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Kindergarten Program Type as a Predictor for Reading Achievement in Third Grade

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by

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Abstract

Kindergarten programming, being full and half-day, has been in the forefront of educational topics since 1837. Today, proponents advocate for full-day programming for various reasons including the notion that increased time will lead to increased academics such as in reading. Educational stakeholders have relied on empirical evidence about student achievement and the potential long-term effects therein to support full-day kindergarten programming. Although short-term research presents positive results in support of full-day kindergarten, the results are limited and mixed with regard to long-term impacts. This is especially true when considering the relationship between kindergarten program type and reading achievement by the end of third grade. This study examined kindergarten program type, and other select variables, as predictors for reading achievement in third grade. Results indicated that reading achievement could be predicted, given specific variables, including kindergarten program type. Regression analyses resulted in the variables full-day kindergarten, possessing an IEP, being deemed as LEP, and being of male gender each presenting a negative effect in the final regression equation. Additional chi square tests of independence resulted in the finding of a high prevalence of students enrolled in full-day kindergarten were also those students deemed as LEP. Implications for practice cannot be made at this time with one exception: to recommend further research. This study adds to the body of literature related to kindergarten program type and includes implications for leadership in early childhood education and kindergarten programming.

Dedication

This project is dedicated, in honor, to

Todd James Regan...

Thank you for the years of countless memories, everlasting love,

friendship, and our beautiful family.

Your love gave me the courage to live life,

take care of our children,

change what needed to be changed,

focus on what mattered most,

and finish all things worth pursuing...

You believed in me before I truly believed in myself…

Thank you.

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Thank you God for all of the gifts you have brought to my world. Thank you to my family and friends, near and far. You were always in my heart and on my mind. Thank you to my children, whose shining spirits inspired me daily: Keely, Kassidy, Kaelob, Kaiden, Macy, Biron, Jocobi, and Ahlin Lilly. May this project inspire each of you to follow your own path in finding success and happiness. Thank you to my husband, Victor, for being a wonderful father, friend, partner, and husband. Through daily life challenges and celebrations, your unconditional love and silly humor kept me going. You always encouraged, supported, and reminded me… "*No worries, about a thing… cuz… every little thing, is gonna be alright*" when I needed it most. Thank you, my Noah… I love you. ~

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CHAPTER ONE

Introduction to the Study

Kindergarten represents a time of rapid growth and learning when children acquire essential skills and knowledge. This is especially true in regards to reading (Denton, West, & Walston, 2003). Reading is an essential skill that is fundamental to all other academic success. Reading acquisition and knowledge in basic skills, vocabulary, and comprehension are the foundation grounded in educational instruction as the precursor to other subjects (Denton et al., 2003). Specific family and school characteristics have been related to children's acquisition and knowledge of reading skills (Denton et al., 2003). Specific family characteristics included: ethnicity; mother's highest educational level attained; socioeconomic status; single parent households; primary language other than English; "literacy-rich" home environment; positive approaches to learning; and general health (Denton et al., 2003). Specific school characteristics included: kindergarten program type (full or half-day); instructional practices (teacher-directed or child-initiated activities being whole or small groups and individualized experiences); and time spent on types of reading activities in kindergarten (Denton et al., 2003). Denton, West, and Walston (2003) indicated children who attend full-day kindergarten programs have increased opportunities for exposure to a variety of reading activities. Findings from the Early Childhood Longitudinal Study – Kindergarten (ECLS-K) study (2004) suggested that students enrolled in full-day kindergarten make greater reading achievement gains during the kindergarten year than their half-day peers.

The notion of full-day kindergarten is not a new concept. Kindergarten historically started as a full-day program in the United States (Holmes & McConnell,

1990; Walkowiak, 2007). Changes in social and economic conditions resulted in shifts in kindergarten programming. During World War II and The Great Depression, funding, space limitations, and teacher shortages called for half-day kindergarten programming (Estes, 2007; Walkowiak, 2007). Half-day programming remained the most common form of publicly funded kindergarten throughout World War II. Half-day kindergarten continued when the population grew during the *baby boom* years as classroom space was limited (Oelerich, 1984; Puleo, 1988; Walkowiak, 2007).

Full-day kindergarten was increasingly the norm as the population slowed and more facility space was available (Walkowiak, 2007). From 1970 to 1990, the proportion of students attending full-day kindergarten increased from 13% to 45% (Elicker & Mathur, 1997; Walkowiak, 2007). By the year 1999, more than 61% all public or private schools offered at least one full-day kindergarten program and 56% of all students were enrolled in a full-day kindergarten program (Rathbun & West, 2004; Walkowiak, 2007; Walston & West, 2004). In public schools, 54% were reported as enrolled full-day kindergarten compared to 67% of private school attendees (Estes, 2007; Walston, 2004). In 2006, 68% of American kindergarten children were reported as enrolled in public and private full-day kindergarten programs and 32% were in half-day programs (Oliver, 2007).

Despite the increasing prevalence of full-day kindergarten programs, countervailing factors exist and require consideration. Financial challenges and limited budgets arose from The Great Recession of 2008. This presents challenges in regards to allocating resources towards necessary personnel, professional development, facility space, equipment, and curriculum required to offer full-day kindergarten programs.

Educational stakeholders make programming decisions based on limited evidence relating to the long-term impact of full versus half-day kindergarten, especially in regards to reading achievement. Educational stakeholders should be able to rely on existing research, empirical evidence about student achievement, and the long-term effects to support either kindergarten program type. Although short-term research presents positive results in support of full-day kindergarten, the research is limited and results are mixed with regard to the long-term impacts. This is especially true when considering the relationships between kindergarten program type and reading achievement by the end of third grade.

This study adds to the understanding of the relationship of kindergarten program type, full versus half-day kindergarten, as a predictor for reading achievement in the third grade. This chapter will further examine the topic in eight sections: a statement of the problem; the purpose of the study; research questions; significance of the study; definition of terms; limitations and delimitations; assumptions; and in the organization of study.

Statement of the Problem

There is a perception that students who enrolled in publically funded full-day kindergarten programs may initially enter with skills and knowledge below those of their peers in half-day programs. This perception is based on the notion that students who participate in full-day kindergarten have increased academic achievement in reading by the third grade. This perception further notes that increased time in a full-day kindergarten will result in decreasing the achievement gap, which is present at the onset of kindergarten. It further notes students will sustain reading achievement gains by the

third grade. Unfortunately, educational stakeholders assume the existence of causal relationships and fund such programs accordingly. There is limited research with respect to long-term impacts of variables such as kindergarten program type, school, and student characteristics on academic achievement in reading.

Purpose of the Study

The purpose of this post-hoc study is to determine if reading achievement for third grade can be predicted from knowledge of selected variables. The variables that were investigated included: kindergarten program type, school and student characteristics, and a measure of academic achievement. This quantitative research study examined data from students who were enrolled in either full or half-day kindergarten programs during the 2006-2007 school year and completed the Nevada Criterion Referenced Test (CRT) in third grade during the 2009-2010 school year.

Research Question

This study examined the relationships between variables related to kindergarten program type, student, and school characteristics to academic achievement in reading on the Criterion-Referenced Test (CRT) in the third grade. The following research question guided this study.

Is third grade CRT reading achievement predictable from knowledge of selected variables (kindergarten type, AYP designation in kindergarten year, limited English proficiency status, gender, race/ethnicity, special education with IEP, same school, mathematics achievement)?

Significance of the Study

Educational stakeholders currently make programming decisions based on limited evidence relating to the long-term impact of full versus half-day kindergarten, especially in regards to reading achievement. Increasing accountability in public education continues to drive standards, curriculum, and instruction especially related to reading. The economic conditions of state and district budgets, due to The Recession of 2008, continue to interfere with resources associated with quality education. Although some financial assistance is available through national mechanisms, much of those funds are tailored to specific programs. Limited resources are available for public education resulted in budgets being aligned with whether districts are providing full or half-day kindergarten programs. Reports show more than 65 % of the nation's children attend full-day kindergarten programming in some capacity whether it be based on state, grant, or private funds (Shin, 2005).

The school district in a western state conducted a study on the 2006-2007 kindergarten cohort using a pre-post comparison. This study reportedly yielded positive results in eliminating or narrowing the achievement gap between students attending full and half-day programs, which were reported present at the start of kindergarten. In addition, students deemed Limited English Proficient (LEP) and attended full-day kindergarten surpassed their half-day kindergarten peers in all areas tested including: sounds to writing; high frequency words; letter sound identification; letter name identification; rhyming; reading numbers 1-20 out of order; and matching numerals 1-20. No additional studies have been conducted on the kindergarten cohort of 2006-2007 to date. No additional studies related to the long term effects of the 2006-2007 full verses

half-day kindergarten programs have been published as of the start of this study. The 2009-2010 school year was the first time the cohort participated in the Criterion Referenced Test as required by the State of Nevada. Analysis of the data is warranted to determine the long-term impacts of the full-day kindergarten program cohort in regards to predicting reading achievement on the Criterion-Referenced Test required as part of the Annual Yearly Progress under No Child Left Behind Act. To date there has been no analysis conducted to yield such results.

Educational stakeholders should be able to rely on existing research and empirical evidence about student achievement and the long-term effect therein to support either kindergarten program type. Short-term research presents positive results in support of full-day kindergarten. The research is limited and results are mixed with regard to the long-term impacts. This is especially true when considering the relationship between kindergarten program type and reading achievement by the end of third grade. Reading is an essential skill that is fundamental to all other academics. Reading acquisition and knowledge in basic skills, vocabulary, and comprehension are the foundation of educational instruction and are precursors to other subjects. Reading is known as a foundation for overall school success. Proponents of full-day kindergarten indicate that increased time in the kindergarten program will result in an overall increased academic achievement and especially in reading.

This study provides insight to the effects of predicting reading achievement on the Criterion Referenced Test in third grade based on full verses half-day kindergarten programming as a variable and other school and student characteristics. This research benefits educational stakeholders and legislators in legislative sessions as policy and

programming decisions drive funding allocations in the Nevada K-12 system. By understanding kindergarten programming and the potential long-term impacts therein, educational stakeholders can make informed decisions regarding funding full-day kindergarten programs.

Definition of Terms

For the purpose of this study, the following terms will be defined as stated in this section.

Academic Outcomes

This term referred to the academic effects by score as it relates to mathematical or reading scores on the Criterion Referenced Test (CRT).

Adequate Yearly Progress (AYP)

The term is used to describe a yearly designation of achievement deeming proficiency based on a state established criteria for proficiency under the NCLB Act.

Alternate Day Kindergarten

Alternate day kindergarten referred to an every other day schedule for students. Typically these are full-day program options but students meet with teachers for instruction every other day. While this is not a focus of this study, there are other studies referenced that included alternate day schedules in their research.

Annual Measurable Objective

This term referred to the state defined annual measurement of achievement under the NCLB Act.

Criterion Referenced Test (CRT)

This term referred to a high stakes assessment adopted by the state of Nevada and designed to measure annual progress of the Annual Measurable Objective (AMO) under the NCLB Act. The Criterion-Referenced Test is published through Measured Progress, a national testing company who distributes and scores individual tests. Measured Progress currently serves seven states in their implementation of annual progress tests under the AMO.

Developmentally Appropriate Practice (DAP)

This term referred to the educational program in early childhood where practice is grounded in the research on child development and learning and in the knowledge base regarding educational effectiveness (Copple & Bredekamp, 2009).

Early Childhood Education (ECE)

According to the National Association for the Education of Young Children (NAEYC) (2009), this term referred to an educational program that serves children from birth through age eight.

Educational Stakeholders

This term relates to those persons who hold a stake in the K-12 educational institution, which may include: school and district level personnel; legislators and policy makers; parents; and the community.

English Language Learner (ELL)

The term English Language Learner (ELL) is used to describe a student who is national-origin-minority student who is a non-native speaker of English who is limited in their English proficiency. In the school district where the study is conducted, parents have

deemed another language as the primary language spoken in the home during the enrollment process. This term is found in the literature to be interchangeable with the term Limited English Proficient (LEP).

Family

This term referred to the primary caregivers with whom the child resides.

Full-day Kindergarten (FDK)

This term referred to a kindergarten program whereas the scheduled time of attendance is 240 minutes or more.

Half-day Kindergarten (HDK)

This term referred to a kindergarten of program whereas the scheduled time of attendance is found between 120 minutes to 150 minutes of instruction. This can be a morning or afternoon session of scheduled time.

Instructional Time

This term referred to the amount of time spent in instructional activities throughout the school day.

Kindergarten Student

This term referred to a student who is enrolled in a kindergarten class. According to NAEYC (2011), the age range for a kindergarten student is a child who is enrolled in a kindergarten class between 4 ¾ to 7 ¼ years of age by September 30.

Kindergarten Teacher

This term referred to the licensed employee who is assigned to work with those students enrolled in kindergarten.

Limited English Proficient (LEP)

This term referred to describe a student who is national-origin-minority student who is a non-native speaker of English who is limited in their English proficiency. In this school district, parents have deemed another language as the primary language spoken in the home during the enrollment process. This term is found in the literature to be interchangeable with the term English Language Learner (ELL).

Mathematics Achievement

This term is used in reference to the measurement of a student's ability in the areas of numbers and operations, algebra, measurement, geometry, and data analysis. This achievement is measured by students' individual CRT results.

No Child Left Behind (NCLB)

The Act enacted under former President Bush that established academic benchmarks of achievement whereas all students will be proficient by the year 2014.

Reading Achievement

This term is used in reference to the measurement of a student's ability in the areas of word analysis, literary and expository texts using three levels of the Depth of Knowledge (DOK) matrix. This achievement is measured by students' individual CRT results.

School District

This term referred to the school district where the study is conducted.

Social Outcomes

This term referred to the social effects as they relate to the interpersonal relationship with others.

Title 1

The term Title 1 is used to describe the Title 1 section of the Elementary and Secondary Education Act (PL 89-10). The Title 1 program is responsible for providing the largest federal aid to public schools as determined by the percentage of students deemed at-risk, based free and reduced breakfast/lunch eligibility, at a given school site. During the 2006-2007 school year, Title 1 eligible was designated at the federal level to be a 40% poverty threshold. The school district where the data was derived designated Title schools as those schools meeting a 60% poverty threshold. The schools in which poverty thresholds fell between the 40% federal designation and the 60% school district designation were designated as Title 1 eligible, but not served by the school district. For the purpose of this study, the schools who received funding for full day kindergarten were those schools meeting the 55% poverty threshold under Title 1 and Title 1 eligible, but not served categories.

Title 1 eligible, not served

The term Title 1 eligible, not served is used to describe the schools that attained the 55% poverty threshold to be eligible for Title 1 funding but did not receive Title 1 allocations from the school district. While the federal threshold for Title 1 eligibility was at 40%, the school district only served those schools where 60% of the students were eligible for free and reduced breakfast/lunch. For the purpose of this study, the schools who received funding for full day kindergarten Title 1 eligible, not served were those schools meeting the 55% poverty threshold. The Title 1 eligible not served who received full day kindergarten allocations were defined as those schools between 55% and 60%.

Transient

This term referred to whether or not a student has remained in the same school in the school district between the start date of the school year at a given school and the last day of school at a given school. In the school district, specific data related to CRT examinations is coded as continuously enrolled between "count day" and the completion date of the CRT examination each school year.

Limitations

The study was limited to the number of schools in the particular state and school district where the study is conducted. Students in the study were selected based on two primary criteria: those who attended free and appropriate public kindergarten in either half or full-day kindergarten programs in the 2006-2007 school year and completed the Criterion Referenced Test (CRT) in third grade during the 2009-2010 school year. All students who met the primary criteria were included regardless of gender, ethnicity, age, or socio-economic status. This study was limited by enrollment in the school district in which this study was conducted in both kindergarten and third grade and who were not retained at any time between. The study was further limited by including all students who were continuously enrolled during the first cohort of full-day kindergarten in school district during the 2006-2007 school year and the completion of the CRT proficiency examination during the 2009-2010 school year were included in the data analysis. The study was limited by students who participated in 100% of each of the subtests required to complete a composite score for analysis in either reading or mathematics respectively. This study was limited as data was derived from the first kindergarten cohort where full-day kindergarten was implemented in the school district. The study was limited by the

study design being the first study using kindergarten program type as a predictor of reading achievement.

Specific family and school characteristics were identified as being related to children's acquisition and knowledge of reading skills and may be a limitation in this study. Specific family characteristics considered: ethnicity; mother's highest educational level attained; socioeconomic status; single parent households; primary language other than English; "literacy-rich" home environment; positive approaches to learning; and general health. Specific school characteristics considered: kindergarten program type (full or half-day); instructional practices (teacher-directed or child-initiated activities being whole or small groups and individualized experiences); and time spent on and types of reading activities in kindergarten.

Same school data may have posed a limitation in this study. Continuous enrollment or transiency between and among schools may not be included in the data set. Students attending the same school during the kindergarten year of 2006-2007 and the third grade year of 2009-2010 were tracked in the database. However, due to the way data was coded and maintained in the database, students may have moved during their first, second, or part of their third grade year and returned to the original school in which they attended kindergarten by the time they took the CRT. Students who moved between schools or out of the district and back between the 2006-2007 school year and the completion of the CRT in 2009-2010 school were coded as not being in the same school.

Delimitations

Data analysis was conducted on students enrolled in kindergarten for the 2006-2007 school year and the respective third grade for the 2009-2010 school year in the

School district. Students who may have attended other districts, private school, charter schools, home schooling for their kindergarten or third grade year were not included in this study. Students who attended the school district tuition based full-day kindergarten were not included in this study.

Assumptions

Criterion Referenced Test

The CRT examination measures reading and mathematics respectively when students participated in completing those sections.

Data Accuracy

Data analyzed in this study used pre-existing data from kindergarten cohort of 2006-2007 and the third grade CRT cohort of 2009-2010. Data was coded, verified, and maintained in the school district database. Data was assumed accurate when it was received.

Student Achievement

All students were expected to show academic progress in reading and mathematics between kindergarten and third grade.

Test Accommodations

All students requiring specific accommodations due to a disability or special education need were implemented to ensure the results of the test were based on achievement in the objectives of that portion of the test.

Test Environment

All students participated in the administration of the CRT examination with the same testing environment as all students in the school district and according to the guidelines as published and presented by the Nevada Department of Education.

Teacher Instruction

All teachers were expected to uphold district standards developing and implementing instructional opportunities for students in all grades including the effected related testing grades being kindergarten through third grade.

Testing Irregularities

All CRT testing irregularities were reported accordingly by the appropriate test administrator and test coordinators at each site so those tests will be disqualified and not included as part of this study.

Test Performance

All students are expected to try their best when participating in the CRT exam.

Organization of the Study

The organization of the study included five chapters. Chapter 1 includes: the introduction, the statement of the problem, purpose of the study, research question, significance of the study, definition of terms, limitations of the study, delimitations of the study, and the assumptions of the study. Chapter 2 presents a review of the literature which includes: an introduction to the literature and theoretical framework; an overview of Frederick Froebel, the father of kindergarten, and his relevant contributions; a brief history of kindergarten in the United States; an overview of full-day and half-day kindergarten programing in the United States; an overview of the increasing need for full-day kindergarten; a review of recent studies on the differences in achievement between full and half-day kindergarten programs; and a summary of the research. Chapter 3 describes the methodology used for this research study included: data acquisition; instrumentation; and data analysis procedures. Chapter 4 presents the findings of the

study included: any demographic information; and results of the data as related to the research question. Chapter 5 provides several key components: a summary of the study; discussion of the findings; conclusions and implications; and recommendations for future research.

CHAPTER TWO

Literature Review

The following literature review includes: background and historical context of kindergarten; the increasing need for kindergarten; barriers to consider; reading and kindergarten; and a summary of current and relevant literature regarding research studies related to kindergarten and reading or other related variables. The chapter begins with a theoretical framework that delineates the underlying theories in the literature. Related research on the increasing need for full-day kindergarten is presented including: family dynamics; increasing accountability; diversity and limited English proficiency; achievement gap and workforce development; child development theory; and instructional time. Barriers and considerations to full-day kindergarten are explored through funding and tracking mechanisms across the United States and Nevada. A summary of reading instruction and kindergarten is presented. Recent and relevant research on kindergarten and reading is presented through seven studies selected from a rich and complex body of research on kindergarten programming. This chapter concludes with conclusions and a summary.

Background and Historical Context of the Study

This section presents the background and historical context of kindergarten. Since inception in 1837, kindergarten has remained in the forefront of education discourse. This section presents a brief overview of the historical context surrounding kindergarten including pedagogy, social complexities that challenged the status quo and the emigration from Europe to the United States where a Free Kindergarten movement took root.

Friedrich Wilhelm Froebel (1782-1852), known as the Father of Kindergarten, established the first kindergarten or "a child's garden" in Blankenburgh, Germany (Allen, 2006; Baader, 2004; Bryant & Clifford, 1992; Estes, 2007; Hall & Mansfield, 1893; Holmes & McConnell, 1990; Lee, Burkam, Ready, Honigman, & Meisels, 2006; Nawrotzki, 2006, 2009; Shapiro, 1983; Walkowiak, 2007). Froebel used the metaphor of a child to that of a seed whereas the seed will grow with the proper conditions and flourish into a fruit bearing plant while the teachers' role is similar to the gardener. Thus, the term kindergarten was established and still exists today to describe the transition year into traditional public schooling (Morrison, 2004).

Froebel's school, based on the teachings of Johann Heinrich Pestalozzi and Jean-Jacques Rousseau, established a focus on curriculum, learning, methodology, and teacher training. Froebel's institution of kindergarten called for a systematic curriculum to include gifts, occupations, songs, educational games, and a planned environment. Froebel's gifts represented the material form of a child's perception through a series of tangible and progressive toys such as balls or building blocks (Bryant & Clifford, 1992; Elicker & Mathur, 1997; Estes, 2007; Morrison, 2004; Shapiro, 1983). Occupations included drawing, paper weaving, folding, and sewing which were intended to extend the gift experiences. Songs were much like the songs used during circle times we see in today's kindergarten to promote social harmony. Educational games were based on the development of young children to extend gifts and occupations through social harmony (Bryant & Clifford, 1992; Elicker & Mathur, 1997; Estes, 2007; Morrison, 2004; Shapiro, 1983). The environment was important in creating a learning utopia removed from the family (Shapiro, 1983). Froebel called for an adjoining garden or at least a room that

mimicked a garden with a great deal of sun, plants, and animals (Shapiro, 1983). He reiterated the importance of furniture, materials, and space being appropriate for young children and their developmental needs (Shapiro, 1983). He "envisioned a space that was filled with the sights, sounds, and objects of early childhood" (Shapiro, 1983, p. 23).

Froebel's kindergarten was established amidst a social background of relative turmoil as the establishment of kindergarten represented a challenge to the status quo (Allen, 2006). Based on an idealist philosophy exploring the connection between the natural and social world, teaching kindergarten originated as a male-dominated profession (Allen, 2006). Froebel approached women to teach kindergarten after being rejected by male teachers who believed the proposed pedagogy was based on play and not serious studies (Allen, 2006). During this time, women were determined to establish roles for themselves as public professionals (Allen, 2006). Their nurturing instincts added credence and importance to the role of professional educators of young children (Allen, 2006). Froebel was disturbed by the role that women held in society yet believed that a nurturing ability did not suffice as a solid foundation for teaching. Instead, he developed a specific training protocol for professional development (Allen, 2006). He envisioned the Kindergarten Center where a comprehensive approach to kindergarten included: a student kindergarten lab for young children; a professional training program for teachers; and a publishing house and educational apparatus production and distribution facility (Shapiro, 1983).

In 1848, the Froebel kindergarten was subject to social reform initiatives such as representative government, religious tolerance and the overcoming of class barriers (Allen, 2006). During this time, Germany's first college for women was established

(Allen, 2006). Students engaged in academic studies and practicum experiences in kindergarten (Allen, 2006). The notion of "women as educators" emerged as a result (Baader, 2004, p. 430). Women gained professional qualifications, which were considered a radical experiment that posed a perceived threat to the country (Allen, 2006). In 1851, one year before Froebel's death, kindergarten was prohibited by the Prussian monarch as a subversive influence and resulted in the perceived threat. This perceived threat was combined with the so-called unorthodox religious atmosphere, which culminated in the prohibition of kindergarten (Allen, 2006; Shapiro, 1983).

The prohibition of kindergarten by the government led to the emigration from Germany to the United States for individuals who widely accepted his model (Allen, 2006). The literature surrounding kindergarten in the United States is somewhat mixed in regards to dates and minor details. Henry Barnard introduced kindergarten in the United States in 1854 after learning about Froebel's materials and methods at an exhibition in London (Chung & Walsh, 2000). Margarete Schurz, one of the emigrants from Germany set up the first full-day private kindergarten Watertown, Wisconsin for her own children and children of other families sometime between 1855 and 1857 (Allen, 2006; Bryant & Clifford, 1992; Estes, 2007; Lee, et al., 2006; Nawrotski, 2006; Oliver, 2007; & Shapiro, 1983). Elizabeth Peabody was introduced to the kindergarten philosophy by Schurz. Peabody established the first English speaking kindergarten in Boston in 1860 (Allen, 2006; Baader, 2004; Bryant & Clifford, 1992; Chung & Walsh, 2000; Estes, 2007; Oliver, 2007). Peabody later served as the founder of the German Froebel Society in 1874, served as the first president of the American Froebel Union, and created and edited the *Kindergarten Messenger* (Baader, 2004; United States Department of Education,

1874). The first public school kindergartens in the United States were established by Superintendent William Torrey Harris in St. Louis sometime between 1873 and 1875 under the leadership of Susan Elizabeth Blow (Allen, 2006; Estes, 2007; Lee et al., 2006).

While the first kindergartens in the United States were private, a movement for free kindergartens began in the 1870's. The Free Kindergarten movement was the first noted reform movement established by American women. The movement was supported by women's organizations, churches, synagogues, wealthy individuals, corporate benefactors, and small-time subscribers to the kindergarten movement (Allen, 2006; Nawrotzki, 2009; Shapiro, 1983). Initially, Froebelian supporters established charity kindergartens for poor children living in working-class neighborhoods as a response to economic hardships (Shapiro, 1983). Free kindergartens provided relief to poor children through food, clothing, and education (Shapiro, 1983).

Free kindergartens were eventually used to target various audiences via performance demonstration projects, which served to provide "true narratives" of how free kindergarteners worked (Nawrotzki, 2009, p. 187). Depicting social class, age, gender, and Froebelianism was an attempt at bridging the social classes, age gaps, and gender divides (Nawrotzki, 2009). Children participated in rehearsed dramatic roles that were seen as having pedagogical value since they served to depict object lessons inherent in kindergarten programs and the social reformation (Nawrotzki, 2009). The plays were performed to educate parents, neighbors, public figures, and potential benefactors as demonstrations, which were crucial to the economic and social survival of free

kindergartens (Nawrotzki, 2009). The demonstrations further served as fundraisers to continue free kindergarten programs and the movement itself (Nawrotzki, 2009).

Kate Douglas Wiggin, who was introduced to Froebelian ideologies by Peabody, was a leader in the Free Kindergarten movement (Shapiro, 1983). Wiggin presided over San Francisco's Public Kindergarten Society where she established the Silver Street Free Kindergarten amidst the Tar Flat Slum (Nawrotzki, 2009). Wiggin proclaimed kindergarten as an opportunity for children of all races to play together, laying the foundation for American citizenship (Allen, 2006). Her platform ensured the public that the motherly discipline associated with kindergarten taught the budding citizen to respect social order and the rights of others (Allen, 2006). Such beliefs appealed to those in the American teaching profession. During that time period, the profession was dominated by women at the elementary level (Allen, 2006).

The kindergarten movement began to spread through the United States. A model kindergarten was shown at the Philadelphia Centennial Exposition in 1876 (Allen, 2006). The first teacher-training program was established in 1880 at the Oshkosh Normal School in Philadelphia (Allen, 2006). The American Association of Elementary, Kindergarten, and Nursery School Educators were established to serve in a consulting capacity for other educators (Allen, 2006). The National Education Association (NEA), which was founded in 1872, developed a Kindergarten Department in 1884 (Allen, 2006). Allen (2006) reported that during 1884, the NEA's annual conference hosted a majority of women. The conference was headed by William Hailmann, an emigrant from Switzerland who had formerly translated Froebel's *Die Menschenerziehung,* which translated means "The Education of Man" (Allen, 2006; Chung & Walsh, 2000; Froebel, 1892). In 1888,

Hailmann's wife, Eudora, became the head of the Kindergarten Department of the NEA and proclaimed it was women's right and responsibility to be involved with administration of educational interests equally with men (Allen, 2006). The NEA defended the kindergarten movement against male school administrators (Allen, 2006).

By the year 1892, delegates to the NEA annual meeting organized the International Kindergarten Union (IKU) (Morrison, 2004; Allen, 2006). The IKU sponsored a demonstration kindergarten in the Children's Building at the Columbian Exposition in Chicago in 1893 (Allen, 2006). The free kindergarten movement spread to other cities where similar beliefs existed. There were more than 1,000 free kindergartens by the end of the 1880's (Shapiro, 1983). Such large numbers influenced and "dramatically transformed the structure and ideology of the kindergarten movement" (Shapiro, 1983, p. 87). By 1906 in New York City alone, there were 362 free kindergartens supported by 18 organizations (Nawrotzki, 2009). Public interest in kindergarten grew between 1890 and 1910 based on the premise that children would flourish cognitively, emotionally, and socially in environments where they could explore, manipulate, and interact through self-directed play (Lee, et al., 2006).

Full-day kindergarten in the United States preceded the half-day kindergarten program we know today. During The Great Depression of the 1930's, the full-day program was reduced to half-days due to lack of funding, space limitations, and teacher shortages (Estes, 2007; Walkowiak, 2007). Half-day programming remained the most common form of publicly funded kindergarten throughout World War II (Oelerich, 1984, Puleo, 1988, Walkowiak, 2007). Half-day kindergarten continued as the population grew during the baby boom years from 1946-1964 as classroom space was limited (Oelerich,

1984; Puleo, 1988; Walkowiak, 2007). Full-day kindergarten options increased as population growth slowed and more facility space was available (Walkowiak, 2007).

The Increasing Need for Full-day Kindergarten

This section outlines specific social reforms, demographic changes, economic conditions, and challenges with half-day kindergarten programs, and educational reform initiatives that indicate the increasing prevalence of full-day kindergarten program in the United States (Walston & West, 2004). This section presents several recurring themes are found in the literature including; the growing diversity of the kindergarten population and the family dynamics therein; challenging content and performance standards that results from increasing accountability measures; increasing demand to reduce the achievement gap; and the national interest in the workforce development (Walkowiak, 2007). Other themes presented in this section include poverty (Fenton, 2010), and *Developmentally Appropriate Practice*, and early childhood theory as it relates child development and instructional time (Baskett et al., 2005; Bredekamp & Copple, 1997, 2009; Cannon, Jacknowitz, & Painter, 2006; Elicker & Mathur, 1997).

The increasing diversity among student populations entering the public school system combined with and the increasing benchmarks of the accountability movement impacted kindergarten. According the National Association for the Education of Young Children (NAEYC) (2009), teachers in the United States reported the children they teach today have "more diverse in backgrounds, experiences, and abilities" than those taught in the past (p.5). Kindergarten cohorts may include students who had experience in previous group settings for three or four years and students who were attending school for the first time. Students ranged in abilities from those identified with learning disabilities

to others with exceptional abilities. Kindergarten teachers may experience classes in which students range from the developmental and learning ability of a three year old to that of an eight-year-old (IRA & NAEYC, 1997). Children are increasingly entering the classroom from homes where English is not the primary language (IRA & NAEYC, 1997). This diversity may challenge teachers who are expected to produce specific uniform benchmark results in reading without any consideration for the variation in abilities, experiences, interests, cultures, and personalities at the onset (IRA & NAEYC, 1997).

Family Dynamics

The evolution of the family unit has led to an increased number of single parent homes and dual income families in the workforce (Brewster & Railsback, 2002). ECLS-K study measured family background as one area of the analysis conducted on the 1998-1999 United States kindergarten class with the support of 20,000 kindergarten parents and students, 3,000 kindergarten teachers, and 1,000 school administrators of the 72,000 U.S. schools that offer kindergarten (Walkowiak, 2007; Walston & West, 2004). Nearly half of all entering kindergartners were identified as coming from families with one or more risk factors: having a mother with less than a high school education; living in a family receiving food stamps or cash welfare; living in a single parent household; and having parents whose primary language was not English (Walkowiak, 2007; Walston & West, 2004).

Parents were challenged to manage half-day kindergarten schedules due to employment (Baskett et al., 2005) and women in the workforce (Green, 2006). The U.S. Bureau of the Census in 2000 reported that in 1960, 36 out of 100 women participated in

the workforce (Green, 2006). By 2000, 58 out of 100 women were reported as participating in the workforce (Green, 2006). The U.S. Department of Labor and the Bureau of Labor Statistics (2011) reported that in 2009, 59 % of women participated in the workforce for 50 or more weeks of the year. The report projected an increase of 9% between 2009 and 2018 (The U.S. Department of Labor and the Bureau of Labor Statistics, 2011). Kreider and Elliott (2010) reported that the percentage of "stay at home" married mothers has decreased from 44 % in 1969 to 26 % in 2009. Transportation and multiple caregivers associated with childcare before or after the half-day kindergarten program was reported as a burden to many parents (Estes, 2007; Oliver, 2007). As a result of such variables as single parent homes or dual income families, there was an increase in the number of students who attended full-day preschool programs (Elkind, 1987; Greer-Smith, 1990; Gullo, 1990; Holmes & McConnell, 1990; Humphrey, 1990; Karweit, 1992; Katz, 1980; Railsback, 2002; Rothenberg, 1995; Sheehan, Cryan, Wiechel, & Bandy-Hedden, 1991; Walkowiak, 2007; Zill & West, 1995; Zimiles, 1996).

Karweit (1992) and Wolgemuth, Cobb, Winokur, Leech, & Ellerby, 2006 (2006) argued that consistent and longer school schedules allow parents manage family and work responsibilities easier as well as fostering more individualized attention for young children when they are home from school. Many parents prefer full-day over half-day due to time constraints (Clark & Kirk, 2000; Wolgemuth, Cobb, Winokur, Leech, & Ellerby, 2006) and for providing their children with increased opportunities for academic, social, and personal enrichment (Wolgemuth et al., 2006). Elicker and Mathur (1997) and Wolgemuth et al. (2006) stated the majority of parents would select full-day kindergarten if given the choice.

Increasing Accountability

Although the federal government designates education legislation to individual states, there are funding opportunities for states based on the implementation of certain requirements and accountability measures. This began with the Elementary and Secondary Education Act of 1965, which appropriated funds to improve educational opportunities for disadvantaged children (Walkowiak, 2007). According to Walkowiak (2007) *A Nation at Risk* was the first national report on the progress of American education as compared to other world countries. This led to individual states establishing academic standards. In 1994, President Clinton established the *Goals 2000: Educate America Act* (Walkowiak, 2007). This act resulted in states' establishment of assessments aligned to the standards and benchmarks for improvement ensuring schools achieve Adequate Yearly Progress (AYP). *The No Child Left Behind Act* (NCLB) was developed in 2001 and enacted by President Bush in 2002 (NAEYC, 2009; Walkowiak, 2007).

The NCLB Act (2002) is based on four specific areas: a) results must be tied to stronger accountability; b) increased spending flexibility and local control; c) greater choice for parents; and d) emphasis on research-based practices. This national policy mandated individual states to increase accountability measures aimed to eliminate the achievement gaps that existed between and among different groups of children (NAEYC, 2009). The NCLB Act further mandated all states to develop English language proficiency standards and to implement related tests therein (United States Department of Education, 2010; Estes, 2007). Each of these components in the NCLB Act was

influential in the more recent ongoing development and implementation of full-day kindergarten programming.

Given the age variances, from 4 3/4 to 7 1/2, among children entering kindergarten and the ever-changing dynamics of American society, teaching practices must be responsive to the vast development and culture variation of individual students while balancing the pressures of the standards driven curriculum (Tomlinson, Copple, & Bredekamp, 2009). Programming options can either hinder or support teachers' efforts. Proponents for full-day programming suggest half-day schedules limit teachers' ability to achieve such balance.

Diversity and Limited English Proficiency

Students with diverse cultural backgrounds populate public schools at increased proportions than in the past. In 1972, 22% of students enrolled in public kindergartens were considered a part of an ethnic minority group (Estes, 2007; Walston, & West, 2004). By 2003, the rate of students enrolled in public education ethnic subgroups increased to 43% (Estes, 2007; Walston, & West, 2004). Simultaneously, Caucasian students decreased from 78% to 58% (Estes, 2007). The increase in the minority population attending public school is reported due to the increase in the Hispanic population from 6% in 1972 to 19% in 2003 (Estes, 2007). The increase in African American and other ethnicities were proportionately less than that of the Hispanic population (Estes, 2007). Similar diverse population proportions are reflective in the school district where the study will be conducted.

During the 1980-81 school year, the school district reported that there were 31,377 students enrolled with a minority population of 3,695 or 11.78% (WCSD, 2010).

The ethnic proportion of students was reported as: 761 students or 2.43% were American Indian; 871 students or 2.78% were Asian/Pacific Islander; 1,336 students or 4.26% were Hispanic; 727 students or 2.32% were African American; and 27,674 students or 88.20% were Caucasian. In the 2009-2010 school year, the school district reported there were 62,452 students enrolled with a minority population of 29,301 students or 46.92%. The ethnic proportion of student is reported was: 1,547 student or 2.48% were American Indian; 4,178 students or 6.69% were Asian/Pacific Islander; 21,172 students or 33.90% were Hispanic; 2,404 students or 3.85% were African American; and 33,149 or 53.08% were Caucasian (WCSD, 2010). This is consistent with the reported trend where the ELL population has risen 80% in the United States and up to 398% in some states such as Nevada since 1990 (Maxwell, 2011).

The increasingly diverse student population has resulted in more students who were English Language Learners (ELL) and qualified under Limited English Proficiency (LEP) programs. Students qualified under the Limited English Proficiency program do not speak English as their primary language and may have a limited ability to speak, read, or write English. The LEP qualification entitles students to additional resources under Federal guidelines in order to gain access to the benefits of education in a Free and Appropriate Public Education. Title VI of the Civil Rights Act of 1964 prohibits discrimination based on race, color, or national origin in programs or activities receiving federal financial assistance (USDOE, 2011). Under the Act, language services and assistance is required for national-origin-minority students who are limited in their English.

The Achievement Gap

Reports indicated a knowledge gap existed when students enrolled in kindergarten based on disaggregated test data from the incoming population (Denton, et al., 2003; Lonigan & Whitehurst, 1998; National Governors Association Task Force on School Readiness, 2005; Shonkoff & Phillips, 2000; Walkowiak, 2007; West et al., 2000). Several studies presented that 38% of all fourth graders read at the "below basic" level on the National Assessment of Educational Progress (NAEP) (Schmoker, 2006). Schmoker (2006) reported that by eighth grade, 43% of poor students are at the "below basic" level in reading. In math 61% of African American students and 53% of Latino students performed at the "below basic" level (Schmoker, 2006). Schmoker (2006) indicated that at the end of 12th grade, the average African American or Latino student performed at the average eighth grade student level. Singleton and Linton (2006) indicated race has an inherent effect on achievement in standardized tests such as the SAT. They refer to this as the "racial achievement gap" and suggest there is potential evidence of cultural biases in standardized tests such as the SAT (p. 31).

Children in the lowest socioeconomic group were reported to be 60% below those in the most affluent group on cognitive tests at the start of kindergarten (Copple & Bredekamp, 2009; Lee & Burkam, 2002; NAEYC, 2009). Average math achievement was reported 21% lower for African American children than for Caucasian children and 19% lower for Hispanic children than for Caucasian children (Copple & Bredekamp, 2009; Lee & Burkam, 2002; NAEYC, 2009). Aber et al. (2006) stated early achievement gaps increased over time rather than diminished due to deep-seated equity issues present in schools and communities. Such persistent discrepancies in achievement between

subgroups remained a concern for lagging student achievement in the United States and the effects on American economic competitiveness in the global economy (Copple & Bredekamp, 2009; NAEYC, 2009).

As reported by Walston and West (2004) in the Early Childhood Longitudinal Study-Kindergarten (ECLS-K) 1999-2000 study, children living in poverty showed slightly smaller gains than those living above the poverty line. Singleton and Linton (2006) reiterated this finding in a study relating SAT scores with family income and race/ethnicity in which they stated, "income does impact achievement. The scores of all races improve as their family income increases. However, wealth or poverty alone fails to fully explain the racial achievement gap which persists irrespective of income level." (p. 30).

Workforce Development

Research related to workforce development in the United States is rooted early in education where the achievement gap is first noted. Research related to early childhood experiences in countries that were known for their global competitiveness were reported as embedded with play-based activities (Miller and Almon, 2009). Miller and Almon (2009) reported that in China and Japan, which are countries envied for their success in math, science, and technology, provided a play-based early childhood prior to second grade. In addition, Finland's children attended playful kindergartens and enter first grade at age seven providing for a lengthy and playful early childhood (Miller and Almon, 2009).

As a culminating result of the early achievement gap and other educational challenges, the United States was reported as struggling to develop a workforce that is

competitive in a global economy (Carnegie Corporation, 1996). The U.S. economy needs highly skilled workers to remain competitive in a rapidly emerging global economy (Carnegie Corporation, 1996; Walkowiak, 2007). Schmoker (2006) reported a mere 7% of low-income students earn a college degree. Only half of the low-income students who enroll in college will return for a second year (Schmoker, 2006). The major reason for college failure was reported due to lack of academic preparation where only 32% of students were academically prepared (Schmoker, 2006). Schmoker (2006) reported only 5% of Americans performed at the highest math level. The U.S. was reported to fall short when compared with nearly 25% of Finns, Koreans, Japanese, and Dutch students who perform at the highest math levels. Failure to address achievement gaps during early childhood education may further increase the world achievement and workforce development.

The Great Recession of 2008

To further compound the future of early childhood education, Fenton (2010) reported findings from the 2010 Child and Youth Well-Being Index. This study indicated the impact of the first year of the recession beginning 2008. While predicting additional impacts in the future, the study indicated the rate of children in poverty in 2010 was reported as the highest it had been in 20 years (Fenton, 2010). There was a reported drop in prekindergarten enrollment, which caused concern when discussing the achievement gap and the benefits of early education therein (Fenton,2010).

As a result of the reported decline in prekindergarten enrollment, children who were living in poverty required additional and supplemental services and experiences when entering traditional schooling. Miller and Almon (2009) report children of poverty

need specialized kindergarten experiences with extra support to reap the full benefits. Initially, children of poverty may need more structure than their middle class peers because they are inexperienced with engaging in play (Miller & Almon, 2009). An effective play-based kindergarten is the foremost way that children use the language they hear which contributes to language development (Miller & Almon, 2009).

The FDC called for local and federal governments to maintain or expand their existing education programs, particularly those programs serving children and facing potential budget reductions in light of the economic downturn (Fenton, 2010). There are reported potential issues that may evolve if early childhood programs, such as kindergarten, are not maintained and expanded during such challenging economic times. Such potential issues include the longitudinal effects for K-12 education such as increased accountability, increased achievement gap, and the lack of a global workforce development (Fenton, 2010).

Child Development Theory

According to the NCES (2008), and Tomlinson, Copple, and Bredekamp (2009), 95% of kindergarten age children, which span in age from 4 ¾ to 7 ¼ years, attend some type of program in the United States. A major shift in cognition was found to occur during this age range (Piaget, 1952; Sameroff & McDonough, 1994; Tomlinson, Copple, & Bredekamp, 2009; White, 1965). Younger children are developmentally more like preschoolers until the shift occurs where they evolve developmentally to be more like school age children. During this time of transition, children increasingly exhibit higher levels of personal responsibility, self-direction, and logical thinking (Copple & Bredekamp, 2009). This period is known throughout research as achieving *the age of*

reason (Copple & Bredekamp, 2009; Whiting & Edwards, 1988). The changes that occur across all domains of development during this period include physical, social and emotional, cognitive, and language (Copple & Bredekamp, 2009). For these reasons, kindergarten is a critical year to establish a foundation for a positive approach to formal schooling and rigorous academic standards that lie in the grades to follow.

Theorists such as Jean Piaget and Lev Vygotsky suggested larger blocks of time are necessary for young children to engage in learning (Cannon, et al., 2006; Morrow, Strickland, & Woo, 1998). Best practices indicate Developmentally Appropriate Practices (DAP) would allow adequate time for children to engage in learning activities (Baskett et al., 2005; Copple & Bredekamp, 2009; Elicker & Mathur, 1997; Estes, 2007). Morrow, Strickland and Woo (1998) wrote in an International Reading Association publication:

> Vygotsky thought that children acquire mental functions through social relationships during which time adults often step back and allow children to internalize activities, emulate behaviors, and incorporate them into existing knowledge. Providing opportunities for this type of process learning requires large blocks of time for exploration and a variety of experiences and materials that are not always available in half-day kindergarten programs. (p. 16)

Researchers warned that a longer day in itself does not guarantee the additional time is utilized in a developmentally appropriate manner (Cannon, et al., 2006; Gullo, 1990; NAEYC, 1987; Olsen & Zigler, 1989). Such child development experts cautioned that additional instructional time could potentially result in negative effects if an

increased traditional academic curriculum structure were implemented (Cannon, et al., 2006; Gullo, 1990; Olsen & Zigler, 1989). Kindergarten originated in a time when education was viewed as a process of development rather than a process of instruction whereas the latter is seen as detrimental to the development of young children (Bryant & Clifford, 1992; Lee, et al., 2006; Meisels & Shonkoff, 2000).

Developmentally Appropriate Practice is based on the notion that teachers understand child development and learning as grounded in theory and research on educational effectiveness (Copple & Bredekamp, 2009). Teachers who understand child development establish an environment where the individual child is the center of the curriculum (Copple & Bredekamp, 2009). Students engage in learning activities through differentiated instruction and play based activities reflective of generally accepted theories on child development (Copple & Bredekamp, 2009). Proponents for full-day kindergarten argue the additional instructional time allows teachers to provide a balance of whole, small group, and individualized instruction in a DAP based approach, while addressing increasing accountability and standards (Copple & Bredekamp, 2009).

Instructional Time

Both full and half-day kindergarten classes spend about the same percentage of time on whole-class, small group, and individual activities (Denton et al., 2003; Walkowiak, 2007; Walston and West, 2004). The same percentage of time in full and half-day kindergarten equals increased instructional time. For example, 30% of 120 minutes is 36 minutes while 30% of 300 minutes is 90 minutes.

An increased amount of time spent in full-day kindergarten programs was found in time allocated to child-selected activities such as in free choice centers (Denton et al.,

2003; Walkowiak, 2007; Walston & West, 2004). Children enrolled in full-day kindergarten were found to provide nearly double the amount of instructional time in mathematics, science, and social studies as the children enrolled in half-day kindergarten (Walston & West, 2004). With additional instruction time, the full-day kindergarten program was found to provide similar activities as the half-day program but allowing for more depth (Walkowiak, 2006).

A primary rational for full-day kindergarten is to increase the time for learning kindergarten skills and for developing appropriate social skills attributed to school success. This was found to be especially true for those students deemed "at-risk" (Estes, 2007; Walston & West, 2004). In addition, Estes (2007) reported that not enough time is allocated to provide adequate services to minority sub-groups such as students deemed as Limited English Proficient (LEP) or English Language Learners (ELL).

Barriers and Considerations

This section presents several barriers and considerations related to full-day kindergarten. An overview is provided in the areas of funding, limited mechanisms related to tracking differences between and among the states, and challenges that are specific to Nevada. These barriers and considerations represent several that drastically affect full-day kindergarten programs.

Funding Full-day Kindergarten: A Patchwork Approach

Costs associated with implementing full-day kindergarten include full-time teacher salaries and benefits, curriculum, facility space and associated costs (Estes, 2007; Walston & West, 2004). While there are increasing and multiple sources of funding such as federal initiatives and local and federal subsidy programs to support early childhood

initiatives (i.e. preschool programming), there are limited funds that support kindergarten. Kindergarten is generally viewed as part of the K-12 program where funding varies between and among the states. Review of state support for full-day kindergarten presents discrepancies between and among the states in the funding allocations to school districts (Kauerz, 2005; Zvoch,, Reynolds, & Parker, 2008). Zvoch, Reynolds, and Parker (2008) reported there are several states that provide adequate funding while others offer limited funding that does not offset the costs associated with full-day kindergarten. Several states opt to utilize Title 1 funding to supplement costs for specific populations of students to access full-day kindergarten opportunities (Zvoch et al., 2008). School districts may offer full-day program options to parents who supplement the program through a tuition-based support (Zvoch et al., 2008). Zvoch et al. (2008) referred to this as a "patchwork approach" to offering full-day kindergarten, which results in a majority of children having access to such programs.

Financial benefits including potential cost savings for students enrolled in full-day kindergarten are hard to track or measure (Estes, 2007). Estes (2007) suggested substantial savings should be realized in the long term. This is reported due to decreased "special education referrals and the need for less remediation, reduced need for midday transportation, and reduced need for half-day child care programs" (Estes, 2007, p. 31).

Challenges in Nevada

In Nevada, students enrolled in half-day kindergarten are required to complete 120 minutes of instruction per day. Those enrolled in a full-day kindergarten program receive between 240 and 300 minutes of instruction. The Nevada Department of Education (NDE) distributes monies to fund education in schools based on a specific per-

pupil rate each year. Charter schools and districts participate in a one-time count date each year (usually the 20th school day of the school year). Reported student counts determines the number of per-pupil allocations each school or district is provided. The per-pupil funding is currently allocated through the Nevada Distributive School Accounts (NV DSA).

Kindergarten is not a mandatory program in Nevada. Kindergarten programs are funded at .6 of an allocation compared to those allocations in first through 12th grade. State and local apportionment funding during the fiscal school year of 2011, provided $5,350 per pupil from the NV DSA and $1,308 from local apportionment monies totaling $6,658 per pupils in grades first through twelfth while kindergarten students were allotted $3994.80 per pupil. Any additional funding to support a full-day kindergarten program in Nevada is part of other mechanisms such as Title 1 monies or SB 404.

Limited Systems

Additionally, there are limited systems to track kindergarten programming and funding. Inconsistencies exist between and among states regarding kindergarten programming legislation and funding therein. Many state-level education personnel across the U.S. cannot delineate key information regarding kindergarten. This includes information related to: legislation establishing kindergarten requirements; how many kindergarten programs exist; how many full verses half-day programs there are; funding details regarding kindergarten programming; and the resulting academic achievement data of those participating in full verses half-day programs.

Kindergarten and Reading

Kindergarten represents a time of rapid growth and learning when children acquire essential skills and knowledge. This is especially true when kindergarten includes a strong reading component (Denton et al., 2003). Reading is an essential skill that is fundamental to all other academics and success later in life (International Reading Association (IRA) & National Association for the Education of Young Children (NAEYC), (1999). One of the best predictors of whether or not a child is successful in school and functions effectively in and contributes to society is the level at which the child progresses through reading and writing (IRA & NAEYC, 1997). Although children continue to develop through the lifespan, the early childhood years, from birth through age eight, are critical for literacy development (IRA & NAEYC, 1997). Kindergarten, the transitional year towards formal schooling, is increasingly important as a literate and accountable society demands every child read by third grade (IRA & NAEYC, 1997).

To be successful readers, children need specific skills and knowledge in: background knowledge, good vocabulary, concepts about print, phonological awareness, understanding the alphabetic principle, letter-sound correspondence and sight recognition, comprehend and understand content, fluency, and interest to pursue reading (Jacobs & Crowley, 2010). The International Reading Association (2011) report that most young children progress through five stages of literacy development: (1) awareness and exploration; (2) experimenting with reading and writing; (3) early reading and writing; (4) transitional reading and writing; and (5) conventional reading and writing. Kindergarten is associated with the experimenting with reading and writing stage.

Reading and Mathematics

There is a correlation and/or relationship between reading and mathematics (Steen, 2007; Schmoker, 2011). Steen (2007) and Schmoker (2011) asserted the interplay of numbers and words was key to meaningful learning in mathematics and other subjects. The connection between math and literacy is found in two fundamental aspects: calculation and interpretation where the latter referred to literacy in reading and writing (Steen, 2007; Schmoker, 2011). The ability to interpret and express quantitative arguments and proposals is seen as an important skill essential to mathematics achievement (Steen, 2007; Schmoker, 2011). Reading mathematic texts require skills where each word must be understood in context (Shanahan and Shanahan, 2008; Schmoker, 2011). Mathematics content involves content where there are more concepts per word, per sentence, and per paragraph than in any other subject (Braselton & Decker, 1994; Schmoker, 2011). The content is rich in vocabulary, which requires readers to comprehend a mixture of numerals, letters, symbols, and graphics (Braselton & Decker, 1994; Schmoker, 2011). Schmoker (2011) concluded his reading and math section by asserting that for "students to understand math, they need direct, intensive reading instruction. Reading is critical" (p. 211).

Literature on Full-day and Half-day Kindergarten Programs and Reading

During the past forty years, various studies have been conducted regarding the effects of full and half-day kindergarten programs and other related school and student characteristics on reading achievement. The majority of studies focus on short term results examining the effects of full-day programs at the end of kindergarten and first grade. Several studies have explored long-term effects of full and half-day kindergarten.

This section presents research published in the past 10 years on the effects of full verses half-day kindergarten programming on reading. Studies depicting the effects of full verses half-day kindergarten programming on reading and other student characteristics such as ethnicity, Limited English Proficiency, and gender are included. All seven studies presented were selected with an $n \leq 250$ and show positive effects related to full-day kindergarten programming and reading.

The Early Childhood Longitudinal Study - Kindergarten (ECLS-K) Studies

The Early Childhood Longitudinal Study – Kindergarten (ECLS-K) was sponsored by the U.S. Department of Education and the National Center for Educational Statistics. The study followed a representative sample of 22,000 kindergarteners represented in 1,200 public and private schools (Walston & West, 2004). In the fall of 1998 and the spring of 1999, data including information about children, their families, and their teachers was collected for study (Walston & West, 2004). This is the first nationally representative collection of kindergarten data in the United States. The ECLS-K data set is used in multiple studies related to kindergarten and reading, reading achievement, and full verses half-day programming. The studies are depicted in the following narrative. The ECLS-K data has been used in various studies related to student, classroom, and school characteristics. However, the purpose of this study was to report on those studies that examined full verses half-day kindergarten.

The Denton, West, and Walston study. Denton et al. (2003) wrote for the National Center for Education Statistics, a department within the United States Department of Education. The study summarized the findings of the Early Childhood Longitudinal Study, Kindergarten (ECLS-K) in a special report entitled *Reading-Young*

Children's Achievement and Classroom Experiences. This was included as part of the mandated report entitled *The Condition of Education*. The special report examined children's reading skills during the first two years of public schooling and the related classroom experiences therein. The summary provided a brief description of how children were assessed based on their reading skills based on the ECLS-K findings (Denton et al., 2003). The resulting data from the assessments provided insight to the development of young children's skills and reading ability through kindergarten and first grade (Denton et al., 2003).

Denton et al. (2003) examined factors related to kindergarteners' reading skills including examination of the literacy environment and students' home life. Specific family characteristics examined included: ethnicity; mother's highest educational level attained; socioeconomic status; single parent households; primary language other than English; "literacy-rich" home environment; positive approaches to learning; and general health (Denton et al., 2003). Specific school characteristics included: kindergarten program type (full or half-day); instructional practices (teacher-directed or child-initiated activities being whole or small groups and individualized experiences); and time spent on and types of reading activities in kindergarten (Denton et al., 2003). Denton et al., (2003) indicate children who attend full-day kindergarten programs have increased opportunities to exposure to a variety of reading activities. Findings from the ECLS-K study (2004) suggest students enrolled in full-day kindergarten make greater reading achievement gains during the kindergarten year than their half-day peers. Summarizing these areas provided a foundation for an examination of the resulting data of students who attended full verses half-day kindergarten programs (Denton et al., 2003).

The analysis was conducted separately for full and half-day kindergarten with a resulting examination of the relationship between the type of kindergarten program children attend and the resulting reading achievement (Denton et al., 2003). Findings indicated those students enrolled in full-day public kindergarten increases their exposure to a variety of instructional practices and opportunities related to early literacy resulting in greater gains in reading than those students attending half-day kindergarten (Denton et al., 2003). Denton et al. (2003) provided this understanding as a foundational format for the Walston and West (2004) study, which further explored the ECLS-K and the increase in the percentage of children who attended full-day kindergarten programs.

The Walston and West study. Walston and West (2004) were the first to examine full-day and half-day kindergarten programs in terms of instructional practices and curricular focus at a national level based on the ECLS-K data in the report entitled *Full-day and Half-day Kindergarten in the United States: Findings from the Early Childhood Longitudinal study, Kindergarten Class of 1998-1999*. The study incorporated the findings of two smaller reports both sponsored by the NCES. First, *Reading- Young Children's Achievement and Classroom Experiences*, specifically focused on kindergarten reading achievement and experiences (Denton et al., 2003). The second report, *The Kindergarten Year*, provided descriptive details about specific skills and abilities that children gain in reading, language arts, and mathematics during their kindergarten experience (West, Denton, & Reaney, 2001). Both smaller reports were generated and published while the complete analysis was conducted.

Walston and West (2004) reported that during the 1998-1999 school year, 61 % of schools offered at least one full-day kindergarten program and 47 % offered at least one

half-day kindergarten program where 7 % offered at least one of each (Walston & West, 2004). In addition, 44 % of kindergarten children attended half-day programs compared to their full-day counterparts (Walston & West, 2004). Walston and West (2004) reported regional differences existed where full-day programs were represented in 84% of public schools in the southern region of the United States. Full-day kindergarten programs existed in higher proportions in major U.S. cities at 64% and small towns at 63% compared to suburban or large town areas, which offered 46% of the programs as full-day (Walston &West, 2004).

Walston and West (2004) provided a national overview of the children attending public kindergartens and the resulting class composition based on the ECLS-K data. Walston and West (2004) reported 57% of kindergarten students attended full-day programs verses 52% of kindergarten students attended half-day programs in public schools. Walston and West (2004) reported that 79% of African American kindergarten children attend full-day programs compared to Caucasian students reported at 49%, Hispanic students reported at 46%, and Asian students reported at 40% in public schools. Such statistics resulted in a class composition where 46% of full-day attendees were minority compared to 35% in half-day. More than 75% minority enrollment accounted for 30% of full and 19% of half-day public kindergarten programs.

Walston and West (2004) reported more full-day kindergarten classes received proportionately more time in teacher-directed, whole, and small groups as well as individual activities than those in half-day classes. Walston and West (2004) reported the proportion of instructional time by subject between full and half-day kindergarten programs respectively as follows: reading and language arts 97% to 96%; mathematics

90% to 73%; social studies 30% to 18%; and science 24% to 10%. These findings indicated students attending full-day programs received more instructional minutes in time and proportion by subject. In addition, although mixed-level grouping was the most common group type in both programs, teachers in full-day programs were reported as spending time in reading instruction groups based on ability at least once per week.

Walston and West (2004) presented findings through a detailed analysis of schools and their characteristics, child and family characteristics, classroom characteristics including minority and limited-English proficiency enrollment, curricular and instructional in reading/language arts and mathematics, and cognitive gains of students enrolled in public full and half-day kindergarten programs. Walston and West (2004) findings indicated all children attending full-day verses half-day programs gained greater achievement in both reading and mathematics at a 32 % and 22 % standard deviation respectively after controlling for variables. Children, who initially scored the top quartile in either subject, made smaller gains by year-end than those in the lower quartiles (Walston & West, 2004). Furthermore, children living in poverty presented slightly smaller gains than those living above the poverty line. When considering achievement by ethnicity, Caucasian students made smaller gains than Asian students did in reading and higher gains than African American students did in mathematics (Walston & West, 2004).

The Kaplan study. Kaplan (2002) used a growth mixture modeling procedure for the analysis of longitudinal data. A growth mixture modeling procedure "relaxes the assumptions associated with conventional growth curve modeling" (Kaplan, 2002, p.189). The study focused on growth on reading over kindergarten and first grade while

"remaining cognizant of the limitations associated with being unable to capture sequential growth" (Kaplan, 2002, p. 198). The model analysis was used to analyze the Early Childhood Longitudinal Studies – Kindergarten (ECLS-K) data from the kindergarten class of 1998-1999 as sponsored by the NCES within the U.S. Department of Education (Kaplan, 2002). The study sought to determine the latent growth in trajectory classes in reading proficiency and the effects of full or half-day kindergarten programs on growth within reading trajectory classes. Questions considered for the study focused on several key areas: (a) the general levels of growth rates in reading proficiency among the study participants; (b) differences between full and half-day programs; (c) differences between specific classes of students; and (d) how the growth rates for children within the classes "differ as a function of attending full verses half-day kindergarten programming before and after controlling for relevant covariates" (Kaplan, 2002, p. 199).

The sample used in this study was a 27% subsample (n = 3988) of the total ECLS-K population in the fall of first grade in order to use four time points for estimation of the growth parameters. The study used measures for a reading assessment and kindergarten program schedule with covariates of socioeconomic status and the child's age at the start of kindergarten. The reading assessment was designed for ECLS-K, using various experts in the field and related achievement and cognitive tests, to assess basic skills in print familiarity, letter recognition, beginning and ending sounds, rhyming sounds, and word recognition, vocabulary, and comprehension.

Results indicated a "small but positive benefit to reading achievement at the end of the kindergarten year for those students who attended the full-day kindergarten

program" (Kaplan, 2002, p. 211). Kaplan (2002) reported the study indicated some children benefited more than others in the full-day kindergarten program. The growth mixture model reliably identified three categories of children based on their reading growth trajectories: a slow-, normal-, and fast- reading development groups (Kaplan, 2002). The results yielded a profound positive effect for children who were in the slow reading development class relative to their counterparts in part-day kindergarten programs. The results further yielded little benefit for those students in the normal-and fast- reading development classes (Kaplan, 2002). The effects were lessened when covariates of socioeconomic status and entry-age of kindergarten were added to the model. Causal inferences surrounding the effect of kindergarten programming on growth in reading could not be drawn through the use the growth mixture modeling in this study.

The Cannon, Jacknowitz, and Painter study. Cannon et al. (2006) conducted a study using the Early Childhood Longitudinal Study-Kindergarten (ECLS-K) of 1998-1999 to evaluate the efficacy of a full-day kindergarten policy. Cannon et al. (2006) reported that "students and parents receive benefits from full-day kindergarten classes, it remains a significant expense for school districts to expand their kindergarten programs" (p. 300). The analysis examined the education, social, and maternal employment benefits of full verses half-day kindergarten programs. Cannon et al. (2006) used the ECLS-K data to: examine student and parental outcomes through the third grade; test for differential effects of full-day programs by poverty level and gender; and control for parents' choice in program options by estimating county fixed effects and instrumental variable models.

Analysis indicated full-day kindergarten attendance increased the academic performance in math (0.12 standard deviations) and reading (0.15 standard deviations) by the spring of the kindergarten year. They wrote in their findings "there are initial benefits for students and the mothers of students who attend full-day kindergarten, but these differences largely evaporate by third grade" (Cannon et al., 2006, p. 299). Cannon et al. (2006) found initial benefits of full-day kindergarten for students and their mothers using data collected from the ECLS-K. However, the results appeared short-lived as the research revealed any differences initially found dissipated by third grade (Cannon et al., 2006). The study indicated a lack of long-term sustained results at the third grade level (Cannon et al., 2006). Cannon et al. reported there is no additional benefit on average by poverty level in attending a full-day kindergarten program. However, in final comments the report suggested results could have been affected by mechanisms, which might have influenced the outcomes and proved ambiguous. The study suggested future research was necessary to determine whether full-day kindergarten was cost beneficial (Cannon, 2006).

Additional Studies

This section presents two studies published in the past five years on the effects of full verses half-day kindergarten programming on reading achievement. The Estes (2007) study is one that examined the effectiveness of full verses half-day kindergarten for those students who were Limited English Proficiency (LEP). The Zvoch et al. (2008) study was chosen due to the size of the school district in which the study was derived and the number of cases included (n = 443). The findings were depicted in full verses half-

day kindergarten programming as well as examining other variables such as disadvantaged students, LEP, and class size.

The Estes study. Estes (2007) conducted a study on the effectiveness of full-day verses half-day kindergarten in reading achievement for students who were classified as English language learners (ELL). Research questions sought to: test for differences between ELL students attending full and half-day kindergarten programs using the Dynamic Indicators of Basic Early Literacy Skills (DIBELS) assessment; check for differences between ELL students enrolled in full and half-day kindergarten programs in speaking, reading, writing, and comprehension indicators of the Stanford English Language Proficiency (SELP) scales as well as in the gain scores attained for literacy acquisition rates; and using the DIBELS and SELP measures, determine whether or not there is supporting evidence that full-day kindergarten is an effective method of accelerating or enhancing student literacy achievement for ELL students. The study was an ex po facto design as all students were already enrolled in full or half-day kindergarten programs at the onset of the research during the 2005-2006 school year. Stratified sampling was used to identify specific site requirements and student characteristics to allow for purposeful selection of students in the study (n=298). All children in the study were classified as ELL on the SELP at the beginning of their kindergarten year (Estes, 2007). Students were tested on the DIBELS three times throughout the year (Estes, 2007).

Based on an Analysis of Covariance method for both the SELP and DIBELS scores, the study revealed students who attended full-day kindergarten outperformed those attending half-day kindergarten in three out of five subtests of the DIBELS: initial

sound fluency, phoneme segmentation fluency, and nonsense word fluency (Estes, 2007). The study yielded no significant differences in either letter name fluency or word use fluency subtests (Estes, 2007). The only exception across all subtests was for those students who initially scored 300 on the SELP, which indicates they were not advanced enough to register on the fluency scale provided in the SELP screening instrument (Estes, 2007). Results indicated there was a significant difference when using the SELP screening instrument to analyze speaking, reading, writing, and comprehension whereas those students attending full-day kindergarten outperformed those attending the half-day program. Results indicated a positive relationship between the DIBELS gain scores and SELP scores indicating the higher the score was on the SELP, the higher the score would be on the DIBELS. This finding was conclusive at all levels of initial testing with the exception of those student scores in the pre-emergent category which resulted in mixed DIBELS score indicating a positive relationship could not be determined. The study results were concluded where full-day kindergarten programming was an effective method of accelerating and/or enhancing literacy achievement of students deemed ELL.

The Zvoch, Reynolds, and Parker study. Zvoch et al. (2008) conducted a quasi-experimental study to assess the effects of full-day verses half-day kindergarten and literacy outcomes (n=443). Zvoch et al. (2008) used multilevel modeling techniques to analyze data collected. The study analyzed data from a large, rapidly growing school district with over 300 schools and nearly 300,000 students annually. The data was derived from 188 kindergarten programs in the district. Research questions sought to reveal if: (a) students attending full-day kindergarten programs attained literacy at a faster rate than those students attending half-day kindergarten programs; (b) students from

traditionally disadvantaged populations, such as English language learners, differentially benefit from participation in full-day kindergarten programs; and (c) classroom characteristics such as size or calendar effect the relationship between kindergarten and literacy acquisition rates (Zvoch et al., 2008).

Results indicated those students attending a full-day kindergarten programs acquired literacy at a faster rate than their peers in half-day kindergarten (Zvoch et al., 2008). The relative efficacy of full-day kindergarten varied with class size whereas classes with less than 20 students acquired literacy at a rate twice as fast as their half-day peers (Zvoch et al., 2008). The full-day advantage was reported as maintained in classes with 20-24 students (Zvoch et al., 2008). In classes where there were more than 24 students, literacy acquisition rates were more similar between the two groups. While small fluctuations in literacy acquisition rates occurred with varied class-sizes for students attending full-day kindergarten whereas the literacy acquisition rates for students enrolled in half-day kindergarten remained constant regardless of class size (Zvoch et al., 2008). Disadvantaged students, such as English language learners, presented a literacy acquisition rate that outperformed their peers enrolled in half-day programs. Zvoch et al. (2008) indicated limitations regarding the generalization of the study due to: (a) lack of data on program processes; (b) lack of student assignment to kindergarten program conditions; (c) transciency; (d) outside control of factors; and (e) a limited literacy acquisition assessment.

Summary

This chapter provided a brief history of early childhood education and the kindergarten movement including the development of full verses half-day kindergarten.

The literature revealed additional study was warranted to flush out the major topics outlined in this paper herein as related to the academic effectiveness of full verses half-day programs. This chapter presented a review of the literature including: an introduction to the literature and theoretical framework; an overview of the increasing need for full-day kindergarten; a review of recent studies on the differences in achievement between full and half-day kindergarten programs; and a final summary of the research therein.

Chapter 3 describes the methodology used for this post-hoc research study including: selection of participants; variables; instrumentation; data acquisition; and data analysis procedures. Chapter 4 presents the findings of the study including: any demographic information therein; testing the research questions; confirmatory analysis; and results of the data as related to the research questions and null hypothesis. Chapter 5 provides several key components: a summary of the entire study; discussion of the findings therein; and implications of the findings for theory and practice; recommendations for future research; and conclusions to the study.

CHAPTER THREE

Methodology

Kindergarten programming remains a topic of interest for legislators and school district administrators as funding for education across the United States is ever changing related to the challenging economic landscapes. Proponents of full-day kindergarten argue longer days allow for *Developmentally Appropriate Practices* and closing the achievement gap at the beginning of formal schooling. Proponents of half-day kindergarten argue that while the effects might prove effective in the short term, there is limited research to show longitudinal effects to justify funding. The results of studies over the last four decades are complex and equivocal, with a small number of studies yielding significant positive effects in regards to the long-term effect of full day kindergarten programming (Walkowiak, 2007).

The school district researchers conducted a study on the kindergarten cohort of 2006-2007. The study reportedly yielded positive results in support of the full-day program. The study portrayed an initial achievement gap at the beginning of the school year between those students deemed Limited English Proficient (LEP) and their peers (B. Hayes, personal communication, March 4, 2011). The results showed a decrease in achievement gap at the end of the kindergarten year (B. Hayes, personal communication, March 4, 2011). Additional studies have not been conducted on long-term benefits of the kindergarten 2006-2007 cohort to date. The 2009-2010 school year was the first time this cohort participated in the Criterion Referenced Test (CRT), as required by the State of Nevada. Analysis of the data was warranted to determine the long-term effects of the cohort regarding the required testing under the Annual Yearly Progress (AYP) under No

Child Left Behind Act (NCLB). Chapter 3 describes the methodology used for this post-hoc research study including: purpose of the study; research question; data sources; variables; instrumentation; data acquisition; district and data background; data analysis procedures; and summary.

Purpose of the Study

The purpose of this post-hoc study was to determine if reading achievement for third grade could be predicted from knowledge of selected variables. The variables included kindergarten program type, school and student characteristics, and a measure of academic achievement. This quantitative research study analyzed reading achievement scores from the Nevada Criterion Referenced Test (CRT) associated with 3,579 students who were enrolled in either full or half-day kindergarten programs in the school district during the 2006-2007 school year and completed the CRT during third grade in 2009-2010. The following is the research question that guided this study.

Research Question

Is third grade CRT reading achievement predictable from knowledge of selected variables (kindergarten type, AYP designation of the school in kindergarten year, limited English proficiency status, gender, ethnicity, special education with IEP, same school, mathematics achievement)?

Data Sources

This post-hoc study was conducted using student-level data derived from a school district. Data for this study was derived from students who met two criteria: (a) being enrolled in a full or half-day kindergarten program in a public school for kindergarten in the district for the 2006-2007 school year; and (b) the completion of the CRT in 2009-

2010. There were two known exclusions: (a) student data sets for which there were any missing elements in the variables of the cases; and (b) students who attended a charter school or tuition-based school in kindergarten because this introduced new variables into the study.

During the 2006-2007 school year there were 4,464 students enrolled in the kindergarten cohort, which included 31 full-day and 30 half-day programs (D. Hobblit, personal communication, March 4, 2011). The total number of students who took the CRT in the spring of 2010 from the original 2006-2007 kindergarten cohort included 3,579 participants from a total of 61 elementary schools. This indicated 885 students left the district or did not participate in the CRT and were removed from the data set. The data set of 3579 students (who attended kindergarten in the 2006-2007 school year and took the CRT in 2009-2010) came from 31 total schools offering full-day sessions of kindergarten; however, seven schools offered tuition-based and/or partial grants and were not included in the study. Twenty-four schools offering full-day programs remained in the study. All 30 reported schools with half-day kindergarten programs were included. The school district selected schools for full-day kindergarten; each school with full-day kindergarten was funded under the Senate Bill 404 (SB 404) for the 2006-2007 school year based on the "at-risk" status of the school. The "at-risk" status of each school was determined according to the Title 1 status of the school based on the free and/or reduced lunch (FRL) program criteria (Hurst, 2005).

Variables

The variables examined in this study included the following: kindergarten program type, full or half-day program [*Ktype*]; race/ethnicity based on five categories:

American Indian [*Am Ind*]; Asian or Pacific Islander [*Asian*]; African American [*African American*]; Hispanic [*Hispanic*]; and Caucasian [*Caucasian*]; gender [*gender*]; Limited English Proficiency [LEP]; IEP designation [*IEP*]; same school for kindergarten and CRT [*same sch*]; AYP status of the school in kindergarten [*KAYP*]; reading achievement on the third grade CRT Reading [*Reading*]; and mathematics achievement on the third grade CRT in math [*Math*].

These variables were selected for several reasons. As presented in Chapter 2, there is an existing knowledge gap at the onset of kindergarten between various subpopulations. There was an increased proportionate number of students represented in the Hispanic population in the school district where the data derived. In the 1980-81 school year, the school district where the data set was obtained from reported there were 31,377 students enrolled with a minority population of 3,695 or 11.78%. The ethnicity values reported for the Hispanic population was 727 students or 2.23% and the Caucasian population represented 27,674 students or 88.20%. In the 2009-2010 school year, the school district reported there were 62,452 students enrolled with a minority population of 29,301 students or 46.92%. The ethnicity values reported for the Hispanic population was 21,172 students or 33.90% and the Caucasian population was 33,149 or 53.08% (WCSD, 2010). The increasingly diverse student population resulted in larger numbers of students who were English language learners and potentially qualified under Limited English Proficiency (LEP) programs. There were additional research studies that suggest females attain reading skills at faster rates than males and that math and reading achievement are related. Research indicated students who attend full-day kindergarten programs have lower special education placements. Other variables warranted research

as the proposal was written including same school attendance and the implications of adequate yearly progress designation. These variables presented interesting information to further research in regards to kindergarten program type and reading achievement.

School Characteristics

School characteristic variables used in this study included: kindergarten program type [*Ktype*] and AYP designation during the kindergarten year [*KAYP*]. All school characteristic variables were converted to binary code for the purpose of the multiple regression as routinely operated by researchers such as Draper and Smith (1998), and Hardy (1993).

Kindergarten program type [*Ktype*]. Kindergarten program type related to whether or not the school operated a full or half-day kindergarten program during the 2006-2007 school year. All students in the post-hoc study were enrolled in either a half or full-day kindergarten program. Half-day kindergarten referred to a kindergarten program where the scheduled time of attendance was 120 minutes to 150 minutes of daily instruction associated with a morning or afternoon session of scheduled time. Full-day kindergarten referred to a kindergarten program where the scheduled time of attendance was 300 minutes or more per day. This variable was coded as a "0" and a "1" where "0" indicated the student was enrolled in a half-day kindergarten program during the 2006-2007 school year and a "1" indicated the student was enrolled in a full-day kindergarten program during the 2006-2007 school year. Kindergarten type in this study was a first order independent variable. The variable was ordered first in two of the regression analyses conducted to determine the significance of kindergarten program type when predicting reading.

AYP status of the school in kindergarten [*KAYP*]. Adequate Yearly Progress designation during the kindergarten year related to whether or not the school was deemed "Adequate" as part of the yearly designation of achievement based on a state established criteria for proficiency under NCLB. Kindergarten AYP was an independent variable in this study. This section was coded as a "0" and a "1" where "0" indicated the school did not make AYP during the 2006-2007 school year and a "1" indicated the school did make AYP during the 2006-2007 school year.

Student Characteristics

Student characteristics refer to variables directly related to a given student. Such variables in this study included: ethnicity [*ethnic*]; gender [*gender*]; Limited English Proficiency [*LEP*]; *IEP* designation [*IEP*]; same school for kindergarten and CRT [*same sch*]; Mathematics Achievement on the CRT [*Math*]; and Reading Achievement on the CRT [*Reading*]. All student variables were converted to binary code for the purpose of the multiple regression analysis as routinely operated by researchers such as Draper and Smith (1998), and Hardy (1993).

Student race/ethnicity. Students enrolled in public schools come from diverse cultural backgrounds. For reporting purposes, school districts are required to record specific ethnic/racial codes. Parents self-report this data during the enrollment process. This data was binary coded using five ethnic categories: American Indian [*Am. Ind.*]; Asian or Pacific Islander [*Asian*]; African American [*Afr. Am.*]; Hispanic [*Hispanic*]; and Caucasian [*Cauc*]. Binary code was used where a "1" indicated the student is categorized as a specific ethnicity and a "0" indicated the student is not categorized as a specific ethnicity based on reported enrollment data.

Gender [*gender*]. Students were either male or female according to their reported gender. This variable was coded as "1" or a "0" where a "1" indicated the student was male and a "0" indicated the student was female.

Limited English Proficiency [*LEP*]. Students qualified under the Limited English Proficiency (*LEP*) program do not speak English as their primary language and may have a limited ability to speak, read, or write English. The *LEP* qualification entitles students to additional resources under federal guidelines in order to gain access to the benefits of education such as meeting proficiency benchmarks under the accountability act in a Free and Appropriate Public Education (FAPE). This variable was coded as "0" and "1" where "0" indicated the student was not classified as *LEP* and a "1" indicated the student was classified as *LEP*.

IEP designation [*IEP*]. Students qualified for special education receive specialized education services under The Individuals with Disabilities Education Act (IDEA) (P.L. 101–476) which incorporated and replaced the Education for All Handicapped Children Act (P.L. 94–142). The IDEA requires that all states receiving federal education funding provide individuals with disabilities a Free and Appropriate Public Education designed to meet each child's needs. Students who qualify under the program have a tailored education plan called an Individualized Education Plan (IEP), which specify goals, objectives, specialized instruction, and assistance required. The data reported indicated students as participating or not participating in the special education at the time the CRT examination was administered. There was no indication regarding length of time of participation in the special education program before or after the examination. This variable was coded as "0" and "1" where "0" indicated the student

was not in a special education program with an IEP and "1" indicated the student was in a special education program and had an IEP.

Same school status [*same sch*]. This variable was coded as "0" and "1" where a "0" indicated the student was not in the same school during the 2006-2007 school year for kindergarten and the 2009-2010 school year for third grade. The value of "1" indicated the student was in the same school during the 2006-2007 school year for kindergarten and the 2009-2010 school for third grade. This did not assume continuous enrollment between the two school years. This coding was independent of the district definition of transient students. Students who were not in the same school during their 2006-2007 kindergarten school year and the 2009-2010 third grade school year, were coded as a "0". Students who were in the same school during their 2006-2007 kindergarten school year and the 2009-2010 third grade school year, were coded as being a "1". However, the child may have attended other schools between the end of the kindergarten year and the beginning on the third grade year.

Mathematics achievement [*Math*] and reading achievement [*Reading*]. Measures of student academic achievement in mathematics and reading were obtained using scaled scores from the Nevada CRTs. In this study, reading scaled scores on the CRT was the dependent variable. The mathematics scaled score on the CRT was the independent variable. Scaled score on the CRT for both subjects ranged from 100 (low) to 500 (high) and are considered to be continuous even though some scaled score values are impossible to obtain because of the scaling process. De-identified student-level data was used for statistical analyses in this study. The CRT referred to a high stakes assessment adopted by the state of Nevada and designed to measure annual progress of

the Annual Measurable Objective (AMO) under the NCLB. The CRT was published through Measured Progress, a national testing company that distributes and scores individual tests. Measured Progress served seven states in their implementation of annual progress tests under the AMO. The term math achievement [Math] was used in reference to the measurement of a student's ability in the areas of numbers and operations, algebra, measurement, geometry, and data analysis. This achievement was measured by a student's individual CRT result. The term reading achievement [Reading] was used in reference to the measurement of a student's ability in the areas of word analysis, literary and expository texts using three levels of the Depth of Knowledge (DOK) matrix. This achievement was measured by student's individual CRT result.

Instrumentation

The Nevada Department of Education ([NDE], 2010) Proficiency Examination Administration Booklet called for all students enrolled in public schools, including charter schools, at a grade level where a mandated test was administered statewide, to participate in a test administration. Because participation rates for students were used to determine AYP, all public schools were required to submit an answer document for every student enrolled in grades 3 through 8, whether that student actually tested or not (NDE, 2010). The student information for each answer document was complete and accurate (NDE, 2010). Students who received special education or section 504 services, or who were identified as LEP, were afforded accommodations that provided better access and opportunity to demonstrate proficiency (NDE, 2010).

The instrument used by the school district was the Criterion Referenced Test (CRT). All items on the CRT are constructed by the Nevada Department of Education

and evaluated, edited, and revised by WestEd, a nationally recognized testing company, and Measured Progress, the testing vendor (NDE, 2010). All items were field-tested and were checked through a 'Bias Review' process to ensure validity and reliability prior to implementation. Results are reported in terms of scaled scores that allow for comparisons in content from grade to grade. Each year the scaled scores are equated, a statistical process that allowed two examinations to be compared in spite of different versions. Measured Progress and the University of North Carolina at Greensboro, outside evaluators, evaluate equating results statistically to ensure quality (NDE, 2010).

Per state statute NRS 389.550, the NDE administers the CRT, as developed in partnership with Measured Progress, in Reading and Mathematics to students in grades 3 through 8 (NDE, 2010). The reading test measured proficiency in word analysis skills, comprehension, interpretation, evaluation of literary, informational, persuasive, and functional text (NDE, 2010). The mathematics test measured proficiency in numbers and operations, algebra and functions, measurement, geometry, and data analysis (NDE, 2010). The third grade CRT included multiple-choice questions only (NDE, 2010). The CRT results placed students into one of four grouped levels: Emergent/Developing, Approaches Standard, Meets Standard, and Exceeds Standard (NDE, 2010). Students in the Meets Standard or Exceeds Standard levels were considered proficient (NDE, 2010).

Per state statute NRS 389.015, within 14 days after the results of the examinations were reported to the NDE, the Superintendent of Public Instruction for certification of the results of the examinations were transmitted to each school district and charter school (NDE, 2010). Not more than 10 working days after a school district received the results for the examinations, the superintendent of each school district certifies the results of the

examination; results were transmitted to each school within the school district (NDE, 2010).

Data Acquisition

The post-hoc data sought for this study was securely stored in the school district database, maintained in the Public Policy, Assessment, and Accountability Department as required under statute. Data was coded, verified, and archived according to district and state protocol by appropriate research personnel employed by the school district. Upon exemption of the Institutional Review Board at the University of Nevada, Reno and the school district approval via the Research Director, the de-identified data was provided in an Statistical Package for the Social Sciences (SPSS) file on a 2 GB USB drive. A copy of the documentation of exemption and approval can be found in Appendix A.

The data obtained and analyzed in this study resulted from the 2009-2010 Nevada Proficiency Examination third grade CRT scores, which is the same data set for the resulting kindergarten cohort for the 2006-2007 school year. The USB drive was maintained in a locked fireproof cabinet stored in the researcher's personal office. After the analyses, the data will be stored in the Office of the Principal Investigator in the Department of Educational Leadership for not more than 36 months, at which time the data will be erased.

District and Data Acquisition Background

During the 2006-2007 school year, 31 schools were selected to offer the first full-day kindergarten programs. Selection of participating schools was based on low-income status being at least 55% of the students were eligible for the free and/or reduced breakfast/lunch. Schools that were designated as Title 1 included those schools in which

60% or more students qualified for the free and/or reduced breakfast/lunch program. Schools that were designated as Title 1 eligible, but not served were those schools with included 40-60% or more students qualified for the free and/or reduced breakfast/lunch program. The funding for the full-day kindergarten programs during the 2006-2007 school year was allocated under the Senate Bill 404 (SB 404) (Hurst, 2005). The bill targeted Title 1 and Title 1 eligible, but not served schools with a 55% or higher percent of students eligible for the free and/or reduced breakfast/lunch program.

During the 2010-2011 school year, the year students in this study participated in the CRT, student characteristics were reported by gender, ethnicity/race, and special program enrollment. Gender was reported as being composed of 52% male to 48% female (WCSD, 2011). Ethnicity/race was reported as: American Indian/Alaskan Native 2%; Asian 5%; Hispanic 38%; African American 3%; Pacific Islander 1%; White/Caucasian 48%; and Multi-Racial 4% (WCSD, 2011). Special programs enrollment was reported as students with Individualized Education Plans 17%; student deemed as being Limited English Proficient 17%; and students who participate in the free/reduced lunch program 44% (WCSD, 2011). During the 2010-2011 school year, there were 64 elementary schools where each school provided some type of kindergarten program (WCSD, 2011).

The school district had planned for new directions in curriculum and program approaches, which are increasingly the result of diversity. A growing and diverse population demands a culturally responsive program that incorporates three pedagogy areas: institutional which incorporates administration and policy related areas; personal which is when the teacher processes teaching in an emotionally and instructionally

responsive manner sensitive to the cultural backgrounds of students; and instructional which relates to the materials and curriculum used for instruction (WCSD, 2011). Specific initiatives were recommended for students who fell under the LEP classification. The IRA and NAEYC (1997) report children who speak a primary language other than English in their home acquire specific skills, such as reading, when they have a strong academic foundation in their primary language. A strong foundational knowledge in vocabulary and concepts in their primary language increases the likelihood they will become strong readers (IRA & NAEYC, 1997). Full-day kindergarten programming is one option encompassed in a cadre of options, which addressed the needs of ever-changing populations.

Data Analysis

Multiple regression analysis was the primary statistical analysis technique used in this study. The multiple regression was chosen for three reasons: (a) regression analysis procedures result in the development of an equation that can be used in predicting a specific outcome with a given set of variables; (b) the regression analysis is a means to explain causal relationships among variables in the social science settings; and (c) the regression analysis is a means to describe and test the existence of predictable relationships among a set of variables (Mertler & Vannatta, 2010). The following describes the preliminary, primary, and additional data analyses conducted on the data set for this study.

Preliminary descriptive statistical analyses on each variable were conducted to describe the variables using descriptive techniques. The four types of descriptive statistical analyses included: (a) measures of central tendencies including median and

mean; (b) measures of variability to describe the range, standard deviation and variance within the data set; (c) measures of relative position, percentile rank; and (d) measures of relationship to examine the degree of relatedness two variables share, including the *Pearson r* correlation, depending on the metrics of the variable that was being described (Mertler & Vannatta, 2010). All relative findings were analyzed and reported as necessary.

The data were screened for missing data, univariate outliers, and multivariate outliers, including the calculation of Mahalanobis distance, in order to determine if any cases warranted elimination. Mahalanobis distance is the "statistical measure of an outlier; [the] distance of a case from the centroid of the remaining cases where the centroid is the point created by the means of all the variables" (Mertler & Vannatta, 2010, p. 345). Data screening and univariate analysis provided for new case eliminations as univariate outliers based upon the attained Mahalanobis distance, which yielded a new population. Each time the analysis resulted in case elimination, a new Mahlanobis distance was calculated to determine if any additional extreme values warranted exclusion. After the second Mahlanobis distance was calculated, the data set contained no extreme values.

To understand the predictable relationship between and among the variables of this study, including full-day kindergarten, in predicting reading, the multivariate regression model was applied using several different methods: enter, stepwise, and using an enter, stepwise, enter method. The first of the three multiple regressions was a conducted using the enter method with all twelve variables. The second multiple regression analysis was conducted using the stepwise method and included all twelve

variables. The third multiple regression was conducted using a three step process: the enter, stepwise, enter method. The third regression forced kindergarten type as the first order variable and math as a last order variable with all other ten variables using the stepwise method. The rationale to the selection of variables can be found in the section on variables as presented in Chapter 3. Three considerations specific to the regression analysis were taken into consideration: (a) the extent to which points are scattered around the line; (b) the slope of the regression line; and (c) the point at which the line crosses the Y-axis (Mertler & Vannatta, 2010). These three facts served as the basis for the calculation of the regression equation itself (Mertler & Vannatta, 2010). All statistical analyses were conducted using SPSS.

The multiple regression equation involved more than one independent or predictor value where the Y was the value for the dependent variable, reading achievement score on the third grade CRT [*Reading*], and *X* was the raw score values on the independent or predictor variables (Mertler & Vannatta, 2010). The independent or predictor variables included: kindergarten program type [*Ktype*]; AYP status of the school in kindergarten [*KAYP*]; American Indian [*Am Ind*]; Asian or Pacific Islander [*Asian*]; African American [*African American*]; Hispanic [*Hispanic*]; and Caucasian [*Caucasian*]; gender [*gender*]; Limited English Proficiency [LEP]; IEP designation when took CRT [*IEP*]; same school for kindergarten and CRT [*same sch*]; and mathematics achievement on the third grade CRT [*Math*]. The regression equation and explanation of variables were as follows.

$Y_{pred} = B_O + B_1X_1 + B_2X_2 + B_3X_3 + B_4X_4 + B_5X_5 + B_6X_6 + B_7X_7 + B_8X_8 + B_9X_9 + B_{10}X_{10} + B_{11}X_{11} + B_{12}X_{12} + e_n$, where:

Y_{pred} = predicted value for third grade reading achievement

B_O = Y axis intercept

B_1 = regression coefficient for kindergarten program type

X_1 = value for kindergarten program type

B_2 = regression coefficient for the AYP status of the school in kindergarten

X_2 = value for the AYP status of the school in kindergarten

B_3 = regression coefficient for the American Indian

X_3 = value for the American Indian

B_4 = regression coefficient for the Asian or Pacific Islander

X_4 = value for the Asian or Pacific Islander

B_5 = regression coefficient for the African American

X_5 = value for the African American

B_6 = regression coefficient for the Hispanic

X_6 = value for the Hispanic

B_7 = regression coefficient for the Caucasian

X_7 = value for the Caucasian

B_8 = regression coefficient for gender code

X_8 = value for gender code

B_9 = regression coefficient for Limited English Proficiency status

X_9 = value for Limited English Proficiency status

B_{10} = regression coefficient for Special Education with an IEP

X_{10} = value for Special Education with an IEP

B_{11} = regression coefficient for same school for kindergarten and CRT

X_{11} = value for same school for kindergarten and CRT

B_{12} = regression coefficient for mathematics achievement on the third grade CRT

X_{12} = value for the percentage mathematics achievement on the third grade CRT

e_n = prediction errors

Data was screened for missing data and univariate outliers. Univariate outliers were calculated using Mahalanobis distance in a preliminary regression procedure (Mertler & Vannatta, 2010). An Explore function was conducted on the Mahalanobis distance to determine which cases exceed the critical chi square (X^2_{crit}) criteria (Mertler & Vannatta, 2010). The critical value of chi square was determined using a chi square table where $p < .001$ with df = 13. The Degree of Freedom was equal to the number of variables included in the preliminary regression. In this case the variables were: Student id [*stud id*]; kindergarten program type [*Ktype*]; AYP status of the school in kindergarten [*KAYP*]; race/ethnicity based on five codes: American Indian [*Am Ind*]; Asian or Pacific Islander [*Asian*]; African American [*African American*]; Hispanic [*Hispanic*]; and Caucasian [*Caucasian*]; and gender [*gender*]; Limited English Proficiency [LEP]; IEP designation when took CRT [*IEP*]; same school for kindergarten and CRT [*same sch*]; and mathematics achievement on the third grade CRT [*Math*].

Univariate normality was assessed by conducting a second Explore function of the data, excluding univariate outliers. Distribution of the data was analyzed to ensure a normal distribution and that distributions were not too extreme in skewedness. In order to assume multivariate normality and homoscedasticity, data was examined through residual plots during preliminary screening (Mertler & Vannatta, 2010). Data was cleaned, which lead to the elimination of specific cases and will be reported accordingly. Evaluation of linearity was conducted. Variables were recoded and transformed, as necessary, to meet the necessary assumptions of a multiple regression analysis (i.e. univariate and multivariate normality, linearity, homogeneity of variance-covariance, and homoscedasticity) (Mertler & Vannatta, 2010).

The multiple regression analysis was conducted after tests for linearity, normality, and homoscedasticity were completed and all data was reviewed. The results were analyzed to check estimates, model fit, *R squared change* (if a step model was used), descriptives, part and partial correlations, and linearity diagnostics (Mertler & Vannatta, 2010). Tolerance was interpreted. For each independent variable greater than .1, the model summary, ANOVA summary table, and the coefficients table were interpreted.

Results were summarized for descriptive statistics and the significance of the overall regression. The model was analyzed for significant correlation between a given independent variable as a predictor for reading achievement. Results were reported in terms of correlation (*Pearson's R*); percent shared variance (R^2 and *adjusted* R^2); the *F* statistic; and significance (*p* value). When the stepwise method was conducted, results were reported in terms of *R*, R^2 *adj*, R^2 *change*, and level of significance for change as well. Tables were presented to report the Beta weights, β weights, bivariate *r*, and partial

r for each independent variable in the model. The various models were tested to account for the percentage of variance in reading achievement. All results are presented in Chapter 4 and discussed in Chapter 5.

Summary

The purpose of this study was to determine if reading achievement for third grade can be predicted from knowledge of selected variables. These variables included kindergarten program type, school, and student characteristics to measures of academic achievement in reading. This study compared the relationship of students who were enrolled in a full or half-day kindergarten program in the school district, and other related school and student characteristics with their respective reading achievement as determined by the third grade-reading test results on the CRT adopted in the state of Nevada. Specific information related to the selection of the kindergarten participants defining the parameters surrounding data included in study was presented. Information related to the validity and reliability of the CRT and the NDE requirements for testing therein was provided via the instrumentation section above. In addition, data collection and analysis procedures were described. The following chapters include the results and discussion of the implications of this study.

CHAPTER FOUR

The Results

This chapter presents the results of the study through narrative and tables for predicting reading achievement in the third grade based on specific variables including full day kindergarten enrollment. First, the guiding research question and variables are presented. Initial data exploration is presented to provide insight to the data as received and the screening and coding process used to obtain the final data set. Descriptive statistics and related means and frequency tables present specific information related to the data set and the identified variables. Univariate analyses are delineated to identify deleted cases due of tests for linearity, normality, and homoscedasticity. Several regression analyses were conducted to understand the relationship of specific variables and predicting reading achievement. The final regression analysis presented in Chapter 4 yields the strongest model for predicting reading achievement. After initial results were examined, post hoc chi square analyses were conducted to explore specific relationships between the variable kindergarten type and other selected variables. Such results are presented herein. Chapter 5 follows, which summarizes the findings, conclusions and implications, and recommendations for future research.

Research Question

This study examined relationships between variables related to kindergarten program type, student, and school characteristics and academic achievement in reading on the Criterion-Referenced Test (CRT) for third grade. The research question proposed to guide this study was:

Is third grade CRT reading achievement predictable from knowledge of selected variables (kindergarten type, AYP designation in kindergarten year, limited English proficiency status, gender, race/ethnicity, special education with IEP, same school, mathematics achievement)?

Descriptive Statistics

Descriptive statistics were completed to determine the number of students in the original data set and to delineate initial composition of the data prior to any exclusions (*N* = 4494). All variable data, with the exception of *Math* scores, were converted to binary code for the purpose of conducting the multiple regressions as routinely operated by researchers such as Draper and Smith (1998), and Hardy (1993). The *Math* scores were treated as continuous, as they ranged from 100-500 and distributed normally. Initial frequency analyses delineated student classification as being enrolled in one of the five different program types as seen in Table 1: the half-day (*n* = 2017); full day kindergarten (*n* = 1905) program; full day tuition (*n* = 514); the Johnson full day program *(n* = 8); and charter schools (*n* = 50).

Table 4.1
Kindergarten Population by Kindergarten Program Type in the Initial Dataset

Kindergarten Type	Frequency	Cumulative Percent
Half Day	2017	44.9
Full Day (State Funded)	1905	42.4
Full Day Tuition	514	11.4
Rural Full Day (Johnson)	8	.2
Charter	50	1.1
Total	4494	100.0

*Note: All students in the data set are included in the initial *Ktype* breakdown.

Study criteria for inclusion called for: (a) being enrolled in a full or half-day kindergarten program in a public school for kindergarten during the 2006-2007 school

year, and (b) the completion date of the CRT. Exclusion criteria called for: (a) student data sets for which there were any missing elements in the variables of the cases and (b) students who attended a charter school or tuition-based school in kindergarten. Because of the above inclusion and exclusion criteria (a), 20% of the cases were eliminated. The eliminated cases were those missing a reading CRT score, the dependent variable. This resulted in a 3,579 cases, which accounted for 80% of the initial data set.

Additional analyses called for several eliminations due to exclusion criteria (b). First, students who attended a charter school or tuition based kindergarten were eliminated (n = 446) which resulted in a 3133 remaining cases. A review of the data set resulted in the detection of one charter school being miscoded as a traditional school; therefore the 16 cases associated with this school were eliminated [criteria (b)], which left 3,117 cases. In addition, there was one case noted with missing data for the *LEP* and *IEP* variables.

Descriptive statistics for each variable provided insight to the characteristics of the data set. Table 4.2 summarizes the frequencies and cumulative percentages by kindergarten program type (*Ktype*). Students who were enrolled in a state funded full day kindergarten program were coded as a one. Students who were enrolled in a half-day kindergarten program were coded as a zero. Students enrolled in a state funded full day kindergarten program (n = 1504) accounted for 48.3% of the cases in the data set. Students enrolled in a half-day kindergarten program *(*n = 1613) accounted for 51.7% of the remaining cases. The frequencies are summarized in Table 4.2.

Table 4.2
Summary of Frequencies by Kindergarten Type (Ktype)

Kindergarten Type	Frequency	Cumulative Percent
Half Day Kindergarten Program	1613	51.7
Full Day Kindergarten Program (State Funded)	1504	48.3
Total	3117	100.0

*Note: Cases included in the table are pre-univariate analyses.

For the variable *gender,* students who were male were coded as a one. Students who were female were coded as a zero. Male students (n = 1669) represented 53.5% of the data set. Female students (n = 1448) represented 46.5% of the data set. The frequencies and cumulative percentages are summarized in Table 4.3.

Table 4.3
Summary of Frequencies by Gender

Gender	Frequency	Cumulative Percent
Female	1448	46.5
Male	1669	53.5
Total	3117	100.0

*Note: Cases included in the table are pre-univariate analyses.

For the variable *Limited English Proficiency (LEP),* students who were *LEP* were coded as a one. Students who were not *LEP* were coded as a zero. The frequencies and cumulative percentages are summarized in Table 4.4. Students who were not *LEP* (n = 2002) accounted for 64.2% of the remaining cases. Students who were *LEP* (n = 1114) accounted for 35.7% of the remaining cases.

Table 4.4
Summary of Frequencies by Limited English Proficiency (LEP) Variable Breakdown

LEP Status	Frequency	Cumulative Percent
LEP No	2002	64.2
LEP Yes	1114	35.0
Total	3116	100.0

*Note: Cases included in the table are pre-univariate analyses and includes one missing data point.

For the variable *Individualized Education Plan (IEP)*, students participating in a special education program with an *IEP* were coded as a one. Students not participating in a special education without an *IEP* were coded as zero. The frequencies and cumulative percentages are summarized in Table 4.5. Students participating in a special education program with an *IEP* accounted for 12.1% of the remaining cases (n = 377). Students who were not participating in a special education program (n = 2739) accounted for 87.9% of the remaining cases.

Table 4.5
Summary of Frequencies by Individualized Education Plan (IEP)

IEP Status	Frequency	Cumulative Percent
IEP No	2739	87.9
IEP Yes	377	12.1
Total	3116	100.0

*Note: Cases included in the table are pre-univariate analyses and includes one missing data point.

For the variable, *same school* (*same sch*), students who attended the same school in kindergarten as when they participated the CRT were coded a one. Students who did not attend the same school in kindergarten as when they participated in the CRT during their third grade year were coded a zero. The frequencies and cumulative percentages are summarized in Table 4.6. Students who did attend the same school in their kindergarten year and the subsequent third grade year when they took the CRT accounted for 63.3% (*n*

= 1972). Students who were not in the same school when they attended kindergarten and when they participated in the CRT accounted for 36.7% (*n* = 1145).

Table 4.6
Summary of Frequencies by Same School (Same Sch)

Same School Status	Frequency	Cumulative Percent
Not Same School	1145	36.7
Same School	1972	63.3
Total	3117	100.0

*Note: Cases included in the table are pre-univariate analyses.

For the variable *Kindergarten Adequate Yearly Progress* (*KAYP*), students who attended a school during their kindergarten year that did make AYP were coded as a one. Students who attended a school during their kindergarten year that did not make AYP were coded as a zero. Students who attended a school that did make AYP (*n* = 1943) accounted for 62.3%. Students who attended a school that did not make AYP (*n* = 1174) accounted for 37.7%. The frequencies and cumulative percentages are summarized in Table 4.7.

Table 4.7
Summary of Frequencies by Kindergarten Adequate Yearly Progress (KAYP)

AYP Status	Frequency	Cumulative Percent
Did not Make AYP	1174	37.7
Made AYP	1943	62.3
Total	3117	100.0

*Note: Cases included in the table are pre-univariate analyses.

For the variable ethnicity, the data was separated into five categories: African American (*Afr. Am.*), American Indian (*Amer. Ind.*), Asian (*Asian*), Caucasian (*Cauc.*), and Hispanic (*Hisp.*). The ethnic categories were binary coded. Students who were African American (*Afr.Am.*) were coded as a one. Students who were not African American (*Afr.Am.*) were coded as a zero. Students who were American Indian (*Amer.*

Ind.) were coded as a one. Students who were not American Indian (Amer. Ind.) were coded as a zero. Students who were Asian (*Asian*) were coded as a one. Students who were not Asian (*Asian*) were coded as a zero. Students who were Caucasian (*Cauc.*) were coded as a one. Students who were not Caucasian (*Cauc.*) were coded as a zero. Students who were Hispanic (*Hisp.*) were coded as a one. Students who were not Hispanic (*Hisp.*) were coded as a zero.

The frequencies and cumulative percentages are summarized in Table 4.8. Students who were African American (*n* = 112) accounted for 3.6%. Students who were American Indian (*n* = 60) accounted for 1.9%. Students who were Asian ethnicity (*n* = 200) accounted for 6.4%. Students who were Caucasian ethnicity (*n* = 1483) accounted for 47.6%. Students who were Hispanic ethnicity (*n* = 1262) accounted for 40.5%.

Table 4.8
Summary of Frequencies by Ethnic Composition

Ethnicity	Frequency	Cumulative Percent
African American	112	3.6
American Indian	60	1.9
Asian	200	6.4
Caucasian	1483	47.6
Hispanic	1262	40.5
Total	3117	100.0

*Note: Cases included in the table are pre-univariate analyses.

Descriptive statistics were explored for *Math* and *Reading* achievement scores on the CRT, which is presented in Table 4.9. Both reading and math achievement scores on the CRT examination were reported within a range of 400 where the minimum score was 100 and the maximum score was 500. The CRT mathematics score was analyzed to yield the mean, median, mode and standard deviation are reported ($Math_{Mean}$ = 332.74, $Math_{Mdn}$ = 328, $Math_{Mode}$ = 400, *S.D.* = 59.702). The CRT reading score was analyzed to yield

the mean, median, mode, and standard deviation are reported ($Reading_{Mean}$ = 318.55, $Reading_{Mdn}$ = 323, $Reading_{Mode}$ = 328, *S.D.* = 63.630).

Table 4.9
Descriptive Statistics for Math Scores and Reading Scores

Ethnicity	Math Score	Reading Score
Mean	332.74	318.55
Median	328.00	323.00
Mode	400.00	382.00
Std. Deviation	59.70	63.63

*Note: Cases included in the table are pre-univariate analyses.

Next, a series of independent samples t-tests were conducted to understand the data set more in-depth. The reading achievement mean scores were presented for each variable. Each variable was binary coded as discussed in Chapter 3. This allows for a means analysis within in variable where cases were coded as a 1 or 0. Discussions regarding the results were integrated into Chapter 5 where relevant.

The independent samples t-test results for comparing kindergarten program type did not meet the assumption of homogeneity of variance. Therefore, a nonparametric Mann Whitney U test was conducted. The mean reading scores for kindergarten program type, full and half-day, were significantly different. The Mann-Whitney test on reading achievement scores yielded an obtained *U* of 808871.500, which was found to be significant ($z = -16.068$, $p < .001$). Students enrolled in half-day kindergarten programs achieved at a higher level (*Mean* = 335.17) than students enrolled in a full day kindergarten program (*Mean* = 300.73) as presented in Table 4.10.

Table 4.10

Reading Achievement Mean Scores by Kindergarten Type

	Kindergarten Type	N	Mean	Std. Dev.	Std. Error Mean
Reading Score	Full Day (State Funded)	1504	300.73	57.98	1.50
	Half Day	1613	335.17	64.18	1.60

*Note: $N = 3117$

The independent samples t-test results for comparing gender did not meet the assumption of homogeneity of variance; therefore, a nonparametric Mann Whitney U test was conducted. The mean reading scores for gender, male and female, were significantly different. The Mann-Whitney test on reading achievement scores yielded an obtained *U* of 1,104,517, which was found to be significant ($z = -4.14$, $p < .001$). Male students achieved at a lower level (*Mean* = 314.31) than female students (*Mean* = 323.45) as presented in Table 4.11.

Table 4.11

Reading Achievement Mean Scores by Gender

	Gender	N	Mean	Std. Deviation	Std. Error Mean
Reading Score	Male	1669	314.31	64.22	1.57
	Female	1448	323.45	62.59	1.64

*Note: $N = 3117$

The independent samples t-test results for comparing LEP status did not meet the assumption of homogeneity of variance; therefore, a nonparametric Mann Whitney U test was conducted. The mean reading scores for LEP status, being LEP and non-LEP were significantly different. The Mann-Whitney test on reading achievement scores yielded an obtained *U* was 682,338, which was found to be significant ($z = -17.995$, $p < .001$).

Students deemed as being LEP achieved at a lower level (*Mean* = 292.52) than non-LEP students (*Mean* = 333.08) as presented in Table 4.12.

Table 4.12
Reading Achievement Mean Scores by LEP Status

	LEP	N	Mean	Std. Deviation	Std. Error Mean
Reading Score	Yes	1114	292.52	56.83	1.70
	No	2002	333.08	62.57	1.40

*Note: *N* = 3116, due to one case missing *LEP* data

The independent samples t-test for comparing IEP status did not meet the assumption of homogeneity of variance; therefore, a nonparametric Mann Whitney U test was conducted. The mean reading scores for IEP status, possessing an IEP and non-IEP, were significantly different. The Mann-Whitney test on reading achievement scores yielded an obtained *U* was 290,898.500, which was found to be significant ($z = -13.774$, $p < .001$). Students possessing an IEP achieved at a lower level (*Mean* = 272.32) than non-IEP students (*Mean* = 324.95) as presented in Table 4.13.

Table 4.13
Reading Achievement Mean Scores by IEP Status

	IEP	N	Mean	Std. Deviation	Std. Error Mean
Reading Score	Yes	377	272.32	72.04	3.71
	No	2739	324.95	59.64	1.14

*Note: *N* = 3116, due to one case missing *IEP* data

An independent samples t-test was conducted on the variable *same school*. The mean reading scores for *same school* were significantly different ($t = 5.102$, $df = 3115$, $p < .001$). Students who were enrolled in kindergarten and were in the same scored for their participation on the CRT examination scored significantly higher (*Mean* = 322.97)

than students who were not in the same school (*Mean* = 310.95) for their kindergarten enrollment and participation in the CRT examination as presented in Table 4.14.

Table 4.14
Reading Achievement Mean Scores by Same School Status

	Same School	N	Mean	Std. Deviation	Std. Error Mean
Reading Score	Same School	1972	322.97	63.43	1.42
	Not Same School	1145	310.95	63.26	1.87

*Note: $N = 3117$

An independent samples t-test was conducted on the variable Kindergarten AYP (KAYP). The mean reading scores for Kindergarten AYP were significantly different ($t = 8.514$, $df = 3115$, $p < .001$). Students who attended schools that attained AYP in kindergarten scored significantly higher (*Mean* = 326.01) than students who did not attend a school that did not attain AYP in kindergarten (*Mean* = 306.21) as presented in Table 4.15.

Table 4.15
Reading Achievement Mean Scores by Kindergarten AYP Status

	KAYP	N	Mean	Std. Deviation	Std. Error Mean
Reading Score	Made AYP	1943	326.01	63.31	1.44
	Did not Make AYP	1174	306.21	62.23	1.81

*Note: $N = 3117$

Data Screening and Univariate Analysis

Traditional statistical analyses suggest that data should be screened to identify outliers. Mahalanobis distance is the "statistical measure of an outlier; [the] distance of a case from the centroid of the remaining cases where the centroid is the point created by the means of all the variables" (Mertler & Vannatta, 2010, p. 345). These statistics were

computed; all African American (n = 112) and all American Indian (n = 60) cases were identified as outliers. To investigate this phenomenon, additional Mahalanobis distance were computed without entering the ethnicity variable. These calculations indicated that all cases were within acceptable limits: that is, there were no outliers identified within the data set. The primary purpose of this study was to establish a possible relationship between *Ktype* and reading achievement. In addition, the correlation between LEP status and Hispanic ethnicity was .764, which indicates that 58.4% of the variance was accounted for (Appendix B). As a result, it was determined that the regression analyses should be conducted without using the variable ethnicity. That is all cases were included in the regression analyses; to some extent, the variable LEP provided a surrogate for Hispanic ethnicity.

Regression Analysis

As discussed in Chapter 3, multiple regression analysis was the primary statistical analysis technique planned for this study. The multiple regression analyses were chosen for three reasons:

(a) regression analyses procedures result in the development of an equation that can be used in predicting a specific outcome with a given set of variables;

(b) regression analyses are a means to explain causal relationships among variables in the social science settings; and

(c) regression analyses are a means to describe and test the existence of predictable relationships among a set of variables (Mertler & Vannatta, 2010).

Several methods in which the variables incorporated into the regression analysis and the subsequent equation were considered (Mertler & Vannatta, 2010). In this study,

several regression analyses were conducted on the data set to ascertain information about each of the selected variables as predictors of the dependent variable. Further evaluation of the results of the three regression analyses allowed for determination of the strongest regression model given the selected variables. The variables which were evaluated in the multiple regression equation included: kindergarten program type [*Ktype*]; Adequate Yearly Progress designation during the kindergarten year [*KAYP*]; gender [*gender*]; Limited English Proficiency [*LEP*]; IEP designation when took CRT [*IEP*]; same school for kindergarten and CRT [*same sch*]; and mathematics achievement on the third grade CRT [*Math*].

A series of regression analyses were conducted to analyze the data and answer the research question of this study. Several regression models were applied to explore the data. In all cases, *Ktype* was the first variable entered because of the purpose of this study. Two different analyses provided insight to the data and the strength of each independent variable in relation to predicting CRT reading achievement scores, the dependent variable. The two different approaches of interest are expanded upon in the following section.

The first regression analysis was conducted using the stepwise method approach. This technique allowed multiple variables simultaneously; that is the Statistical Package for the Social Sciences (SPSS) software program selected the strongest variable first, the second strongest next and so on. The effect of each variable as a predictor of reading achievement was evaluated and ordered in relevance to building a regression equation model that predicts reading achievement. Each variable was evaluated at each step whereas statistical tests were performed to determine the significance of the variables in

relation to the other variables already in the equation. During each step of the procedure, the evaluation of an additional variable may have called for a previous variable be eliminated from the equation. The final equation resulted in a regression equation where the variables were presented in order of significance generating a specific model. In this model, mathematics was the best predictor of reading. Correlation between reading and mathematics was .682, which indicates that 46.5% of the variance was accounted for (Appendix B). Since the primary purpose of this study was to establish a possible relationship between *Ktype* and reading achievement, a second analysis was conducted and reported.

This regression analysis yielded a strong model and accounted for 52.2% of the shared variance in predicting reading achievement. In this analysis, *Ktype* was ordered as the first variable to delineate the strength of the variable *Ktype* without relevance to the other variables. Next, the variables *LEP*, *IEP*, *gender*, *same school*, and *KAYP* were entered in a stepwise fashion allowing SPSS to determine the significance of each variable in relation to the other variables already in the equation. The variable mathematics (*Math*) was ordered to be the last variable to allow the remaining variables to be calculated in their strength to predict reading without regard to the math variable until the last calculation was conducted.

To summarize, this regression analysis allowed for the evaluation of the effect of kindergarten type on third grade reading achievement without other variables. Then it allowed for the other variables, with the exception of mathematics achievement, to be evaluated on their effect to predict reading achievement in addition to kindergarten program type. Lastly, it allowed mathematics achievement to be entered into the model.

This is important because the effect of kindergarten program type was a primary interest in this study. This approach provided an understanding of the contributions of the various variables. In addition, it was important to understand the effect of all other variables on reading achievement in the absence of mathematics achievement because math and reading are highly correlated.

The final regression model under this procedure accounted for 52.2% of the variance. The final regression equation is:

$CRT\ Reading\ Achievement = -10.304X_{Ktype} - 25.972X_{IEP} - 18.816X_{LEP} - 8.570X_{Gender} + 3.574X_{KAYP} + .645X_{Math} + 121.069.$

The beta weights (β) which generated the regression equation were presented in Coefficient Table (Table 4.16). The beta weights (β) yielded *Ktype* β = -10.304, $t(3117) = --5.582$, $p < .001$, *IEP* β = -25.972, $t(3117) = -10.354$, $p < .001$, *LEP* β = -18.816, $t(3117) = -9.841$, $p < .001$, *KAYP* β = 3.574, $t(3117) = 2.069$, $p = .039$, *Gender* β = -8.570, $t(3117) = -5.383$, $p < .001$, and *Math* β = .645, $t(3117) = 46.074$, $p < .001$, which significantly contributed to the model. The model that resulted excluded variables *same school, Caucasian* ethnicity, and *Asian* ethnicity because they were not statistically significant.

Table 4.16
Coefficient Table for Regression Final Model

Model 6	Unstandardized Coefficients		Standardized Coefficients		
Variable	B	Std. Error	Beta	t	Sig.
(Constant)	121.069	5.235		23.125	.000
Ktype	-10.304	1.846	-.081	-5.582	.000
IEP	-25.972	2.508	-.133	-10.354	.000
LEP	-18.816	1.912	-.142	-9.841	.000
KAYP	3.574	1.727	.027	2.069	.039
Gender	-8.570	1.592	-.067	-5.383	.000
Math	.645	.014	.605	46.074	.000

*Note: The variable s*ame school* was excluded since it was not a significant variable in predicting reading.

The model described in the aforementioned regression equation accounted for 52.2% of the shared variance in predicting reading achievement scores (Table 4.17). This approach provided six progressive models that are summarized in Table 4.11. Because kindergarten type was of primary interest in this study, *Ktype* was treated as a first order variable which accounted for 7.3% of the variance illustrated in the Model Summary for Model 1 (R^2 = .073, R^2_{adj} = .073, $F(1, 3114) = 246.857$, $p < .001$). Next, the variables *IEP, LEP, KAYP, Gender* were entered into the equation respectively based on their relative contribution. These contributions are summarized in Table 4.17 (Model 2 – 5). Model 6 resulted in the regression equation with the highest proportion of shared variance. This is logical because of the correlation between reading and math scores (*Pearson's r* = .682, R^2 = .465, $p < .001$). Results indicated the regression equation included specific variables including: *Ktype, IEP, LEP, KAYP, Gender, and Math* significantly shared 52.2% of the variance in predicting *reading* (R^2 = *.523*, R^2_{adj} = .522, $F(1, 3109) = 2122.822$, $p < .001$).

Table 4.17
Regression Final Model Summary

Model	R	R^2	Adjusted R^2	Std. Error of the Estimate	Change Statistics				
					R^2 Change	F Change	df1	df2	Sig. F Change
1	.271[a]	.073	.073	61.251	.073	246.857	1	3114	.000
2	.385[b]	.149	.148	58.724	.075	274.684	1	3113	.000
3	.439[c]	.193	.192	57.187	.044	170.656	1	3112	.000
4	.441[d]	.195	.194	57.124	.002	7.824	1	3111	.005
5	.444[e]	.197	.196	57.064	.002	7.570	1	3110	.006
6	.723[f]	.523	.522	43.996	.326	2122.822	1	3109	.000

a. Predictors: (Constant), Kindergarten Type
b. Predictors: (Constant), Kindergarten Type, IEP
c. Predictors: (Constant), Kindergarten Type, IEP, LEP
d. Predictors: (Constant), Kindergarten Type, IEP, LEP,
e. Predictors: (Constant), Kindergarten Type, IEP, LEP, KAYP
f. Predictors: (Constant), Kindergarten Type, IEP, LEP, KAYP, Gender, Math

Additional Statistical Tests: Chi-Square Tests of Independence

Research analyzed in the literature, as found in Chapter 2, reported a positive effect for students attending full day kindergarten. However, the regression equation, which resulted from the regression analyses, yielded a negative effect for several variables including attending full day kindergarten, possessing an *IEP*, being deemed *LEP*, and being of male *gender* (Table 4.16). This finding warranted further investigation into the relationships between *Ktype* and other variables that add a negative effect including *LEP*, *IEP*, and *Gender*. Although a chi-square test of independence was not described in Chapter 3 because it was not a planned part of the research, the results warranted further research into understanding the relationship of the negative effect of each variable as they relate to kindergarten program type. Therefore, a chi-square test of independence was conducted to determine whether *Ktype* is independent of each variable or related in a separate analysis for each pair of independent variables. In order to conduct the chi-square test of independence, each analysis began with a null hypothesis

and an alternative hypothesis. This is not to be confused with the research question of the study, as this section serves to understand the statistical results in conducting the regression analysis required to answer the research question driving this study.

First, the chi-square test of independence for *Ktype* and *LEP* examined the relationship between the variables to test the null and alternative hypothesis: (a) H_A: There is a relationship between *Ktype* and *LEP*; (b) $H_\varnothing$: There is no relationship between *Ktype* and *LEP*, the variables are independent of each other. The cases (N = 3116) included students coded as enrolled in a half-day kindergarten program (n = 1612) and students enrolled in a full day kindergarten program (n =1504) (Table 4.18). When examining the students enrolled in a half-day kindergarten program, 1,392 were not coded as *LEP* with an expected count of 1035.7; and 220 were coded as *LEP* qualified with an expected count of 576.3 (Table 4.18). When examining the students enrolled in a full day kindergarten program, 610 were not coded as *LEP* with an expected count of 966.3; and 894 were coded as *LEP* qualified with an expected count of 537 (Table 4.18). The chi square test of independence was conducted to test the null hypothesis that the variables *Ktype* and *LEP* are independent of each other. The chi square test was significant [X^2 (1, N = 3116) = 710.355, $p < .001$, *Cramer's* $\Phi = .477$]. The null hypothesis was rejected; some type of relationship between *Ktype* and *LEP* exists.

Table 4.18
Chi Square Test of Independence for Kindergarten Type by LEP Status

			LEP		
			No	Yes	Total
Kindergarten Type	Half Day	Count	1392.0	220.0	1612
		Expected Count	1035.7	576.3	1612
	Full Day (State Funded)	Count	610.0	894.0	1504
		Expected Count	966.3	537.7	1504
Total		Count	2002	1114	3116
		Expected Count	2002	1114	3116

*Note: Includes 3116 cases and one missing data case.

The chi-square test of independence for *Ktype* and *IEP* examined the relationship between the variables to test the null and alternate hypothesis: (a) H_A: There is a relationship between *Ktype* and *IEP*; (b) $H_{\emptyset}$: There is no relationship between *Ktype* and *IEP*, the variables are independent of each other as shown in Table 4.19. The population (N = 3116) included students coded as enrolled in a half-day kindergarten program (n = 1612) and students enrolled in a full day kindergarten program (n = 1504) (Table 4.19). When examining the students enrolled in a half-day kindergarten program, 1409 were not coded as *IEP* with an expected count of 1417; and 203 were coded as *IEP* qualified with an expected count of 195 (Table 4.19). When examining the students enrolled in a full day kindergarten program, 1330 were not coded as *IEP* with an expected count of 1322; and 174 were coded as *IEP* qualified with an expected count of 182 (Table 4.19). The chi square test of independence was conducted to test the null hypothesis that the variables *Ktype* and *IEP* are independent of each other. The test was not significant [X^2 (1, N = 3116) = .767, p = .381, *Cramer's* Φ = -.016]. This indicated there was no relationship between *Ktype* and *IEP* and the variables are independent of each other.

Table 4.19
Chi Square Test of Independence for Kindergarten Type by IEP Status

			IEP		
			No	Yes	Total
Kindergarten Type	Half Day	Count	1409	203	1612
		Expected Count	1417	195	1612
	Full Day (State Funded)	Count	1330	174	1504
		Expected Count	1322	182	1504
Total		Count	2739	377	3116
		Expected Count	2739	377	3116

*Note: N = 3117

The chi-square test of independence for *Ktype* and *Gender* examined the relationship between the variables to test the null and alternate hypothesis: (a) H_A: There is a relationship between *Ktype* and *Gender* ethnicity; (b) $H_Ø$: There is no relationship between *Ktype* and *Gender* ethnicity, the variables are independent of each other. The population (N = 3117) included students coded as enrolled in a half-day kindergarten program (n = 1613) and students enrolled in a full day kindergarten program (n = 1504) (Table 4.20). When examining the students enrolled in a half-day kindergarten program, 886 were coded as being of male *Gender* with an expected count of 863.7; and 727 were coded as being of female *Gender* ethnicity with an expected count of 749.3 (Table 4.20). When examining the students enrolled in a full day kindergarten program, 783 were coded as being of male *Gender* with an expected count of 805.3; and 721 were coded as being of female *Gender* with an expected count of 698.7 (Table 4.20). The chi square test of independence was conducted to test the null hypothesis that the variables *Ktype* and *Gender* are independent of each other. The chi square test was not significant [X^2 (1, N = 3117) = 2.573, p = .109, *Cramer's* Φ = -.029]; there is no relationship between *Ktype* and *Gender*.

Table 4.20
Chi Square test of Independence for Kindergarten Type by Gender

			Gender		
			Male	Female	Total
Kindergarten Type	Half Day	Count	886.0	727.0	1613
		Expected Count	863.7	749.3	1613
	Full Day (State Funded)	Count	783.0	721.0	1504
		Expected Count	805.3	698.7	1504
Total		Count	1669	1448	3117
		Expected Count	1669	1448	3117

*Note: N = 3117

Summary

This chapter presented the results of this study. Initial univariate screening was conducted and cases were eliminated, including two ethnic categories: American Indian and African American. A new univariate screening was conducted that did not include ethnicity, which did not eliminate those same cases indicating they were being eliminated due to the small *n*'s as coded with each category. *Ktype* was the primary interest in this study, not ethnicity. Therefore, a decision was made to remove ethnicity from the regression equation in order to include more cases for analyses in the final regression analysis. The data set was summarized for descriptive statistics, including frequencies and means for each variable. The data set was summarized to delineate the significance of the overall regression.

Several models indicated a significant correlation between several independent variables as predictors for reading achievement using several different types of regression analysis. Results were reported in terms of correlation (Pearson's *R*); percent shared variance (R^2 and adjusted R^2); the *F* statistic; and significance (*p* value) for each regression. When the stepwise method was selected, the results were reported in terms of

R^2, R^2_{adj}, R^2_{change}, and the level of significance for change. Tables were presented to report this information as well as the Beta weights, β weights, bivariate *r*, and partial *r* for each independent variable in the model. Each model in the three regressions conducted accounted for a percentage of shared variance in reading achievement.

This chapter represented the results of the study through narrative and tables for predicting reading achievement in the third grade using specific variables including full day kindergarten enrollment. First, the guiding research question and variables were presented. Initial data exploration was presented to provide insight to the data as received and the screening and coding process. Descriptive statistics and related tables presented specific information related to the data set and the identified variables. Univariate analyses were delineated to identify deleted cases because of the tests for linearity, normality, and homoscedasticity. Although three regression analyses were conducted, the third regression analysis was presented in Chapter 4 as it represented the strongest model for predicting reading achievement. After initial results were examined, post hoc chi square analyses were conducted to explore specific relationships between the variable kindergarten program type and other selected variable. Such results were delineated therein. Chapter 5 follows to delineate findings, conclusions and implications, as well as recommendations for further research.

CHAPTER FIVE

Discussion

The preceding chapter presented the results for the data analysis of this study. This chapter will examine the results further and provide a discussion of the topic through several sections: a summary of the findings; implications and conclusions; and recommendations for further research. The purpose of the following sections are to expand on the data analysis and results chapter with professional insight and brevity on the implications for educational leadership, specifically related to early childhood education and kindergarten programming. Recommendations for the future provides researchers, policy makers, and educational stakeholders who make programming decisions, with evidence relating to the long term impact of full versus half-day kindergarten, specifically predicting reading achievement in Nevada.

The purpose of this post-hoc study was to examine relationships between the selected variables and to determine if reading achievement for third grade could be predicted from knowledge of the selected variables, with a particular interest on full day kindergarten as a predictor variable. The variables examined included kindergarten program type, school and student characteristics, and a measure of academic achievement. The variables examined in this study included the following: kindergarten program type being full or half-day program [*Ktype*]; race/ethnicity based on five categories: American Indian [*Am Ind.*]; Asian or Pacific Islander [*Asian*]; African American [*Afr. Am.*]; Hispanic [*Hisp.*]; and Caucasian [*Cauc.*]; gender [*gender*]; Limited English Proficiency [*LEP*]; IEP designation [*IEP*]; same school for kindergarten on the Criterion Referenced Test (CRT) [*same sch*]; AYP status of the school in kindergarten

[*KAYP*]; mathematics achievement on the third grade CRT in math [*Math*]; and reading achievement on the third grade CRT Reading [*Reading*]..

This post hoc quantitative research study was proposed to analyze reading achievement scores from the CRT associated with 3117 students who were enrolled in either full or half-day kindergarten programs in the school district during the 2006-2007 school year and completed the CRT in third grade during the 2009-2010 school year as the inclusion and exclusion criteria called for. The following research question was examined in relationship to the data analysis conducted in Chapter 4:

Is third grade CRT reading achievement predictable from knowledge of selected variables (kindergarten type, AYP designation in kindergarten year, limited English proficiency status, gender, race/ethnicity, special education with IEP, same school, mathematics achievement)?

Summary of the Findings

Four key findings were reported in Chapter 4: (a) reading achievement is predictable, given specific variables and a statistical margin of error; (b) mathematics, when used as a variable in predicting reading, yields the highest proportion of shared variance of all the variables selected in the model; (c) full day kindergarten enrollment is a variable that can be used to predict reading achievement; (d) and enrollment in full day kindergarten and being deemed Limited English Proficient, both yielded a negative effect, meaning those variables in the final equation resulted in the deduction of points from the constant baseline score when generating a predicted reading achievement score. These findings will add to the body of literature regarding kindergarten program type and predicting reading achievement. The key findings will be discussed briefly in the

following paragraphs. Implications, conclusions, and opportunities for further research are presented in the following sections.

Results indicated reading achievement is predictable from knowledge of kindergarten program type and other selected variables. Regression analyses were conducted to analyze the data and answer the research question of this study. Two regression models were applied to explore the data. In all cases, *Ktype* was the first variable entered because of the purpose of this study. Two different analyses provided insight to the data and the strength of each independent variable in relation to predicting CRT reading achievement scores, the dependent variable. The two different approaches of interest are expanded upon in the following section.

The first regression analysis was conducted using the stepwise method approach. This technique allowed multiple variables simultaneously; that is the software program selects the strongest variable first, the second strongest next and so on. The effect of each variable as a predictor of reading achievement was evaluated and ordered in relevance to building a regression equation model that predicts reading achievement. Each variable was evaluated at each step whereas statistical tests were performed to determine the significance of the variables in relation to the other variables already in the equation. During each step of the procedure, the evaluation of an additional variable may have called for a previous variable be eliminated from the equation. The final equation resulted in a regression equation where the variables were presented in order of significance generating a specific model. In this model, mathematics was the best predictor of reading. Correlation between reading and mathematics was .682, which indicates that 46.5% of the variance was accounted for (Appendix B). Since the primary

purpose of this study was to establish a possible relationship between *Ktype* and reading achievement, a second analysis was reported.

This regression analysis yielded a strong model and accounted for 52.2% of the shared variance in predicting reading achievement. In this analysis *Ktype* was entered as the first variable, the variables *LEP*, *IEP*, g*ender*, *same school*, and *KAYP* were allowed to enter in a stepwise fashion based upon correlations, and mathematics (*Math*) was forced to be the last variable. This regression analysis allowed for the evaluation of the effect of kindergarten type on third grade reading achievement without other variables. Then it allowed for the other variables, with the exception of mathematics achievement, to be evaluated on their effect to predict reading achievement in addition to kindergarten program type. Lastly, it allowed mathematics achievement to be evaluated in the model. This is important because the effect of kindergarten program type was a primary interest in this study. This approach provided an understanding of the contributions of the various variables. In addition, it was important to understand the effect of all other variables on reading achievement in the absence of mathematics achievement because math and reading are highly correlated.

As reported in Chapter 4, CRT math scores provided for the highest proportion of shared variance in predicting reading achievement scores in each of the regression analyses. Additional findings indicated *Ktype*, possessing an *IEP*, being *LEP*, *gender*, and *KAYP* were each statistically significant in predicting reading achievement in each of the regression analyses conducted. However, the variable *same school* was contributed to the model when all of the variables were entered using the stepwise approach and was not found when the second approach ordered *Ktype* first and *Math* last.

Several variables contributed to the model yielding a negative effect to the regression analysis including *Ktype*, *IEP*, *LEP*, and *gender*. In this study, a negative effect indicated that the reading achievement mean score on the CRT was changed negatively when considering the independent variable. That is, each of the reported variables resulted in a lower score equal to the beta weight (coefficient) of each variable (e.g. a case coded as *LEP* would experience a reduction of 18.816 points on the actual CRT reading score based on the regression equation, whereas a student not coded as *LEP* would not experience this reduction).

Further analysis was conducted to determine whether if a statistically significant relationship existed among kindergarten program type and any other variables that yielded a negative effect when conducting the chi-square test of independence analysis. The data yielded significant results between kindergarten program type and the variable, *LEP*. This finding indicated there was a statistically significant relationship between the kindergarten program type and the *LEP* variable. More students deemed as *LEP* attended full day kindergarten than were expected by a margin approaching 50%. This means that LEP students were overrepresented in full day kindergarten and non-*LEP* students were overrepresented in half-day kindergarten. This finding indicates that students who were deemed as being *LEP* were not normally distributed within the kindergarten cohort population of 2006-2007. The implications of the findings are discussed in the following section.

Conclusions and Implications

Educational stakeholders have relied on empirical evidence about student achievement and the long-term effects therein to support either kindergarten program

type. Although short-term existing research presents positive results in support of full day kindergarten, the research is limited and results are mixed concerning the long-term impacts (Brewster & Railsback, 2002; Clark, 2002; Clark & Kirk, 2000; Housden & Kam, 1992; Karweit, 1992; Morrow, Strickland, & Woo, 1988; Olsen & Zigler, 1989; Puleo, 1988; Weiss & Offenberg, 2002; Wolgemuth et al., 2006). This is especially true when it comes to the relationship between kindergarten program type and reading achievement by the end of third grade. This study sought to add to the understanding of the relationship of program scheduling, full versus half-day kindergarten, as a predictor for reading achievement in the third grade as a single variable and in relation to other selected variables. This study provided insight to the effects of predicting reading achievement on the third grade CRT based on full verses half-day kindergarten programming as a variable and in relation to other variables including select school and student characteristics. By understanding kindergarten programming and the potential long-term impacts, educational stakeholders can make informed decisions regarding funding full day kindergarten programs and research related to the benefits thereof.

The findings, rather than pointing to clear and concise implications for practice, point to one recommendation; to conduct further research related to kindergarten program type, LEP status, and predicting reading achievement. No other implications can be made at this time without regard to further research. Opportunities and recommendations for further research are discussed in the following section.

Recommendations for Further Research

The findings leave several areas in which researchers should conduct additional studies to expand on the existing study and to replicate the study in this school district and/or other geographical regions. The additional research naturally contributes to the literature and provides necessary information. This section outlines several recommendations for further research.

Reading Achievement is Predictable

The first finding indicated reading achievement is predictable, given specific variables and a statistical margin of error. It would likely serve as a benefit to expand through comparative case studies over various kindergarten types to explore the factors that may have contributed to the findings outlined in this study. A case study design could investigate variables that may have contributed to the findings by exploring the dynamics of the study cohort, student characteristics, resource allocation, school characteristics, curriculum and instructional services, and professional development services when the initial program was implemented.

Furthermore, the study should be replicated in the school district with kindergarten cohorts post 2006-2007. Since initial program implementation, the school district is likely to have incurred program changes, provided professional development of staff, and experienced improvements therein. Specific student and school characteristics present during the initial program implementation may have contributed to the negative effect findings, which therefore warrant further research. Replications of the study using data from kindergarten cohorts post 2006-2007 school year would allow researchers to

identify trends and patterns in the data related to kindergarten program type, student, and school characteristics variables in predicting reading.

As reported in Chapter 1, the school district from where the data was derived in this study conducted a pre-post study on full verses half-day kindergarten programming. The study was reported to show an achievement gap that existed between ethnic categories and for those students deemed LEP or not LEP at the onset of kindergarten. They further reported full day kindergarten attendance closed that gap. The school district should consider conducting pre-post analysis for the kindergarten year using a valid and reliable assessment instrument. The results should then be used to conduct a comparison to the third grade CRT reading achievement data. The comparison should be used to determine a difference in the data for students enrolled in full verses half-day kindergarten students between their kindergarten and third grade year. The data may also be used to determine whether achievement is sustained for both cohorts. Understanding the impact of full day kindergarten on reading achievement, and in predicting reading achievement, is valuable to students and educational stakeholders who make decisions regarding kindergarten programming.

Mathematic Achievement Predicts Reading Achievement

The second key finding indicated that mathematics, when used as a variable in predicting reading, yielded the highest significance of all the variables selected in the model. In addition, math was highly correlated with reading achievement scores. The regression analysis in this study should be replicated with using another valid and reliable mathematics assessment in preceding grades to the third grade CRT as a predictor for reading achievement. Additionally, Walston and West (2004) found that in full day

kindergarten programs math instructional time is double that of half-day programs. Educational leaders should conduct further research regarding time allocations in full verses half-day kindergarten for math and reading programming to determine appropriate time allocations for reading and mathematics instruction.

Kindergarten Program Type and Predicting Reading Achievement

The third key finding indicated full day kindergarten enrollment was a variable that can be used to predict reading achievement. In this study students who were enrolled in Title 1, or Title 1 eligible but not served, schools in the school district based on a high prevalence of students qualified for free/reduced lunch program (55% or higher), were the same students enrolled in full day kindergarten programs. This study should be replicated to determine patterns and trends inherent in achievement based on the poverty threshold of schools. Further research should explore effects of poverty on achievement and kindergarten program type in which poverty is not a confounding variable. Future research should be replicated with a cross section of demographics for students enrolled in full verses half-day kindergarten programs.

Kindergarten Program Type and LEP Status Yields Negative Effect

The fourth key finding indicated enrollment in full day kindergarten and being deemed LEP each yielded a negative effect in the model with the highest proportion of shared variance in predicting reading achievement. Future research could delineate if these findings are a one-time phenomenon, or if these are issues beyond the scope of the study. Research should be replicated in the same school district on data for cohorts post 2006-2007 kindergarten as well as in other geographic regions of the United States where full and half-day programs are offered. Examining effects of full and half-day

kindergarten, ethnicity, and English as a second language, and other selected variables in other geographical areas could provide insight into impacts of full day kindergarten. Additional instructional time in full day kindergarten does not appear to be sufficient to reduce the effects of poverty and/or LEP when compared to their more affluent counterparts.

Summary

In order to ensure an equitable education experience for all students, it is vital that programming adjustments continue to meet the needs of a growing and diverse student population. Understanding how kindergarten program type influences student achievement is a positive step in providing a firm foundation for prolonged student success. Through targeting the kindergarten and subsequent programming through the third grade year, educational stakeholders will understand better how select variables to influence student achievement as assessed in third grade and throughout the remainder of K-12 education. This knowledge should provide educational leaders with specific information to make informed decisions regarding programming designed to address the needs of specific student populations, as accountability measures measure all students regardless of ethnicity, gender, language, or countless other demographic differences.

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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

Date: August 7, 2011
To: George Hill, PhD
Department of Educational Leadership
0283

CC: Kimberly Regan Schoenfeldt,
Department of Educational Leadership /

Subject: Evaluation of Human Subject Research

Project:	**E12-001** **Full Versus half-day Kindergarten as a Predictor for Reading Success in Third Grade**
UNR Assurance Number:	**FWA00002306**

The Office of Human Research Protection has reviewed the scope of work for the above referenced project, and determined that it does not require human research protection oversight by this institution.

Project Summary

As described, the project does not satisfy the federal definition of *human subject*. The regulations at 45 CFR 46.102(f) state: "Human subject means a living individual about whom an investigator (whether professional or student) conducting research obtains (1) Data through intervention or interaction with the individual, or (2) Identifiable private information." Your plan involves data not collected for the express purpose of this project and the data will be provided to and recorded by the investigators without individually identifiable information. The investigators will not be able to link the data to any individual; therefore, you do not need to obtain human subjects approval or an exemption from IRB review.

If any additional information is necessary, please contact our office at 775.327.2368.

Appendix B

Correlations for LEP and Ethnicity

Descriptive Statistics for LEP by Ethnicity

	Mean	Std. Deviation	N
LEP	.36	.479	3116
Hispanic Y/N	.4049	.49095	3117
White Y/N	.4758	.49949	3117
Black Y/N	.0359	.18615	3117
American Indian	.0192	.13742	3117
Asian Y/N	.0642	.24508	3117

*Note: One missing case in the LEP data set.

Correlations for LEP by Ethnicity

Variable		LEP	Hispanic Y/N**	White Y/N**	Black Y/N**	American Indian**	Asian Y/N*
LEP	Pearson Correlation	1	.764	-.692	-.130	-.105	.037
	Sig. (2-tailed)		.000	.000	.000	.000	.040
	N	3116	3116	3116	3116	3116	3116

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

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

Descriptive Statistics for Math and Reading

	Mean	Std. Deviation	N
Math	332.74	59.702	3117
Reading Score	318.55	63.630	3117

Reading and Math Correlations

		Math	Reading Score
Math	Pearson Correlation	1	.682**
	Sig. (2-tailed)		.000
	N	3117	3117
Reading Score	Pearson Correlation	.682**	1
	Sig. (2-tailed)	.000	
	N	3117	3117

Correlations for LEP by Ethnicity

Variable		LEP	Hispanic Y/N**	White Y/N**	Black Y/N**	American Indian**	Asian Y/N*
LEP	Pearson Correlation	1	.764	-.692	-.130	-.105	.037
	Sig. (2-tailed)		.000	.000	.000	.000	.040
	N	3116	3116	3116	3116	3116	3116

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

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