmental factors.

Statement of the Problem

With respect to the characteristics of transient students, school characteristics, and academic achievement, little research exists that accurately connects these factors. There is a perception amongst educators that students who experience a transient lifestyle attain lower levels of academic achievement as compared to students who remain at one school for extended periods of time. This perception is based largely on antidotal observations that transient students often enter their new schools with skills and knowledge below those of their peers. Unfortunately and all too often, educators assume the existence of causal relationships and plan school improvements or learning interventions accordingly. In summary, the research examining the relationship between student transiency and academic achievement is limited and the evidence supporting the notion that student transiency significantly contributes to lower levels of academic achievement is mixed.

Purpose of this Study

The purpose of the study was to determine if there was a relationship between academic achievement, school characteristics, and student transience within Nevada elementary schools. This quantitative research study was based on data from approximately 15,000 students and nearly 300 elementary schools across the state. This research study attempted to identify key variables associated with effective instruction and corresponding improvements in student achievement within elementary schools in the state of Nevada.

Research Questions

This research proposed to study many of the student- and school-level variables within their contextual affiliations to student achievement. To this end, this study considered two research questions.

Research Question 1: Are there significant differences in student achievement between transient and non-transient student groups?

Research Question 2: Are mathematics achievement and reading achievement predictable from knowledge of student characteristics and school factors?

The above questions were addressed using progressive statistical techniques.

Significance of this Study

The NCLB legislation places the responsibility for improving student outcomes on principals and teaching staff; schools. If students or student subpopulations are not making adequate yearly progress, schools are expected to change in order to bring about the desired increases in student- and school-level achievement. School change must be made in such a way to benefit the current student population experiencing less than adequate growth as well as the student population expected to move into a given school. Within this context, student transience becomes an important variable.

The overarching mission of the NCLB legislation is to increase student achievement and to publicly report on the academic achievement of student subpopulations traditionally underserved by public education. Yet, students who are enrolled in a given school for less than a full academic year are excluded from the proficiency analysis for that school. In other words, the transient students' scores are not reported and are not monitored over time, which is opposed to a major underpinning of the NCLB legislation. Virtually nothing can be stated with any degree of certainty about the relationship between student transiency and academic achievement. The results from this work shed some light on the relationship between student transiency and student academic achievement, an issue becoming ever more important in our highly mobile society.

In comparison to other states, Nevada ranks near the bottom with respect to reading and mathematics proficiency as measured by the most recent NAEP administration. Also, NAEP results support the notion that the achievement gap between Nevada students and students from other states is increasing, suggesting that Nevada students are not demonstrating the academic growth shown by students from other states. Finally, the achievement gap separating the academic achievement of at-risk populations from those not at-risk is widening; student transiency has been linked to at-risk populations. This study provides an analysis of important data, which could provide information to improve the teaching and learning throughout the state. For example, these results may provide information that could help local educational agencies (LEAs) plan more effectively to fulfill the legislative mandate of educating all children.

Limitations and Assumptions

Cohort studies, such as this, follow a group of students over time and for the first three years of the study period the cohort is dynamic and changing. In the spring 2004 more than 33,000 students were eligible for the cohort and by the spring of 2006, nearly one half of those students were disqualified from the final cohort. Students are allowed to enter and exit the cohort up to spring 2004, which means that the study cohort differed substantially from the group of first grade students entering school in the fall 2001. However, it is assumed that the student characteristics of students entering the 1st grade in the fall of 2001 are not significantly different than the cohort completing the 5th grade CRT administration in the spring of 2006.

For purposes here, it must be assumed that that all students are fundamentally the same and possess comparable motivation levels and learning capacity. If not entirely comparable, it must be assumed that the differences between the students included in this study and those not included in the study are minimal.

The generalization of results may be limited because of non-random group, classroom, and school assignments. For example, a student or group of students may be assigned to the transient student group only because of a district attendance zoning change. In this case, the student may possess all the characteristics and traits of a non-transient student, including having lived in the same house with the same parents for his or hers entire life and, yet be assigned to the transient group. Also, only one cohort is followed and there is no compelling reason to believe that other cohorts would exhibit similar achievement results and possess the same characteristics. However, there is no reason to believe that the study cohort is atypical for any reason.

It is stipulated that every classroom differs from the next in some manner. However, it is assumed that teachers are delivering the intended curriculum, that which was adopted by the respective school district and aligned to the state of Nevada content standards. It is assumed that every classroom teacher followed the testing protocol defined by the Nevada Department of Education and the respective school districts. It must also be assumed that classroom testing conditions are essentially the same and that any testing condition differences have a negligible impact on test score results. The test administration protocol requires that proctors monitor students' progress to ensure the students are putting forth a reasonable effort; therefore, it is assumed that the students' scores are representative of that meaningful effort. With respect to the Nevada Math and Reading CRT, the assessment tool is reliable, valid, and is free of biases that may lead to erroneous interpretations of test scores (Popham, 2003).

Definition of Terms

Student transiency is defined as "movement between or changes in school, either once or on repeated occasions, at times other than the normal age at which children start or finish their education at a school" (Strand and Demie, 2006, p. 551). For purposes of this study, a transient shall be further defined as one who has officially attended at least two different schools through the 3rd grade and at least two schools between the 3rd and 5th grade CRT administrations.

Migrant students are defined as "the children of migratory workers who relocate across school and district boundaries in order to obtain seasonal or temporary employment in agriculture or fishing" (Kirby et.al., 2002, p. 1).

Homeless students are considered as such if they lack "a fixed, regular, and adequate nighttime residence" or if, their residence is a supervised shelter, welfare hotel, or a place that has not been ordinarily used for sleeping accommodations (Phillips, Wodatch, & Kelliher, 2002, p. 11).

Adequate Yearly Progress (AYP) is the determination made by state educational agencies (SEAs) as to whether a school has met the annual measurable objectives or some other measure defined by the state. A school can be deemed to have made AYP without meeting the strictly defined annual measurable objectives.

The No Child Left Behind (NCLB) Act is the 2002 reauthorization of the Elementary and Secondary Education Act (ESEA) initially enacted in 1965.

The Trends in International Mathematics and Science Study (TIMSS) is a standardized assessment administered to a sample of students in participating countries every four years (Provasnik, Gonzales, & Miller, 2009)..

An effective school "shall have near-equal proportions of low, middle, and high socioeconomic (or other demographic characteristics) students attaining similarly high levels of mastery of the essential curriculum" (Davenport & Anderson, 2002, p.26). In other words, effective schools are those in which all student groups or subpopulations are performing at similarly high academic levels regardless of student characteristics.

The dependent variable is a variable not under the experimenter's control but is the variable being measured (Howell, 1995). In educational research, the experimenter measures changes in the independent variable and corresponding changes in the dependent variable.

An independent variable is a variable that is manipulated by the experimenter or is a characteristic possessed by the subjects and brought into the study with them (Howell, 1995; Mertler & Vannatta, 2002).

CHAPTER 2

Literature Review

Central to the issue of student academic achievement is the variable of student transience, which is imposed upon students for a variety of reasons but content standards, uniform curricula, pacing guides, and annual criterion-referenced assessments are but a few of the tools utilized to ensure that all students attain an adequate level of education. Unfortunately, some students in Nevada do not attain the desired educational outcomes but many non-transient and transient students alike do attain the desired educational outcomes; these students are the intended focus of study.

Introduction

The workings of any school can be described as an intricate interaction between many factors, of which, students, teachers, curriculum, and school leadership are but a few. The ability of a school to operate effectively is not merely a function of a single factor such as teacher quality; rather, school effectiveness is best examined in the context of many variables, some of which are imposed from the external environment and others which originate from within the school environment. When the complex interaction between within- and out-of-school factors is considered, the effectiveness of public education is best studied through the lens of systems theory. For current purposes, systems theory is broadly viewed as a framework used to analyze and describe various phenomena in the formal educational setting (Banathy, 1992).

Despite historical precedents, Ludwig von Bertalanffy is credited with developing the general theory of systems (Davidson, 1983). The general systems theory (GST) asserts that all observed phenomena can be described as a web of relationships among elements, of which the elements have common patterns or behaviors that can be used to develop a deeper understanding of the complex phenomena (Bertalanffy, 1950). The overarching idea of GST shifts thought from individual parts to the organization of the parts, recognizing that the relationship between the parts forms a dynamic rather than static process (Bailey, 1994).

In addition to framing the GST, Bertalanffy (1969) put forth the notion of open systems as compared to closed systems. On the one hand, closed systems neither interact with the environment nor do they take in any information from any outside source. While on the other hand, organisms in open systems take in information from the environment and dynamically interact with that environment. The basic characteristics of a simple open system are the environment, input, throughput, output, and feedback. The environment includes those exogenous considerations or elements having the capacity to impact all or part of a defined system. Input includes all identified resources needed for system maintenance and growth. Throughput is the process of transforming the resources within the system to assist in the creation of the desired product. Output is the intended and unintended products attributed to a system. Feedback is a continually flowing source of information addressing the relationship between the environment and the system, which the system uses to adapt and improve (Khalil, 1995).

Elements of the GST were integrated into the private business sector, social sciences, computer sciences, and other non-science fields in the 1970s and 1980s after having been successfully applied in Japan since the 1950s (Deming, 1967; Hammond, 2003). Public school educators embraced systems theory, which quickly led to the redefinition of schools as living and learning systems (Senge, 1990). However, the applicability of systems theory in the educational setting has recently been brought into question because educational outputs are reportedly not commensurate with educational inputs (Hanushek, 2001: 2005, & 2006).

The educational system continuously interacts with both the non-educational and the educational environments, either of which are individually or collectively capable of accentuating or attenuating the academic achievement of students. Environmental elements such as judicial mandates, government legislation, special interest groups, and economic factors are but a few of the exogenous environmental factors that are capable of impacting schools. The resources put into the system for the purpose of producing the desired products or outcomes are frequently expressed in per pupil dollars and are often distributed at legislatively dictated levels but may be categorically allocated or targeted by school district administrators. System resource measures are typically expressed in per pupil dollars but other resource measures can include the number of teachers, the qualities of teachers, capital improvements, new school construction, classroom enhancements, and the support staff, all of which can be closely related to per pupil dollars.

Throughput is sometimes under the control of school staff and includes the curriculum viability, curriculum delivery, class sizes, school leadership, and after school or supplemental programming. Output is a measure of the quality of the product produced, which for educational purposes, is a measure of the academic achievement attained by a student or group of students. The quality of the output or the effectiveness of the system is measured utilizing standardized assessments, the results of which are disseminated back into the environment through public reporting and accountability; feedback. The newly educated student outputs are absorbed into the environment and this newly formed environment interacts with the school system.

In other words, systems theory embraces numerous interrelated student-, classroom-, school-, and national-level issues and elements. A report titled *Equality of Educational Opportunity*, an early attempt to uncover the determinants of student academic achievement, concluded that schools accounted for only about 10 percent of the variance in student achievement (Coleman, Campbell, Hobson, McPartland, Mood, Weinfeld, & York, 1966), while student characteristics accounted for about 80 percent of the variance in student achievement. The notion that schools had little impact on student academic achievement was independently validated (Jencks, Smith, Ackland, Bane, Cohen, Grintlis, Heynes, & Michelson, 1972) and continues to be supported, at least in part, in the current era of accountability-based reform (Hanushek, 2006; Hill, 2008; Ornstein & Levine, 2000) despite the fact that schools, not students, are held accountable for student learning (LeFloch, Martinez, O'Day, Stecher, Taylor, & Cook, 2007). Current educational research presupposes that a combination of student, classroom, and school variables explains the greatest percentage of the variance found in student academic achievement.

Student Characteristics

Student-level factors such as family background, socio-economic status (SES), and participation in special programs can have substantial effects on academic attainment (Berliner, 2006; Davenport & Anderson, 2002; Payne, 1998), but these student factors are beyond the control of educators (Milanowski, 2004). The NCLB reporting requirements do not consider the impacts of these factors and, much to the contrary, schools are specifically required to report achievement by these groups and schools are penalized when one or more student subgroups fail to meet the same minimum standard for all students. The NCLB legislation requires that student achievement status or proficiency serve as the primary criteria used for AYP determination but these CRT-based measurements are highly sensitive to student characteristics (Berliner, 2006; Koretz, 2008), of which student transience is one such factor.

Student Transiency

In the early 1960s, the *Sputnik* reformers produced a number of papers directed at public education reform after the Woods Hole Conference of 1959. Among these works was *The Process of Education* (Bruner, 1960), which addressed the major questions of what should be taught to children, when, and how? In this landmark work, Bruner was one of the first to recognize the educational needs of transient students by arguing that a uniform curriculum was required to accommodate a mobile society. In addition, Bruner argued that schools should strive to cultivate excellence; the purpose of public education was to help all students achieve their optimum intellectual development (Bruner, 1960).

The recognition of transiency as a student-level characteristic carrying serious consequences in terms of educational attainment was largely dismissed or overlooked well into the 1980s (Kerbow, 1996). The examination of student transiency was triggered by extensive immigration into developed European and North American countries. Research on student transiency first sought to identify the causes of transiency which include international migration, residential migration of low income families, the relocation of military families, family breakups, voluntary and involuntary school transfers, and school zoning changes (Henethorne & Dobson, 2000; Nelson, Simoni, & Adelman, 1996). Not until the early 1980s did educational researchers begin to examine student transiency as a student-level variable capable of explaining variances in educational outcomes. Research for the purpose of connecting academic achievement differences between transient and non-transient groups at diverse schools continues to be a focus of study in educational arenas where student transiency is noteworthy (Demie, Lewis, & Taplin, 2005).

Because international immigration and other forms of student transiency continue to reshape the face of student populations in Europe and the United States, the current focus of student transiency research is to develop interventions and support to facilitate the learning of transient students who perform significantly lower than their non-transient counterparts. The development of interventions and school supports for transient students is driven by legislated school-level accountability reform, of which NCLB is one of the most recent examples (Demie, Lewis, & Taplin, 2005; Strand & Demie, 2006).

Immigration to developed European countries, beginning in the mid- to late-1900s, was but part of a worldwide phenomenon that included economic- and political-motivated immigration to other developed nations including the United States. Through the 1980s, California, Florida, and Texas served as the principal gateways into the United States for millions of immigrants from Latin America. The parents of students immigrating to developed nations from under-developed nations are most often relegated to the lowest paying jobs for prolonged periods of time which forces families to move repeatedly for a variety of reasons. Students who fail to master the English language and whose family is unable to overcome poverty have a lower chance of becoming proficient in reading and mathematics (Demie, Lewis, & Taplin, 2005; Strand & Demie, 2006; Terrazas & Fix, 2008).

Nevada's immigrant population has grown 354 percent between 1990 and 2006, making immigration to Nevada a relatively recent phenomenon (Terrazas & Fix, 2008). Although the sheer numbers of immigrants moving into Nevada is unspectacular, the fact that immigrants make up 19 percent of the state's population presents a unique set of educational challenges the state of Nevada must meet. Central to the issue of educational challenges is Nevada's ability to support the learning of the dramatically expanding population of English language learners, a sub-population growing 208 percent between 1994 and 2005 (Terrazas & Fix, 2008).

As the annual measurable objectives (AMOs) mandated under NCLB are raised, the academic success for all at-risk student populations becomes an even greater concern. Student transiency, or non-scheduled movement between schools, is common and, on a national basis, is greater in elementary schools as compared to high schools (Yang, Goldestein, Rath, & Hill, 1999). There is a widespread assumption that student transiency is disruptive to the process of education; that transiency indirectly effects learning through domestic stress or inadequate social adjustment or directly by disrupting the delivery or receiving of a coherent curricula either because of non-sequential instruction or student absenteeism (Gamoran, 1986; Kerbow, 1996; Romero & Lee, 2007; Smith, Fien, & Paine, 2008; Wood, Halfon, Scarlata, Newacheck, & Nessim, 1996). In addition, there is a perception amongst school administrators that transient or mobile students will likely perform at academic levels lower than their peers, which raises concerns as to school performance in the context of the NCLB legislation (Strand & Demie, 2006). The research examining the relationship between student transiency and academic achievement is limited and the evidence supporting the notion that student transiency significantly contributes to lower levels of academic achievement is mixed.

Two early research efforts (Benson, Haycraft, Stayaert, & Weigel, 1979; Johnson & Lindblad, 1981) concluded that higher levels of academic achievement would be expected from students who remain in the same school for longer periods of time, regardless of the grade level tested In a more recent study, Demie (2002), found that the academic achievement differences between transient and non-transient groups widened when the student factors of IEP status and participation in English language learning and the FRL programs was included in the analyses. At approximately the same time, Mott (2002) found a strong negative association between academic achievement and transiency but the study was small in scale and did not consider other student characteristics. A study of a national sample of approximately 3500 students found that student transiency contributed significantly to lower achievement levels when accompanied by lower levels of parents' education (Straits, 1987). Other studies found higher incidences of high school drop-out (Astone & McLanahan, 1994) and retention in grade (Simpson & Fowler, 1994) for transient students as compared to non-transient students.

Another research study of the academic achievement of approximately 1000 Swedish 8th grade students showed that students who attended at least three schools through the 8th grade scored significantly lower than students who attended fewer than 3 schools (Schaller, 1976). However, the study presented evidence that the group differences could be attributed to differences in prior learning and the speculation that the academic achievement differences were unrelated to student transiency. In another study of London schools, significantly lower reading and mathematics scores were reported for 5th grade students who attended three or more schools as compared to those who attended only one or two schools (Blane, 1985). Although the differences were statistically significant, the effects attributed to student transiency were much smaller than the effects attributed to socioeconomic status and other family background characteristics.

In yet another study of London area schools, the educational achievement of transient and non-transient students was measured at the beginning of the 1st grade and the end of the 5th grade to identify group differences. The results showed that transient students entering the 1st grade scored significantly lower than non-transient students and that the group differences continued through the 5th grade. The study concluded that the differences between the transient and non-transient groups were significant, but the differences were due primarily to differences in socioeconomic status, participation in special education, and English language acquisition programs (Strand, 2002). The study also reported that transient students progressed slower than expected in mathematics as compared to reading and writing. Yet another study revealed that only a weak relationship between student achievement and transiency existed after other student characteristics were controlled (Alexander, Entwisle, & Dauber, 1996).

Some of the perceptions about student transiency and academic achievement are broadly supported by research conducted by the British Office of Standards in Education (OFSTED), showing that London schools with above average student transiency demonstrate lower than average school-level achievement on standardized assessments

(OFSTED, 2002). This finding is consistent with school-level data reported in the Nevada ARC. While the reports strengthen the link between higher levels of student transiency and lower academic achievement, the report also acknowledges the difficulty in separating the effects of student transiency from the effects of socioeconomic status on student academic achievement.

The results of high stakes CRTs reflect entire educational experiences, not just students' experiences during the academic year of testing (Hanushek, 1986; Koretz, 2008). The achievement scores from any CRT administration are only partly due from the students' experience at their current school of attendance (Berliner, 2006; Kohn, 2000; Strand & Demie, 2006; Turkheimer, et. al, 2003). The link between the programs offered by a school and students' performance on CRTs is tenuous and ascribing student achievement to the operations of schools is often inappropriate due to school, teacher, and student differences (Offenberg, 2004). However, the link or connection between student achievement and the operations of schools may be strengthened when the variable of student transiency is considered.

Other Transient Subpopulations

The definition of transient students adopted for this study includes students who may also be classified as children of homeless, migrant, or immigrant parents. The academic achievement of children of migrant and homeless parents is monitored under certain federal programs aimed at ensuring that certain at-risk children receive an appropriate public education (Kirby, et. al., 2002; Phillips, Wodatch, and Kelliher, 2002)

However, the academic achievement of transient students and children of immigrants is not formally monitored in Nevada (Terrazas & Fix, 2008).

Students categorized as transient, homeless, migrant, or immigrant share several important characteristics and face many of the same barriers limiting to receiving a free and appropriate public education. More often than not, the children of migrant workers and immigrants are highly mobile, are socioeconomically disadvantaged, participate in limited English proficiency (LEP) programs, and are of an ethnicity other than Caucasian (Kirby et. al., 2002; Terrazas & Fix, 2008). Likewise, homeless children are more apt to experience multiple unscheduled school changes, are socioeconomically disadvantaged, and participate in other educational programs at higher than average rates than non-homeless students (Phillips, Wodatch, & Kelliher, 2002). In addition to the disruption of educational processes, transient students often experience cultural differences and social isolation, both of which are negatively associated to higher levels of academic achievement (Lennon & Markatos, 2002).

A report on the academic outcomes of migrant students as compared to all students at the elementary school level showed that the academic performance of migrant students was substantially lower in reading and mathematics achievement in all of the 15 states examined. The authors concluded that the differences in proficiency rates between migrant students and all students at the elementary school level ranged from approximately 10 to 30 percentage points in most states. The authors also reported comparable proficiency rate differences at the middle school level for both reading and mathematics. The differences in educational attainment continued well into high school, where migrant students graduated at rates far below those of their peers (Blank, Manise, & Brathwaite, 2000).

Migrant students in Nevada did not fare any better than the students in other states. The reading and mathematics proficiency rates (Table 1) for migrant students in 2004, 2005, and 2006 were substantially lower than the proficiency rates for non-migrant students (CEP, 2009). The number of migrant students represented in Table 1 is small in comparison to the number of non-migrant students and those numbers vary considerably from year to year. The table is simply meant to illustrate that the reading and mathematics proficiency rates are substantially different for migrant and non-migrant student groups in Nevada.

Table 1 Proficiency rates for migrant and non-migrant students.

	Reading Percent Proficient								
	2004			2005			2006		
	ES	MS	HS	ES	MS	HS	ES	MS	HS
Migrant	12	26	52	13	35	35	20	31	0
Non-Migrant	44	51		43	51	75	48	51	78

	Mathematics Percent Proficient								
	2004			2005			2006		
	ES	MS	HS	ES	MS	HS	ES	MS	HS
Migrant	31	30	26	37	35	24	43	36	0
Non-Migrant	47	49		51	49	51	54	53	47

Note: ES = elementary school, MS = middle school, HS = high school

Nevada collects three pieces of information about student transiency for use in determining whether a school has made adequate yearly progress for accountability purposes. The reading and mathematics proficiency rates for the three variables defining transiency are presented in Table 2. The table illustrates that, as a group, students who enter their respective elementary school after the official count day had substantially lower reading and proficiency rates as compared to students who were continuously enrolled in their respective schools from count day. Based on these data, students who enroll in a new school or a new school district after count day are more likely to be non-proficient in reading and mathematics as compared to students who remain in their respective schools for the full academic year, regardless of school level. Students categorized as new in country are defined as being an immigrant identified as LEP who was enrolled in a U.S. school for the first time. Students categorized as new in country were much more likely to be non-proficient in reading and mathematics as compared to students who were not new in country. These data support the idea that students who experience a transient lifestyle perform at academic levels far below those of students who do not experience a transient lifestyle.

Table 2 Reading and mathematics proficiency rates for some Nevada students.

	New in School (ES)		New in District (ES)		New in Country (ES)	
	Reading	Math	Reading	Math	Reading	Math
yes	44.2	47.0	45.3	46.9	9.7	28.9
no	53.6	57.3	59.3	63.5	58.7	62.7
	New in School (MS)		New in District (MS)		New in Country (MS)	
yes	44.0	39.8	46.5	40.9	18.7	31.6
no	66.0	63.4	64.4	61.8	63.6	60.8

Note: ES = elementary school, MS = middle school

Transiency is a defining characteristic of a migrant student and the frequent moves cause disruptions in the educational process that contribute to the challenges of migrant students in meeting academic standards. The problems and disruptions are mitigated when the frequent moves are within states rather than between states, which is more often than not, the case. For the migrant student, language difficulty is perceived as a greater barrier to meeting academic standards than is student transiency. All states currently offer language accommodations in one form or another, but only a handful of states provide any transiency-related accommodations for statewide student assessments. The punitive consequences mandated under the NCLB Act provide a strong incentive for school administrators to engage in practices supporting the exclusion of migrant children from participating in statewide assessments (Lennon, & Markatos, 2002).

Due to the fact that most immigration into Nevada is from Latin America countries, some researchers turn to LEP status as a proxy for recent immigration. While the merits of such a proxy are questionable at best, the achievement attainment of students participating in LEP programs is substantially lower than non-LEP program participants on the 2005 to 2010 NAEP administrations and the 2004 to 2009 CRT administrations in Nevada (Terrazas & Fix, 2008). As may be the case for migrant students, learning differences between immigrant students and non-immigrant students may result from language barriers rather than the defining characteristic of transiency (Lennon, & Markatos, 2002). However, Nevada does not specifically report on the academic achievement of immigrant students and the learning of migrant children is not reported to the public through the subpopulation disaggregation required by the NCLB legislation.

Socioeconomic Status, Race, and Ethnicity

An achievement gap is a phenomenon generally defined as academic achievement disparities between groups of students based on ethnicity, family wealth, and participation in other educational programs (Borman & Rachuba, 2001; Davenport & Anderson, 2002; Guskey, 2007). However, other educational researchers argue that the achievement gap should be framed only in socioeconomic terms (Becker & Luthar, 2002; Berliner, 2006; Hanushek, 2006; Porter, 2007). Americans most often attribute the achievement gap to inadequate or failing schools but often overlook the fact that the enrollment of any school is a reflection of the neighborhood and the families in the neighborhood share certain qualities, of which, socioeconomic status is the most unifying factor (Mishel, Bernstein, & Allegretto, 2005; Rothstein, 2004). In other words, poverty is inextricably interwoven with issues of race, ethnicity, and ultimately student academic achievement. Students living in poverty are also more apt to be subjected to a transient home life for a variety of reasons (Strand & Demie, 2006).

At the student- and school-level, the achievement gap is more closely associated with socioeconomics or poverty rather than ethnicity because low income neighborhoods and high poverty schools are attended by students of many ethnicities or races (Berliner, 2006; Rothstein, 2004). Regardless of how one may choose to frame the achievement gap, children from poverty are disproportionately placed at risk of academic failure and an individual's status as a racial or cultural minority is associated with academic risk due to living in poverty, not because of the person's ethnicity or race (Connell, Spencer, & Aber, 1994; Finn & Rock, 1997; Mishel, Bernstein, & Allegretto, 2005).

The recent TIMSS and PISA results for U.S. students provide a glimpse as to the relationship between poverty and student academic achievement (Gonzales, Guzman, Partelow, Pahlke, Jocelyn, Kastberg, & Williams, 2004; Gonzales, Williams, Jocelyn, Roey, Kastberg, & Brenwald, 2008; Provasnik, Gonzales, & Miller, 2009). The results of the 2003 TIMSS performance by U.S. students are presented in Table 3. The TIMSS 2003 and 2007 results show the association between student academic achievement and school-level poverty measures, in which students from the low poverty (wealthy) schools score higher than students from high poverty (poor) schools in both mathematics and science. Also, scores for both mathematics and science systematically decrease as the school-level percentage of poverty increases. Further, the average mathematics and science scores for students from the most impoverished schools (those with greater than 75 percent in poverty) are well below the average for U.S. students. The 2003 and 2007 TIMSS results show that students attending low poverty schools are competitive on the TIMSS while those attending high poverty schools are far less competitive. The 2003 and 2007 TIMSS results suggest that poverty rather than race or ethnicity is a significant factor preventing most poor children from performing well on standardized instruments (Berliner, 2006).

Table 3 Results from TIMSS 2003 and 2007 by School-Level Poverty

School Poverty	2003 Math	2003 Science	2007 Math	2007 Science
Less than 10% in poverty	567	579	583	590
10 to 24.9% in poverty	543	567	553	567
25 to 49.9% in poverty	533	551	537	550
50 to 74.9% in poverty	500	519	510	520
75% or more in poverty	471	480	479	477
U.S. Average Score	518	536	529	539

The association of school-level poverty level and race/ethnicity is not at all clear, yet some argue that it is appropriate to use poverty or socioeconomic measures as a substitute for ethnicity or race (Becker & Luthar, 2002; Berliner, 2006). The U.S. scores for the 2003 and 2007 TIMSS (Table 4) by ethnicity showed that some minorities actually performed at higher academic levels than did Caucasian students, thereby providing further evidence that socioeconomic status is more closely associated to academic achievement than is minority status (Berliner, 2006).

Table 4 Results from TIMSS 2003 and 2007 by Ethnicity

Student Ethnicity/Race	2003 Math	2003 Science	2007 Math	2007 Science
Caucasian	542	565	550	567
Asian	550	543	582	573
Hispanic	492	498	504	502
African American	471	486	482	488
U.S. Average Score	518	536	529	539

When the educational outcomes of students at a school fall short of that desired, educators and the public alike cry out for school reform even though many out-of-school factors reportedly influence student achievement (Berliner, 2006; Koretz, 2008; Marzano, 2003; Turkheimer, Haley, Waldron, D'Onofrio & Gottesman, 2003). Students at risk of academic failure most often come from an impoverished family, are of an ethnic minority, are non-native English speakers, participate in special education programs, have poorly educated parents, or come from a single parent family (Vesely & Crampton, 2004). Regardless of the impact of out of school factors, educators and the NCLB legislation indirectly and sometimes directly argue that educational reform must occur from within the school (Berliner, 2006; Darling-Hammond, 2002; DuFour, 2004; DuFour & Eaker, 1998; Hord, 1997; Johnson & Johnson, 1999; Schniker, 2006).

In addition to the individual factors associated with academic failure, schools may exacerbate the effects of academic risk factors by institutionalizing an unsupportive school climate and setting low academic expectations through the delivery of inadequate instruction or through the implementation of low quality or inappropriate curriculum (Borman & Rachuba, 2001). On the other end of the spectrum, students at risk of academic failure achieve at higher levels when taught by caring and supportive teachers who demonstrate high expectations for all students in safe school environments where meaningful home and school partnerships are developed (Comer, 1984; Finn & Rock, 1997; Freiberg, Stein, & Huang, 1985; Wang, Haertel, & Walberg, 1984).

More than two-thirds of non-Caucasian students attend predominantly minority schools across the nation, and many of these schools are characterized as being intensely segregated. The segregation of ethnic minorities is typically accompanied by a high percentage of students living in poverty, and the combination of these two factors is the best predictor of academic failure (Berliner, 2006). School segregation facilitates inequality, which is further exacerbated by the fact that schools serving low-income and minority populations receive fewer resources lowering the likelihood of receiving an adequate education (Darling-Hammond, 2004; Warner-King & Smith-Casem, 2005; Vesely & Crampton, 2004). Schools serving the poor and minority students employ less qualified and less experienced teachers, who are often required to teach overcrowded classes with less access to high quality curriculum, which exacerbates the achievement disparities evident between impoverished minorities and the middle class or affluent (Darling-Hammond, 2004).

Accountability in the context of high-stakes testing and sanctions for failing to meet AYP targets also compromise the educational opportunities of disadvantaged students. When federal funding is reduced or withheld from schools performing poorly on high-stakes testing, the already disadvantaged students are doubly penalized: once for simply being forced to attend an inadequate school and again for failing to perform at the levels of their wealthy neighbors. Sanctions and penalties articulated in NCLB legislation serve a variety of purposes, none of which contributes to school improvement (Darling-Hammond, 2004). Schools whose students score well on high-stakes tests focus on school-wide instructional improvement, while schools whose students perform poorly on high-stakes test respond by supporting the learning of a few in order to meet the requirements of a certain percentage of students to attaining grade-level proficiency (Diamond & Spillane, 2004). The implementation of accountability policy can work against the attainment of equal educational outputs and may even exacerbate educational stratification (Darling-Hammond, 2004; Diamond & Spillane, 2004).

Special Program Participation

Students with Limited English Proficiency are growing at very high rates due to immigration from non-English speaking countries; most of the recent immigrants are Hispanic or Latino (Jamieson, Curry, & Martinez, 2001; Terrazas & Fix, (2008). Students participating in LEP programs perform at an academic achievement level below their English-proficient peers (DeStefano, 1998; Moss & Puma, 1985; Thomas & Collier, 2002) and have higher dropout rates than their native-born peers (Heubert, 2002; Guisbond & Neill, 2004; Ruiz de Velasco & Fix, 2000; Thomas & Colier, 2002). These findings suggest that the special needs of linguistically diverse students are not being met in U.S. schools, which is counter to the requirements of educating all children under the NCLB legislation.

Students participating in LEP bring a wide range of abilities and circumstances to the classroom. Some students participating in LEP have strong academic backgrounds, are literate in their native language, and often have begun to study English as a second language. On the other hand, some other students participating in LEP have limited formal schooling, are not literate in their native language, lack knowledge in specific content areas, and may be accustomed to school routines. The students described above forming either end of the spectrum and all those in between require different pathways for academic success, which necessitates specialized programs for all LEP participants (Echevarria, Vogt, & Short, 2004).

Standardized test requirements for LEP participants vary little from those for regular education students; the high stakes test more often than not becomes a test of their English knowledge rather than their content knowledge (Coltrane, 2002). Notwithstanding the difficulties of completing a standardized test in English, many LEP students are expected to learn in a regular education classroom from a teacher ill-trained in the methods of instruction for LEP participants. School administrators are forced to engage in a wide range of ineffective staffing and professional development practices in order to just comply with the law, while doing little to support the learning of students in LEP programs (Darling-Hammond & McLaughlin, 1995). In theory, students participating in LEP programs should become English proficient under the guidance of specially trained ELL instructors and only then move into the regular education classroom. Due to high costs and state policies, English-fluent students are rarely exited from LEP programs (Thomas & Collier, 2002).

Content-based ESL instruction is widely utilized to simultaneously teach English language learners the language and subject area content in a manner the students may encounter in the regular education classroom (Short, 2002). However, many children require four to ten years to become proficient in the English language and, until then, cannot be expected to perform at achievement levels with otherwise comparable students. There is a large achievement gap separating English language learners and native English speakers and the two or three year LEP programs that typify public education are ineffective in closing the large achievement gap (Echevarria, Vogt, & Short, 2004; Thomas & Collier, 2002).

Little has really changed since the early 1800s when the American educational system was actually designed to produce disparate educational outcomes based on wealth and social class for the purpose of maintaining distinct social classes and creating a plentiful supply of workers for low skilled jobs (Spring, 2001). The disaggregation of student assessment data called for in the NCLB legislation is required as a means to track the educational progress of certain student groups in order to determine whether schools are improving the achievement levels of all students (Blank, Toye, & Langesen, 2006) but in Nevada, the educational progress of the transient subpopulation is neither tracked nor monitored (NDE, 2007a).

Sustained educational reform required to eliminate the achievement gap was advanced as socially responsible cause but would not come about without a significant financial cost (Roellke, Green, & Zielewski, 2004). Educational policy-makers are forced to balance increased education expenditures for all students against cost incurred to meet the special educational needs of select groups (Hanushek, 1986). However, the message comprising the core ideal of the NCLB legislation is clear; all children are expected to be taught a challenging and meaningful curriculum by a highly qualified teacher regardless of the cost (Hanushek, 2005). Unfortunately, decades of nationwide education and school reforms have failed to significantly increase the educational outcomes for many low-income, non-native, and students of color (Fuller, Wright, Gesicki, & Kang, 2007). The development and implementation of content standards, uniform curricula, pacing guides, formative assessments, and annual criterion-referenced assessments are all in place to ensure that all students attain an adequate level of education (Cobb, McClain, de Silva Lamberg, & Dean, 2003), whether they move from school to school or remain at one school site for multiple years. In the case of the transient student subpopulation, little can be stated for certainty because the group has historically been ignored by state accountability systems and remains unrecognized by NCLB.

The Nevada Accountability Report Card (ARC) reported an annual state-level student transience rate of approximately 33 percent for each of the 2003 to 2006 testing years, while some districts and many schools reported student transiency rates in excess of 50 percent. With so many students moving from school to school, between districts, and entering from out of state, one may question whether it is even appropriate to connect students' annual test results to specific schools in the context of NCLB (Offenberg, 2004), yet the practice is mandated. For students confining their entire education experience to one school, the practice would appear to be more appropriate. If schools, teachers, and classroom instruction were the same, then the variance in students' achievement level could be associated with systems or school variables of their current school placement.

However, the law requires that schools are to be held accountable for a student's entire formal educational experience even if the student in question has been enrolled at the school for only one partial academic year. This practice becomes an issue only if high rates of student transiency are negatively correlated to high student achievement, a topic not at all well examined by previous research studies. On the national-level, some might argue that the public educational system has made great strides toward the goal of providing an adequate education for all students as a result of curricular and school finance reform. However, others might point to the unchanging achievement gap and undesirably low scores on international standardized assessments (Gonzales et.al. 2004; Gonzales et.al. 2008; Livingston, 2008; Provasnik, Gonzales, & Miller, 2009) as evidence of systemic educational inequities.

Classroom Characteristics

Over the years, much has been reported on the effects of student-level, classroom-level, and school-level factors on student academic achievement and most agree that the effects of classroom factors are strong (Bloom, 1976; Edmonds, 1979; Reynolds & Teddlie, 2000; Sanders & Rivers, 1996; Wright, Horn, & Sanders, 1979). A detailed review of the literature pertaining to the effects of classroom-level factors on student academic achievement is beyond the scope of this work. Nonetheless, classroom effects cannot be altogether ignored.

Classroom-level factors, which include teacher quality and teacher effects, reportedly have the greatest effect on student achievement but are also amongst the most difficult and costly to measure and quantify (Marzano, 2003; Rivkin, Hanushek, & Kain, 2005; Rowan, Correnti, & Miller, 2002; Sanders & Horn, 1998). Rather than collecting authentic classroom or teacher data, researchers turn to teacher characteristics such as licensure, credentials, earned degrees, salary, and years of experience as measures of teacher quality. The relationship between many of these characteristics and student achievement is not clear because the variables do not individually or collectively consistently predict student achievement (Podgursky & Springer, 2007). However, other research shows that teacher and classroom variables are significantly and positively correlated with student achievement (Monk, 1994; Wayne & Youngs, 2003). The value-added growth studies assert that the most effective teachers produce the greatest amounts of student academic growth (Hershberg, Adams, & Lea-Kruger, 2004; Sanders & Rivers, 1996, 2000) but these studies fail to report that teacher effectiveness varies significantly from year to year and classroom to classroom depending on the unique mix of students (Hanushek, 2006; Odden, Borman, & Fermanich, 2004; Stronge, Ward, Tucker, & Hindman, 2007).

Some studies adjust for important characteristics such as the grouping or mix of students, students' characteristics, and even history of school effectiveness (Jencks & Meyers, 1990; Rowan, Correnti, & Miller, 2002; Slavin, 1987). Class size is an often used variable in educational research and, through many studies, has yielded mixed and indeterminate results. Some studies have shown that a small class size can have a positive and lasting effect on student learning, especially for some at-risk populations (Biddle & Berliner, 2002; Finn & Achilles, 1999; Nye, Hedges, and Konstantopoulos, 2002), while other studies have reported negligible effects from a small class size (Darling-Hammond, 2000; Johnson, 2002; Konstantopoulos, 2008).

Teacher characteristics and qualifications have revealed a connection to student achievement and academic improvements. In particular, studies have examined the link between teachers' verbal skills (Bolwes & Levin, 1968; Hanushek, 1971; Darling-Hammond, 1997; 2000; Schalock, 1979; Soar, Medley, & Coker, 1983) teacher certification and degree in the field to be teaching (Darling-Hammond, 2000; Hawk, Coble, & Swanson, 1985; McNeil, 1974), teacher licensure (Darling-Hammond & Youngs, 2002; Goldhaber & Brewer, 1999), and teacher training (Berliner & Tikunoff, 1976; Doyle, 1985; Schalock, 1979) and student academic achievement with indeterminate results. Notwithstanding the mixed results, many in education would agree that student learning is enhanced by the efforts of teachers who are fully certified for their teaching assignment and are more knowledgeable in their field (Darling-Hammond, 2000).

Many directly involved in education and even those far removed from the process of education would agree that what teachers taught and how they taught it impacts student learning (Porter, 2002; Rowan, Chaing, & Miller, 1997; Rowan, Correnti, & Miller, 2002). The decisions made in the classroom by individual teachers have a greater impact than those made by other site personnel, including school administrators (Boynton & Boynton, 2005; Fay, 2005; Hallinger & Heck, 1996; Kohn, 1996; Marzano, 2003; Sanders & Rivers, 1996; Sanders, 2000). The decisions made outside of the classroom but still in the school setting can also have a positive impact on student learning (DuFour, 2004; Gamoran, Porter, Smithson, & White, 1997; Hayes-Jacobs, 1997).

Class Size

Class size is often used as a classroom-level variable in educational research and many studies have been reported upon over the previous 20 years. The effects of class size on student academic achievement have yielded mixed and indeterminate results (Becker & Luthar, 2002; Biddle & Berliner, 2002). Early class size experiments conducted in a field (school) setting were often plagued with uncontrolled events such as student withdraws from the school, which were largely responsible for producing questionable or indeterminate results. Through the early-1970s, the small field-oriented experiments generally concluded that class size had little or no effect on student academic achievement (Bowles & Levin, 1968). After re-examining the research base developed up to the late 1970s, Hedges & Stock (1983) reported that students who were taught in small classes tended to show small or minor gains in academic achievement as compared to students who were taught in larger classes. Also, the student achievement gains were most pronounced in the early elementary grades and for the traditionally disadvantaged students or those most at-risk for academic failure.

Based largely upon the assertion that a small class size supports greater student academic achievement, Indiana initiated a two-year class size reduction trial for a small sample of schools. The trial was viewed so successfully, the state implemented the program statewide. Notwithstanding the impressive findings, critics discounted the results by criticizing the non-random assignment of students to control or experimental groups, citing other statewide school reform as possible explanation of achievement changes, and brought into question the motivation of teachers in small versus large class sizes (McGivern, Gilman, & Tillitski, 1989).

Tennessee’s Project STAR was conceived to demonstrate the benefits of class size reduction programs. After carefully considering the criticism directed at Indiana’s class size reduction program, the Project STAR was designed as a four-year study to measure the effects of small class sizes on student academic achievement. The design included the random assignment of students to standard, supplemented, or small classes, a demographic sample of students that approximated Tennessee’s student enrollment at the time, and an adequate representation of urban, suburban, and rural schools (Finn & Achilles, 1990). The experimental findings were minimally influenced by students leaving the STAR program and their position being filled by other students, parent-requested student transfers from one group to another (non-random assignment), and school staff changes (Krueger, 1999). Students taught in the small class group demonstrated substantially higher levels of achievement as compared to those who were taught in the standard or supplemented groups (Finn, 1998). The learning differences attributed to the small class group were evidenced for all student subpopulations, but the gains attributed to the small class group were greatest for African-American students and students from impoverished urban school settings (Finn & Achilles, 1990).

Project STAR was expanded to follow the student participants through high school to determine if the effects or benefits attributed to the small class sizes would be retained or lost as the students progressed through their formal education in standard sized classes. The subsequent studies showed that a small class size can have a positive and lasting effect on student learning, especially for some at-risk populations (Finn & Achilles, 1999; Finn, Gerger, Achilles, & Zaharias, 2001; Nye, Hedges, & Konstantopoulos, 1999; 2002).

The results from Tennessee’s Project STAR were diminished or criticized because the student sample represented Tennessee’s student demography and did not closely match the U.S. student population demography. In particular, Project STAR did not include many Hispanic or Native American students because few of these families lived in Tennessee at the time of the experiment (Hanushek, 1999). Nonetheless, findings from

Project STAR prompted class size reductions in a handful of states, including Nevada which had a substantial Hispanic population. In their summary of the projects, Berliner and Biddle (2002) reported similar findings for the various studies; students taught in smaller classes attain higher levels of achievement as compared to students taught in large class sizes. However, the results of the projects were largely dismissed because they were “small in scope” (Biddle & Berliner, 2002, p. 18).

In 1996, the state of Wisconsin undertook a rather small pilot project for the purpose of assessing the effects of class size reduction on the academic achievement of economically disadvantaged students. Wisconsin’s Student Achievement Guarantee in Education (SAGE) Program was designed similarly to Tennessee’s Project STAR but began with only 30 schools in 21 school districts and involved greater percentages of Hispanic, Asian, and Native American students. Findings from Wisconsin’s SAGE Program suggest that students taught in small sized classes have higher average achievement scores than do students taught in large sized classes and African American students benefit disproportionately greater than to other student subpopulations (Molnar, Smith, Zahorik, Palmer, Halbach, & Ehrle, 1999).

The SAGE study provided evidence that small class sizes provided teachers with a greater opportunity to learn about their students, changed instructional time in a manner allowing for more content to be taught, and provided more opportunity for individualized instruction. The class size reduction effort also contributed to the unintended benefits of increasing teacher job satisfaction and providing an educational environment conducive for increased collaboration (Millsap, Giancola, Smith, Hunt, Humphrey, Wechsler, &

Riehl, 2004). The early successes of the SAGE Program prompted state officials to expand the program to other schools across the state.

A class size reduction program was undertaken in California with mixed results. A program evaluation found that overall teacher qualifications were reduced by the hiring of additional teaching staff. The newly hired teachers were more likely to be assigned to schools serving the most disadvantaged students. The evaluation did not provide evidence that additional curriculum content was taught nor were changes in student achievement attributed to class size reduction initiative (Bohrnstedt & Stecher, 2002).

Some of the findings from the Project STAR and SAGE Program have been brought into question as more sophisticated statistical techniques were applied to the original data (Achilles, Finn, & Pate-Bain, 2002). Several studies asserted that there were no statistically significant differences in student achievement when class size was used as the independent variable and achievement on the NAEP Reading Assessment was used as the dependent variable after controlling for other factors (Johnson, 2000, 2002; Rees & Johnson, 2000). However, the NAEP collects class size data in the form of school- and district-level pupil to teacher ratios rather than actual class sizes, which serves well for the NAEP trend analyses at the state-level but not district- or school-level reporting (Darling-Hammond, 2000). Some research, especially that utilizing large databases like produced through NAEP reporting, uses class size and pupil to teacher ratio to mean the same when the two measures are the same in only very rare instances. Admittedly, the effects of class size reduction are reduced or negligible at the upper grades but to lump early elementary class size reduction effects into a statement that includes high school students serves a political purpose or ideology rather than contributing to educational research (Achilles, Finn, & Pate-Bain, 2002; Biddle & Berliner, 2002).

Still other research has sought to re-examine the Project STAR or SAGE Program data using more sophisticated statistics for the purpose of closing the achievement gap. Konstantopoulos (2008) investigated the effects of small class sizes for students at different ends of the learning spectrum to determine whether small sized classes supported the learning of struggling students more than supporting the learning of thriving students. He concluded that high achieving students received more benefit than low achieving students from being taught in small classes. He further concluded that class size reduction did little to reduce the achievement gap but did serve to raise the learning levels of both high and low achieving students (Konstantopoulos, 2008).

While criticism may be readily attributed to portions of the results reported on from individual studies and shortcomings identified in various interpretations for one reason or another, the research base provides evidence that students taught in small sized classes in the lower grades attain higher levels of academic achievement as compared to their counterparts who are taught in large sized classes. The gains made by students taught in small sized classes are maintained when the students enter standard sized classes and the effects gained in the early grades are retained through the students' high school education. Finally, many student groups or subpopulations benefit from learning in small sized classes but research examining which group of students might benefit the most from small classes is being reshaped through the use of more sophisticated statistical analyses.

School Characteristics

In the case of schools and school systems, throughput is the process whereby financial resources are converted to goods or services necessary to produce the desired product: educated and proficient students. Unlike some system components, school administrators, teachers, and other education staff have a great deal of influence over the educational throughputs. For example, district administrators choose whether to build large schools or small schools, urban school or rural schools. Broad factors included in the throughput process include the school size, school setting, class size, curriculum viability, curriculum delivery, targeted expenditures, school leadership, and teacher absenteeism amongst others. Only a few of the many school-level factors known to have effects on student learning are examined below.

School Size and Setting

Increasing the size of schools began in the post-World War I era. The construction of large schools was a deliberate design intended to impart the American ideals of efficiency, depersonalization, and standardization for the purpose of producing human capital; factory workers (Lee & Smith, 1995). However, the contemporary belief that bigger schools were required to create the environment necessary to turn out more scientists was triggered by political fears strengthened during the Cold War era of the 1960s (Conant, 1959; Smith & DeYoung, 1988). Then and now, proponents of large schools argue that large schools provide a higher quality, richer, and more varied curriculum, which would be expected to yield greater outputs in the form of better educated, civic-minded, adults at lower per-pupil costs (Kenny, 1982). The overall benefits of larger schools were widely embraced and, for the most part, were unchallenged well into the 1960s.

Proponents of large schools make the argument that students benefit from the more varied and richer curriculum offered at large schools and it is unfair to those attending small schools that offer a limited curriculum (Cotton, 1996). However, research demonstrates that there is no reliable or systematic relationship between school size and curriculum quality (Fowler & Walberg, 1991; McGuire, 1989; Monk & Haller, 1993). Pittman and Haughwout (1987) argued that dramatic size increases are required to make even small increases in course offerings; a school must be very large to offer a significantly different curriculum than a medium or small school. Also, the additional course offerings at large schools are most often in the form of introductory and remediation courses that do little to increase the overall richness of the curriculum (McGuire, 1989; Monk & Haller, 1993). Finally, the breadth and depth of a curriculum designed for approximately 500 students compares favorably to the curricula offered at much larger schools (Monk & Haller, 1993).

Some research has shown that students at larger schools attain higher levels of academic achievement (Haller Monk, Bear, Griffith, & Moss, 1990; Mok & Flynn, 1996). However, the effects of school size on academic achievement may be non-significant if the students' prior academic achievements were included in their list of independent variables (Mok & Flynn, 1996). Also, when the relationship between student achievement and school size are examined, some results are mixed (Caldas, 1987; Lamdin, 1995; Ramirez, 1990), while others conclude that there is no difference in the academic achievement levels attained by students attending large schools as compared to those attending small schools (Haller, Monk, & Tien, 1993; Huang & Howley, 1993; McGuire, 1989). Still other research has found student academic achievement at small schools exceeds the academic achievement at large schools (Fowler and Walberg, 1991; Miller, Ellsworth, & Howell, 1986).

Cotton (1996) reported that student achievement in small schools is often greater and at least equal to the student achievement at bigger schools. Investigations examining the effects of school size with students considered to be at-risk found that small schools tended to produce higher levels of student academic attainment as compared to that of at-risk students at large schools (Berlin & Cienkus, 1989; Fowler, 1995; Huang & Howley, 1993; Miller, Ellsworth, & Howell). Further, Crosnoe, Johnson, and Elder (2004) concluded that large schools negatively impact all students approximately the same. Finally, the higher levels of academic attainment documented at small schools is observed whether the small school occurs in a rural or urban setting, which supports the notion that the small size effects are independent of the effects attributed to rural setting (Stockard & Mayberry, 1992).

Schools of different sizes produce different outcomes with respect to student achievement (Borland & Howsen, 2003; Crosnoe, Johnson, & Elder, 2004; Lee & Smith, 1997). Nonetheless, the research forms the basis upon which one may argue that small schools are superior to large schools when student academic achievement is examined and this conclusion holds true for elementary and secondary schools alike (Cotton, 1996). However, much of the research base fails to discriminate small schools from large schools in absolute terms and there is no clear definition as to what student enrollment constitutes a small school and what enrollment is required to be classified as a large school. After reviewing the literature examining the relationship between school size and student achievement, Cotton (1996) reported that an effective size for an elementary school ranges from about 300 to 400 students (Cotton, 1996) but Borland and Howsen (2003) reported that the optimal elementary school size may be as large as 760 students when considering other economic and competition factors.

School Diversity

An in depth review of the effects of some school-level factors such as curriculum, curricula alignment, and the delivery of curriculum on student academic achievement is beyond the scope of this work but are, nonetheless, worthy of a brief review. At-risk students perform below standards in disproportionately high percentages, which denies them important skills and access to the traditional pathways to enhanced economic opportunity. This limited opportunity to learn has increased dropout rates for at-risk students to unacceptably high levels for a society committed to equality of opportunity (Gamoran, 1998).

Assessment results from the most recent NAEP and TIMSS administrations show a positive relationship between relative wealth and academic achievement at the state-, district- (Blank, Toye, & Langeson, 2006; Gonzales et.al. 2004; Gonzales et.al. 2008; Provasnik, Gonzales, & Miller, 2009), and school-levels (Schoenfeld, 2002). Some argue that this finding may occur when teachers with high proportions of at-risk students cover less curricular content and focus on low-level skills indicative of a remedial curriculum, from which the students are less likely to engage in meaningful problem solving or reasoning activities (Gamoran, 1998; Rousseau & Powell, 2005). When teachers are well supported, have high quality curricular materials, and deliver cognitively demanding instruction, all children learn and differences in academic performance decrease (Porter, 2002). Professional development in the form of joint planning, collaborative research, curriculum assessment teams, and peer coaching should be part of the daily tasks undertaken by all teachers, and especially those teaching in classrooms or schools with disproportionately high percentages of at-risk children (Rousseau & Powell, 2005; Schoenfeld, 2002).

School Leadership

School leadership should be added to the school-level factors that influence the levels of academic achievement made by students. While some would argue there is no direct relationship between school leadership and student academic achievement (Hallinger & Heck, 1996; Nettles & Herrington, 2007; Witziers, Bosker, & Kruger, 2003), many others would argue that an effective site leader (school principal) to be an essential precondition for an effective school (Hallinger & Heck, 1998; Scott, 1998). Moreover, effective site leadership is often viewed as an indispensable component crucial for the successful functioning of many aspects of a school. School leaders are expected to monitor student academic progress, supervise the teaching staff, and monitor the delivery of curriculum, amongst other duties (Brookover, Beady, Flood, Schweitzer, & Wisenbaker, 1979; Lambert, 2003; Okpala, Smith, Jones, & Ellis, 2000). Leadership in a school building has been linked to school climate, the climate in individual classrooms, attitude of teachers, classroom teaching practices, organization of curriculum and instruction, and students' opportunity to learn. Since many would link the above-cited factors to student academic achievement, a profound connection between student achievement and site leadership may be inferred (Bossert, Dwyer, Rowan, & Lee, 1982; Hallinger & Heck, 1998) but is also somewhat difficult to quantify (Marzano, Waters, & McNulty, 2005).

School Expenditures

The system inputs are the resources contributing to system performance and, in the context of a school, are nearly always described in terms of levels of funding or expenditures of dollars. Educational funding levels are most often expressed as per pupil expenditures, which vary dramatically on a regional basis, from state to state, and from district to district within a state (Hanushek, 2006). Logic presupposes that public educational systems providing greater financial inputs are capable of hiring more teachers with greater experience, undertaking a wider variety of capital improvements, and providing a vast array of technology in the classroom, any of which might be expected to enhance the educational outcomes of the students. Systems theory asserts that the system output can be directly related to a series of inputs, an assertion that continues to be questioned (Becker & Luthar, 2002; Hanushek, 2006; Hill, 2008; Rivkin, Hanushek, & Kain, 2005).

For a thorough review of the literature examining public education spending or per-pupil expenditures, refer to literature reviews by Greenwald, Hedges, & Laine (1996), Hanushek (1986, 1997), and Dewey, Husted, & Kenny, 2000) for more details about the topics summarized here. Since the 1960s, spending on education increased dramatically and this increase was accompanied by the hiring of more teachers, which resulted in an overall reduction in the overall student to teacher ratio. Over the same 40 or 50 year period, the average age of the teacher workforce also increased which was accompanied by an increase in the average number of years of teaching experience and more classroom teachers than ever have earned graduate degrees (Hanushek, 2001). The wage increases for teachers largely result from the fact that schools must pay teachers more to attract the more highly educated candidates to the teaching profession and away from other industries also seeking their services. However, teacher salaries have not kept up with the salaries of comparable college graduates, arguably suggesting that the quality of those entering the teaching profession may be lower than the quality of those entering other industries (Hanushek, 2001). Schools could have decided to match the higher salaries offered by private industry which may have resulted in higher quality teachers but chose to hire more teachers given their fixed expenditure limits, thereby, opting to increase student learning through a reduction in the student to teacher ratios rather than maintaining a smaller and, albeit arguably, higher quality workforce (Hanushek, 1986; 2001).

Per pupil spending, measured in adjusted dollars to remove the effects of inflation, has grown steadily at high rates for many decades as a result of smaller class sizes, increases in teachers' salaries, and disproportionately high costs associated with non-instructional educational costs (Hanushek, 2001). Approximately 80 percent of the public school per pupil spending is attributable to instructional costs, which is directly related to teacher salaries and, within a district, teacher salaries are most often contractually determined by a combination of formal education and years of teaching experience (Hanushek, 1986). The remaining 20 percent of the variance found in per pupil spending is attributed to operational expenses, instructional support, and school administrative costs, any of which might be expected to contribute to the desired outcomes or outputs. Of these categories, Archibald (2006) recently found that the variance in student academic achievement is best explained by differences in expenditures attributable to instructional support.

Annual per pupil expenditures have incrementally increased at a higher rate than health costs from 1890 to 1990 (Hanushek, 2001) and the American public views public school, per pupil, expenditures as sufficient to educate children (Hart & Teeter, 2004; Rose & Gallup, 2005). The increased education expenditures have been attributed to additional funding for students with disabilities (Chaikind, Danielson, & Brauen, 1993), increased teacher salaries (Murphy & Welch, 1992), and other disproportionately high costs of other educational services and products (Rothstein & Miles, 1995). Environmental elements have injected additional resources over a long period of time, but there is little evidence that the increased resources have led to an increase in student academic achievement. In the context of systems theory it is curious that the increases in the quality and amount of inputs are largely unmatched by the system outputs, which leads one to conclude that the relationship between educational inputs or resources and outputs is ambiguous (Hanushek, 2006).

Public school funding strives to achieve educational equity, based on the notion that equals should be treated equally and unequals should be treated unequally (Berne & Stiefel, 1984; Colburn & Horowitz, 2003; Grissmer, Flanagan, & Williamson, 1997; Peternick, Smerdon, Fowler, & Monk, 1998; Vesely & Crampton, 2004). The Nevada Plan for school funding provides for a minimum level of per-pupil funding for each of

Nevada’s school districts, which is established biennially by the State of Nevada Legislature (Daugherty & Cockerill, 1998). The Nevada Plan and local school district funding above the state’s basic support guarantee ensure disparate levels of per-pupil funding across the state (Hertert, 1996). There is a widely held assumption that higher educational spending will result in higher proficiency rates and a better education for children (Archibald, 2006; Koski & Levin, 2000).

With respect to unadjusted per-pupil expenditures, Nevada has consistently spent more over successive years. For the 2004-05 school year, Nevada spent $6325 and $7141 in 2006 per pupil, both of which are nearly $2000 lower than the national average. After being adjusted for regional cost differences, Nevada ranked 49th in 2005 and 45th in 2006 in the country in terms of dollars spent per-pupil (EPE, 2006; 2008).

School Environment

For purposes here, the school environment consists of all the people and organizations claiming some stake in public education, which is admittedly rather broad in scope. Whether the environment is examined at the individual-, organizational-, or society-level, all stakeholders bring different perceptions, opinions, motives, and special interests to the goals of public education. In addition to the endogenous environment factors that are arguably associated with educational outcomes, exogenous environmental factors also may be associated with educational outcomes. However, the exogenous factors that may be associated to student learning outcomes are not reviewed in detail here.

For more on the relationship between learning theory and the educational environment, please see Bloom (1956), Dewey (1916), Hunter, (2002), McInerney (2005), Feldman & Benjamin (2006), Harris & Alexander (1998), Thorndike (1922), and Skinner (1953). The effects of equity and adequacy litigation on educational outcomes are reviewed in Colburn & Horowitz (2003), Daugherty & Cockerill (1998), Green, McIntosh, Cook-Morales, & Robinson-Zanartu (2005), Rebell (2004), Rodriguez (2004), Vesely & Crampton (2004), Viteritti (2004), and Zirkel, (2002). Other exogenous factors connecting the educational environment to student learning have been examined by Coleman, Campbell, Hobson, McPartland, Mood, Weinfeld, & York (1966), Darling-Hammond (2000), Hanushek (1997, 2006), Hill (2008), Jencks, Smith, Ackland, Bane, Cohen, Grintlis, Heynes, & Michelson (1972), Ornstein & Levine (2000), Rivkin, Hanushek, & Kain (2005).

Nevada K-8 Education

In order to bring about greater centralized control of public education, the Nevada legislature consolidated approximately 200 independent school districts into 17 school districts in the late 1950s: one school district per county (Jordan & McCord, 2001). At the time of the district consolidation, Nevada's population began to dramatically increase which seriously impacted the state's ability to provide basic services such as education. The state overhauled its school funding vehicle by adopting the Nevada Plan for funding public education in 1967 and supported new school construction at an unprecedented level. However, until new school construction met the needs of the fastest growing state in the nation, districts would be forced to implement double sessions in high schools and enlarge class sizes just to maintain a basic level of education services. In order to reduce the tax burden placed on the public for new school construction, both the Clark and Washoe County School Districts build large schools to reduce unit educational costs and utilize multi-track, year-around schedules to further reduce unit educational costs. More than one-third of all elementary-level students in Nevada attend a school following a non-traditional schedule.

Achievement Measures – National Assessment of Educational Progress

The National Assessment of Educational Progress (NAEP) is a standardized test regularly administered by the federal government for the purpose of monitoring student achievement. In 1998, Nevada was amongst the lowest in the nation with respect to 4th grade reading ability as measured by the NAEP. Only 21 percent of the Nevada 4th graders tested earned the ranking of Proficient or higher, while 53 percent of the 4th graders earned the ranking of Basic or higher with respect to reading ability. Both of these ratings were significantly below the national averages (29 and 61 percent, respectively). Only 33 percent of the Nevada 4th grade students participating in the Free and Reduced Lunch Program were at or above the Basic reading level, which is considerably lower than the 53 percent for all Nevada 4th graders completing the 1998 NAEP. In each of these cases, Nevada 4th graders were ranked nationally at 43rd to 46th in reading proficiency (Blank, Toye, & Langesen, 2006). Students with a broad knowledge base would be expected to score well on any national achievement NRT or broad-based CRT (Popham, 2001). Not only is the overall low performance on NAEP by Nevada 4th grade students disconcerting but the achievement gap between Free and Reduced Lunch

(FRL) Program participants and those not participating in the FRL program is much more disturbing to most Americans (Berliner, 2007; Rose & Gallup, 2005).

The 2005 NAEP results show that Nevada 4^{th} grade students continued to score far below the national average in both reading and math content areas. When the students' reading test results are collectively considered, only a few states scored lower than Nevada. Nevada was ranked 44^{th} in the nation with respect to reading and math proficiency, as measured by the 2005 NAEP results and the 2007 NAEP results showed negligible change from the earlier test administrations: Nevada ranks near the bottom of the list at position 45 and students continued to score far below the national average in both reading and math (EPE, 2008; Olson, 2006).

Not only did Nevada students score below the national averages on the NAEP administrations over the previous ten years, the academic growth of Nevada students in math and reading is occurring at a lower rate than the national average. Results from the last four NAEP tests show that an achievement gap between Nevada students and the national average exists and is widening (ARC, 2007). From 1998 to 2005, nearly one-half of the states (Nevada included) narrowed the achievement gap separating low-income or minority students from all students. However, the achievement gap was reduced by only one percentage point as measured by the 4^{th} grade NAEP Reading Test, which was below the national average achievement gap reduction of four percentage points. For the 2005 4^{th} grade NAEP in Reading, the percentage of Nevada students at the Basic level or higher was actually reduced by one percent as compared to the previous administration (Blank, Toye, & Langesen, 2006). On the 2007 NAEP Test, Nevada continued to score far below the national average in the category of reducing the poverty-related achievement gap (EPE, 2008).

Achievement Measures – Nevada Criterion Referenced Tests

In addition to participation in the NAEP and as part of Nevada's fulfillment of NCLB assessment mandates, the state currently administers an annual criterion referenced test (CRT) aligned with Nevada academic standards in mathematics and reading to include all grade levels from 3rd to 8th (NDE, 2007a). With respect to the mathematics component of the CRT, approximately 50 percent of all 3rd and 5th grade students met or exceeded standards measured by the 2005-06 assessment instrument. The reading component of the 2005-06 CRT yielded similar pass rates, although the 5th grade reading pass rate was somewhat lower at only 39.3 percent.

The NCLB legislation requires that the proficiency rates for these tests be further broken down into and reported by demographic groups based on ethnicity, family economic status, and participation in special programs. According to the Nevada ARC, the White/Caucasian and Asian/Pacific Islander demographic subgroups consistently met or exceeded the AMOs (ARC, 2007). As a means to increase student achievement and improving classroom instruction, Nevada school districts have implemented wide ranging curricula changes, embraced formative or interim assessment programs, altered school structures, employed content (math and literacy) coaches, changed school leadership, restructured schools, and modified professional development.

Summary of the Research

The research examining the relationship between student characteristics, classroom factors, school factors, and student academic achievement is voluminous but the results are mixed. Most agree that student, teacher, classroom, and school factors are important determinants of academic achievement but there is little agreement as to the relative importance of each. Relatively little research has been reported upon that is intended to explain learning outcomes or differences in the context of student transiency. The literature does not necessarily support many educators' view that transient students perform lower on standardized assessments as compared to non-transient students. However, the literature reporting on student transiency in relation to learning outcomes is mixed.

CHAPTER 3

Methods and Design

The focus of this research study is to determine if there is a potential relationship between academic achievement, school characteristics, and student transience within Nevada elementary schools. All too often, educators erroneously assume the existence of causal relationships and plan school improvements or learning interventions accordingly. This research study will attempt to identify key variables associated with effective instruction and corresponding student achievement.

Introduction

To answer the research questions, a quantitative research design was selected because the research is centered on “what” questions rather than “why” questions as to the possible academic achievement differences that may be related to student transiency and other student, classroom, and school variables. Rooted in the positivist paradigm or theoretical lens, quantitative research typically utilizes sample randomization, rejection of the null hypothesis, variable isolation and testing, and statistical analyses of central tendency (Ponterotto, 2005). The primary goal here is to identify differences in academic achievement between transient and non-transient student groups and to determine the association or relationship between student transiency and academic achievement.

The design of the research will be *post-facto*, which means that the work represented here will not be experimental. In *post-facto* research, the independent variable is not manipulated but is assigned based on traits or characteristics the subject already possesses (Sprinthall, 2003). The research design places the students in one of two groups (transient or non-transient) and measures the academic achievement of all students. The *post-facto* research design utilized examined the relationship of the independent variable of student transiency on student academic achievement. Admittedly, *post-facto* research designs do not allow for causal relationships but do allow for better-than-chance predictions (Sprinthall, 2003). In other words, a change in the independent variable often allows the researcher to make a more accurate prediction as to the corresponding change in the dependent variable.

Office of Human Research Protection

An application of Exempt Research was submitted to the University of Nevada Office of Human Research Protection (OHRP) for approval. The OHRP categorized and approved the design, methodology, and safeguards as Exempt Research without modification. A copy of the OHRP approval is included in Appendix A.

Sample and Population

The control group consisted of approximately 9500 students, from nearly 300 Nevada elementary schools. Students assigned to the control group attended the same elementary school continuously for grades 1 to 5 (5 years). This group is considered NON-TRANSIENT. The students forming the control group encompassed all NCLB demographic sub-populations previously described.

The comparison group was comprised of approximately 7500 students from the same schools and districts as the control group; however, students in the comparison group have attended two or more schools prior to the 2004 Grade 3 CRT administration and at least two schools between the 2004 CRT administration and the 2006 Grade 5

CRT administration. Students in the comparison group will not have attended the same school for more than 2 years. It is also likely that at least some students in the comparison group will have attended schools outside of Nevada. The comparison group is considered TRANSIENT. Like the control group, the students forming the comparison group encompassed all NCLB demographic sub-populations.

The population initially included all of the nearly 35,000 Nevada students who entered the 1st grade in fall 2001. The fall 2001 cohort will be followed through the spring 2006 CRT testing when the cohort was completing the 5th grade. The students will not be followed any further because the majority of the students move into middle schools for the 6th grade. Students in the fall 2001 cohort who transferred out of Nevada before the spring 2004 CRT administration will be immediately eliminated from further study unless they re-enter from out-of-state prior to the administration of the 2004 Grade 3 CRT. Also, any student enrolling in a Nevada school during the 2nd grade in 2002 and 3rd grade in 2003 will be considered for inclusion in the fall 2001 cohort so long as the student had valid scores for the 2004 Grade 3 CRT. With a state-level student transiency rate on the order of 30 percent, the cohort make up is considerably different in the fall of 2001 as compared to the cohort at the time of the Grade 5 CRT administration in the spring of 2006. To be included in either the control or comparison groups, a student must have valid reading and mathematics measurements for both the 2004 Grade 3 CRT and 2006 Grade 5 CRT administrations.

Student-level quantitative data sources are primarily the 2004 (3rd grade) and 2006 (5th grade) reading and math CRTs, which provide the academic measures. Student demography, scaled test scores, and achievement levels will be provided by the Nevada

Department of Education from the department's assessment data files, while classroom-level and school-level data will come from the Nevada Accountability Website (ARC) and publicly available resources on the NDE website. These data sources are sufficient to place the students into either group (control or comparison) or to eliminate them from further study. The student assessment data (reading and math raw and scaled scores) will be merged with demographic data in a SPSS data file. School characteristics for the years 2001 to 2006 will added to the SPSS data file for each student and the file will be cleaned. The student and school data will be analyzed to establish correlations and measures of central tendency for the transient and non-transient student groups.

Data Screening and Cleaning

The NDE has been continuing the process of assigning a unique student identifier to every student attending a Nevada public or charter school. The student unique identifier is complete and useable for about 98 percent of Nevada's current public school enrollment but is woefully inadequate for use as a student identifier during the 2004 and 2006 assessment years. This fact and the fact that the NDE assessment data file layouts change to varying degrees from year to year can make file merging a challenge. The cleaning and screening process is described below in two stages: first, the cleaning and screening required to create the student data file and second, the cleaning and screening necessary to meet the parametric statistical test assumptions of normality, linearity, and homoscedasticity.

The 2004 and 2006 NDE assessment data files were examined for major differences which would likely hinder the merging of files and several major differences were noted: the primary student identifiers student name and birth date were formatted differently which rendered the matching and duplicate identification commands unreliable, while the second problem of different variable names was less onerous to overcome. The first task completed was to delete unnecessary variables in each file and rename the remaining variables so as to be consistent in each file. Once the structure of each file was identical, the files were merged using Excel software and the matching of 2004 and 2006 test scores to students could be initiated. After the 2004 and 2006 data files were combined, the combined file contained about 70,000 rows, which exceeded the Excel worksheet limit making the matching process somewhat cumbersome. Nonetheless, numerous sorting iterations were undertaken to match students in the 2004 data file to those in the 2006 data file in such a way as to maximize the number of students eligible for further study. Sorting and matching criteria were local student identification number, last and first name, date of birth, and occasionally other identifiers such as gender and ethnicity to positively identify student matches between files. After a student's assessment and demographic information from the 2004 data file were matched to that in the 2006 data file, the paired data were saved into another Excel file. Of the 70,000 rows in the original combined file, only about 50,000 (25,000 students total) rows were saved into the matched pairs data file. This means that about 60 percent of the students taking the 2004 Grade 3 CRT also took the 2006 Grade 5 CRT. The Excel file containing the two years of test scores were imported into SPSS for the purpose of further screening and cleaning. Student test scores were sorted by the test condition flag and all students with an invalided test score was deleted or eliminated from further study. Test scores were sorted and students missing any required test score and those with any score of zero were deleted from the file and eliminated from the study. SPSS conditional syntax was written for the purpose of comparing the years in school variable, 2004 school identification variable, and the 2006 school identification variable in order to recode or place each student into the transient or non-transient group.

- If the years in school variable equaled five and 2004 school number equaled 2006 school number, then the group variable was coded as zero (non-transient) for that student.
- If the years in school variable equaled four and 2004 school number equaled 2006 school number, then the student was deleted from the file because positive placement into one of the two groups was impossible.
- If the years in school variable equaled five and 2004 school number equaled 2006 school number, then the group variable was coded as one (transient) for that student.

After the students were grouped by transiency status, missing student demography were added from the NDE student information system. If any student information were not available, the student was deleted from the student data file and eliminated from the study. When the data screening and cleaning were completed, complete data existed for the 9578 students placed into the non-transient group and the 7408 students placed into the transient group.

Univariate parametric statistical techniques require that the assumptions of normality, linearity, and homogeneity of variance be met while multivariate parametric statistical techniques require that the assumptions of multivariate normality, linearity, and homoscedasticity be met for the dependent and independent variables in order to obtain meaningful statistics (Mertler & Vannatta, 2002). Data screening was undertaken to check for cases with missing values and values outside of the expected value range. After screening for cases with missing or out of range values, the next step in the cleaning process was the identification of outliers for the quantitative variable within each group. Outliers were identified for each of the grouping variables using the SPSS Explore diagnostics command and the cases made up of extreme values were deleted, since a very large number of students were eligible for further study. After outliers and extreme cases were eliminated, univariate normality for the quantitative variable in each of the groups was examined. The coefficient of skewness was determined for all quantitative or interval level data and were determined to be greater than -1.0 and less than 1.0, which is sufficient to assume normality (Mertler & Vannatta, 2002; Tabachnick & Fidell, 2007). Coefficients of skewness falling within the ranges of -1.0 and -.5 and .5 to 1.0 are defined as moderately skewed and those in the range of -.5 to .5 are indicative of relative symmetry (Evans & Olson, 2003). Nonetheless, the Reflect and Square Root transformation was applied to the quantitative variable in order to bring the skewness statistic closer to zero, which means the distribution is closer to perfectly normal. In every case where the transformation was used on the moderately negative skews, the transformed values failed to favorably alter the skewness in comparison to the original skew. The Square Root transformation was applied to cases with a moderate positive skew but this also did little to bring the distributions closer to normality. The original values were used for further analyses because normality could be assumed from the initial moderately negatively and positively skewed distributions and the statistical tests proposed for the analyses are robust to violations of the assumption of normality, especially when the n-counts are high (Mertler & Vannatta, 2002).

Multivariate outliers for the quantitative variables were examined through calculation of the Mahalanobis distance and subsequent deletion of outliers based on the appropriate X^2 critical value for the corresponding *df* at $p < .001$. After deleting the appropriate cases, matrix scatterplots were constructed in order to examine for multivariate outliers. Moving forward with the understanding that the assumption of normality has been met, the assumptions of linearity and homoscedasticity were examined. To accomplish this task, a regression residual plot was generated to examine the quantitative variable for the assumptions of normality, linearity, and homoscedasticity. The regression residual plots do not indicate any serious violations of the assumptions. The multiple regression statistical technique, proposed for the study, is robust to minor and even moderate violations of the assumptions and the violations serve to weaken the regression analysis, not invalidate the analysis (Mertler & Vannatta, 2002).

Prior to interpreting any multivariate regression analysis, the serious problem of multicollinearity must be assessed. Multicollinearity is the situation in which two predictor variables are measuring essentially the same thing, which means to say that the predictor variables in question are explaining the same portion of the variance found in the criterion variable. Multicollinearity can be problematic for two reasons. First, multivariate regression procedures eliminate the overlap between predictors, which diminishes the size of the multiple correlation (*R*). Second, multicollinearity makes it more difficult to determine the importance of the individual predictors because the individual effects are masked due to overlapping information (Mertler & Vannatta, 2002).

Potential multicollinearity problems are initially indicated by moderate to high intercorrelations among predictor variables to be used in the multivariate regression analysis. Predictor variables with correlation coefficients in the range of 0.60 to 0.80 are indicative of potential multicollinearity problems and should be further assessed. Regardless of whether multicollinearity was suspected, tolerance statistics were calculated for each predictor. If the tolerance statistic (defined as $1 - R^2$) was below 0.1, multicollinearity would likely be a problem and was addressed. In addition to assessing the tolerance statistic, the variance inflation factor (VIF) for each predictor was calculated. The VIF indicates whether a strong linear association existed between the predictor in question and the other predictor variables. The VIF statistics were well below 10.0, which were within the acceptable range (Aiken & West, 1991; Leech, Barrett, & Morgan, 2005; Mertler & Vannatta, 2002).

Student Characteristics after File Cleaning

The student characteristics for the final study cohort are presented in Table 5 and Table 6 below. Please note that the breakdown of ethnicity and special program participation is for the most part unchanged from the original population. However, the characteristics of students in the transient group are substantially different than the characteristics of students in the non-transient group. This observation implies that transient students are less likely to be Caucasian and more likely to participate in the FRL or LEP programs as compared to non-transient students (Table 6).

Table 5 Student Demography by Transiency for 5th Grade

	Non-Transient		Transient		All	State
	N	Percent	N	Percent	Percent	Percent
Asian	491	5.9	619	9.0	7.3	7.3
African Amer.	549	6.5	1096	15.9	10.8	11.1
Caucasian	4706	56.1	2555	37.1	47.5	46.5
Hispanic	2463	29.4	2552	37.0	32.8	33.6
Amer. Ind.	174	2.1	74	1.1	1.6	1.6

Table 6 Student Participation in Special Programs by Transiency for 5th Grade

		Non-Transient		Transient		All	State
		N	Percent	N	Percent	Percent	Percent
IEP	No	7637	91.1	6272	91.0	91.0	88.9
	Yes	746	8.9	624	9.0	9.0	11.1
LEP	No	7675	91.6	6001	87.0	89.5	84.5
	Yes	708	8.4	895	13.0	10.5	15.5
FRL	No	5306	63.3	3255	47.2	56.0	58.5
	Yes	3077	36.7	3641	52.8	44.0	41.5

Measures of Student Learning

Measures of student academic achievement included math and reading scaled scores derived from the Nevada criterion-referenced tests. Each year, Nevada’s test development contractors develop a new test for grades three to eight, which necessitates complex instrument equating prior to scoring to ensure that any given test is equally difficult from one year to the next. Scaled scores on either measure range from a low of 100 to a high of 500 and were considered to be continuous data because the scale is continuous even though some scaled score values are not possible on account of the scaling process (Sprinthall, 2003). In cases where student-level data were analyzed and student-level data was reported upon, a common practice would be to report separately on student-level reading and math assessment performances as is done annually for AYP determination required under the NCLB legislation. However, when reporting at the school-level, some educational agencies combine assessment results in differing manners for the purpose of reporting a single value or metric for each school. In addition to those described below, some research studies conduct analyses using content specific assessment results and a combined or composite results for the purpose of reporting on an overall achievement metric (Milanowski, 2004; Strand & Demie, 2006)

The state of California uses a combination of weighted assessments (California Standards Tests and California Achievement Tests) across four content areas to calculate each elementary school's Academic Performance Index (API), which is the state's primary indicator of school-level performance (California Department of Education, 2008). The Mississippi Department of Education (MDE) uses the combined results from the Mississippi Curriculum Tests (MCT) in reading, language, and mathematics to produce a School Performance Classification (SPC) or narrative descriptor (Superior, Exemplary, Successful, Under-Performing, or Low-Performing) for every elementary school (MDE, 2006).

While piloting the accountability model utilizing both status and growth components, the MDE conducted regression analyses under different prediction scenarios. Under the first scenario, student assessment scores were summed and entered as a single independent variable, while under the second scenario, each of the three, content area, assessment scores were entered as discrete independent variables in the regression equation. While the results produced by either scenario were sufficient for the department's purposes, the department opted to follow the second scenario because the regression residuals were reported to be slightly lower and the R^2 value slightly higher (MDE, 2006).

Statistical Analysis

The nature or types of variables and the number of variables are the most important factors contributing to the decision as to which statistical test or tests should be conducted (Mertler & Vannatta, 2002). This research utilized a combination of nominal-level categorical and continuous quantitative independent variables, which did little to limit the exploitation of any particular statistical test. However, to select the appropriate statistical test, one must be clear as to whether the intent of the research is to establish the degree of relationship between variables, establish the significance of group differences, or to predict group membership (Mertler & Vannatta, 2002). This research sought to identify group differences and establish relationships between variables, which mean that a combination of parametric statistical tests were required to answer various aspects of the research questions, which were centered on student learning, student transiency, student characteristics, classroom factors, and school characteristics.

The research here utilized a combination of continuous and dichotomous variables to answer the research question. Univariate statistical tests utilized one independent variable and one dependent variable for the overarching purpose of identifying group differences or relationships between the variables. The terminology of independent variable and dependent variable was used when utilizing univariate statistical tests (Sprinthall, 2003). Multivariate statistical tests also serve the purpose of identifying group differences or relationships between variables through the use of multiple dependent or independent variables. However, the terminology of predictor and criterion was preferred over independent and dependent variables, respectively, when multivariate statistics were used (Tabachnick & Fidell, 2007). Irrespective of these preferences, the variable terminology for univariate and multivariate statistics is often used interchangeably by researchers (Green & Salkind, 2005).

Independent Samples t-Test

The independent samples t-test is the simplest and most frequently used statistical test to measure the differences between two group means (Mertler & Vannatta, 2002). An independent samples t-test is appropriate when the dependent variable is quantitative and the independent variable measures a quality having exactly two categories. The independent samples t-test is well suited for *post-facto* designs as well as experimental designs provided the assumptions of normality, homogeneity of variance, sample independence, and the presence of at least interval data for the dependent variable are met (King, 1986; Sprinthall, 2003). Where a single, interval-level, dependent variable (reading scaled score, math scaled score, or combined reading and math scaled scores for example) is to be used, an independent samples t-test is appropriate.

When the research question includes more than one continuous dependent variable (reading score and math score for example), many researchers conduct multiple univariate tests only after a significant multivariate statistical test to control for a Type I error (Mertler & Vannatta, 2002). Another approach to reducing Type I errors is to apply the Bonferroni correction in the individual univariate tests. The Bonferroni correction systematically reduces the alpha level for each test by the total number of individual tests

(Huberty & Morris, 1989). In the case here where two dependent variables analyzed in separate analyses, the alpha level would be lowered to 0.025 from the traditional 0.05 to determine statistical significance.

Another approach to identifying group differences and the characteristics distinguishing the groups is to utilize the grouping variable (transient and non-transient) as the dependent variable and other student characteristics as the independent variables. This design relies on the use of a single dichotomous dependent variable, multiple dichotomous independent variables, and continuous independent variables. The use of dichotomous dependent variables in analysis of variance is reported to be appropriate in some but not all circumstances (Cleary & Angel, 1984; D'Agostino, 1971; Lunney, 1970). However, others argue that the use of dichotomous dependent variables in ANOVA, regression analysis, and Independent samples t-Tests are never appropriate (King, 1986; Leech, Barrett, & Morgan, 2005; Mertler & Vannatta, 2002). In cases where both dichotomous and continuous independent variables are utilized, only regression analysis will accommodate the research problem (King, 1986). After considering the arguments, the use of dichotomous dependent variables in ANOVA or regression will be considered no further.

Regression

The primary purpose of regression analysis is to predict values of some dependent variable based on the values of some independent variable. In contrast to multivariate regression, simple regression utilizes one independent variable to predict values on one dependent variable (Mertler & Vannatta, 2002). Multiple or multivariate regression is a test capable of handling many independent categorical independent variables. Multivariate regression is a test which allows for the use of multiple categorical and quantitative predictor variables and covariates to predict a single quantitative criterion (Kehane, 2001). Multiple regression using dummy variables produces the same statistics as an ANOVA (Leech, Barrett, & Morgan, 2005). In addition, when quantitative independent variables are added to the analysis, the multivariate regression test produces a One-way ANCOVA (Mertler & Vannatta, 2002).

For purposes here, student characteristics and school factors were simultaneously entered as predictors and student scaled scores served as the criterions. The multivariate regression computes regression coefficients for each predictor through a series of calculations while holding each predictor constant. In this case, the test computed a regression coefficient that was a measure of how strongly each predictor variable influences the criterion. The value for the regression coefficient was calculated for each predictor in unspecified units of measure and calculated in standardized units. The multivariate regression created a linear combination of predictors that best predicted the criterion and the predictions and residuals were compared for the student groups.

The multiple regression analyses utilized a hierarchical approach, which refers to the examination of the influence of multiple predictors in a specific order. The method entered predictors in discrete groups or blocks which provided the opportunity to assess the impact of the new group of variables to the model created by the preceding groups of variables (Mertler & Vannatta, 2002). In other words, the approach was intended to determine whether the addition of student characteristics and school-level variables improved the prediction of student academic achievement.

Other Statistical Analysis

Standard measures of central tendency and statistical correlations were utilized to support the parametric statistical tests. Measures of central tendency were intended to provide information about the average or typical score based on many individual scores. The mean is a measure of central tendency that represents the average value of the entire data set (Evans & Olson, 2003). Because the distribution of data was approximately normal, the group mean rather than the median score was reported along with the standard deviation, which provided an indication as to the spread of the data. Larger standard deviations indicate a greater degree of heterogeneity while a smaller standard deviation indicates a greater degree of homogeneity (Sprinthall, 2003).

Both univariate (t-tests) and multivariate statistical analyses provided measures of group differences based on the relationship between the independent and dependent variables. Statistical significance is a crucial metric to document but all too often conveys a great deal of importance to a measure that is otherwise unimportant in the practical sense (Valentine & Cooper, 2003). Some, but not all research reports effect size for group differences, which provides a measure as to the strength of the relationship or difference between groups (Thalheimer & Cook, 2002). One of the more commonly used effect size is Cohen's *d* (Cohen, 1988), which is a measure of the separation between two group means. Cohen's *d* is calculated by dividing the difference between the two group means by either the pooled (average) standard deviation or by the standard deviation of the control group. The former is used when group sizes are substantially different and the latter is appropriate when group sizes are approximately equal (Green & Salkind, 2005; Valentine & Cooper, 2003). The calculation of Cohen's *d* produces a measure of the difference between the two group means expressed in terms of their standard deviation or that of the untreated population. An effect size (*d*) of .25 means that the means of the two groups are separated by .25 standard deviations. Cohen's *d* values of .2, .5, and .8 are interpreted as small, medium, and large effect sizes, respectively (Green & Salkind, 2005).

With the knowledge that the assumptions for parametric statistical were met, Pearson correlation coefficients were calculated. The correlation coefficient (*r*) is the most common measure of the degree of association between two variables and is the statistic used to report the degree of association between the independent and dependent variables in bivariate linear regression. The Pearson *r* statistic ranges from -1 to +1 and values closer to either endpoint are indicative of stronger linear relationships. A positive Pearson *r* value indicates that when the independent variable value increases the dependent variable also increases, while a negative Pearson *r* indicates that when the independent variable increases in value the dependent variable value decreases. Correlation coefficients of .10, .30, and .50 are interpreted as small, medium, and large coefficients, respectively. The Pearson *r* correlation coefficient is appropriate when the degree of association between a continuous quantitative variable and a dichotomous categorical variable is desired (Green & Salkind, 2005).

In similar fashion to that described above, multiple correlation *R*, R^2, and adjusted R^2 were reported when multivariate regression is used to assess how the linear combination of predictor variables predict the criterion. An *R* value of 1 means that the linear combination of predictor variables perfectly predicts the criterion, while an *R* value of 0 indicates there is no linear relationship between the predicted values and the criterion values. To interpret *R*, the *R* value is squared and multiplied by 100 to yield a value characterized as the percentage of the variance found in the criterion explained by or accounted for by the linear combination of predictor variables (Green & Salkind, 2005). A high coefficient of determination (R^2) value is often accompanied by small standard errors, large coefficients, and narrow confidence intervals. The coefficient of determination is best evaluated or most useful when comparing two regression equations with different predictors and identical criterions (King, 1986).

For this study, two exploratory and somewhat increasingly complex approaches or models were applied to the data, which are explained below. The intent of the various analyses was to explain potential differences in student academic achievement based on student characteristics and school factors.

Model 1: Basic Analysis

To identify the presence of statistically significant group differences in student achievement based on student transiency, a series of independent samples t-tests were conducted using reading scaled scores, mathematics scaled scores, and the combined reading and mathematics achievement as the dependent variables and student transiency as the independent or grouping variable. To confirm the association between student transiency and academic achievement, simple regression analyses were also conducted.

Model 2: Multivariate Analysis with Student and School Characteristics

To determine whether differences in academic achievement between group means (transient and non-transient) existed, multivariate regression analyses using student characteristics and school factors were conducted. Students were categorized as being either transient or non-transient and analyses were conducted using a combination of dependent variables. Because transient students were more likely to participate in other educational programs (FRL and LEP for example), this model established whether there was an independent association between transiency and academic achievement after controlling for other variables.

The multivariate regression was conducted using reading and math achievement individually and together as the criterion and student characteristics and school factors as the predictors. The overall goal was to first identify the presence (or not) of statistically significant differences between and within groups, and then to identify associations or correlations between variables which could then be used to predict changes in the criterion based on changes in the predictors.

The multivariate regression analyses utilized a hierarchical approach, which entered variables in discrete groups or blocks. The approach provided the opportunity to assess the impact of the new group of variables to the model created by the preceding groups of variables. In other words, the approach was intended to determine whether the addition of school-level variables improved the prediction of student academic achievement.

Summary of the Models

In summary, two exploratory and somewhat increasingly complex models were applied to the data, which were briefly explained in the above paragraphs. The intent of the analyses was to develop a statistical model that explained potential differences in academic achievement between transient and non-transient students. A combination of student characteristics and school factors were used in the models to explain potential differences in academic achievement between student groups distinguished by transiency.

CHAPTER 4

Analyses and Results

Chapter 4 presents the results of a quantitative study undertaken for the purpose of examining student academic achievement in the context of student transiency, student characteristics, and school characteristics. Due to the possibility that transiency may be related to other student characteristics such as poverty and English language proficiency amongst others, analyses were first conducted to determine whether an independent association between transiency status and student achievement could be established. Analyses also sought to link some school-level factors and demography to student academic achievement.

Introduction

The overarching notion guiding the design was to identify the student characteristics and school factors that were associated with the academic achievement of all students, but especially transient students. The statistical analyses simply sought to identify achievement differences between student groups and then to identify some of the student- and school-level factors that were statistically significant predictors of student achievement. The focus here was to identify and compare the characteristics of schools that enhance the academic achievement of all students.

Variables

Student Achievement

Measures of student academic achievement included mathematics and reading scaled scores derived from the Nevada criterion-referenced tests (CRTs). Scaled scores on either measure range from a low of 100 to a high of 500 and are considered to be continuous even though some scaled score values are impossible to obtain on account of the scaling process. Students' scaled scores from the 2005 Iowa Test of Basic Skills, a norm-referenced assessment (NRT) was also collected but was not used in any of the student-level statistical analyses. The dependent or outcome variables measuring student academic achievement are presented in Table 7.

Table 7 Summary of Outcome Variables Utilized in the Statistical Tests

Variable Name	Type	Description of Measure
read_3ss	Quantitative	Scaled score from 3rd Grade Reading CRT
math_3ss	Quantitative	Scaled score from 3rd Grade Math CRT
read_4sts	Quantitative	Scaled score from 4th Grade Reading NRT
math4_sts	Quantitative	Scaled score from 4th Grade Math NRT
read_5ss	Quantitative	Scaled score from 5th Grade Reading CRT
math_5ss	Quantitative	Scaled score from 5th Grade Math CRT
read_math3	Quantitative	Combined 3rd Grade CRT reading and math score
read_math5	Quantitative	Combined 5th Grade CRT reading and math score

The Pearson *r* correlation coefficients for four of the independent variables measuring student academic achievement are presented in Table 8. For each of the assessment years examined, a strong positive association between the 3rd grade reading scores and the 3rd grade mathematics scores and, likewise, a strong and positive association between the 5th grade reading scores and the 5th grade mathematics scores was indicated. In other words, students scoring high on the reading assessment would be expected to score high on the mathematics assessment and those scoring low on the reading assessment would be expected to score lower on the mathematics assessment. The moderate to strong correlation coefficients mean that much of the information regarding both mathematics and reading achievement for a given assessment administration can be inferred when the achievement score of only one variable was known. Also, a strong positive association between the 3rd grade reading achievement and the 5th grade reading achievement was indicated and a strong and positive association existed between the 3rd and 5th grade mathematics achievement. In other words, better than chance predictions of 5th grade achievement are possible when only one 3rd grade CRT score is known.

Table 8 Correlation Coefficients for Academic Measures

	read3_ss	math3_ss	read4_sts	math4_sts	read5_ss	math5_ss
read3_ss	1.000					
math3_ss	.696*	1.000				
read4_sts	.638*	.522*	1.000			
math4_sts	.545*	.598*	.721*	1.000		
read5_ss	.576*	.496*	.741*	.655*	1.000	
math5_ss	.492*	.547*	.608*	.731*	.712*	1.000

Note: number of students=15,279 *Correlation is significant at the .01 level.

Student Characteristics

The student characteristic variables are briefly described and are presented in Table 9. Student group was a dichotomous or categorical variable differentiating non-transient students from transient students. The independent variable was collected from the NDE assessment files and served as the principal grouping variable. For a student to be placed in the non-transient group, he or she must have been officially enrolled in the same elementary school from grade two to the time of CRT testing during grade five. To be placed in the transient group, a student must have been officially enrolled in at least three elementary schools from grade one to the time of CRT testing during grade five. For grouping purposes, mobile students must have attended at least two schools during grades one to three and at least one different school during grades four or five.

Students in the transient group shared the characteristic of having made at least two unscheduled school enrollment changes during grades one to five and at least one move was made during the 4th or 5th grade. No distinction was made as to whether the school changes were initiated by the student's parents (residential changes), school administrators (variance revocation), or district administration (rezoning). It was entirely possible for a student placed in the mobile or transient group to have attended an out-of-state school for at least part of the study period. To be included in the study, each student must have been positively placed in only one of the two groups and have valid CRT reading and mathematics results for both the 2004 3rd grade CRT administration and the 2006 5th grade CRT administration.

Table 9 Summary of Student Characteristic Variables

Variable Name	Type	Description of Measure
group	Dichotomous	Assignment to the non-transient group = 0 or the transient group = 1
g*_minor	Dichotomous	Race/ethnicity: Caucasian = 0 or non-Caucasian = 1
g*_iep	Dichotomous	Special education participation: no = 0 and yes = 1
g*_lep	Dichotomous	Limited English proficient: no = 0 and yes = 1
g*_frl	Dichotomous	Participates in Free and Reduced Lunch program: no = 0 and yes = 1

Note: * denotes either 3rd or 5th grade program participation status

Student minority was a dummy coded variable derived from the ethnicity variable coded for each student by the NDE. The self-reported race or ethnicity identifier was collected from the NDE assessment file for each student and recoded into the new variable, which identified each student as being either Caucasian or non-Caucasian. The ethnic or racial make-up of the study cohort based upon the 2006 5th grade assessment file is shown below (Table 10).

Table 10 Race and Ethnicity by Transiency for the 5th Grade

	Study Cohort					
	Non-Transient		Transient		All	State
	N	Percent	N	Percent	Percent	Percent
Asian	491	5.9	619	9.0	7.3	7.3
African Amer.	549	6.5	1096	15.9	10.8	11.1
Caucasian	4706	56.1	2555	37.1	47.5	46.5
Hispanic	2463	29.4	2552	37.0	32.8	33.6
Amer. Ind.	174	2.1	74	1.1	1.6	1.6

Note: N = number of students

Students with an Individualized Educational Plan (IEP) receive special education services in the regular education classroom and possibly a resource room. Student special education participation was a dummy coded variable derived from data in the NDE assessment files specifying special education participation status at the time of the test administration. The NDE collects data for students currently receiving special education services, those exiting special education less than two years prior to testing, and those exiting special education more than two years prior to testing. For the purposes here, one student characteristic variable (g3_iep) identifies students who were receiving special education services at the time of the 3rd grade CRT administration in spring 2004 and another variable (g5_iep) identifies special education participants at the time of the 5th grade CRT administration in spring 2006. Special education participation status can periodically change for various reasons and may differ in 2004 as compared to 2006. The percentage of students in the study cohort receiving special educational services in spring 2006 was slightly lower than the percentage of students participating in special education programs across the state; 9.0 percent for the study cohort as compared to 11.1 percent for the entire state (Table 11).

Student limited English proficiency (LEP) program participation was a dummy coded variable derived from student demography in the NDE assessment files. The NDE collects data for students currently receiving LEP services, those exiting the LEP less than one year prior to testing, those exited from the LEP more than one year but less than two years prior to testing, and those exiting LEP more than two years prior to testing. For the purposes of this study, the variable identified students who participated in the LEP program at the time of the 3rd grade CRT administration in spring 2004 (g3_lep) and LEP participants at the time of the 5th grade CRT administration in spring 2006 (g5_lep). The LEP participation status sometimes changed between 2004 and 2006. The percentage of students in the study cohort receiving LEP educational services for the 5th grade CRT administration was somewhat lower than the percentage of students receiving participating in the LEP program across the state; 10.5 percent for the study cohort as compared to 15.5 percent for all students enrolled in Nevada public schools during the 2006 assessment year.

Participation in the Free and Reduced Lunch (FRL) program by a student is a grouping variable also obtained from the NDE assessment file. For the purposes of this study, the independent variable (g3_frl) identified the FRL status of a student at the time of the 3rd grade CRT administration and another variable (g5_frl) identified the FRL status of a student at the time of the 5th grade CRT administration. It was not unusual for students to change FRL categories or status, which depended on the students' parents' current financial circumstances. The percentage of students in the study cohort participating in the free or reduced lunch program was slightly higher than the percentage of students receiving free or reduced lunch benefits across the state in 2006; 44.0 percent in the study cohort as compared to 41.5 percent for the entire state.

Table 11 Special Program Participation for the 5th Grade

		Non-Transient		Transient		All	State
		N	Percent	N	Percent	Percent	Percent
IEP	No	7637	91.1	6272	91.0	91.0	88.9
	Yes	746	8.9	624	9.0	9.0	11.1
LEP	No	7675	91.6	6001	87.0	89.5	84.5
	Yes	708	8.4	895	13.0	10.5	15.5
FRL	No	5306	63.3	3255	47.2	56.0	58.5
	Yes	3077	36.7	3641	52.8	44.0	41.5

Note: N = number of students

The ethnic or racial make-up of the study cohort was nearly identical to the ethnic and racial make-up of students across the state for the same academic school year (Table 8), which would support the notion that the cohort was representative of the state student demography in 2006. However, the subgroups participating in special programs making up the cohort, those students participating in LEP, FRL, or special education, were slightly different than those making up the state special populations (Table 11). In particular, the study cohort comprised a slightly lower percentage of students with an IEP, a moderately lower percentage of students participating in LEP, and a somewhat higher percentage of students receiving free or reduced lunch benefits. While the discrepancies were noteworthy, none were expected to be of sufficient magnitude to bias the results or findings.

The reader is again referred to Table 10 and Table 11 to note the ethnic and racial differences between the transient and non-transient groups that were central to this study. While the study cohort was representative of the state student enrollment, the non-transient group was made up of a significantly higher percentage of Caucasian students as compared to the transient group. Also, the non transient group contained a lower percentage of students participating in LEP and the FRL program as compared to the transient group, while the percentage of students with an IEP was nearly identical for the two groups. With respect to individual student characteristics, it was noteworthy that the typical non-transient group member was somewhat different from the typical transient group member; a transient group member was more likely to be categorized as a student of color with a higher likelihood of participating in the LEP or FRL programs and a higher likelihood of having an IEP than the typical non-transient group member.

The Pearson *r* correlation coefficient was used to measure the degree of association between the student characteristic independent variables and the dependent variables measuring the 3rd grade CRT results (Table 12). All except two of the correlation coefficients indicated a two-tailed significance of <.01 and another yielded a two-tailed significance of <.05. The correlation matrix showed that all of the independent variables exhibited a weak to moderate negative correlation to the dependent variables measuring student academic achievement. In other words, a student who participated in either LEP, FRL, special education programs, or was an ethnic minority would be expected to score lower on the 3rd grade CRTs than those students not fitting those criteria. Further, a transient student would be expected to achieve at lower levels on the 3rd grade CRTs than a non-transient student.

The Pearson *r* correlation coefficients indicated that students in the transient group were more likely to be categorized as an ethnic or racial minority and to participate in the FRL or LEP programs than non-transient students. The moderate positive correlation coefficient measuring the association between minority status and LEP and

FRL program participation (Table 12) indicated that students categorized as a minority were also more likely to participate in the LEP and FRL programs. Although significant, students receiving special education services were somewhat more likely to be categorized as a minority and participate in the LEP and FRL programs. The correlation coefficients support the idea that participation in special education, LEP, FRL programs and student ethnicity were significant in explaining changes in student achievement scores and that the variables were positively associated to one another.

Table 12 Correlation Coefficients for Student Characteristics by 3rd Grade Achievement

	group	g3_minor	g3_iep	g3_lep	g3_frl	read3_ss	math3_ss
group	1.000						
g3_minor	.191*	1.000					
g3_iep	-.012	-.041*	1.000				
g3_lep	.049*	.338*	-.016**	1.000			
g3_frl	.087*	.292*	.031*	.335*	1.000		
read3_ss	-.129*	-.240*	-.204*	-.373*	-.310*	1.000	
math3_ss	-.128*	-.206*	-.171*	-.263*	-.263*	.696*	1.000
read_math3	-.140*	-.242*	-.203*	-.344*	-.311*	.918*	.924*

Note: No. of students=15,279 * Correlation is significant at the 0.01 level (2-tailed).
** Correlation is significant at the 0.05 level (2-tailed).

The Pearson *r* correlation coefficient was used to measure the degree of association between the student characteristic independent variables and the dependent variables connected to the 5th grade CRT results (Table 13). All except two of the correlations yield a two-tailed significance of $p < .01$. The correlation matrix shows that all of the independent variables exhibited a weak to moderate negative correlation to the academic achievement. In other words, a student who participated in either LEP, FRL, special education programs, or was an ethnic minority would be expected to score lower on the CRTs than those students not fitting those criteria.

The correlation matrix (Table 13) also shows that transient students were more likely to be categorized as a racial or ethnic minority and participate in the LEP and FRL programs. Also significant, students receiving special education services were somewhat more likely to participate in the LEP and FRL programs. The correlation coefficients support the idea that participation in special education, LEP, FRL programs and student ethnicity were significant in explaining changes in student achievement scores.

Table 13 Correlation Coefficients for Student Characteristics by 5th Grade Achievement

	group	g5_minor	g5_iep	g5_lep	g5_frl	read5_ss	math5_ss
group	1.000						
g5_minor	.190*	1.000					
g5_iep	.003	-.015	1.000				
g5_lep	.074*	.302*	.088*	1.000			
g5_frl	.161*	.422*	.062*	.283*	1.000		
read5_ss	-.155*	-.268*	-.267*	-.327*	-.328*	1.000	
math5_ss	-.142*	-.220*	-.233*	-.258*	-.292*	.712*	1.000
read_math5	-.161*	-.263*	-.268*	-.315*	-.335*	.923*	.927*

Note: No. of students=15,279 * Correlation is significant at the 0.01 level (2-tailed).

Class Size

The school-level student to teacher ratio was used as a measure of class size, which is a common and acceptable practice in education research (Rivkin, Hanushek, & Kain, 2005). The student to teacher ratio was determined by the official count of students at the school divided by the number of regular classroom teachers assigned to the school. The school-level student to teacher ratio did not take into account special education instructors, part-time music instructors, or other licensed personnel whose principal duty was not regular classroom instruction. The student to teacher ratio data presented in Table 14 represented school-level counts or averages, which was far more meaningful than the district-level ratio data used in research utilizing large-scale databases. District-level student to teacher ratio data have historically has been shown to be a poor predictor of school achievement and even school-level averages, like that shown in Table 14 below can be misleading because teachers in the upper elementary grades often teach many more children than do teachers in the lower elementary grades (Hanushek, 1986).

Table 14 School-Level Student to Teacher Ratios

	N	*Minimum*	*Maximum*	*M*	*SD*
2004	281	9	35	21.8	2.7
2005	288	11	34	21.4	2.3
2006	286	12	32	21.4	2.3

Note: N = number of schools

The Nevada ARC provided further disaggregation of school-level student to teacher ratios into grade-level ratios. In other words, the grade-level student to teacher ratio for any given school can be ascertained through the ARC and this was valuable information because the student to teacher ratio often differs greatly between grades but differs little between classrooms within a grade level at a given school. Table 15 shows how the student to teacher ratio varied across grade levels for the 1st, 2nd, 3rd, 4th, and 5th grade students for the 2004, 2005, and 2006 school years.

Table 15 Grade-Level Student to Teacher Ratios

	N	*Minimum*	*Maximum*	*M*	*SD*
Grade 1 (2004)	272	6	36	17.6	3.5
Grade 2 (2004)	272	10	31	17.4	2.8
Grade 3 (2004)	279	5	31	20.7	3.5
Grade 4 (2005)	285	9	43	27.0	4.9
Grade 5 (2006)	290	6	50	27.3	4.2

Note: N = Number of schools

<u>School-Level Academic Measures</u>

Descriptive statistics for the school-level measures of the 3rd grade CRTs administered in 2004 and the 5th grade CRTs administered in 2006 from Nevada elementary schools are presented in Table 16. The data in Table 16 included statistics for all students with valid test scores who tested at the school and for the non-transient students at each school, which were those continuously enrolled since count day of the respective years. The descriptive statistics and measures of central tendency for the non-transient student population were higher than the corresponding values for all students. For this analysis, the transient students were those who enrolled at the school in question at some time after the official count day. Because the group of all students scored lower than the non-transient analysis, one may cautiously conclude that the levels of attainment for transient students were lower than for non-transient students.

It was not the intent to focus exclusively on school-level student learning in terms of individual reading and math academic achievement scores. Rather, the intent was to additionally describe school-learning in a broader sense of overall learning and, for this reason, the school-level average reading and math scores were collapsed into a single academic achievement measure. Table 16 shows the school-level measures of central tendency for the 3rd Grade CRTs administered in 2004 and the 5th Grade CRTs administered in 2006 from Nevada elementary schools from which useable data could be collected. The central tendency measures are shown for all tested students and the non-transient students. As was the case for reading and math individually, the group average for all students was slightly lower than the average for non-transient group. From this simple analysis, one might conclude that the levels of attainment for transient students were only slightly lower than for non-transient students.

Table 16 School-Level Academic Measures by Content and Grade

		All Students				Non-transient Students			
	N	*Min.*	*Max.*	*M*	*SD*	*Min.*	*Max.*	*M*	*SD*
Reading CRT									
Grade 3	280	212	354	288.2	29.8	214	357	291.0	29.9
Grade 5	293	213	353	278.6	27.9	217	353	281.1	27.5
Mathematics CRT									
Grade 3	280	211	354	287.3	27.9	214	359	290.3	27.4
Grade 5	293	227	382	302.4	27.7	234	383	305.0	27.7
Combined Reading and Mathematics CRT									
Grade 3	280	423	708	575.8	56.7	429	716	581.7	56.6
Grade 5	293	451	732	581.2	54.3	454	734	586.3	53.8
4^{th} Grade ITBS NRT									
Reading	286	173	220	196.3	10.4	172	220	196.7	10.5
Math	285	179	217	197.2	7.5	178	216	197.7	7.6

Note: N = Number of schools

School Setting

The effects of school setting on student learning were captured by a categorical variable intended to describe the general setting of the schools across the state. Schools situated in the greater metropolitan areas of Las Vegas, Henderson, Reno, Sparks, Carson City, and the larger bedroom communities were characterized as being situated in an urban setting, while schools in the central and eastern part of Nevada were characterized as rural. The rural schools were typically situated in small towns and communities serving cattle ranching families and the children whose parents work in Nevada's mines and agricultural areas. The categorization of rural and urban schools was consistent with that utilized by the U.S. Department of Education for considering schools for the Rural Education Achievement Program, which was reauthorized by the NCLB legislation (Magill, Reeves, Hallberg, & Hinojosa, 2009). Approximately 80 percent or 235 of the

295 Nevada elementary schools examined here were characterized as urban, while only 61 schools were characterized as being situated in a rural setting. The school-level student demography is presented on Table 17 and Table 18 in relation to urban versus rural settings. As compared to urban schools, rural schools were characterized by higher percentages of Caucasian students and lower percentages of students participating in the LEP and FRL programs. The differences noted above are typical of rural districts across the country (Magill, Reeves, Hallberg, & Hinojosa, 2009).

Table 17 School-Level Student Demography for Rural Schools

	N	*Minimum*	*Maximum*	*M*	*SD*
Asian	59	0	17.0	2.6	2.53
African Amer.	59	0	7.0	1.8	1.49
Hispanic	59	0	73.1	18.9	15.81
Amer. Indian	59	1.0	97.0	7.9	18.53
Caucasian	59	2.3	93.4	69.0	21.08
IEP	59	0	32.0	11.6	6.00
LEP	59	0	49.0	8.6	11.81
FRL	59	0	84.9	36.9	19.74

Note: N = number of schools and other values are reported as percent.

Table 18 School-Level Student Demography for Urban Schools

	N	*Minimum*	*Maximum*	*M*	*SD*
Asian	234	0	33.0	7.5	5.26
African Amer.	234	0	81.0	11.9	11.45
Hispanic	234	2.6	93.1	38.7	23.37
Amer. Indian	234	0	16.0	1.3	1.55
Caucasian	234	1.6	91.2	40.6	23.46
IEP	234	0	30.0	11.9	3.41
LEP	234	0	75.0	23.3	18.82
FRL	228	0	100.0	51.2	29.99

Note: N = number of schools and other values are reported as percent.

Not only were rural schools attended by a different student population than urban schools, rural schools differed in other characteristics (Table 19 and Table 20). Rural schools were typically smaller than urban schools (enroll6), as the average rural school enrollment was approximately two-thirds of that of the typical urban school. The range of per pupil expenditures (stud_ex6) was approximately equivalent but the average per pupil expenditures at rural schools was considerably greater than that for urban schools. Expenditures of 12,000 to 16,000 dollars per student per year correspond with high instructional and operational expenditures at a handful of rural and urban schools.

The mean percentage of teachers who were not highly qualified (tch_nohq6) was lower in rural schools as compared to schools in an urban setting. Both the teacher average daily attendance (tch_ada6) and student average daily attendance (std_ada6) were comparable, but were slightly lower for rural schools as compared to urban schools. The school-level percentage of transient students (stud_tran6) was greater in urban schools and the school-level student to teacher ratio (scstr_rat6) was greater at urban schools as compared to rural schools. The differences noted above were typical of rural and urban districts and schools across the country (Magill, Reeves, Hallberg, & Hinojosa, 2009).

Table 19 School-Level Characteristics for Rural Schools

	N	*Minimum*	*Maximum*	*M*	*SD*
enrollment	60	85	836	448	218
stud_exp6	60	5665	16,411	8956	2564
tch_nohq6	60	0	50.0	5.1	9.9
tch_ada6	60	83.9	98.4	93.8	2.9
stud_ada6	59	92.6	99.1	93.2	12.4
scstr_rat6	51	12.0	26.0	19.6	3.7
stud_tran6	60	7.5	45.6	25.8	8.4

Note: N = number of schools, enrollment as number of students, student expenditures in dollars, and other values are reported as percent.

Table 20 School-Level Characteristics for Urban Schools

	N	*Minimum*	*Maximum*	*M*	*SD*
enrollment	234	134	1466	711	198
stud_exp6	233	4932	16,618	7276	1656
tch_nohq6	234	0	55.0	15.0	10.6
tch_ada6	234	91.8	98.8	96.4	0.9
stud_ada6	234	90.8	97.2	95.0	0.9
scstr_rat6	234	15.0	32.0	21.8	1.7
stud_tran6	234	4.6	65.6	33.2	11.2

Note: N = number of schools, enrollment as number of students, student expenditures in dollars, and other values are reported as percent.

Student Transiency

School-level student transiency rates are calculated annually by Nevada school districts and published on the ARC by the Nevada Department of Education. The school-level student transiency rates are presented in Table 21. The reader is cautioned about interpreting school-level transiency rate as the transiency rate reflects the school-wide transience and may not necessarily reflect the tested population.

Table 21 School-Level Student Transiency Rates

	N	*Minimum*	*Maximum*	*M*	*SD*
2004	273	5.4	69.9	31.7	11.52
2005	284	6.6	66.0	31.9	11.59
2006	294	4.6	65.6	31.7	11.06

Note: N = number of schools and other values are reported as percent.

School Leadership

The Nevada ARC provides little, if any, information as to the characteristics of school principals or administrators. However, the ARC and AYP reporting indirectly provided data as to the longevity or continuous assignment of the principal to any given school. The underlying premise of the school leadership variables was that effective school principals remain at their assigned school for longer periods of time while ineffective school leaders were more often reassigned to a school where they may be more effective.

The nature of school administrator service to a school was accounted for or measured in a combination of ways (Table 22). First, an administrator longevity variable (prin_long) represented the greatest number of consecutive years a school administrator served in that capacity during the study period. The prin_long variable measured the school leadership stability or consistency over the course of the study. The variable was quantitative, continuous, and ranges from two to five.

Two somewhat related variables measured the principal stability or consistency over the first three years (prin_frst3_yrs) and the last three years (prin_last3_yrs) of the study period. The first three-year period spanned grades 1 to 3 and included the time of the 3rd grade CRT administration. The final three-year period spanned grades 3 to 5 and included the Grade 3 and Grade 5 CRT. Both variables were categorical and were dummy coded to represent group membership. Finally, the variable (prin_num) sought to capture administrator effects through administrator stability.

The quantitative variable represented the number of principals or school administrators officially assigned to the school for the five-year period of the study. A value of one means that only one school administrator was officially assigned to the school for the duration of the study, while a prin_num value of three means that three different administrators were assigned to the school during the five-year period of the study. Integer values range from one to four.

Table 22 Characteristics of School Administrator Service or Assignment

	N	*Minimum*	*Maximum*	*M*	*SD*
prin_long	293	1	5	3.75	1.037
prin_num	294	1	4	1.78	.679
prin_frst3_yrs	294	0	1	.56	.498
prin_last3_yrs	294	0	1	.54	.499

Note: N = number of schools, principal longevity reported in years, and prin_num is reported as number of principals.

A total of 88.5 percent of the principals were assigned to their schools for three or more years through the study period, while 60.5 percent had been assigned to their school for four or all five years of the study. Approximately 35 percent of the schools had only one principal for the 5 year study span, while 53 percent of the schools had two principals assigned to the school during the study period. As indicated above (Table 22), approximately 56 percent of the schools had the same administrator for the first three years (Grades 1 to 3) of the study period, while approximately 54 percent of the schools had the same administrator for the last three years (Grades 3 to 5) of the study period.

The Pearson *r* correlation coefficient was used to measure the degree of association between each of the school-level independent variables and the 5th grade student-level academic achievement dependent variables. Based on the results presented on Table 23, the length of school administrator assignment to a school over the five-year study period was weakly associated with changes in the 5th grade math achievement level of students at the school. The association was positive; students attending schools with a high administrator turnover tended to score higher on the 5th grade CRT mathematics administration in schools where the principal was assigned for longer periods of time.

Table 23 Correlation Coefficients for Principal Factors by Achievement

	prin_long	prin_num	prin_frst3	prin_last3	read_5ss	math_5ss
prin_long	1.000					
prin_num	-.571*	1.000				
prin_frst3	.453*	-.416*	1.000			
prin_last3	.749*	-.534*	-.100	1.000		
read_5ss	.100	-.030	-.029	.070	1.000	
math_5ss	.118**	-.079	-.016	.098	.914*	1.000
read_math5	.111	-.056	-.023	.086	.978*	.978*

Note: No. of schools=291   * Correlation is significant at the 0.01 level (2-tailed).
** Correlation is significant at the 0.05 level (2-tailed).

Per Pupil Expenditures

Total per pupil spending represented the total number of dollars expended for the academic school year toward the education for each student present on the official district count day. The total per pupil spending dollar amount was determined in part by the Nevada legislature as the basic guarantee provided for under the Nevada Plan for school funding, an amount that may be increased by the district but may not be reduced. The per pupil expenditure was the dollar amount that represented the school-level average reported to and by the NDE through the Nevada ARC. Annual per pupil expenditures were collected and reported for a total of four years (2003 to 2006) in order to ensure that a consistent level of per pupil funding existed for all of the schools included in this study for all of the years covered. The per pupil funding presented in Table 24 was the school-level average.

Table 24 School-Level per Pupil Expenditures

Year	*N*	*Minimum*	*Maximum*	*M*	*SD*
2003	274	3721	26198	5879	2142
2004	280	4785	16212	6829	1684
2005	286	5057	16732	7234	2030
2006	293	4932	16618	7620	1992

Note: N = number of schools and other values are reported in dollars.

Nevada is one of the few states annually providing a readily accessible categorical breakdown of school-level per pupil expenditures (Archibald, 2006). Total per pupil spending for instructional, instructional support, operations, and leadership expenditures for every Nevada school are provided to the NDE annually. Per pupil instructional costs (inst_ex_04) are presented in Table 25 and included all expenditures directly attributable to the instruction of students. The expenditure amount consisted primarily of teacher salaries. The per pupil expenditures attributable to instructional support (insup_ex_04) are presented in Table 26 and included the dollar amount expended toward student instruction that does not include teacher salaries and was allocated at the discretion of the school administration. The per pupil costs allocated to operations (oper_ex_04) are presented in Table 27 and included building maintenance, utility costs, repairs, and upgrades to school facilities. Finally, the costs of school administration are presented in Table 28 and include school administrative staff salaries and additional administrative support costs provided to the school by the district.

Table 25 School-Level per Pupil Instructional Expenditures

Year	*N*	*Minimum*	*Maximum*	*M*	*SD*
2003	273	2204	16921	3674	1377
2004	279	3115	9157	4394	1001
2005	286	2804	11053	4534	1337
2006	294	2737	11727	4760	1313

Note: N = number of schools and other values are reported in dollars.

Table 26 School-Level per Pupil Instructional Support Expenditures

Year	*N*	*Minimum*	*Maximum*	*M*	*SD*
2003	273	397	2922	776	359
2004	279	336	2830	825	325
2005	286	418	2917	910	334
2006	294	225	2673	976	327

Note: N = number of schools and other values are reported in dollars.

Table 27 School-Level per Pupil Operational Expenditures

Year	*N*	*Minimum*	*Maximum*	*M*	*SD*
2003	273	647	4296	1043	496
2004	279	629	5072	1140	552
2005	286	655	4463	1302	547
2006	294	694	4813	1371	545

Note: N = number of schools and other values are reported in dollars.

Table 28 School-Level per Pupil School Leadership Expenditures

Year	*N*	*Minimum*	*Maximum*	*M*	*SD*
2003	273	220	3065	411	234
2004	279	224	1894	496	210
2005	286	221	1813	520	225
2006	294	158	1956	538	214

Note: N = number of schools and other values are reported in dollars.

The state of Nevada determines the annual per pupil expenditure for every student in Nevada public schools but each Nevada school district has the opportunity to increase that per pupil expenditure if so desired. Not only did total per pupil expenditures vary across districts and across the state, the dollars spent for instruction, instructional support, operations, and leadership varied dramatically between schools. Because some Nevada school districts negotiate lower teacher salary contracts than other school districts, expenditures (expressed in dollars) attributed to instructional costs varied considerably. Increased per pupil expenditures attributable to teacher salary increases alone would not be expected to lead to increased student achievement (Hanushek, 2006). However, if the teacher salary increase was necessitated by the requirement to employ more highly qualified teachers, one might expect to see positive changes in student achievement measures. Also, one might expect student achievement to be higher where a greater percentage of total per pupil expenditures were attributable to instructional costs.

In addition to the actual dollars spent per pupil in each of the four categories, the percentage of total spending for each category was also used here for the 2003, 2004, 2005, and 2006 academic school years. Table 29 shows the percentage of per pupil expenditures attributed to instructional costs over a period of four testing years. The percentage of per pupil expenditures attributed to instructional support are presented in Table 30, the percentage of per pupil expenditures attributed to operations in Table 31, and the percentage of per pupil expenditures attributed to school leadership are presented in Table 32.

Table 29 School-Level per Pupil Instructional Expenditures by Percentage

Year	*N*	*Minimum*	*Maximum*	*M*	*SD*
2003	273	44.6	72.9	62.5	4.53
2004	279	48.0	75.0	64.6	4.43
2005	286	43.8	73.6	62.5	4.18
2006	294	41.5	74.5	62.3	4.49

Note: N = number of schools and other values are reported in percent.

Table 30 School-Level per Pupil Instructional Support Expenditures by Percentage

Year	*N*	*Minimum*	*Maximum*	*M*	*SD*
2003	27	4.9	28.8	13.1	3.24
2004	279	3.8	21.4	11.9	2.61
2005	286	4.8	21.7	12.6	2.46
2006	294	2.3	20.7	12.8	2.53

Note: N = number of schools and other values are reported in percent.

Table 31 School-Level per Pupil Operational Expenditures by Percentage

Year	*N*	*Minimum*	*Maximum*	*M*	*SD*
2003	273	11.8	39.3	17.5	2.86
2004	279	10.3	40.8	16.2	3.98
2005	286	8.7	39.0	17.7	3.59
2006	294	9.4	39.0	17.8	3.46

Note: N = number of schools and other values are reported in percent.

Table 32 School-Level per Pupil Leadership Expenditures by Percentage

Year	*N*	*Minimum*	*Maximum*	*M*	*SD*
2003	273	3.4	14.4	7.0	1.56
2004	279	3.8	17.4	7.3	2.06
2005	286	3.5	16.8	7.2	1.91
2006	294	1.5	13.1	7.1	1.73

Note: N = number of schools and other values are reported in percent.

School Size

The effects of school size were captured by a quantitative variable that represented the official school enrollment as determined by the number students enrolled at or in attendance at a particular school on the official district count day. Public elementary schools with a count-day enrollment of less than 50 students were eliminated from further analyses. The school enrollment figures are presented in Table 33 and were gathered for 2004, 2005, and 2006 in order to identify any unusual or dramatic swings in school size.

Table 33 Size of Elementary Schools

	N	*Minimum*	*Maximum*	*M*	*SD*
2004 enrollment	280	73	1355	651	228
2005 enrollment	287	67	1303	661	232
2006 enrollment	294	85	1466	657	228

Note: N = number of schools and other values are reported in number of students.

School-Level Teacher Average Daily Attendance

The teacher average daily attendance (ADA) is reported to the NDE and was made available to the general public through the Nevada ARC. The teacher ADA has not varied substantially from 2004 to 2006 but it was noteworthy that teacher ADA has increased slightly from 2004 to 2006. The teacher ADA varied little from school to school. The teacher ADA from 2004 to 2006 is presented in Table 34.

Table 34 School-Level Teacher Average Daily Attendance

Year	*N*	*Minimum*	*Maximum*	*M*	*SD*
2004	279	91.0	99.0	95.4	1.6
2005	282	90.0	99.0	95.8	1.4
2006	294	83.9	98.8	95.9	1.9

Note: N = number of schools and other values are reported in percent.

School-Level Characteristics Correlations

The Pearson *r* correlation coefficient was used to measure the degree of association between each of the school-level predictor variables and the school-level academic achievement criterion variable. Based on the correlation matrix (Table 35), the independent variables of school setting, school enrollment, and school-level per pupil expenditures yielded significant probabilities in explaining changes in the school-level reading and mathematics achievement scores. The school-level student to teacher ratio was not significant in explaining changes in the academic achievement scores. Differences in school setting, school size, and per pupil expenditures can be utilized to explain differences in school-level academic measures, while the school-level student to teacher ratio does not explain differences in school-level academic measures.

Table 35 Correlation Coefficients for School Characteristics by Achievement

	sch_setting	enroll6	scstr_rat6	stud_exp6	read_6ss	math_6ss
sch_setting	1.000					
enroll6	.459*	1.000				
scsttr_rat6	.352*	.547*	1.000			
stud_exp6	-.344*	-.463*	-.470*	1.000		
read_6ss	-.208*	-.180*	-.073	-.213*	1.000	
math_6ss	-.043	-.085	-.032	-.246*	.914*	1.000
read_math6	-.129**	-.136**	-.054	-.235*	.978*	.978*

Note: No. of schools= 292 * Correlation is significant at the 0.01 level (2-tailed).
** Correlation is significant at the 0.05 level (2-tailed).

The association between school setting and school-level academic achievement was weak and negative. The association indicated that schools situated in an urban setting were characterized by lower overall achievement levels as compared to schools situated in a rural setting. The association between school size and school-level academic achievement was also weak and negative, which indicated that student achievement at larger schools was expected to be lower than the student achievement at smaller schools. The association between school-level per pupil expenditures and school-level achievement was also negative, meaning that higher per pupil expenditures were associated with lower levels of academic achievement.

To measure the degree of association between the predictor variables capturing school staff characteristics and the school-level academic achievement criterion variable, the Pearson *r* correlation coefficient was calculated. Based on the correlation matrix (Table 36), the independent variables measuring the percentage of teachers not highly qualified at the school and student transiency percentage yielded significant probabilities in explaining changes in the school-level academic achievement scores. The school-level teacher average daily attendance yielded significant, albeit lower, probabilities in explaining changes in the school-level academic achievement scores. The association between the percentage of teachers not highly qualified and the percentage of transient students and measures of academic achievement was negative, which means that lower school-level achievement scores would be expected at schools that employ a higher percentage of teachers not highly qualified and at schools serving higher percentages of transient students. In other words, differences in the percentages of teachers who were not highly qualified in a school and the percentage of transient students enrolled at a school could be utilized to explain differences in school-level academic measures.

Table 36 Correlation Coefficients for School Staffing by Achievement

	tch_nohq6	tch_ada6	stud_ada6	stud_tran6	read_6ss	math6_ss
tch_nohq6	1.000					
tch_ada6	.302*	1.000				
stud_ada6	-.037	.121**	1.000			
stud_tran6	.320*	.174*	-.082	1.000		
read_6ss	-.337*	-.128**	.030	-.706*	1.000	
math_6ss	-.244*	-.030	.036	-.653*	.914*	1.000
read_math6	-.297*	-.081	.033	-.695*	.978*	.978*

Note: No. of schools=292   * Correlation is significant at the 0.01 level (2-tailed).
** Correlation is significant at the 0.05 level (2-tailed).

The association between the percentage of teachers at a school who were not highly qualified and the school-level student achievement was weak to moderate and negative. The association indicated that the school-level student achievement was expected to be lower when the percentage of not highly qualified teachers at the school increased. The association between school-level student transiency and academic achievement was strong and negative. In other words, schools with high levels of student transiency were far more likely to be characterized by lower levels of student achievement.

To measure the degree of association between each of the school-level demography predictor variables and the school-level academic achievement criterion variable, the Pearson *r* correlation coefficient was calculated. Based on the correlation matrix (Table 37), the predictor variables measuring the percentage of students participation in the LEP program and the percentage of students participating in the FRL program yielded significant probabilities in explaining changes in the school-level academic achievement scores. Also, the predictor categorical variable of minor_school, identifying schools where ethnic minorities comprise more than 50 percent of the student enrollment, was significant in explaining changes in school-level academic achievement. The school-level measure of percentage of IEP students was not significant in explaining changes in the criterion variable of academic achievement scores. In other words, differences in the percentages of non-Caucasian students at a school and the percentages of students participating in the LEP or FRL programs could be used to explain differences in school-level academic measures. The association between the predictor variables and the criterions were moderately strong and negative. In other words, as the percentage of students who participated in LEP and FRL programs increased, the achievement measures of the school would be expected to decrease. Also, schools with more than 50 percent non-Caucasian students would be expected to have lower school-level achievement as compared to schools with less than 50 percent non-Caucasian students.

Table 37 Correlation Coefficients for School-Level Student Demography

	minor_sch6	lep_pct6	iep_pct6	frl_pct6	read_6ss	math_6ss
minor_sch6	1.000					
lep_pct6	.685*	1.000				
iep_pct6	-.066	-.142**	1.000			
frl_pct6	.736*	.811*	-.044	1.000		
read_6ss	-.657*	-.779*	-.003	-.873*	1.000	
math_6ss	-.606*	-.702*	-.022	-.797*	.914*	1.000
read_math_6	-.633*	-.602*	-.046	-.796*	.978*	.978*

Note: No. of schools=292 * Correlation is significant at the 0.01 level (2-tailed).
** Correlation is significant at the 0.05 level (2-tailed).

The Pearson *r* correlation coefficient was used to measure the degree of association between each of the school-level independent variables related to categorical per pupil expenditures and the school-level academic achievement dependent variable. Based on the correlation matrix (Table 38), the independent variables of per pupil dollars expended in the categories of instructional costs, instructional support costs, school operating costs, and school leadership costs were significant in explaining changes in the academic achievement scores. In other words, differences in categorical spending on a per pupil expenditure basis could be utilized to explain differences in school-level academic measures. However, the percentage of categorical dollars (Table 39) spent on a per pupil expenditure basis proved to be much less useful in explaining school level academic measures. Only the percentage of dollars spent in the category of instructional support yielded a significant probability in explaining changes in the academic achievement scores. In other words, either the actual amount or percentage of the total per pupil expenditure attributed to the category of instructional support could be utilized to predict the dependent variable of student academic achievement. However, the association was weak and negative which means that lower school-level academic achievement would be expected at schools where a higher percentage of expenditures attributable to instructional support are made.

Table 38 Correlation Coefficients for School-Level Expenditures (Total) by Achievement

	instex_06	insupex_06	operex_06	leadex_06	read_6ss	math_6ss
instex_06	1.000					
insupex_06	.581*	1.000				
operex_06	.565*	.467*	1.000			
leadex_06	.618*	.447*	.531*	1.000		
read_6ss	-.171*	-.215*	-.094	-.194*	1.000	
math_6ss	-.201*	-.276*	-.155*	-.160*	.914*	1.000
read_math_6	-.190*	-.251*	-.127**	-.181*	.978*	.978*

Note: No. of schools=292 * Correlation is significant at the 0.01 level (2-tailed).
** Correlation is significant at the 0.05 level (2-tailed).

Table 39 Correlation Coefficients for School-Level Expenditures (%) by Achievement

	instpct_6	insuppct_6	operpct_6	leadpct_6	read_6ss	math_6ss
instpct_06	1.000					
insuppct_06	-.475*	1.000	-			
operpct_06	-.737*	.104	1.000			
leadpct_06	-.424*	-.020	.064	1.000		
read_ss6	.096	-.111	.022	-.120**	1.000	
math_ss6	.102	-.131**	-.025	-.019	.914*	1.000
read_math_6	.101	-.124**	-.001	-.071	.978*	.978*

Note: No. of schools=292 * Correlation is significant at the 0.01 level (2-tailed).
** Correlation is significant at the 0.05 level (2-tailed).

The Pearson *r* correlation coefficient was used to measure the degree of association between each of the school-level independent variables related to student to teacher ratios and the school-level academic achievement dependent variable (Table 40). Based on the correlation results, none of the school-level student to teacher ratios (2004, 2005, or 2006) was significant in explaining changes in the school-level dependent variables measuring 5th grade reading and mathematics achievement scores.

Table 40 Correlation Coefficients for School-Level Student to Teacher Ratio by Academic Achievement

	scsttr_rat4	scsttr_rat5	scsttr_rat6	read_6ss	math_6ss
scsttr_rat4	1.000				
scsttr_rat5	.664*	1.000			
scsttr_rat6	.550*	.632*	1.000	-	
read_6ss	-.010	-.016	-.073	1.000	
math_6ss	.070	.050	-.032	.914*	1.000
read_math_6	.031	.018	-.054	.978*	.978*

Note: N = 285 * Correlation is significant at the 0.01 level (2-tailed).

The Pearson *r* correlation coefficient was used to measure the degree of association between each of the school-level independent variables related to grade-level student to teacher ratios and the school-level academic achievement dependent variable

(Table 41). Based on the correlation results, only the 3rd grade student to teacher ratio (2004, 2005, or 2006) was significant in explaining changes in the school-level dependent variable measuring 5th grade mathematics achievement. The association was weak and positive, which means that an increase in the 3rd grade student to teacher ratio was associated with an increase in 5th grade mathematics achievement.

Table 41 Correlation Coefficients for Grade-Level Class Size Proxy by Achievement

	sttr_gr3_04	sttr_gr4_05	sttr_gr5_06	read_6ss	math_6ss
sttr_gr3_04	1.000				
sttr_gr4_05	.276*	1.000			
sttr_gr5_06	.335*	.523*	1.000		
read_6ss	.065	-.003	-.057	1.000	
math_6ss	.132**	.042	-.015	.914*	1.000
read_math_6	.101	.020	-.037	.978*	.978*

Note: No. of schools=292 * Correlation is significant at the 0.01 level (2-tailed).
** Correlation is significant at the 0.05 level (2-tailed).

Summary of Bivariate Correlations

- The Pearson *r* correlation coefficient for the 5th grade total per pupil expenditures was weakly moderate and negative. The negative correlation indicated that 5th grade student achievement would be expected to decrease when the 5th grade per pupil expenditures increased.
- Each of the student characteristic predictor variables exhibited a weak to moderate negative correlation to academic achievement.
- The 3rd grade student to teacher ratio had a small and positive relationship to student academic achievement. The association indicated that student achievement would be expected to increase as the student to teacher ratio increased.

- The 3rd grade student to teacher ratio was a significant predictor of 5th grade academic achievement but the association was small and positive. The association indicated that 5th grade student academic achievement would be expected to increase as the 3rd grade student to teacher ratio increased.
- The 5th grade student to teacher ratio had a small and negative relationship to the 5th grade academic achievement. The association indicated that students' scaled scores would be expected to decrease as the student to teacher ratio increased.
- Regardless of the educational expenditure metric used, the association between per pupil expenditures and academic achievement was weak and negative, indicating that greater per pupil expenditures were associated with lower student academic achievement.
- Pearson *r* correlation coefficients were calculated to assess the association between the 2004, 2005, and 2006 school-level student to teacher ratios on 5th grade academic achievement but none were statistically significant. The results indicate that school-level student to teacher ratios did not vary systematically with student academic achievement.
- The Pearson *r* correlation coefficients for school setting was weak and negative, which means that students in urban school settings would be expected to score lower than students in rural settings.
- The Pearson *r* correlation coefficients for school size was weak and negative, which means that students in smaller schools would be expected to score higher on the CRTs than students in larger schools.

- The association between the percentage of teachers who were not highly qualified and 5th grade student achievement was found to be moderate and negative, which indicated that student achievement would be expected to be lower at schools which employ more non-highly qualified teachers.
- A strong and negative association was indicated for school-level student transiency and academic achievement. This indicated that student achievement would be expected to be lower at schools where student transiency was high.

School-Level Composite Factor

The inclusion of school factors in the regression analyses was viewed as being essential because school factors reportedly have a substantial association to school- and student-level academic achievement. Further, the predictors measuring school factors should be associated with the criterion of student academic achievement and provide an opportunity to thoughtfully explain the analytical results. However, the goal of any regression analysis should be to achieve a parsimonious solution, which means to use the fewest number of predictors to maximize the multiple correlation (R) and minimize the total errors of the regression predictions.

Approximately 150 school level variables were collected for all Nevada elementary schools for possible inclusion in the statistical tests. The correlation coefficients of the school-level factors to school-level academic achievement described in the preceding section differ substantially; some were positive and some were negative, while others exhibited strong and significant correlation and still others exhibited weak and negligible correlations that were non-significant. In order to achieve a parsimonious solution, a composite school-level measure was created rather than including dozens of individual school-level measures in the regression analyses. The composite school-level factor utilized for student-level regression analyses was the school-level reading score predicted from ten school-level factors.

The regression equation and explanation of variables are as follows.

$Y_{pred} = B_O + B_1X_1 + B_2X_2 + B_3X_3 + B_4X_4 + B_5X_5 + B_6X_6 + B_7X_7 + B_8X_8 + B_9X_9 + B_{10}X_{10} + e_n$, where:

Y_{pred} = predicted value for school-level 3rd grade reading achievement,
B_O = Y axis intercept
B_1 = regression coefficient for school setting
X_1 = value for school setting
B_2 = regression coefficient for the natural log of school enrollment
X_2 = value for the natural log of school enrollment
B_3 = regression coefficient for per pupil expenditures in dollars
X_3 = value for per pupil expenditures in dollars
B_4 = regression coefficient for the percentage of teachers employed at the school who are not highly qualified
X_4 = value for the percentage of teachers employed at the school who are not highly qualified
B_5 = regression coefficient for the grade level student to teacher ratio
X_5 = value for the grade level student to teacher ratio
B_6 = regression coefficient for school-level student to teacher ratio
X_6 = value for the school-level student to teacher ratio
B_7 = regression coefficient for the percentage of transient students attending the school
X_7 = value for the percentage of transient students attending the school
B_8 = regression coefficient for percentage of students participating in LEP who are attending the school
X_8 = value for the percentage of students participating in LEP who are attending the school
B_9 = regression coefficient for percentage of students with an IEP who are attending the school
X_9 = value for the percentage of students at the school with an IEP
B_{10} = regression coefficient for the percentage of students participating in the FRL program who are attending the school
X_{10} = value for the percentage of students participating in the FRL program who are attending the school
e_n = prediction errors

The results of the multivariate regression equation above were used to create a composite school factor (g*_sch) for use in the student-level regression analyses. The predicted composite school factor was saved as a standardized value and was assigned to each student based on assessment file records. To create the composite school factor, the school-level average reading score was regressed on ten predictor variables describing various aspects of the school for the given year.

Multivariate regression analyses were conducted to determine the predictive strength of a regression model that used one dummy coded predictor variable and nine quantitative predictor variables to predict the 2004 3rd grade school-level reading score. The predictor variables were school setting (urban or rural), natural log of the 3rd grade school enrollment, 2004 per pupil expenditure, percentage of teachers at the school in 2004 that were not highly qualified, 3rd grade student to teacher ratio, 2004 school-level student to teacher ratio, percentage of transient students that attended the school in 2004, percentage of students that participated in the LEP program in 2004, percentage of students that participated in the FRL program in 2004, and percentage of students with an IEP in 2004. The multivariate regression simultaneously entered the ten school-level predictor variables specified above to predict the 3rd grade school-level reading achievement, which was saved as a standardized value representing the 3rd grade composite school factor (g3_sch) and used as a predictor variable in student-level regression analyses.

Prior to interpreting the regression analysis, multicollinearity was assessed for each of the predictor variables. Neither the tolerance statistic nor the variance inflation factor (VIF) indicated that multicollinearity was a distinct problem. The assumptions of normality, linearity, and homoscedasticity were also met. The SPSS multivariate regression package produces output that includes an analysis of variance (ANOVA) table, which calculates the exact probability of obtaining the *F*-statistic by chance. A significant *F*-test indicates a linear relationship.

The ANOVA yielded a significant result ($F(10, 248) = 83.013$, $p<.001$, $R^2 = .770$) which indicated that the school-level measures were significant in predicting the 3rd grade reading score. In addition to the significant ANOVA, five of the predictor variables (percentage of teachers not highly qualified, percentage of transient students, percentage of students participating in the LEP program, percentage of students with an IEP, and percentage of students participating in the FRL program) were significant predictors on the regression model (Table 42). The predictor variables describing the 2004 (3rd grade) school factors collectively explained approximately 76 percent of the variance found in the criterion of school-level reading achievement.

Table 42 Regression Coefficients and Summary for 3rd Grade Composite School Factor

	Unstandardized Coefficients		Standardized Coefficients		
	B	*SE*	*β*	*t*	*p*
Model 1					
Constant	370.455	28.794		12.866	<.001
sch_setting	1.727	3.189	.022	.542	.589
new_enroll4	-4.053	3.676	-.060	-1.103	.271
stud_exp4	-.001	.001	-.055	-.971	.332
tch_nohq4	-.229	.070	-.129	-3.280	.001
sttr_g3_04	.147	.357	.016	.413	.680
scsttr_rat4	.372	.517	.032	.719	.473
stud_tran4	-.502	.122	-.194	-4.125	<.001
lep_pct4	-.477	.089	-.313	-5.352	<.001
iep_pct4	-.825	.282	-.108	-2.927	.004
frl_pct4	-.486	.078	-.403	-6.266	.001

Note: Criterion=3rd grade school-level average reading score (259 schools)

Multivariate regression analyses were conducted to determine the predictive strength of a regression model that used one dummy coded predictor variable and nine quantitative predictor variables to predict the 2005 4^{th} grade school-level reading score. The 4^{th} grade school-level average reading scaled score was regressed on ten school-level predictor variables and saved as a standardized prediction. The predictor variables were school setting (urban or rural), natural log of the 4^{th} grade school enrollment, 2005 per pupil expenditure, percentage of teachers at the school in 2005 that were not highly qualified, 4^{th} grade student to teacher ratio, 2005 school-level student to teacher ratio, percentage of transient students that attended the school in 2005, percentage of students that participated in the LEP program in 2005, percentage of students that participated in the FRL program in 2005, and the percentage of students with an IEP in 2005. The multivariate regression simultaneously entered the ten predictor variables specified above to predict the 4^{th} grade school-level reading achievement, which was saved as a standardized value representing the 4^{th} grade composite school factor (g4_sch) and used as a predictor variable in student-level regression analyses.

Prior to interpreting the regression analysis, multicollinearity was assessed for each of the predictor variables but neither the tolerance statistic nor the variance inflation factor for the predictor variables indicated that multicollinearity was a distinct problem. The assumptions of normality, linearity, and homoscedasticity were assessed.

The ANOVA yielded a significant result ($F(10, 263) = 110.543$, $p<.001$, R^2 = .808) which indicated that the school-level measures were significant in predicting the 4^{th} grade reading score. In addition to the significant ANOVA, four of the predictor variables (school setting, percentage of transient students, percentage of students participating in the LEP program, and the percentage of students participating in the FRL program) were significant predictors in the regression model. The predictor variables describing the 2005 (4th grade) school factors collectively explained approximately 81 percent of the variance found in the criterion of school-level reading achievement. The regression coefficients and statistics are presented in Table 43.

Table 43 Regression Coefficients and Summary for 4th Grade Composite School Factor

	Unstandardized Coefficients		Standardized Coefficients		
	B	*SE*	*β*	*t*	*p*
Model 1					
Constant	213.324	7.834		27.230	<.001
sch_setting	3.202	.947	.117	3.379	.001
new_enroll5	-.382	1.122	-.016	-.341	.734
stud_exp5	<.001	<.001	.076	1.757	.080
tch_nohq5	-.016	.022	-.025	-.705	.481
sttr_g4_05	-.056	.071	-.026	-.785	.433
scsttr_rat5	.097	.173	.020	.563	.574
stud_tran5	-.165	.036	-.182	-4.599	<.001
lep_pct5	-.110	.029	-.209	-3.849	<.001
iep_pct5	-.135	.083	-.049	-1.622	.106
frl_pct5	-.228	.022	-.630	-10.416	<.001

Note: Criterion=4th grade school-level average reading score (274 schools)

Multivariate regression analyses were conducted to determine the predictive strength of a regression model that used one dummy coded predictor and nine quantitative predictors to predict the 2006 5th grade school-level reading score. The predictors were school setting (urban or rural), natural log of the 5th grade school enrollment, 2006 per pupil expenditure, percentage of teachers at the school in 2006 that were not highly qualified, 5th grade student to teacher ratio, 2006 school-level student to teacher ratio, percentage of transient students that attended the school in 2006, percentage of students that participated in the LEP program in 2006, percentage of students that participated in the FRL program in 2006, and percentage of students with an IEP in 2006. The multivariate regression simultaneously entered the ten predictor variables specified above to predict the 5th grade school-level reading achievement, which was saved as a standardized value representing the 5th grade composite school factor (g5_sch).

Prior to interpreting the regression analysis, multicollinearity was assessed for each of the predictor variables. Neither the tolerance statistic nor the variance inflation factor for each of the predictor variables indicated that multicollinearity was a problem.

The ANOVA yielded a significant result ($F(10, 259) = 78.803$, $p<.001$, $R^2 = .753$) which indicated that the school-level measures were significant in predicting the 5th grade school-level reading score. The predictor variables describing the 2006 (5th grade) school characteristics collectively explained approximately 75 percent of the variance found in the criterion of 2006 school-level reading achievement. The regression coefficients and statistics are presented in Table 44.

Table 44 Regression Coefficients and Summary for 5th Grade Composite School Factor

	Unstandardized Coefficients		Standardized Coefficients		
	B	*SE*	*β*	*t*	*p*
Model 1					
Constant	321.530	21.692		14.823	<.001
sch_setting	2.141	2.890	.028	.741	.459
new_enroll6	-.449	3.443	-.007	-.130	.896
stud_exp6	.002	.001	.148	3.143	.002
tch_nohq6	-.169	.095	-.066	-1.780	.076
sttr_g5_06	-.422	.288	-.063	-1.469	.143
scsttr_rat6	.712	.529	.056	1.345	.180
stud_tran6	-.632	.115	-.248	-5.469	<.001
lep_pct6	.137	.091	.091	1.507	.133
iep_pct6	-.383	.227	-.055	-1.686	.093
frl_pct6	-.759	.067	-.786	-11.411	<.001

Note: Criterion=5th grade school-level average reading score (270 schools)

Results of Analyses

Research Question 1

The 3rd grade reading achievement of students was examined in order to determine whether significant academic achievement differences could be identified for transient and non-transient populations. Students were categorized as being either transient or non-transient based on information derived from the NDE assessment files. Table 45 presents the results of an independent samples t-test conducted after a significant Levene's Test showed that homogeneity of variance could not be assumed and yielded a significant test: $t(df = 15{,}277) = 16.158$, $p < .001$, and a small effect size (*Cohen's d* = .26). Despite the fact that Levene's Test was significant and unequal n-counts existed for the groups, the test results were meaningful on account of the large sample. The mean scaled score of the transient group ($M = 284.6$, $N = 6896$) was significantly lower than the mean scaled score of the non-transient group ($M = 302.1$, $N = 8383$) for 3rd grade reading achievement. The test provided evidence that students who attended multiple schools between the 1st and 3rd grades performed significantly lower on the Nevada CRT reading achievement test as compared to those students who remained at the same school during the 1st to 3rd grades.

Table 45 Independent Samples T-Test Summary Table - Transience by 3rd Grade Reading Achievement

Group	*N*	*M*	*SD*	*t*	*p*
Non-transient	8383	302.1	68.1	16.158	<.001
Transient	6896	284.6	65.5		

N = number of students

The 3rd grade mathematics achievement of students was examined in order to determine whether significant academic achievement differences could be identified for transient and non-transient groups. The results of an independent samples t-test (Table 46), conducted after a non-significant Levene's Test showed that homogeneity of variance could be assumed, yielded a significant test: $t(df = 15{,}277) = 15{,}991$, $p < .001$, and a small effect size ($d = .26$). The mean scaled score of the transient group (M = 285.0, N = 6896) was significantly lower than the mean score of the non-transient group (M = 303.0, N = 8383) for mathematics achievement. The test provided evidence that students who attended two or more schools during grades one to three performed significantly lower on the Nevada CRT mathematics achievement test as compared to those students who remained at the same school for grades one to three.

Table 46 Independent Samples T-Test Summary Table - Transience by 3rd Grade Mathematics Achievement

Group	*N*	*M*	*SD*	*t*	*p*
Non-transient	8383	303.0	69.5	15.991	<.001
Transient	6896	285.0	69.6		

N = number of students

After categorizing each student as being either transient or non-transient, a multiple analysis of variance (MANOVA) was conducted using transiency as the grouping independent variable and the 3rd grade reading and mathematics CRT scaled scores as the dependent variables. Prior to testing the assumptions of MANOVA, the Pearson r correlation coefficient was calculated to ascertain the degree of association between the dependent variables. A high degree of correlation (Pearson r = 0.696) existed between the 3rd grade reading and mathematics scaled scores, which went against the recommendation of using low to moderately correlated dependent variables. When the dependent variables are too highly correlated, multicollinearity becomes a problem diminishing the results of MANOVA. As recommended by Leech, Barrett, & Morgan

(2005), the highly correlated dependent variables (3^{rd} grade reading and mathematics scores) were summed and analyzed using another statistical test.

The overall academic achievement of 3^{rd} grade students was examined in order to determine whether significant academic achievement differences could be identified for transient and non-transient groups. The analysis used the student transiency status as the independent variable and the 3^{rd} grade combined reading and mathematics CRT scaled score as the dependent variable. Table 47 presents the results of an independent samples t-test conducted after a non-significant Levene's Test showed that homogeneity of variance could be assumed and yielded a significant test, ($t(df = 15{,}277) = 17.446$, $p < .001$), and a small effect size ($d = .28$). The mean scaled score of the transient group ($M = 569.6$, $SD = 124.4$, $N = 6896$) was significantly lower than the mean score of the non-transient group ($M = 605.2$, $SD = 126.4$, $N = 8383$) for the student academic achievement measure of combined 3^{rd} grade reading and mathematics scores. The test provided evidence that students who attended multiple schools through the grades of one to three performed significantly lower on standardized achievement tests as compared to those students who remained at the same school for grades one to three. The results presented in Table 45 to Table 47 consistently indicated that students who attended two or more schools during grades one through three tended to score lower on the CRT reading and mathematics tests than did students who attended the same school for all three years.

Table 47 Independent Samples T-Test Summary Table - Transience by 3rd Grade Combined Reading and Mathematics Achievement

Group	*N*	*M*	*SD*	*t*	*p*
Non-transient	8383	605.2	126.4	17.446	<.001
Transient	6896	569.6	124.4		

N = number of students

The 5th grade reading achievement of students was examined in order to determine whether significant academic achievement differences could be identified for transient and non-transient groups. Students were categorized as transient or the non-transient based on information derived from the NDE assessment files. Table 48 presents the results of an independent samples t-test conducted after a non-significant Levene's Test showed that homogeneity of variance could be assumed and yielded a significant test, *(t*(*df* = 15,277) = 19.445, *p* <.001), and a small effect size (*d* = .32). The mean scaled score of the transient group (*M* = 278.0, *SD* = 55.3, *N* = 6896) was significantly lower than the mean scaled score of the non-transient group (*M* = 295.7, *SD* = 56.3, *N* = 8383) for reading achievement as measured by the 2006 reading CRT. The test provided evidence that students who attended at least three schools through the grades of one to five performed significantly lower on standardized reading achievement tests as compared to those students who remained at the same school for grades one to five.

Table 48 Independent Samples T-Test Summary Table - Transience by 5th Grade Reading Achievement

Group	*N*	*M*	*SD*	*t*	*p*
Non-transient	8383	295.7	56.3	21.566	<.001
Transient	6896	278.0	55.3		

N = number of students

The 5th grade mathematics achievement of students was examined in order to determine whether significant academic achievement differences could be identified for transient and non-transient groups. Table 49 presents the results of an independent samples t-test conducted after a non-significant Levene's Test showed that homogeneity of variance could be assumed and yielded a significant test, (*t*(*df* = 15,277) = 17.772, *p* <.001, and a small effect size (*d* = .29). The mean scaled score of the transient group (*M*

= 301.5, *SD* = 57.9, *N* = 6896) was significantly lower than the mean score of the non-transient group (*M* = 318.1, *SD* = 56.9, *N* = 8383) for mathematics achievement as measured by the 5th grade mathematics CRT. The test provided evidence that students who attended three or more schools through the grades of one to five performed significantly lower on standardized mathematics achievement tests as compared to those students who remained at the same school for grades one to five.

Table 49 Independent Samples T-Test Summary Table - Transience by 5th Grade Mathematics Achievement

Group	*N*	*M*	*SD*	*t*	*p*
Non-transient	8383	318.1	56.9	17.772	<.001
Transient	6896	301.5	57.9		

N = number of students

After placing each student into either the transient or non-transient groups, a multiple analysis of variance (MANOVA) was conducted using transiency as the grouping independent variable and the 5th grade reading and mathematics CRT scaled scores as the dependent variables. Prior to the MANOVA analysis, the Pearson *r* correlation coefficient was calculated to ascertain the degree of association between the dependent variables. A high degree of correlation (Pearson *r* = 0.712) was calculated for the reading and mathematics scaled scores, which went against the recommendation of using weakly to moderately correlated dependent variables. To avoid the problem of multicollinearity, the highly correlated dependent variables (5th grade reading and mathematics scores) were summed and analyzed using another statistical test (Leech, Barrett, & Morgan, 2005).

The academic achievement of 5th grade students was examined in order to determine whether significant achievement differences could be identified for transient and non-transient groups. After students were categorized as being either transient or non-transient, an independent samples t-test was conducted after a significant Levene's Test showed that homogeneity of variance could be assumed. The independent samples t-test (Table 50) yielded a significant result, ($t(df = 15{,}277) = 20.141$, $p < .001$), and a small effect size ($d = .33$). The mean scaled score of the transient group ($M = 579.5$, $SD = 104.8$, $N = 6896$) was significantly lower than the mean scaled score of the non-transient group ($M = 613.7$, $SD = 104.3$, $N = 8383$). The test provided evidence that students who attended at least three schools in grades one through five scored significantly lower on the CRTs in reading and mathematics than did students who attended the same school for all five years.

Table 50 Independent Samples T-Test Summary Table - Transience by 5th Grade Combined Reading and Mathematics Achievement

Group	*N*	*M*	*SD*	*t*	*p*
Non-transient	8383	613.7	104.3	20.141	<.001
Transient	6896	579.5	104.8		

N = number of students

Collectively, the results presented in Table 48 to Table 50 show that the transient student group consistently scored lower on standardized achievement tests that did the non-transient group, regardless of the academic achievement measure. The analyses showed that the mean 3rd grade reading score for the transient group was approximately 18 points lower than the mean reading score for the non-transient group. Also, the mean 3rd grade mathematics achievement score for the transient group was approximately 18 points lower than the mean mathematics score for the non-transient group. With respect to the 5th grade achievement scores, the mean reading score for the transient group was also approximately 18 points lower than the mean reading score for the non-transient group and the mean 5th grade mathematics achievement score for the transient group was approximately 17 points lower than the mean mathematics score for the non-transient group. When the combined reading and math student academic achievement measure served as the dependent variable, the mean score for the transient group was approximately 35 points lower on the achievement measure at the end of the 3rd grade compared to the non-transient group and the 35 point differential was maintained through the 5th grade.

Research Question 2

The results of the statistical tests described above demonstrated that statistically significant differences in student-level academic achievement scores exist between the transient and non-transient student groups. Further, the statistically significant differences between the groups were identified in both the 3rd grade CRT administration and the 5th grade CRT administration, regardless of content area or metric used in the analyses. However, it was necessary to establish whether there was an independent association between student transience and academic achievement after controlling for other relevant student-level variables such as participation in various educational programs because student transiency was weakly correlated with minority status and participation in the LEP and FRL programs. The regression analyses entered variables in groups to ascertain changes brought about by the additional of variables.

The regression equation and explanation of variables for the 3rd grade regression analyses are as follows.

$$Y_{pred} = B_O + B_1X_1 + B_2X_2 + B_3X_3 + B_4X_4 + B_5X_5 + e_n\text{, where}$$

Y_{pred} = predicted value for 3rd grade academic achievement,
B_O = Y axis intercept
B_1 = regression coefficient for group
X_1 = value for group
B_2 = regression coefficient for g3_iep
X_2 = value for g3_iep
B_3 = regression coefficient for g3_lep
X_3 = value for g3_lep
B_4 = regression coefficient for g3_frl
X_4 = value for g3_frl
B_5 = regression coefficient for g3_sch
X_5 = value for g3_sch
e_n = prediction errors

Multivariate regression analyses were conducted with dummy coded variables to determine the predictive strength of a regression model that used transiency status, student characteristics (LEP status, FRL status, and IEP status), and the 3rd grade composite school factor (g3_sch) to predict 3rd grade reading achievement. The multivariate regression entered the predictor variables in three discrete groups. A regression model was created for each of the three blocks and changes in the predictive strength of the models were easily ascertained.

For Model 1, the 3rd grade reading scaled score was regressed on transiency status alone. Prior to interpreting the regression analysis, multicollinearity was assessed for each of the predictor variables. The first stage of the multivariate regression entered only the transiency status, effectively creating a simple regression analysis for which multicollinearity tests were inappropriate. The ANOVA yielded a significant result ($F(1, 14{,}356) = 256.454$, $p<.001$, $R^2 = .018$) which indicated that student transiency status alone was significant in predicting the 3rd grade reading score. The predictor variable describing student transiency explained slightly less than 2 percent of the variance found in the criterion of 3rd grade reading achievement.

For Model 2, the 3rd grade reading scaled score was regressed on transiency status, IEP status, LEP status, and FRL status. Multicollinearity was assessed for each of the predictor variables prior to interpreting the regression analysis. Neither the tolerance statistics nor the variance inflation factor for each of the predictor variables indicated that multicollinearity was a problem. The SPSS multivariate regression package produces output that includes an analysis of variance (ANOVA) table, which calculated the exact probability of obtaining the *F*-statistic by chance. The F-test examines the degree to which the relationship between the predictor variables and the criterion was linear for each step or model generated. A significant *F*-test would indicate the existence of a linear relationship.

The ANOVA for Model 2 also yielded a significant result ($F(4, 14{,}353) = 1055.756$, $p<.001$, $R^2 = .227$) which indicated that the combination of the predictor variables was significant in predicting the academic achievement of the student groups. In addition to the significant ANOVA for Model 2, each of the predictors contributed significantly to the regression model. The predictor variables describing student characteristics collectively explained slightly less than 23 percent of the variance found in the criterion of 3rd grade reading achievement.

For Model 3, the 3rd grade reading scaled score was regressed on transiency status, IEP status, LEP status, FRL status, and the 3rd grade composite school factor. Prior to interpreting the regression analysis, multicollinearity was assessed for each of the predictor variables. Neither the tolerance statistic nor the variance inflation factor for each of the predictor variables indicated that multicollinearity was a problem. The third ANOVA also yielded a significant result (F(5, 14,352) = 907.887, p<.001, R^2 = .240) which indicated that the combination of the predictor variables was significant in predicting the academic achievement of the student groups. In addition to the significant ANOVA for Model 3, each of the predictors contributed significantly to the regression model. The predictor variables describing student characteristics and the 3rd grade composite school factor collectively explained approximately 24 percent of the variance found in the criterion of 3rd grade reading achievement.

The multivariate regression coefficients are presented in Table 51, which provided a great deal of information about the association of each predictor on the criterion. The unstandardized regression coefficient (B) of the constant represents the predicted average 3rd grade CRT reading score for the circumstance where all dummy coded variables are entered as zero. An individual with all dummy variables coded as zero was a non-transient, 3rd grade student not participating in special education, LEP programs, or the FRL program. For purposes here, the predicted 3rd grade reading scaled score for a student fitting these characteristics would be approximately 326. Since multivariate regression using dummy variables simultaneously held other predictor variables constant while calculating the beta (β) value for a test variable, the impact and significance of the test variable was easily ascertained. For example, after holding IEP status, LEP status, and FRL status constant, a B value of -13.727 was calculated for a change in student transiency grouping from zero (non-transient) to one (transient). In other words, all things being equal, a 3rd grade transient student would be expected to score approximately 14 points lower than a non-transient 3rd grade student with identical student characteristics. For all the covariates and grouping variable a strong negative association to academic achievement is indicated. The negative regression coefficient for all the predictor variables (covariates) indicated that transient students or students participating in special education, LEP, or FRL programs would be expected to score lower on the 3rd grade reading CRT as compared to non-transient, students not participating in special programs. After including the 3rd grade school factor specified in model 3, a 3rd grade transient student would be expected to score approximately 10 points lower than a non-transient 3rd grade student with identical student and school characteristics. The test provided evidence that an independent association between student transiency and 3rd grade reading academic achievement existed.

Multivariate regression analyses were conducted with dummy coded variables to determine the predictive strength of student transiency status, student, and school characteristics on 3rd grade mathematics achievement. The multivariate regression entered group status, student characteristics, and school factors separately from one another to predict the 3rd grade mathematics achievement. A regression model was created for each group of variables and changes in the models' predictive strength could be easily ascertained.

For Model 1, the 3rd grade mathematics scaled score was regressed on student transiency status alone. Prior to interpreting the regression analysis, multicollinearity was assessed for each of the predictor variables. Neither the tolerance statistic nor the variance inflation factor was calculated for the simple regression analysis. The ANOVA for transiency status alone yielded a significant result ($F(1, 14{,}356) = 254.539$, $p<.001$, R^2

= .017) which indicated that student transiency status alone was significant in predicting the 3rd grade mathematics score.

Table 51 Regression Coefficients and Summary for 3rd Grade Reading Regressed on Transiency Status, Student Characteristics, and Composite School Factor

	Unstandardized Coefficients		Standardized Coefficients		
	B	*SE*	*β*	*t*	*p*
Model 1					
Constant	301.790	.763		395.667	<.001
group	-17.888	1.117	-.132	-16.014	<.001
Model 2					
Constant	326.226	.806		404.514	<.001
group	-13.727	.995	-.102	-13.797	<.001
g3_iep	-46.826	1.757	-.196	-26.651	<.001
g3_lep	-50.965	1.283	-.309	-39.725	<.001
g3_frl	-26.156	1.059	-.193	-24.688	<.001
Model 3					
Constant	321.024	.866		370.655	<.001
group	-10.012	1.013	-.075	-9.988	<.001
g3_iep	-47.682	1.743	-.199	-27.354	<.001
g3_lep	-45.734	1.315	-.278	-34.768	<.001
g3_frl	-20.876	1.103	-.154	-18.919	<.001
g3_sch	8.827	.564	.131	15.643	<.001

Note: Criterion Variable = read_ss3, number of students = 14,357

For Model 2, the 3rd grade mathematics scaled score was regressed on transiency status, IEP status, LEP status, and FRL status. Prior to interpreting the regression analysis, multicollinearity was assessed for each of the predictor variables. Neither the tolerance statistics nor the variance inflation factor for each of the predictor variables indicated that multicollinearity was a problem. The ANOVA for Model 2 yielded a significant result (F(4, 14,353) = 590.817, p<.001, R^2 = .141) which indicated that the combination of the predictor variables was significant in predicting 3rd grade mathematics scaled scores. In addition to the significant ANOVA for model 2, each of the predictors contributed significantly to the regression model. The predictor variables describing student characteristics collectively explained slightly more than 14 percent of the variance found in the criterion of 3rd grade mathematics achievement.

For Model 3, the 3rd grade mathematics scaled score was regressed on transiency status, IEP status, LEP status, FRL status, and the 3rd grade composite school factor. Prior to interpreting the regression analysis, multicollinearity was assessed for each of the predictor variables. Neither the tolerance statistic nor the variance inflation factor for each of the predictor variables indicated that multicollinearity was a problem. The third ANOVA also yielded a significant result (F(5, 14,352) = 506.756, p<.001, R^2 = .150) which indicated that the combination of the predictor variables was significant in predicting the academic achievement of the student groups. In addition to the significant ANOVA for model 3, each of the predictors contributed significantly to the regression model. The predictor variables describing student characteristics and the 3rd grade composite school factor collectively explained approximately 15 percent of the variance found in the criterion of 3rd grade mathematics achievement.

The multivariate regression coefficients are presented in Table 52. The predicted 3rd grade mathematics scaled score for a student fitting the case where all dummy coded variables were entered as zero was approximately 324. All things being equal, a 3rd grade transient student was expected to score approximately 15 points lower than a non-transient 3rd grade student with identical student characteristics. For all the covariates and grouping variable a strong negative association to academic achievement was indicated. The negative regression coefficients for all the predictor variables (covariates) indicated that transient students or students participating in special education, LEP, or FRL programs were expected to score considerably lower on the 3rd grade reading CRT as compared to non-transient, students not participating in special programs. After including the 3rd grade school factor specified in model 3, a 3rd grade transient student was expected to score approximately 12 points lower than a non-transient 3rd grade student with identical student and school characteristics. The test provided evidence that an independent association between student transiency and 3rd grade mathematics achievement existed.

Table 52 Regression Coefficients and Summary for 3rd Grade Mathematics Regressed on Transiency Status, Student Characteristics, and Composite School Factor

	Unstandardized Coefficients		Standardized Coefficients		
	B	*SE*	*β*	*t*	*p*
Model 1					
Constant	302.988	.797		380.277	<.001
group	-18.615	1.167	-.132	-15.954	<.001
Model 2					
Constant	323.585	.888		364.397	<.001
group	-15.135	1.096	-.107	-13.815	<.001
g3_iep	-40.693	1.935	-.163	-21.034	<.001
g3_lep	-34.334	1.413	-.199	-24.304	<.001
g3_frl	-25.934	1.167	-.183	-22.231	<.001
Model 3					
Constant	319.138	.957		333.516	<.001
group	-12.051	1.119	-.085	-10.766	<.001
g3_iep	-41.425	1.926	-.166	-21.510	<.001
g3_lep	-29.861	1.453	-.173	-20.547	<.001
g3_frl	-21.420	1.219	-.151	-17.570	<.001
g3_sch	7.547	.623	.108	12.106	<.001

Note: Criterion Variable = math_ss3, number of students = 14,357

Multivariate regression analyses were conducted with dummy coded variables to determine the predictive strength of student characteristics on the 3rd grade academic achievement measure of combined reading and mathematics scaled score. The multivariate regression entered group status separately from the other predictor variables of IEP status, LEP status, and FRL status during the 3rd grade to predict the 3rd grade academic achievement. The statistical test utilized the 3rd grade combined reading and mathematics scaled scores as the criterion.

For Model 1, the 3rd grade combined reading and mathematics scaled score was regressed on student transiency status alone. Neither the tolerance statistic nor the variance inflation factor was calculated for the simple regression analysis. The ANOVA yielded a significant result ($F(1, 14{,}356) = 302.157$, $p<.001$, $R^2 = .021$) which indicated that student transiency status alone was significant in predicting the combined reading and mathematics achievement.

For Model 2, the 3rd grade combined reading and mathematics scaled score was regressed on transiency status, IEP status, LEP status, and FRL status. Multicollinearity was assessed for each of the predictor variables prior to interpreting the regression analysis. Neither the tolerance statistics nor the variance inflation factor for each of the predictor variables indicated that multicollinearity was a problem. The ANOVA for Model 2 yielded a significant result ($F(4, 14{,}353) = 966.398$, $p<.001$, $R^2 = .212$) which indicated that the combination of the predictor variables was significant in predicting the academic achievement of the student groups. In addition to the significant ANOVA, each of the predictors contributed significantly to the regression model. The predictor variables describing student characteristics and specified in Model 2 collectively explained slightly more than 21 percent of the variance found in the criterion of 3rd grade combined reading and mathematics achievement.

For Model 3, the 3rd grade combined reading and mathematics scaled score was regressed on transiency status, IEP status, LEP status, FRL status, and the 3rd grade composite school factor. Prior to interpreting the regression analysis, multicollinearity was assessed for each of the predictor variables. Neither the tolerance statistic nor the variance inflation factor for each of the predictor variables indicated that multicollinearity was a problem. The ANOVA for Model 3 yielded a significant result (F(5, 14,352) = 832.145, p<.001, R^2 = .225) which indicated that the combination of the predictor variables was significant in predicting the academic achievement of the student groups. In addition to the significant ANOVA for Model 3, each of the predictors contributed significantly to the regression model. The predictor variables describing student characteristics and the 3rd grade composite school factor collectively explained approximately 23 percent of the variance found in the criterion of 3rd grade combined reading and mathematics achievement.

The multivariate regression coefficients are presented in Table 53. The predicted 3rd grade overall achievement score for a student fitting the case where all dummy coded variables are entered as zero was approximately 650. After the IEP status, LEP status, and FRL status were all held constant, a regression coefficient of -28.323 was calculated for a change in student transiency grouping from zero (non-transient) to one (transient). In other words, all things being equal, a 3rd grade transient student was expected to score approximately 28 points lower than a non-transient 3rd grade student with identical student characteristics. The negative regression coefficients for all the predictor variables (covariates) indicated that transient students or students participating in special education, LEP, or FRL programs were expected to score considerably lower on the 3rd grade reading and mathematics CRTs as compared to non-transient students not participating in special programs. After including the 3rd grade school factor specified in model 3, a 3rd grade transient student was expected to score approximately 22 points lower than a non-transient 3rd grade student with identical student and school characteristics. The test provided evidence that an independent association between student transiency and 3rd grade academic achievement existed.

Table 53 Regression Coefficients and Summary for Regression of 3rd Combined Reading and Mathematics Score on Transiency Status, Student, and Composite School Factor

	Unstandardized Coefficients		Standardized Coefficients		
	B	*SE*	*β*	*t*	*p*
Model 1					
Constant	604.778	1.434		421.750	<.001
group	-35.503	2.100	-.144	-17.383	<.001
Model 2					
Constant	649.812	1.533		423.778	<.001
group	-28.862	1.892	-.114	-15.257	<.001
g3_iep	-87.518	3.341	-.194	-26.198	<.001
g3_lep	-85.298	2.439	-.275	-34.968	<.001
g3_frl	-52.090	2.014	-.204	-25.859	<.001
Model 3					
Constant	640.161	1.647		388.580	<.001
group	-22.170	1.927	-.087	-11.504	<.001
g3_iep	-89.107	3.316	-.198	-26.874	<.001
g3_lep	-75.595	2.502	-.244	-30.213	<.001
g3_frl	-42.296	2.099	-.166	-20.151	<.001
g3_sch	16.375	1.073	.130	15.255	<.001

Note: Dependent Variable - read_math3, number of students = 14,357

The regression equation and explanation of variables for the 5th grade regression analyses are as follows.

$$Y_{pred} = B_O + B_1X_1 + B_2X_2 + B_3X_3 + B_4X_4 + B_5X_5 + B_6X_6 + B_7X_7 + e_n, \text{ where:}$$

Y_{pred} = predicted value for 5th grade academic achievement,
B_O = Y axis intercept
B_1 = regression coefficient for group
X_1 = value for group
B_2 = regression coefficient for g5_iep
X_2 = value for g5_iep
B_3 = regression coefficient for g5_lep
X_3 = value for g5_lep
B_4 = regression coefficient for g5_frl
X_4 = value for g5_frl
B_5 = regression coefficient for g3_sch
X_5 = value for g3_sch
B_6 = regression coefficient for g4_sch
X_6 = value for g4_sch
B_7 = regression coefficient for g5_sch
X_7 = value for g5_sch
e_n = prediction errors

Multivariate regression analyses were conducted with dummy coded variables to determine the predictive strength of a regression model that used transiency status, student, and school characteristics to predict 5th grade reading achievement. The multivariate regression entered the predictor variables in three discrete blocks. A regression model was created for each of the three blocks and changes in the predictive strength of the models were readily ascertained.

For Model 1, the 5th grade reading achievement was regressed on student transiency alone through a simple regression. Neither the tolerance statistic nor the variance inflation factors was calculated due to this simple regression design. The ANOVA for Model 1 yielded a significant result ($F(1, 12{,}840) = 318.775$, $p<.001$, $R^2 = .024$) which indicated that student transiency status alone was significant in predicting the 5th grade reading score.

For Model 2, the 5th grade reading achievement was regressed on student transiency status and student characteristics. Prior to interpreting the regression analysis, multicollinearity was assessed for each of the predictor variables and neither the tolerance statistic nor the variance inflation factor for each of the predictor variables indicated that multicollinearity was a problem. The ANOVA for Model 2 yielded a significant result (F(4, 12.837) = 967.007, p<.001, R^2 = .232) which indicated that the combination of the predictor variables was significant in predicting the 5th grade reading achievement. In addition to the significant ANOVA, all the predictor variables were significant contributors to the model and a negative association was indicated for all of the predictors. The combination of variables explained slightly more than 23 percent of the variance found in the criterion of 5th grade reading achievement.

For Model 3, the 5th grade reading achievement was regressed on student transiency status student characteristics, and the composite school factors. Multicollinearity was assessed for each of the predictor variables prior to interpreting the regression analysis. Neither the tolerance statistic nor the variance inflation factor for each of the predictor variables indicated that multicollinearity was a problem. The third ANOVA (Model 3) also yielded a significant result (F(7, 12,834) = 609.050, p<.001, R^2 = .249) which indicated that the combination of the predictor variables was significant in predicting the 5th grade reading achievement. In addition to the significant ANOVA for Model 3, each of the predictors (excluding the 2004 and 2005 school composite predictor) contributed significantly to the regression model. The predictor variables describing student characteristics and school factors collectively explained nearly 25 percent of the variance found in the criterion of 5th grade reading achievement.

The multivariate regression coefficients for Models 1, 2, and 3 are presented in Table 54. After using student transiency, student characteristics, and school factors in a regression model, the predicted 5th grade reading scaled score for a student fitting the case where all dummy coded variables were entered as zero was approximately 307. While holding IEP status, LEP status, and FRL status constant, a regression coefficient of -8.920 was calculated for a change in student transiency status. A 5th grade transient student was expected to score approximately 9 points lower than a non-transient student with identical student characteristics. The test provided evidence that an independent association between student transiency and 5th grade reading achievement existed.

Table 54 Regression Coefficients and Summary for 5th Grade Reading Regressed on Transiency Status, Student Characteristics, and Composite School Factors

	Unstandardized Coefficients		Standardized Coefficients		
	B	*SE*	*β*	*t*	*p*
Model 1					
Constant	295.127	.660		447.410	<.001
group	-17.724	.993	-.156	-17.854	<.001
Model 2					
Constant	312.700	.684		457.382	<.001
group	-10.505	.895	-.092	-17.733	<.001
g5_iep	-45.188	1.546	-.227	-29.237	<.001
g5_lep	-42.758	1.467	-.236	-29.140	<.001
g5_frl	-26.734	.930	-.235	-28.752	<.001
Model 3					
Constant	307.167	.762		402.941	<.001
group	-8.920	.901	-.078	-9.903	<.001
g5_iep	-46.551	1.530	-.234	-30.420	<.001
g5_lep	-39.368	1.481	-.218	-26.587	<.001
g5_frl	-17.736	1.074	-.156	-16.514	<.001
g3_sch	1.535	.790	.027	-1.944	.052
g4_sch	-.605	.916	-.011	-.660	.509
g5_sch	8.748	.781	.149	11.196	<.001

Note: Criterion Variable = read_ss5, number of students = 12,141

Multivariate regression analyses were conducted with dummy coded variables to determine the predictive strength of student transience, student characteristics, and school factors on 5th grade mathematics achievement. The multivariate regression entered the predictor variables in three discrete blocks to predict the 5th grade mathematics achievement. A regression model was created for each of the three blocks and changes in the predictive strength of the models were then interpreted.

For Model 1, the 5th grade mathematics achievement was regressed on student transiency alone, resulting in a simple regression. Neither the tolerance statistic nor the variance inflation factors was calculated due to this simple regression design. The ANOVA for Model 1 yielded a significant result (F(1, 12,840) = 281.254, p<.001, R^2 = .021) which indicated that student transiency status alone was significant in predicting the 5th grade mathematics score.

For Model 2, the 5th grade mathematics achievement was regressed on student transiency status and student characteristics. Prior to interpreting the regression analysis, multicollinearity was assessed for each of the predictor variables and neither the tolerance statistic nor the variance inflation factor for any of the predictor variables indicated that multicollinearity was a problem. The ANOVA also yielded a significant result (F(4, 12,837) = 661.779, p<.001, R^2 = .171) which indicated that the combination of the predictor variables was significant in predicting 5th grade mathematics scaled scores. In addition to the significant ANOVA for Model 2, each of the predictors contributed significantly to the regression model. The predictor variables describing student characteristics collectively explained slightly less than 20 percent of the variance found in the criterion of 5th grade mathematics achievement.

For Model 3, the 5th grade mathematics achievement was regressed on student transiency status, student characteristics, and the composite school factors. Multicollinearity was assessed for each of the predictor variables prior to interpreting the regression analysis. Neither the tolerance statistic nor the variance inflation factor for any of the predictor variables indicated that multicollinearity was a problem. The ANOVA for Model 3 also yielded a significant result ($F(7, 12{,}834) = 423.945$, $p<.001$, $R^2 = .187$) which indicated that the combination of the predictor variables was significant in predicting the 5th grade mathematics achievement. In addition to the significant ANOVA for model 3, each of the predictors (excluding the 3rd and 4th grade composite school factors) contributed significantly to the regression model. The predictor variables describing student and school characteristics collectively explained slightly less than 19 percent of the variance found in the criterion of 5th grade mathematics achievement.

The multivariate regression coefficients are presented in Table 55. The predicted 5th grade mathematics scaled score for a student fitting the case where all dummy coded variables were entered as zero would be approximately 329. All things being equal, a 5th grade transient student was expected to score approximately 9 points lower than a non-transient 5th grade student with identical student characteristics. For all the covariates and grouping variable a strong negative association to academic achievement was indicated. The negative regression coefficients for all the predictor variables (covariates) indicated that transient students or students participating in special education, LEP, or FRL programs were expected to score considerably lower on the 5th grade reading CRT as compared to non-transient students not participating in special programs. The test provided evidence that an independent association between student transiency and 5th grade mathematics achievement existed.

Table 55 Regression Coefficients and Summary for 5th Grade Mathematics Regressed on Transiency Status, Student Characteristics, and Composite School Factors

	Unstandardized Coefficients		Standardized Coefficients		
	B	*SE*	*β*	*t*	*p*
Model 1					
Constant	318.909	.680		469.160	<.001
group	-17.156	1.023	-.146	-16.771	<.001
Model 2					
Constant	334.863	.731		458.623	<.001
group	-10.621	.957	-.091	-11.151	<.001
g5_iep	-40.673	1.652	-.199	-24.596	<.001
g5_lep	-32.479	1.568	-.174	-20.710	<.001
g5_frl	-25.822	.994	-.221	-25.984	<.001
Model 3					
Constant	329.353	.816		403.638	<.001
group	-9.123	.964	-.078	-9.462	<.001
g5_iep	-41.982	1.638	-.205	-25.631	<.001
g5_lep	-29.112	1.585	-.156	-18.368	<.001
g5_frl	-16.835	1.150	-.144	-14.644	<.001
g3_sch	1.126	.845	.019	1.332	.183
g4_sch	-.220	.980	-.004	-.224	.823
g5_sch	8.750	.836	.145	10.462	<.001

Note: Criterion Variable = math_ss5, number of students = 12, 141

A multivariate regression using dummy variables and standardized composite school variables was conducted to assess the predictive strength of student characteristics on 5th grade overall academic achievement. The multivariate regression simultaneously entered the predictor variables of group status, student characteristics, and composite school factors to predict the 5th grade overall academic achievement measure of combined reading and math scaled scores.

For Model 1, the 5th grade combined reading and mathematics achievement was regressed on student transiency alone, resulting in a simple regression. Neither the tolerance statistic nor the variance inflation factors was calculated due to the bivariate regression design. The ANOVA for Model 1 yielded a significant result ($F(1, 12{,}840) = 351.043$, $p<.001$, $R^2 = .027$) which indicated that student transiency status alone was significant in predicting the 5th grade combined reading and mathematics scaled score.

For Model 2, the 5th grade combined reading and mathematics achievement was regressed on student transiency status and student characteristics. Multicollinearity was assessed for each of the predictor variables prior to interpreting the regression analysis. Neither the tolerance statistic nor the variance inflation factor for any of the predictor variables indicated that multicollinearity was a problem. The ANOVA for Model 2 yielded a significant result ($F(4, 12{,}837) = 973.958$, $p<.001$, $R^2 = .233$). In addition to the significant ANOVA, each of the predictor variables contributed significantly to the regression model. Using the results of Model 2, the predictor variables describing student characteristics and student transiency status collectively explained approximately 23 percent of the variance found in the criterion variable of 5th grade overall academic achievement.

For Model 3, the 5th grade combined reading and mathematics achievement was regressed on student transiency status, student characteristics, and the composite school factors. Prior to interpreting the regression analysis, multicollinearity was assessed for each of the predictor variables and neither the tolerance statistic nor the variance inflation factor for any of the predictor variables indicated that multicollinearity was a problem. The ANOVA for Model 3 yielded a significant result ($F(7, 12{,}834) = 621.105$, $p<.001$, R^2

= .253) which indicated that the combination of the predictor variables was significant in predicting the 5th grade combined reading and mathematics achievement. In addition to the significant ANOVA, each of the predictors (excluding the 3rd and 4th grade composite school factors) contributed significantly to the regression model. The predictor variables describing student characteristics collectively explained slightly more than 25 percent of the variance found in the criterion of 5th grade combined reading and mathematics achievement.

The multivariate regression coefficients are presented in Table 56 and the table shows that the regression coefficient for the constant was approximately 637. After holding minority status, IEP status, LEP status, and FRL status constant, a regression coefficient of -18.044 was calculated for a change in student transiency grouping from zero (non-transient) to one (transient). In other words, all things being equal, a 5th grade transient student was expected to score about 18 points lower than a non-transient 5th grade student with identical student characteristics. As was the case for the 3rd grade analyses, all the covariates and grouping variables exhibited a strong negative association to academic achievement. The negative regression coefficients for all the predictor variables (covariates) indicated that transient students or students participating in special education, LEP, or FRL programs would be expected to score considerably lower on the 5th grade CRT as compared to non-transient students not participating in special programs. The test provided further evidence of an independent association between student transiency and 5th grade academic achievement.

Table 56 Regression Coefficients and Summary for 5th Grade Combined Reading and Mathematics Regressed on Student Transiency Status, Student Characteristics, and Composite School Factors

	Unstandardized Coefficients		Standardized Coefficients		
	B	*SE*	*Beta*	*t*	*p*
Constant	614.036	1.237		496.382	<.001
group	-34.881	1.862	-.163	-18.736	<.001
Model 2					
Constant	647.563	1.283		504.879	<.001
group	-21.176	1.680	-.099	-12.607	<.001
g5_iep	-85.819	2.900	-.230	-29.597	<.001
g5_lep	-75.237	2.753	-.221	-27.331	<.001
g5_frl	-52.555	1.744	-.246	-30.129	<.001
Model 3					
Constant	636.520	1.428		445.802	<.001
group	-18.044	1.687	-.084	-10.695	<.001
g5_iep	-88.533	2.866	-.237	-30.899	<.001
g5_lep	-68.480	2.773	-.202	-24.692	<.001
g5_frl	-34.572	2.012	-.162	-17.186	<.001
g3_sch	2.661	1.479	.025	1.799	.072
g4_sch	-.824	1.715	-.008	-.481	.631
g5_sch	17.497	1.463	.159	11.956	<.001

Note: Dependent Variable = read_math5, number of students = 12,841

Exploratory Regressions

The results of the statistical tests described above demonstrated that the variable describing student transiency was a significant predictor of reading, mathematics, and combined reading and mathematics for the 3rd and 5th grades. However, it became of interest to establish whether the elimination of the student transience status variable from the regression analyses would explain the same percentage of the variance found in the criterion variables. The regression equation and explanation of variables for the exploratory 3rd grade reading regression analysis are as follows.

$$Y_{pred} = B_O + B_1X_1 + B_2X_2 + B_3X_3 + B_4X_4 + B_5X_5 + e_n\text{, where}$$

Y_{pred} = predicted value for 3rd grade academic achievement,
B_O = Y axis intercept
B_1 = regression coefficient for g3_iep
X_1 = value for g3_iep
B_2 = regression coefficient for g3_lep
X_2 = value for g3_lep
B_3 = regression coefficient for g3_frl
X_3 = value for g3_frl
B_4 = regression coefficient for g3_sch
X_4 = value for g3_sch
e_n = prediction errors

Multivariate regression analyses were conducted with dummy variables to determine the predictive strength of a regression model that used student characteristics (LEP status, FRL status, and IEP status) and the 3rd grade composite school factor (g3_sch) to predict 3rd grade reading achievement. The predictor variables were entered in two groups, student characteristics separate from the school factor to ascertain the changes that resulted for each model.

For Model 1, the 3rd grade reading scaled score was regressed on IEP status, LEP status, and the FRL status. Prior to interpreting the regression analysis, multicollinearity was assessed for each of the predictor variables. Neither the tolerance statistic nor the variance inflation factor for any of the predictor variables indicated that multicollinearity was a problem. The ANOVA for model 1 yielded a significant result ($F(3, 14{,}354) = 1326.718$, $p<.001$, $R^2 = .217$) which indicated that the combination of the predictor variables was significant in predicting the academic achievement of the student groups. Each of the predictor variables contributed significantly to the regression model. The predictor variables describing student characteristics collectively explained approximately 21.7 percent of the variance found in the criterion of 3rd grade reading achievement.

For Model 2, the 3rd grade reading scaled score was regressed on IEP status, LEP status, FRL status, and the 3rd grade composite school factor. Prior to interpreting the regression analysis, multicollinearity was assessed for each of the predictor variables. Neither the tolerance statistic nor the variance inflation factor for each of the predictor variables indicated that multicollinearity was a problem. The ANOVA for model 2 yielded a significant result (F(4, 14,353) = 1102.332, p<.001, R^2 = .235) which indicated that the combination of the predictor variables was significant in predicting the academic achievement of the student groups (Table 57). Each of the predictors contributed significantly to the regression model. The predictors describing student characteristics and the 3rd grade composite school factor collectively explained approximately 23.5 percent of the variance found in the criterion of 3rd grade reading achievement.

Table 57 Regression Coefficients and Summary for 3rd Grade Reading Achievement Regressed on Student Characteristics and Composite School Factor

	Unstandardized Coefficients		Standardized Coefficients		
	B	*SE*	*β*	*t*	*p*
Model 1					
Constant	320.375	.690		463.989	<.001
g3_iep	-46.529	1.768	-.194	-26.311	<.001
g3_lep	-51.367	1.291	-.312	-39.788	<.001
g3_frl	-27.270	1.063	-.201	-25.647	<.001
Model 2					
Constant	316.178	.720		439.185	<.001
g3_iep	-47.599	1.749	-.199	-27.213	<.001
g3_lep	-45.255	1.319	-.275	-34.309	<.001
g3_frl	-20.888	1.107	-.154	-18.864	<.001
g3_sch	10.110	.551	.151	18.336	<.001

Note: Criterion Variable = read_ss3, number of students = 14,357

The regression equation and explanation of variables for the exploratory 5th grade regression analysis were as follows.

$Y_{pred} = B_O + B_1X_1 + B_2X_2 + B_3X_3 + B_4X_4 + B_5X_5 + B_6X_6 + B_7X_7 + e_n$, where:

Y_{pred} = predicted value for 5th grade academic achievement,
B_O = Y axis intercept
B_1 = regression coefficient for g5_iep
X_1 = value for g5_iep
B_2 = regression coefficient for g5_lep
X_2 = value for g5_lep
B_3 = regression coefficient for g5_frl
X_3 = value for g5_frl
B_4 = regression coefficient for g3_sch
X_4 = value for g3_sch
B_5 = regression coefficient for g4_sch
X_5 = value for g4_sch
B_6 = regression coefficient for g5_sch
X_6 = value for g5_sch
e_n = prediction errors

Multivariate regression analyses were conducted with dummy coded variables to determine the predictive strength of a regression model that used student characteristics and school factors to predict 5th grade reading achievement. The multivariate regression entered the predictor variables in two groups. A regression model was created for each of the groups and changes in the predictive strength of the models were readily ascertained.

For Model 1, the 5th grade reading achievement was regressed on student IEP status, LEP status, and FRL status. Prior to interpreting the regression analysis, multicollinearity was assessed for each of the predictor variables and neither the tolerance statistic nor the variance inflation factor for any of the predictor variables indicated that multicollinearity was a problem. The ANOVA for Model 1 yielded a significant result

($F(3, 12.838) = 1230.355$, $p<.001$, $R^2 = .233$) which indicated that the combination of the predictor variables was significant in predicting the 5th grade reading achievement. In addition to the significant ANOVA, all the predictor variables were significant contributors to the model and a negative association was indicated for all of the predictors. The combination of variables explained slightly more than 23 percent of the variance found in the criterion of 5th grade reading achievement.

For Model 2, the 5th grade reading student-level achievement was regressed on student characteristics (IEP status, LEP status, and FRL status)g c and the composite school factors from 2004, 2005, and 2006. Prior to interpreting the regression analysis, multicollinearity was assessed for each of the predictor variables and neither the tolerance statistic nor the variance inflation factor for any of the predictor variables indicated that multicollinearity was a problem. The ANOVA for Model 2 yielded a significant result ($F(6, 12{,}835) = 689.003$, $p<.001$, $R^2 = .243$) which indicated that the combination of the predictor variables was significant in predicting the criterion of 5th grade reading achievement. In addition to the significant ANOVA for Model 2, each of the predictors (excluding the 2005 4th grade school composite predictor) contributed significantly to the regression model. The predictor variables describing student characteristics and composite school factors collectively explained slightly more than 24 percent of the variance found in the criterion of 5th grade reading achievement. The multivariate regression coefficients for the two models are presented in Table 58.

Table 58 Regression Coefficients and Summary for the 5th Grade Reading Achievement Regressed on Student Characteristics and School Factors

	Unstandardized Coefficients		Standardized Coefficients		
	B	*SE*	*β*	*t*	*p*
Model 1					
Constant	308.899	.605		510.372	<.001
g5_iep	-45.145	1.554	-.227	-29.055	<.001
g5_lep	-43.392	1.474	-.240	-29.436	<.001
g5_frl	-28.444	.923	-.250	-30.811	<.001
Model 2					
Constant	303.500	.669		453.776	<.001
g5_iep	-46.657	1.536	-.235	-30.375	<.001
g5_lep	-39.359	1.486	-.217	-26.481	<.001
g5_frl	-18.324	1.076	-.161	-17.023	<.001
g3_sch	2.498	.787	.044	3.175	.002
g4_sch	-.375	.919	-.007	-.408	.683
g5_sch	8.435	.784	.144	10.763	<.001

Note: Criterion Variable – read_ss5

Summary of the Analyses

In addition to descriptive statistics, parametric statistical analyses were conducted to identify potential associations between student academic achievement and student transiency. Independent samples t-tests were carried out to identify whether the mathematics and reading scaled scores differed for transient and non-transient groups. A summary of the independent samples t-tests are presented in Table 59.

Table 59 Summary of Independent Samples t-Tests

IV	DV	*M* for Group		*Cohen's d*	*p*
		Non-Transient	Transient		
transiency	2004 read ss	302.1	284.6	.26	<.001
transiency	2004 math ss	303.0	285.0	.26	<.001
transiency	2004 read+math ss	605.2	569.6	.28	<.001
transiency	2006 read ss	295.7	278.0	.32	<.001
transiency	2006 math ss	318.1	301.5	.29	<.001
transiency	2006 read+math ss	613.7	579.5	.33	<.001

Note: IV = independent variable and DV = dependent variable

Multivariate regression analyses were conducted to determine whether an independent association between transiency status and student achievement could be established because transiency may be related to other student characteristics. To bring about a parsimonious solution to the regression model, ten school level variables were collapsed into a composite school variable for each academic year, saved as a standardized prediction, and entered into the student level regression analyses. The multivariate regression analyses (Table 60) sought to identify potential relationships between student characteristics, school-level factors and demography, and student transiency to academic achievement.

Table 60 Summary of Multivariate Regression Analyses

	MR Test	Predictors			Criterion	R^2
Table 51	Model 1	transiency			2004 read ss	.018
	Model 2	transiency	student		2004 read ss	.227
	Model 3	transiency	student	school	2004 read ss	.240
Table 52	Model 1	transiency			2004 math ss	.017
	Model 2	transiency	student		2004 math ss	.141
	Model 3	transiency	student	school	2004 math ss	.150
Table 53	Model 1	transiency			2004 read+math ss	.021
	Model 2	transiency	student		2004 read+math ss	.212
	Model 3	transiency	student	school	2004 read+math ss	.225
Table 54	Model 1	transiency			2006 read ss	.024
	Model 2	transiency	student		2006 read ss	.232
	Model 3	transiency	student	school	2006 read ss	.249
Table 55	Model 1	transiency			2006 math ss	.021
	Model 2	transiency	student		2006 math ss	.171
	Model 3	transiency	student	school	2006 math ss	.187
Table 56	Model 1	transiency			2006 read+math ss	.027
	Model 2	transiency	student		2006 read+math ss	.233
	Model 3	transiency	student	school	2006 read+math ss	.253
Table 57	Model 1	student			2004 read ss	.217
	Model 2	student	school		2004 read ss	.235
Table 58	Model 1	student			2006 read ss	.233
	Model 2	student	school		2006 read ss	.243

Note: MR = multivariate regression, transiency = student transiency status, student = student IEP, FRL, and LEP status, school = composite school factors.

CHAPTER 5

Discussion

The purpose of the study was to determine if there were potential relationships between academic achievement, school characteristics, and student transience within Nevada elementary schools. This quantitative study was based on data from approximately 15,000 students and 300 elementary schools across the state. The study attempted to identify key variables associated with effective instruction and corresponding improvements in student achievement within elementary schools in the state of Nevada.

Student transiency has been a globally recognized student characteristic for decades but surprisingly few interventions have been emplaced to support the unique needs of this student population (Kerbow, 1996). One purpose of the No Child Left Behind legislation enacted in 2002 was to monitor the learning outcomes of at-risk students in comparison to the learning outcomes of traditionally successful student subpopulations. However, the NCLB legislation has never recognized transient students as an at-risk student population. As a direct result, many states including Nevada have not monitored the academic outcomes of transient students because it was not required. As part of the state's comprehensive assessment program, Nevada requires that all students participate in annual CRT assessments but the state has not publicly reported the scores of transient students in AYP determinations.

As discussed in earlier chapters, the data for this study considered the 3rd and 5th grade achievement for a group of approximately 15,000 students. In addition, selected data related to student and school characteristics for 4th grade students was utilized. A series of univariate and multivariate parametric statistical tests were conducted to answer two closely related research questions centered on student transiency, student characteristics, and school factors. One research question sought to identify differences in learning outcomes on the basis of student transiency status. The second research question sought to identify potential relationships between student characteristics, school factors, and student achievement through a series of statistical analyses increasing in complexity through the introduction of additional predictor variables describing student characteristics and school factors. The statistical analyses that were conducted produced three major findings centered on student transiency and student academic achievement.

Major Findings

Impacts of Current Schools

In order to bring about a parsimonious solution to the regression analyses, composite school factors (one school variable each for the 3rd, 4th, and 5th grades) were created. These variables were described in detail in earlier chapters. The composite school variable that was created was a significant predictor of student achievement in the year of testing (current year) but was not a significant predictor of academic achievement in later years. This finding was consistent for all academic measures for both the 3rd and 5th grades.

For example, the 3rd grade (2004) composite school factor was a significant predictor in each of the 3rd grade regression analyses, where reading, mathematics, and combined reading and mathematics scaled scores were individually regressed on student transiency, student characteristics, and the composite school factor. However, the 3rd grade composite school factor was not a significant predictor of 5th grade student achievement. The 4th grade composite school factor was not a statistically significant predictor in any of the 5th grade regression analyses. Also, the 5th grade composite school factor was a statistically significant predictor of all of the 5th grade academic measures. Thus, the data indicated that the school effects as determined by the composite school factor were not cumulative effects. In other words, the positive or negative 3rd and 4th grade school effects were statistically unrelated to 5th grade achievement.

Collectively, the statistical tests showed that the composite school factor was a significant contributor to the regression predictions when the school factor was concurrent with the academic year. In other words the 3rd grade school factor was a significant predictor of 3rd grade student achievement only and the 5th grade school factor was a significant predictor of 5th grade student achievement only. The finding supports the idea that school factors contribute to current student learning but school factors from previous schools do not contribute to current student learning.

Early efforts to explain the variance found in student academic achievement attributed only a very small proportion of the effects to schools (Coleman, et.al., 1966) but recent work summarized by Marzano (2003) indicated that the association between school factors and student academic was significant and substantial. The individual school factors reported to be associated with reading and mathematics achievement are numerous and some are difficult to quantify. Suffice to say that the combination of students, teachers, school administrators, and school processes have a profound effect on educational outcomes supporting systems theory, which holds that it is the combination of many environmental (student) and input (school) factors that is most closely associated with the system outputs (Hill, 2008).

The research summarized in Chapter 2 indicated that teachers with high proportions of at-risk students were far more likely to cover less curricular content and in a much more superficial manner. In this situation, students were far less likely to actively engage in any meaningful problem solving or reasoning activities, which were arguably necessary to attain higher levels of learning (Darling-Hammond & Youngs, 2002). The literature also indicated that schools with high proportions of at-risk students employed a higher than average percentage of teachers who were less qualified and who had fewer years of teaching experience (Darling-Hammond, 2004). Often, schools with higher than average enrollments of at-risk students were characterized as being less effective because the school-level proficiency rates were lower than for school with lower percentages of at-risk students. After considering the literature, the association between school factors and student achievement in the current year becomes clearer.

Some research examining the association between class size and student academic achievement concluded that the benefits of small class sizes continued to be measurable years after the class size reduction experience (Nye, Hedges, & Konstantopoulos, 1999; 2002). Also, other research concluded that the effects of a highly effective or ineffective teacher were measurable or observable years later (Sanders, 2000); Sanders & Horn, 1998). However, the findings reported from this study did not indicate that the characteristics of previous schools were a significant predictor of current academic achievement.

Predictive Power of Transiency on Achievement

Student transiency was a significant predictor of all of the academic measures. However, effects attributed to student factors and school factors tended to reduce the effects of student transiency. Thus, the combination of student characteristics and school factors alone tended to account for approximately the same proportion of variance as the combination of transiency, student characteristics, and school factors. This general trend was consistent for 3rd and 5th grade results for reading, math, and combined reading and math.

The data provided evidence that an independent association existed between student transiency and the three measures of achievement. However, the relationships between student transiency and measures of academic achievement were diminished when other student characteristics and school factors were included in the analyses. This finding is consistent with that reported by Strand and Demie (2006). Finally, even though the contribution of student transiency to the predictions was reduced, the contribution of student transiency status remained significant and substantial.

For all 3rd grade academic achievement measures, a weak and negative association was indicated for student transiency status. In other words, the regression analyses showed that, as a group, transient students would be expected to perform at academic levels lower than students who did not attend multiple schools during the 1st, 2nd, and 3rd grades. However, the gap that separated the academic achievement of transient and non-transient students was modestly reduced when student and school factors were included in the regression models. The data also provided evidence that a relationship existed between student transiency status and 5th grade academic achievement. Further, the achievement gap based on student transiency status was variably reduced when other student and school factors were included in the analyses.

Transient students have much in common with homeless, immigrant, and migrant school-aged children. For example, children categorized as homeless, migrant, or immigrant were more often than not foreign-born, come from impoverished families, were former or current English language learners, and faced other out of school stressors (Kirby, et. al, 2002; Lennon & Markatos, 2002). Transiency is inextricably intertwined with issues of race, ethnicity, and socioeconomic status thereby making it nearly impossible to differentiate the variance explained by transiency as compared to the variance explained by another variable. However, it was possible to measure changes in the variance explained by the predictors when variables are included or excluded in various models.

Student transiency was a significant predictor of academic achievement but the predictive strength of transiency status on academic achievement was reduced when other student characteristics were considered. This finding was supported by the research synthesized in Chapter 2, which indicated that lower academic achievement was associated with students who attend multiple schools (Benson, et. al., 1979; Blane, 1985; Mott, 2002; Schaller, 1976). The literature also supported the idea that other at-risk factors such as low socioeconomic status and participation in other educational programs (IEP, LEP, and FRL) have a greater impact on academic achievement than did transiency and when the factors were considered collectively (Strand & Demie, 2006); the predictive strength of transiency was reduced as compared to the situation where transiency was considered alone. This finding supports the application of systems theory to education because it was the combination of factors that was most closely associated with the system outputs.

Academic Achievement of Transient Students

The achievement scores of all non-transiency groups were higher than the corresponding scores for transiency groups. The mean scaled score of the transiency group differed from the means scaled score of the non-transiency group on all academic measures for both the 3^{rd} and 5^{th} grades. In every instance and regardless of academic measure, the mean scaled score for the transient group was lower than the mean scaled score for the non-transient group.

The differences between the groups were identified in both the 3^{rd} grade CRT results and the 5^{th} grade CRT results, regardless of content area or metric used in the analyses. Regardless of whether the dependent variable was reading achievement, math achievement, or combined reading and math achievement, the transient group scored significantly lower on the Nevada standardized assessments than did the non-transient group.

The achievement gap for each of the academic measures between transient and non-transient groups was not substantially reduced over time. For example, the achievement gap in reading between transient and non-transient groups was reduced only two-tenths of a scaled point from the 3^{rd} grade to the 5^{th} grade. Also, the achievement gap in mathematics between transient and non-transient groups was reduced slightly more than one scaled point between the 3rd and 5th grade. The scaled point differential based on transiency status alone was not substantially reduced from the 3rd to the 5th grade. This finding indicated that as a group, transient students learned or grew at a rate comparable to non-transient students; however, the achievement gap was not reduced.

The literature synthesized in Chapter 2 indicated that transient students possess academic abilities and skills below those of their non-transient counterparts (Demie, 2002; Mott, 2002) and the findings from this study might appear to support this view. Transiency was sometimes viewed as causing low academic achievement; an assertion not widely ascribed to or supported by these findings. Quite to the contrary, these findings indicated that some transient students perform at academic levels far above many non-transient students. Transiency indirectly affects student learning through increased domestic stress or inadequate social adjustment or directly affects the educational process through the disruption of the delivery of a coherent curriculum or by excessive student absenteeism (Gamoran, 1986; Kerbow, 1996; Romero & Lee, 2007; Smith, Fien, & Paine, 2008; Wood, Halfon, Scarlata, Newacheck, & Nessim, 1996). Academically successful transient students have either overcome or avoided domestic stressors or have adjusted to the social difficulties imposed by transiency.

Implications for Practice

In this study, student transiency status, student characteristics, and school factors explained only a small percentage of the variance in student achievement. Regardless of the manner in which the factors were excluded or included in the regression models, the models explained only about 25 percent of the variance in the dependent variable. It follows that approximately 75 percent of the variance found in the criterion of student academic achievement was associated with variables or factors not considered in this study.

Of the total variance exhibited by the various criterions, 13 to 20 percent of the variance was explained by the student characteristics and approximately 5 to 10 percent of the variance was explained by the composite school factors. These findings do not support literature asserting that student characteristics account for approximately 80 percent of the variance found in student academic achievement (Coleman, et. al. 1966).

However, the findings of this study suggest that the following should be considered as educational leaders attempt to promote system-level improvements.

- Because student transiency was found to be associated with other environmental factors characteristic of at-risk student factors such as participation in the IEP, LEP, and FRL programs, it should be possible to increase the overall student achievement (system outputs) by providing appropriate, teaching, curriculum, and related supports for all at-risk students. Higher numbers of children with an IEP can become proficient in reading and mathematics when their learning needs are supported by individualized instruction and appropriate accommodations are provided. Children participating in LEP programs also require small group instruction by specially trained educators and, in particular, the time necessary to master a second language. By delivering a high quality curriculum and providing special services to support IEP and LEP program participants, not only would their achievement levels be expected to increase but the children would be expected to acquire the skills necessary to be proficient in reading and mathematics.

- Educational leaders are not in a good position to reduce student transiency because most school changes originate outside of school in relationship to family decisions. However, school leaders and district administrators are in a position to mitigate transiency by reducing school rezoning, eliminating school closures, and limiting open enrollment policies.
- The ability of school leaders to reduce the percentage of students participating in the FRL program is close to negligible. However, school leaders and administrators can provide students from impoverished families with some of their basic needs as a means to reduce the negative impacts of low economic status. At-risk students can also be supported by before- and after-school programs with an academic focus and as a social support to ease some of the hardships faced by the poor.
- School characteristics are associated to student achievement and educators have considerable discretion with respect to controlling school factors. All students would be expected to benefit academically through the employment of greater numbers of highly qualified educators. The relationship between school factors and student achievement means that educators must thoughtfully consider all aspects of the school when developing school improvement plans, a recurring theme in systems theory.

- The findings of this study suggest that not only are teacher characteristics and school factors (system inputs/throughputs) related to student learning, the factors may be the major determinants of student academic achievement.
- Most educators would agree that a high quality curriculum is essential for higher levels of student academic achievement. This might require purchasing and implementing multiple or hybrid curricula to meet the different learning needs of the diverse population served in our public schools; a fact argued for long ago by Jerome Bruner (1960).

The findings from this study suggest that school-level or more likely the classroom-level factors at some educational settings are supporting the academic achievement of all students. School leaders should work to create environments that are supportive of effective teaching and learning for all in the school. Over the recent decades, the curriculum implemented in the classroom has undergone the greatest changes. The curriculum delivered to most students has been narrowed as a result of standardized testing and has been broken down into disjointed pieces that are easy to teach to but difficult to reassemble in young minds. Closer attention to the inner workings of classrooms and the delivery of curriculum will most likely be required to identify factors that contribute to student learning.

Implications for Policy

The research was guided by the underpinnings of systems theory, which adheres to the idea that system outputs are related to complex interactions of many variables. The appropriate study of systems theory in the context of public school education requires the study of multiple variables and student-level databases. System theory holds that it is the interaction of exogenous and endogenous factors that best explains changes in the system outputs, which in this case is student academic achievement (Senge, 2000).

The findings of this study suggest that the following should be considered as educational policy makers attempt to promote system-level improvements.

- Transient students are not presently considered an at-risk subpopulation under the NCLB legislation but, perhaps, should be considered as such. The findings reported from this study indicate an achievement gap between transient and non-transient students; at the very least, formal monitoring of this achievement gap should be undertaken at the state level to determine whether additional actions are necessary.
- Education policy makers should consider expanding programs to support the social and educational challenges faced by transient students; these programs could be parallel to those provided to migrant and homeless children.
- The current school characteristics are critically important determinants of student learning (system outputs). Rather than attributing a student's lack of success to another teacher or school at another time, the focus must shift to supporting every student in their current placement by maximizing the effectiveness of every school.
- Because the educational progress of transient students is largely unreported and not monitored (lack of system feedback), little effort is directed at supporting transient students because school staff expect the transient student to move on to another school. School personnel should be held accountable

for the learning of every student regardless of when the student enters or exits the school.

- Current financial hardships are causing many families to move and educational policy that assumes a static state only serves to exacerbate the challenges of the displaced. Policy makers should support and encourage changes to instructional practice in venues attended by high percentages of transient students.

Limitations of the Study

The design was *post facto*, which means the independent variable was not manipulated but was assigned based on traits or characteristics the subject already possesses. This *post facto* research design placed the students in one of two groups (transient or non-transient) and measured them all based on the metric of academic achievement. The study was limited by the fact that the *post-facto* design did not allow for causal relationships but does allow for better-than-chance predictions. The *post facto* design utilized began with a set of results represented by the dependent variable and relationships or differences in the independent variable were utilized to explain changes in the dependent variable. This *post facto* design was limited by the fact that the researcher was unable to observe the phenomena and depends on the researcher's ability to explain events after the fact.

The design conveniently categorized all students as being either transient or non-transient. In doing so, all transient students were assumed to be equal which is not believed to be the case. For example, the transiency metric of a student who enrolled in a new school because of school rezoning was identical to the transiency measure of a student who was homeless and had been enrolled in numerous schools over a short time span. The generalization of the effects of transiency was limited by convenient grouping based on transiency status.

To be included in the study, students were required to have participated in both the 3rd and 5th grade CRT administrations in 2004 and 2006. The records for students not meeting this requirement were deleted. Although the deletion of these records was systematic in the sense of following a set of business rules, the deleted records may not have been random. The generalization of findings may be limited because the deletion of specific student records may have biased the study cohort by excluding or including a non-representative number of students with particular characteristics. However, there is no evidence indicating that the student cohort is biased in any manner.

The statistical tests conducted to identify differences in student academic achievement showed that significant group differences existed on the basis of student transiency status, a finding supported in part by previous research studies. Findings from this work show that when additional variables were utilized to predict academic achievement, the achievement gap distinguishing transient from non-transient students was modestly narrowed. Because student transiency was associated to other student factors measuring socioeconomic status and participation in other special programs, the actual effects of student transiency on academic achievement could not be totally parsed out. This reality is supported by systems theory, which asserts that it is difficult or impossible to attribute system output (student achievement in this case) differences to a single factor.

Repeated statistical tests, similar to those utilized in this study, without corrections for alpha slippage increase the likelihood of Type-1 errors. The Bonferroni correction systematically reduces the alpha level depending on the number of repeated tests. As was described in Chapter 3, the alpha level was reduced to 0.025 for the independent samples t-tests and the multivariate regression analyses where repeated measures were conducted using reading and mathematics scaled scores individually as the dependent variable. Restoring the alpha level to 0.05 for analyses where the combined reading and mathematics achievement score was utilized may have increased the possibility of committing a Type-1 error. Committing a Type-1 error in this manner is acknowledged as a possible limitation.

Most in education support standardized achievement tests for some purposes but a much smaller number would support grade promotion criteria on the basis of demonstrated proficiency on the CRTs. The Nevada CRTs uses a horizontal scale for scoring which is particularly sensitive to raw score changes proximal the proficient/non-proficient cut score as compared to the outlying cut scores. In other words, a few additional raw score points at the low end of the scale are capable of greatly increasing the scaled score, while the same raw score point change near the proficiency cut makes only a small difference in scaled score. This scale sensitivity is capable of creating the appearance of substantial growth or learning when this is not the case. When student achievement scores are the focus, as was the case with this study, the use of raw scores may be more appropriate. However, few would argue that the results of this study are significantly diminished on account of the use of scaled scores as compared to raw scores.

Recommendations for Further Work

1. Even though the statistical differences in student academic achievement between transient and non-transient groups were identified and were significant, it might be useful to determine the nature of the association between transiency and student achievement after prior learning was considered.
2. This study conveniently treats all transiency as being the same but it may well be that transient students who experienced a high number of school changes may attain different levels of achievement than students who experienced a low number of school changes. To this end, further research emphasizing the degree of transiency may better explain the association between student transiency and academic achievement.
3. Since the inception of this study, Nevada began administering CRTs in all grades 3rd through 8th. The inclusion of 4th grade CRT data in a study like this would serve well to increase the ability to identify potential differences in academic achievement based on student transiency.
4. Also since this study was initiated, the Nevada educational information system (SAIN) has been advanced to the point where student cohorts like the one manually created here could be electronically created and cleaned. This would provide for the opportunity to simultaneously work with multiple cohorts rather than only one.
5. Nevada expects to implement a teacher unique identification system by the end of the 2010 assessment year, which may provide the opportunity to include teacher specific information in the regression model. The inclusion of teacher licensing information,

teaching experience, and other teacher-level data may contribute substantially to the classroom-level factor which was largely absent from this work.

Conclusion

Most students in Nevada elementary schools change teachers every year and changes in the school are an accepted part of the school experience. However, it appears likely that some schools are better prepared to meet the needs of transient students because, all things being equal, transient students at some schools show greater academic growth than do transient students do at other schools. Attention to curriculum and school processes may prove to be important in serving the educational needs of transient students.

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Appendix A

University of Nevada, Reno

Office of Human Research Protection
205 Ross Hall / 331, Reno, Nevada 89557
775.327.2368 / 775.327.2369 fax
www.unr.edu/ohrp

Certification of Approval of Exempt Research

Date: April 27, 2010

To: Andrew Parr
Department of Geology
1575 Krupp Cir
Reno, NV 89509

CC: William Thornton PhD
Department of Educational Leadership / 0283

Exemption:	**E09/10-039**
	A Quantitative Study of the Characteristics of Transient and Non-Transient Students in Nevada Elementary Schools
Sponsor:	**N/A**
VA Research:	**No**
UNR Assurance Number:	**FWA00002306**
Action Item:	**New Protocol: Exempt Research**
Level of Review for Action:	**Exempt**
Exemption Category	**4**
Action Date:	**4/27/10**
Approval Date:	**4/27/10**
Approval Period	**12 months**
Expiration Date:	**4/27/11**

This approval is for:

- Application for exempt research, 4/9/10, as submitted

PI responsibilities

- Proposed changes must be reviewed and approved by the Office of Human Research Protection (OHRP) prior to initiation, except where necessary to eliminate apparent immediate hazards to subjects. Such exceptions must be reported to the OHRP at once.
- Any unanticipated problems which may increase the risks to human subjects or unanticipated adverse events must be reported to the OHRP within 10 days of becoming aware of the issue.
- Exempt applications are not renewable and are not subject to continuing review. If you would like to continue the research or analysis of identifiable data beyond the expiration date, you will need to submit a new Application for Exempt Research to the Office of Human Research Protection for review and approval.

Please reference the exemption number above on all related correspondence with the OHRP. If any additional information is necessary, please contact J. Logan Hamill at 775.327.2368.

Susan Ford Publicover, MA, CIP, OHRP Director

Cert_exempt_studentPI