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## The Relationship Between Length of Kindergarten Day and Student Literacy and Math Achievement

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THE RELATIONSHIP BETWEEN LENGTH OF KINDERGARTEN DAY AND  
STUDENT LITERACY AND MATH ACHIEVEMENT

by

Cheri Nicole Oliver  
December 2007

A Capstone Dissertation submitted to the Education Faculty of Lindenwood  
University in partial fulfillment of the requirements for the  
degree of

Doctor of Education  
Education Division

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## ABSTRACT

With the demands of increased student achievement and the reauthorization of No Child Left Behind (NCLB), educators and policy-makers alike are questioning the effect of full-day kindergarten. The purpose of this study was to determine the relationship between students who attended full-day kindergarten and their second grade literacy and math achievement and students who attended half-day kindergarten and their second grade literacy and math achievement.

Results from the Stanford Achievement Test administered in the fall of 2007 were analyzed for statistically significant differences between the two second grade groups of students. Analysis of the data showed no statistical difference between full-day kindergarten students and half-day kindergarten students in relationship to their second grade literacy and math achievement.

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## CHAPTER ONE - INTRODUCTION

### The Relationship Between Length of Kindergarten Day and Student Literacy and Math Achievement

#### *Background*

Just saying the word “kindergarten” enlivens the senses of children across the nation. The aroma of new crayons and the feel of new clothing for the eventful first day of school begin the sensory experience of the country's five-year-olds. The sounds of bells ringing, the chorus of young voices and the imposing sight of school buildings quicken their heartbeats and further heighten their senses. The stage is set. The taste for new adventures ready to unfold all wait, as if in slow motion, for the nation’s new kindergarteners to embark on their educational journeys. Their parents and caregivers may experience a sense of nostalgia coupled with a bittersweet sense of loss. Nevertheless, their children are excitedly moving forward toward one of the most important expeditions of their lives. In some instances, the children attend school for six hours. In other instances, the children only remain at school for three hours. Herein lies the glitch in the nation's current educational system where kindergarteners are concerned.

In some areas of the United States, there are choices in kindergarten programming. Some school districts offer only half-day kindergarten while others only offer full-day kindergarten. There are some districts, like the Rockwood School District located in St. Louis County, Missouri, that offer both half-day and full-day kindergarten programs. The argument over the effectiveness of full-day kindergarten versus half-day kindergarten has been going on for years. Discussions often turn to social, emotional and academic needs of kindergarten-aged children. Researchers, educators and parents like to passionately discuss kindergarten programs. Researchers and parents have asked the following question for years, "Do children who attend full-day kindergarten make more academic gains?" The purpose of this study was an attempt to answer a similar question: Do children who attend full-day kindergarten become better readers and achieve more success in math by second grade than those who attended half-day kindergarten programs?

Morrow, Strickland and Woo (1998, p. 17) found that "current arguments for a full-day kindergarten schedule centered on greater student achievement and the need for earlier exposure to quality education for all students," especially those in lower socio-economic areas and single parent families. Half-day proponents believe that a full day of kindergarten is too much for a five-year-old child who may not be developmentally ready for the academic rigor of a full day of school. Bryant and Clifford (1992, p. 148) report the following:

The first kindergarten was established by Friedrich Froebel in Blankenburg, Germany in 1837. Kindergarten in Froebel's vision meant both 'a garden for children', where children meet with the environment and also 'a garden of children' where they play together and express themselves in a smaller garden world with children in their age group.

Through the use of play, games, songs, stories and crafts, students were encouraged to use their imaginations and widen their physical and motor talents.

The history of using gifts and occupations to educate children at an early age originated from Froebel. He believed that children needed to have time to explore the world with pliable objects such as clay, beads and sand and build structures with solid blocks (gifts). In later years, educators and researchers have watched this evolve into social interaction and exploration time. Froebel's theories on early childhood development have served as a basis for educators today. His work with nurturing the child's self expression, motor skills and social involvement and teaching to all modalities of learning from day one in a child's educational career has progressed into today's modern kindergarten structure. Froebel's outstanding philosophies and contributions to early childhood development have been accepted globally and have flourished throughout education. Researchers have been using his fundamental research as a basis for their own studies and kindergartens around the world have accepted his methodologies.

Many school districts are battling the decision and financial allocations to fund a full-day kindergarten program. While research supports the benefits of kindergarten, many educationalists still argue the advantages of children attending a full-day kindergarten program versus children attending a half-day kindergarten program. Many districts offer both programs. Some are tuition based, while others are needs-based programming. The Rockwood School District undertook the initiative to implement a full-day, tuition-based kindergarten program in their nineteen elementary schools during the 2004-2005 school year. Entrance into the program is based on tuition and a registration date. While the Rockwood School District has had positive feedback regarding the program, the impact on second grade literacy and math has yet to be investigated. This study investigated the impact of full-day kindergarten on second grade literacy and math achievement at Pond Elementary in the Rockwood School District. Pond Elementary School is located in Wildwood, Missouri, and currently serves 512 students, kindergarten through fifth grade. Pond currently has twenty-four classroom teachers; five art, music and physical education teachers; one library-media specialist; one counselor; and nine Special School District staff members.

#### *Purpose of Study*

The purpose of this study was to determine the relationship between students who attended full-day kindergarten and their second grade literacy and math achievement versus students who attended half-day kindergarten and their

second grade literacy and math achievement. Morrow (1998) defined a half-day kindergarten program “as one operating for three hours per day or less, either morning or afternoon schedule, five days a week. A full-day kindergarten program is one that operates for more than three hours a day, five days a week.” With the implementation of full-day kindergarten, teachers, administrators and parents want to know the best academic placement for their kindergarten child. This study was performed with the hope of answering that question. This study sought to provide statistical data from Pond Elementary School to support the effectiveness of full-day kindergarten programming on second grade literacy and math achievement.

#### *Rationale for Study*

The increase of external pressures from policy-makers, community members, parents and educators for increased student achievement has caused school systems to re-examine curriculum and programming. School districts across the nation have implemented full-day kindergarten in attempts to meet stakeholders’ expectations for increased student achievement. The No Child Left Behind (NCLB) act signed by President George Bush mandated that all students would achieve proficient levels of achievement by the year 2014 (U.S. Department of Education). This national mandate created a sense of urgency to find effective programming in order to positively affect student achievement. The implementation of full-day kindergarten was one attempt to meet this requirement.

At the time of this study, kindergarten students in the Rockwood School District had the option of attending a tuition-based, full-day kindergarten program or a tuition-free half-day kindergarten program. Both kindergarten programs were offered in all 19 elementary schools. This study investigated test data from students who had attended full-day kindergarten to determine if they had statistically significant higher academic achievement in literacy and math on second grade standardized tests compared to those students who attended half-day kindergarten. Permission was granted by Lindenwood University and the Rockwood School District to perform this study (see Appendix A and B for approval form and completed application). The information gleaned from this study could affect educators in their pursuit of research concerning full-day kindergarten programs.

*Independent Variable*

The independent variable in this study was whether the student attended a full-day kindergarten program or a half-day kindergarten program. Students who attended either morning or afternoon half-day kindergarten programs were classified as half-day because there was no reason to believe there was any difference between attending either type of half-day programs. Students who attended full-day programs were classified as full-day.

*Dependent Variable*

The dependent variable in this study was the effect of attending a full-day kindergarten program versus a half-day kindergarten program on second grade

literacy and math achievement. Second grade literary and math achievement results were derived from Fall Stanford Achievement Testing (SAT). SAT test results from students who attended a half-day kindergarten program were compared to students who attended a full-day kindergarten program. In particular, Math and Total Reading subtest scores from SAT were evaluated and compared for this study.

#### *Null Hypothesis*

Second grade students who attended a full-day kindergarten program will not have increased literacy and math achievement scores on second grade SAT standardized tests compared to students who attended a half-day kindergarten program. There will be no significant difference in second grade literacy and math test scores between students who attended full-day kindergarten and students who attended half-day kindergarten.

#### *External Validity - Limitations of Study*

*Selection.* For analysis purposes, the students in this study were not selected by gender, ethnicity, age or socio-economic status. Students were placed into second grade classrooms by their first grade teachers. The placement of students was based on first grade curriculum post-tests and gender. It was a priority to create academically multi-level and evenly dispersed male and female second grade classrooms. This study was limited to the number of students in the Rockwood School District who attended kindergarten at Pond Elementary



during the 2005-2006 school year. Students who did not attend Pond Elementary's half-day or full-day kindergarten were not a part of this study.

*Maturation.* Maturation was not a threat to this study. The Stanford Achievement Test, Tenth Edition is a nationally normed referenced test to accept the age of the second grade students in the fall of their second grade year. Students' developmental processes are considered in the validation of the Stanford Achievement Test, Tenth Edition.

*Repeated Testing.* Repeated testing was not a threat to this study. The Second Grade Stanford Achievement Test, Tenth Edition was only administered once during the fall of the students' second grade school year.

*Instrumentation.* Instrumentation was not a threat to this study. The Stanford Achievement Test, Tenth Edition (SAT) was norm-referenced and used to measure the groups' literacy and math achievement in first grade. This standardized test is well-recognized in the educational field as a valid source of student data. For over seventy years, Harcourt Assessment – The Psychological Corporation, has provided reliable, innovative and valid student assessments for students

*Experimenter Bias.* Experimenter bias was not a threat to this analysis. The Stanford Achievement results were used for the analysis of this study. These test scores were derived from a national standardized test that was not administered by the researcher.

*Attendance.* Daily student attendance in the half-day or full-day kindergarten programs was a limitation of the study.

*Parental Involvement.* The degree to which parents were involved with their students' education both in the school setting and at home was a study limitation.

*Implementation.* Pond half-day kindergarten students were instructed by one teacher during the 2005-2006 school year. Students who attended the full-day kindergarten program during the 2005-2006 school year were divided among two kindergarten teachers based on an even distribution of males and females, thus presenting differences in teaching styles and classroom management. During the 2005-2006 school year, Pond had two full-day kindergarten teachers and one half-day kindergarten teacher who instructed both a morning and an afternoon kindergarten section. While teaching styles and classroom management differed, literacy and math curriculum was consistent among the three classrooms. Rockwood School District's Core Curricular Objectives were taught and tested throughout all three kindergarten teachers' classrooms.

#### *Definition of Terms*

*Building Testing Coordinator (BTC).* The person with this title in the Rockwood School District was responsible for the organization and training of building staff members in the area of standardized testing.

*Department of Elementary and Secondary Education (DESE).* As defined by DESE (2007), this phrase refers to "the administrative arm of the State Board of

Education. It is primarily a service agency that works with educators, legislators, government agencies and citizens to maintain a strong public education system. Through its statewide school-improvement initiatives and regulatory functions, the Department strives to assure that all citizens have access to high-quality public education.”

*Full-Day Kindergarten (FDK).* This term referred to the length of the kindergarten day. Children in full-day kindergarten attend school for six hours each day.

*Half-day kindergarten (HDK).* This term referred to the length of the kindergarten day. Children in half-day kindergarten attend school for two and one half hours each day.

*Individualized Education Plan (IEP).* This term was used to describe an educational program designed to meet a particular student’s unique learning needs.

*Literacy Achievement.* This term was used in reference to the measurement of a student’s ability in the areas of sounds and letters, word reading and sentence reading. This achievement was measured by students’ individual SAT test results.

*Math Achievement.* This term was used in reference to the measurement of a student’s ability in the areas of math computation, number sense and math reasoning. This achievement was measured by students’ individual SAT test results.

*No Child Left Behind (NCLB)*. A law signed by President George Bush in 2001 as “an act to close the achievement gap with accountability, flexibility, and choice so that no child is left behind” (U.S. Department of Education, 2007).

*Stanford Achievement Test (SAT)*. The SAT, a standardized, norm-referenced test, was administered in the Rockwood School District. Reading, Math, Science and Listening Skills assessments were included. This test is widely accepted in the education world as a reliable and valid test.

### *Summary*

The purpose of this study was to determine the relationship between the duration of daily kindergarten attendance intervals and second grade literacy and math achievement. Districts across the country have sought after effective educational initiatives to increase student achievement. Many districts have implemented full-day kindergarten, and achievement results have been analyzed with hopes of increased student achievement. At the time of this study, Rockwood School District in St. Louis County provided both full-day and half-day kindergarten to the community. The same curriculum objectives were utilized in both full-day and half-day kindergarten programs. Thus, educators in Rockwood were not seeking an increase in second grade students’ achievement from those students who attended full-day kindergarten. The effect of full-day kindergarten and academic achievement was studied in this project.

## CHAPTER TWO – REVIEW OF LITERATURE

*Introduction*

The debates over the advantages and disadvantages of full-day kindergarten have been going on for quite some time. The increase of academic demands for students at every grade level has increased the pressures on parents, educators and children. Kindergarten is no longer a place for naps, snack time and extra recess; it is a place where children are expected to read at least 25 sight words, write complete sentences and recognize and count objects up to the number 100. Homework in kindergarten is not unusual; parental understanding of their role in their child's academic success is just as vital as the school's understanding. In a half-day kindergarten program, curriculum demands are not fewer; time is just at a premium. With the implementation of full-day kindergarten in some school districts across the nation, children have had more opportunities for play and social interactions.

Across the country, school districts have retooled kindergarten, adding more hours and more academics. Natale (2001) stated, "It's a change whose critics are as passionate as its supporters, but one that is unmistakably under

way." Clark (2001, p. 2) supported this thought by reporting, "In the fall of 1998, of the four million children attending kindergarten in the United States, 55% were in all-day programs and 45% were in part-day programs." The U.S. Census Bureau (2006) stated, "In the fall of 2006, 68% of America's kindergarten children were enrolled in full-day programs, and 32% were in half-day programs" (p. 3). Changes in families' lives have accounted for more interest in a full-day kindergarten program. A dramatic increase in the number of two-parent income homes has occurred. Half-day kindergarten scheduling makes transportation difficult for parents as well as the burden of having multiple caregivers throughout the child's day. Parents began to feel that their children would learn more in full-day kindergarten programs and they would be better prepared for first grade. The average cost of full-day public kindergarten is less expensive for parents than the cost of daycare providers.

Despite the cost, the number of children enrolled in preschool or academic daycare programs has doubled since the mid 1970s. Rothenberg (1984, p. 2) supported early intervention for the success of students:

These preschool experiences have provided children with their first encounters of daily organized instructional and social activities before kindergarten. These experiences have been extremely beneficial to children in terms of social, emotional and academic preparedness. The vast experiences and real world situations to which children are exposed at a young age on television play a role in five-year-olds' knowledge

compared to those of past generations. Increased academic expectations later in life in the areas of literacy and math have proven the need for an earlier, more academically efficient start to a child's formal education. Parents are realizing this trend and showing more interest in early childhood programs [including full-day kindergarten] to aid their child in later school success.

### *Theory*

In order to gain a better understanding of the current trends regarding kindergarten, it is helpful to have some insight concerning its history. Shapiro (1983) reported "Kindergarten originated in 1837 when Froebel created 'a child's garden' for children between the ages of three and seven. The program served to develop the children's mental, social, and emotional faculties through play, music, movement, interaction with the outdoors, and opportunities to engage in independent and creative pursuits" (p. 12). Years later, Froebel's ideas influenced the development of kindergarten in the United States. Olsen (1989, p. 267) reported the following:

Froebel thought that after the age of three children should be placed in childcare for a portion of the day. This usually involved the employment of a governess who was assigned to work with one or more children for at least two to three hours a day. Froebel emphasized activities that focused on the development of fine motor skills in children as well as their innate curiosity and a sense of social skills.

As the history of kindergarten continued, Karweit (1992, p. 83) followed the path kindergarten took on its journey to America.

Margaret Schurz, a student of Froebel's, opened the first kindergarten in the United States in 1856 in Wisconsin. It was established for German-speaking students. This first kindergarten led to another in Boston, Massachusetts four years later. It was founded by Elizabeth Peabody and was a private kindergarten for English-speaking children. In 1873, the first public kindergarten was opened in St. Louis, Missouri by Susan Blow, and by the 1880s there were hundreds of kindergartens in the public schools throughout the United States.

In the United States, kindergarten started as a full-day program and continued as such until World War II. During the war, and in the years following it, there was a shortage of qualified teachers and facilities to hold school. This led to Bryant and Clifford's (1992) conclusion :

The growing birthrate and the feeling that five-year-olds were not mature enough for a full-day program contributed to the popularity of half-day kindergarten programs. Many methods and theories have come and gone concerning kindergarten, but most of them have been found to support the concept of a full-day kindergarten program. Current theories suggest that large blocks of time are required for optimal learning conditions during a child's early years.



While there is some degree of truth to these theories, the fact remains that what is important is how these blocks of time are utilized for quality instruction.

Morrow, Strickland and Woo, reported the following in a 1998 publication for the International Reading Association (p. 4):

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.

Following this line of thinking, Olerich (1984 p. 13) found that “full-day programs began to make a comeback in the 1960s and 1970s.” The trend in the United States was once again for full-day kindergarten. Olsen (1989 p. 268) stated “from 1969-1982, the children enrolled in full-day kindergarten programs rose from 10% to 30%. By 1989, nearly half the kindergarten age children in the United States were enrolled in full-day programs.”

In 1992, 58% of kindergarteners in the United States attended full-day kindergarten programs. Several reasons existed for this current trend favoring full-day programs for kindergarten-aged children. One of the reasons was that American society and education had changed over the previous twenty years. Beginning in the 1990s and continuing into the 21<sup>st</sup> century, the need for a full-

day program had become more evident than it was in the past. The number of single parent households had increased, as well as households with both parents who were employed outside the home. Studies reported by Housden and Kam (1992, p. 2) have shown that parents “favor a full-day program because it would reduce the need for children to be transported from kindergarten to day-care before being picked up by their parents or guardians at the end of the day.” Another reason for the popularity of full-day kindergarten programs was the theory that a five-year-old child’s brain is very receptive to learning and that a full-day program would provide more opportunities to expose the child to a broader curriculum. Full-day kindergarten advocates such as Lee and Burkam (2002) suggested several advantages for the longer kindergarten day:

1. It allows teachers more opportunity to assess children’s educational needs and individualize instruction.
2. It makes small-group learning experiences more feasible.
3. It engages children in a broader range of learning experiences.
4. It provides opportunities for in-depth exploration of curriculum.
5. It provides opportunities for closer teacher-parent relationships.
6. It benefits working parents who may need a longer school day. (p. 17)

The debate over full-day programs and half-day programs continued.

Much of the controversy appeared to lie in the research itself. Proponents of the full-day program identified positive findings to support their beliefs that full-day programs were better. However, in 1986, Hoffman and Daniels found that half-

day and full-day programs were more alike than different in what and how children were taught. Opponents of full-day programs tended to emphasize the inconclusiveness or lack of significant social and academic gains indicated in the research, even though there has been much research conducted, correlated and recorded on full-day programs versus half-day programs. Opponents' beliefs of full-day kindergarten reported by Snyder and Hoffman (2001, p. 34) argued that

Young children who attend full-day kindergarten are at risk of stress and fatigue due to the long day. However, some research suggests that children attending full-day kindergarten demonstrate less frustration than children in half-day programs and full-day kindergarteners do not show evidence of fatigue. Still others argue that full-day kindergarten increases the chance that children will be expected to achieve and perform beyond their developmental capabilities.

Research has shown that the development of literacy skills begins at a very young age. Connecting this research to practice is vital for the proper development of children. Many times, the literacy development of children begins in a pre-school setting which is then built upon in the kindergarten setting. Transferring from a pre-school educationally-based pre-school program to a half-day kindergarten program could be taking a step backwards in a child's developmental path. Researchers have commented that a full-day program may be the correct choice if parents want to continue their child in a program that is language based and literacy focused. The full-day program offers more time to

the students in the classroom than a half-day program can offer. West, Denton and Reaney (2001 p. 15) also stated

Kindergarten is a time when children begin to develop a sense of independence, self-esteem, social awareness, and peer interactions. A healthy focus on the development of these areas during the first year of school will prove to be integral to future academic and social functioning.

Just as important as the academic aspect of kindergarten, educators and researchers must remember that five-year-old children need time to foster social skills with their peers, explore the world around them in a safe and nurturing environment and have information presented to them in a developmentally appropriate manner. Pennsylvania Partnerships for Children Learning to Learn (2000, p. 1) stated, "Stimulating activities help young brains build the neural connectors that will carry learning and independent thought to the brain at a time in the lives of children when their brains are the most receptive to learning."

The role of the kindergarten classroom has dramatically changed throughout the years. It is not only a place for students to meet new friends, play on the swings and fingerprint; but it is now a setting where instruction is mandatory and failure is not an option. Regardless of the child's background knowledge or experiences in an academic setting, educators must identify the learning needs as all students and create a plan that meets those objectives in order to help the child prepare for first grade. Objectives that were once in the first grade curriculum are now embedded into the kindergarten setting. This is

not a change that is coming from within the district, but one that is being powered by larger forces on a national level. While the pressures of the increased academic demands build, the requirements for an increase in social interaction and appropriate behavior has now been added to the proverbial plate of the school. Harrison and McEachern (1989, p. 5) believe that, "in order for schools to develop children into productive citizens, a need for a program that will provide them with more opportunities to develop not only academically but also with a sense of responsibility for themselves and their actions is necessary" exists.

Controversy between half-day and full-day kindergarten stemmed from this new role of the program. Some researchers stated that what these programs were called did not matter; what really mattered was what children were offered in the programs (Caldwell, 1989; Clark, 2001). Elkind (2001, p. 3) stated, "Today's child has become the unwilling, unintended victim of overwhelming stress. This stress has been borne of rapid, bewildering social change and constantly rising expectations." What must be kept in mind, however, was the fact that full-day kindergarten was not the driving force of higher expectations for students. Critics of full-day kindergarten programs felt that six hours of learning a day was too much for a five-year-old and there should be more time for naps and play. Unfortunately, full-day kindergarten schedules usually do not allow time for naps.

*Research*

Researchers, educators and parents are interested in the relationship between academic achievement and the length of the kindergarten day. Cryan et al. (1992) have reported research has been done using standardized assessments such as the *Metropolitan Reading Readiness Tests* and the *California Achievement Test*. They concluded that participation in all-day kindergarten was related positively to subsequent school performance. Children who attended all-day kindergarten scored higher on standardized tests and had fewer grade retentions.

Adcock conducted a study in 1980 to determine the academic effects of the length of a school day on 189 kindergarten children from five selected schools in the state of Maryland. There were 58 control group children who attended the half-day program while 131 children attended a full-day program. The children were selected randomly. *The Survey Battery of the Metropolitan Achievement Tests* was administered to these kindergarten children by their teachers. The data were collected and analyzed for each subtest area including math, reading and language skills, and the total composite scores were taken from the standard scores reported by the test manufacturer. The full-day kindergarten group scored higher than the half-day group by 0.001 percentile in every category considered. Adcock concluded that these results demonstrated that full-day kindergarten participants achieved higher academic scores in math, reading and language than the children who attended a half-day program in the same time frame.

This study was significant, but researchers continued to study the academic success of children who participated in a full-day kindergarten program. One of the best known research projects was a longitudinal study of the effectiveness of full-day kindergarten, published in 1983. The Evansville-Vanderburgh School Corporation in Indiana implemented a full-day kindergarten program in four schools in the 1978 - 1979 school year and continued the program in 1979 - 1980. The children in these four schools were compared with a control group from four other schools that had a half-day kindergarten program. Standardized tests, report cards, questionnaires and interviews were used as data. The participants were third and fourth grade students who had attended kindergarten at that school.

The 1980 study showed that the full-day kindergarten children scored higher than the half-day kindergarten children on the *Boehm Tests of Basic Concepts* and the *Gates-MacGinitie Reading Tests* in first grade and scored significantly higher in most of the readiness test areas of the *California Achievement Tests*. The results of the teacher questionnaires that were collected during the same 1980 study reflected that the children involved in the study did better in listening skills and language skills; the gains were attributed to more time being available for teaching these skills in a full-day setting. Parent questionnaires reflected positive comments about full-day kindergarten also. These comments included feelings that their children learned more academic-based objectives in the full-day program, were better prepared for first grade,

were more socially adjusted and were able to follow multi-step directions (Humphrey, 1983).

Elicker and Mathur (1997) found that children who attended full-day kindergarten programs showed slightly greater academic progress in kindergarten and higher levels of first grade readiness. They also found that the structure of most full-day kindergarten classrooms allowed children to spend more time engaged in child-initiated activities (especially learning centers), more time in teacher-directed individual work and relatively less time in teacher-directed large groups. Additionally, students had more time for free play outdoors and spent less time in transitions.

Clark and Kirk (2000, p. 2) accurately reported that “full-day kindergarten teachers were more likely than half-day teachers to use small-group instruction (although the dominant mode in both types of classes was whole-group instructional activities).” The opportunity for teachers to use small-group instruction would be more likely in a full-day program based on the number of hours the teacher has with the students. The structure of a full-day program could allow for a variety of teaching methods, including whole group, small group and individualized instruction.

A longitudinal study analyzed by Cryan, et al. (1992, p. 189), including 27 school districts one year and 32 school districts the next year, including students who attended kindergartens with different schedules found that “participation in full-day kindergarten is positively related to subsequent school performance, at



least through first grade.” The children who attended full-day kindergarten performed better on standardized tests, had fewer grade retention, and were less likely to be placed in special education programs. Students in the full-day program were also likely to have their behavior rated more positively.

Conversely, the Early Childhood Longitudinal Study conducted by West, Denton and Reaney (2001, p. 17) which analyzed the kindergarten experiences of over 20,000 children during 1998-99, found that “children in full-day programs may demonstrate slightly higher cognitive knowledge and skills, but they also are more likely to show a higher frequency of some problem behaviors such as arguing and fighting.”

Additionally, some school districts have evaluated the effects of their own full and half-day programs less formally. For example, an early childhood supervisor in a Virginia school district (Natale) discussed benefits that were observed when the district switched from a half-time kindergarten to a carefully planned full-day program. In the discussion, Natale (2001, p. 22) mentioned that “suddenly the children had time to manipulate and build structures with blocks, and teachers were providing additional small group setting instructional time. The pace appeared to be much more relaxed in her opinion.”

Rothenberg (1995, p. 4) concurred with this opinion and identified some of the positive characteristics often experienced in full-day programs, such as allowing time for children and teachers to explore topics in depth. Additionally, full-day programs reduced the ratio of transition time to class time, provided for

greater continuity of day-to-day activity, and provided an environment that favored a child-centered, developmentally appropriate approach to learning.

Several reviews of the available research have attempted to pull together data from a variety of studies. For example, a meta-analysis of 23 studies conducted by Fusaro (1997, p. 276) found that “achievement of full-day kindergarten students was considerably greater than that of their half-day counterparts.” Puelo’s review of research (1988, p. 239) identified “positive outcomes in social, emotional and developmental skills. It also identified staff reactions and reduction of grade retentions.”

### *Summary*

Although research has identified benefits of full-day kindergarten programs, some educators have expressed concerns that full-day programs may be more likely to place undue emphasis on academic skills. According to Rothenberg (1984, p. 2), the curriculum “may become too academic, concentrating on basic skills before children are ready.” Critics also warned that if principals and teachers were not trained to properly move their schools to full-day programs, a trickling down of curriculum from the upper grades may unintentionally result from using materials not developmentally appropriate for five-year-old children.

Although a number of kindergarten research studies have been conducted, few of them have been conclusive enough to make concrete decisions on the best kindergarten program. The difference in curriculum, teaching styles,

student population and test data create a varied pool of existing research on full-day kindergarten programs. While there was a abundance of positive full-day kindergarten research findings in the academic world, they appeared limited to isolated and anecdotal instances under circumstances that could not be repeated. As districts move from half-day kindergarten to full-day kindergarten, the changes in curriculum must contribute to student academic achievement. In past studies, it was difficult to differentiate the extra time allotted with full-day kindergarten from other contributing factors such as teaching styles and methods, parental involvement and class size. Elicker (2000, p. 7) added “Another problem with the available research on full-day kindergarten is that too few studies have been conducted in which the students were assigned randomly to the full and half-day classrooms being studied.” In some situations, those students who signed up for full-day kindergarten were those who came from affluent families who could afford the tuition-based program. Others were in the program because they were among the first to sign up. James Elicker (2000, p.8), an early childhood researcher at Purdue University, conducted a two-year evaluation of a Wisconsin full-day program and critically reviewed the research on full-day kindergarten. Some of his conclusions included the following:

1. Students participating in full-day kindergarten consistently progress further academically during the kindergarten year, as assessed by achievement tests, than students in either half-day or alternate-day programs.

2. Tentative evidence exists that full-day kindergarten has stronger, longer-lasting academic benefits for children from low-income families or others with fewer educational resources prior to kindergarten.
3. No evidence exists for detrimental effects of full-day kindergarten. The full-day curriculum, if developmentally appropriate for five and six-year-olds, does not seem to overly stress or pressure kindergarten children.
4. Kindergarten teachers and parents strongly value the increased flexibility and opportunities to communicate and individualize instruction for children offered by the full-day schedule. (p. 8-9)

Elicker's conclusions were supported by his research and by his peers. However, data-driven studies using random samplings are needed to support the claim that full-day kindergarten programming is effective on student academic achievement.

The effectiveness of full-day kindergarten versus half-day kindergarten has been debated for years. Many of the studies have been conducted over twenty years ago. This has given researchers many years to analyze and scrutinize the same data over and over. Generally, the research on full-day kindergarten showed positive effects on student achievement. Researchers contradicted one another with their findings. Some researchers stated findings that indicated long term benefits from full-day kindergarten while others found no long term positive effects. Some studies showed no significant difference

between academic achievement and the relationship between half-day and full-day kindergarten.

Chapter 3 will discuss the test data that was collected and analyzed in an effort to determine the relationship between students who attended full-day kindergarten and their second grade literacy and math achievement scores and students who attended half-day kindergarten and their second grade literacy and math achievement scores.

## CHAPTER THREE - METHOD

*Overview*

The purpose of this study was to determine the relationship between the duration of daily kindergarten attendance intervals and second grade literacy and math achievement. Current research showed that the effects of full-day kindergarten on student achievement have been ambiguous. As reported by Fusaro (1997, p. 270), "Some studies found beneficial effects of full-day kindergarten on student achievement as opposed to half-day kindergarten, while other studies failed to find any difference in achievement between students who attended full-day kindergarten and students who attended half-day kindergarten."

Full-day kindergarten was implemented in the Rockwood School District during the 2005-2006 school year. Parents, teachers and administrators anxiously anticipated, or feared, an increase in student achievement, particularly in the areas of literacy and math. This study was conducted in order to identify the relationship between students who attended full-day kindergarten and their second grade literacy and math achievement

versus students who attended half-day kindergarten and their second grade literacy and math achievement. Data derived from the Stanford Achievement Test, Tenth Edition was used in this causal-comparative research.

*Type of Research*

This study can first be categorized as a quantitative research project. “Quantitative research is based on the collection and analysis of numerical data” (Johnson, 2005, p.9). “Quantitative data are obtained when the variable being studied is measured along a scale that indicates how much of the variable is present” (Fraenkel and Wallan, 2000, p.212). The purpose of this study was to determine which of two approaches to kindergarten programming – full-day kindergarten versus half-day kindergarten – leads to an increase in literacy and math achievement scores in second grade on the SAT. Quantitative research, according to Johnson (2005, p.5), requires the researcher to understand each of the following:

1. The independent variable is the treatment or factor that the researcher examines.
2. The dependent variable is the particular result of the effect of the treatment.
3. The treatment group is the group of subjects.
4. The control group is a group as similar as possible to the treatment group.

5. The research question is that for which the researcher seeks to find and answer.

In this quantitative research project, the independent variable consisted of the two approaches to kindergarten programming – full-day versus half-day. The dependent variable was second grade literacy and math scores derived from the Stanford Achievement Test, Tenth Edition administered in the fall of 2007. The treatment and control groups were the students in second grade at Pond Elementary School. The overall research question was to determine the relationship between students attending full-day kindergarten and their literacy and math achievement in second grade versus students attending half-day kindergarten and their literacy and math achievement in second grade.

This quantitative research project included causal-comparative research. “Causal-comparative research is used to find reason for existing differences between two or more groups. Causal-comparative research uses statistical analysis to describe conditions that already exist” (Johnson, 2005, p. 95). This research design was used to determine if differences existed between two groups of second graders at Pond Elementary School, those who participated in full-day kindergarten and those who participated in half-day kindergarten. The group difference variable was a variable that could not be manipulated at that point in time. If a significant difference were to be found, a logical argument would be the length of the kindergarten day has an effect on academic achievement in second grade.



Fraenkel and Wallen (2000, p. 11) stated that “interpretations of causal-comparative research are limited...nevertheless, despite problems of interpretation, causal-comparative studies are of value in identifying possible causes of observed variations in the behavior patterns of students.” The possible cause of observed variations, or the independent variable in this study, was the length of the kindergarten day. The behavior pattern of students, or the dependent variable, was the academic achievement test scores derived from the SAT. If second grade students who attended full-day kindergarten achieved higher SAT scores in the areas of literacy and math and if the differences were statistically significant from those students who attended half-day kindergarten, it would be reasonable to assume that full-day kindergarten may contribute to higher student achievement in the areas of literacy and math.

### *Subjects*

The Rockwood School District website (2007) provides the following geographic and demographic details:

. . . the district is St. Louis County’s largest public school system, serving about 22,000 students. Covering 150 square miles in parts of western St. Louis and northern Jefferson counties, Rockwood serves an estimated 150,000 residents in 50,000 households. Eleven distinct communities are within Rockwood’s boundaries, including all or parts of Ballwin, Chesterfield, Clarkson Valley, Ellisville, Eureka, Fenton, Manchester and Wildwood. ([www.rockwood.k12.mo.us](http://www.rockwood.k12.mo.us), 2007)

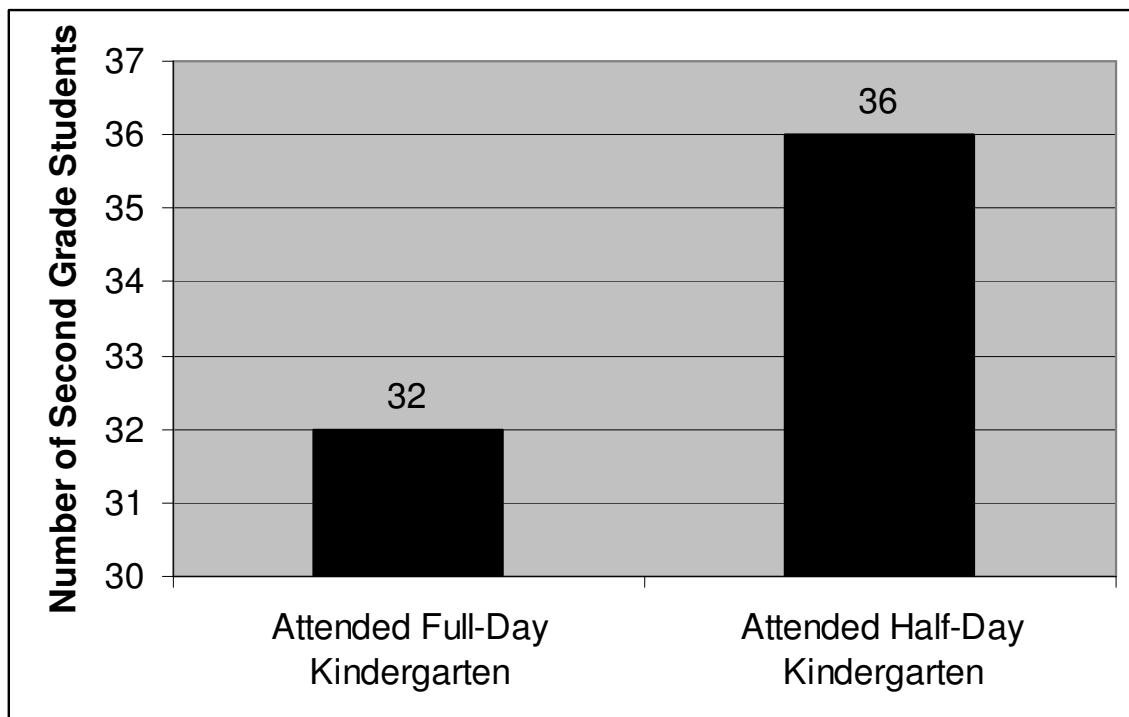
The Missouri Department of Elementary and Secondary Education (DESE) has accredited Rockwood with Distinction in Performance with High Achievement. The district has nineteen elementary schools, six middle schools and four high schools. There are separate campuses for Gifted, Early Childhood and Alternative High School Education. Excluding seasonal employees who do not receive benefits, Rockwood employs over 3,230 people. During the 2005-2006 school year, Rockwood's graduation rate was 98.7% and the dropout rate was 1.3%. Rockwood is proud of its ten National Blue Ribbon Schools and fourteen Missouri Gold Star Schools of Excellence.

Pond Elementary School is nestled in the heart of Wildwood, Missouri. Pond's total enrollment is 512 students in kindergarten through fifth grade. The cultural diversity of Pond's population is as follows: Asian 2.6%, Black 7.0%, Hispanic 0.8%, Native American 0.2%, White 89.4%. Pond's Average Daily Attendance Rate is 96.7%, and 9% of the population is eligible for free or reduced-price meals. The average ratio of students to regular classroom teachers is 18:1, and the average years of experience among the classroom teaching staff is 14.2. Among the staff, 73.6% have advanced college degrees.

Subjects for this study were second grade students from Pond Elementary School in the Rockwood School District. Eighty-three second grade students were enrolled in second grade during the administration of the SAT. Only 68 of these second graders attended Pond Elementary for kindergarten. Those 68 students were used for this study. Thirty-two students in second grade attended

Pond full-day kindergarten, while 36 second grade students attended Pond half-day kindergarten during the 2005-2006 school year (see Figure 1). Students who attended half-day kindergarten were instructed by one teacher. During the 2005-2006 school year, there were two full-day kindergarten teachers. The second grade full-day kindergarten sample was split evenly between the two teachers. For the purpose of this study, students were grouped by their kindergarten enrollment - full-day versus half-day kindergarten. Literacy and math test scores were derived from the Stanford Achievement Test, Tenth Edition administered in the fall of 2007. The two groups used in this study, second grade students who attended full-day kindergarten and second grade students who attended half-day kindergarten, had comparable student demographics. During the 2007-2008 school year, 32 second grade students had attended full-day kindergarten and 36 students had attended half-day kindergarten in 2005. Of the 32 full-day kindergarten second graders, 15 were male and 17 were female. The half-day kindergarten second grade group had 17 male students and 19 female students. The ethnicity of the 32 second grade students who attended full-day kindergarten was comprised of 30 White students, 1 Asian student and 1 Hispanic student. The ethnicity of the 36 second grade students who attended half-day kindergarten was comprised of 35 White students and 1 Asian student. When analyzing both second grade groups of students, it was noted that two of the students who attended full-day kindergarten had Individualized Education Plans (IEPs) and two of the students who attended half-day kindergarten had

Individualized Education Plans. Both test groups of second graders had one student who received services for English Language Learners. Three students from the full-day kindergarten test group qualified for gifted and talented services and seven students from the half-day kindergarten test group qualified for gifted and talented services. Two of the second grade students from the full-day kindergarten test group qualified for free and reduced meals while none of the students in the half-day kindergarten group qualified for those services (see Figures 2, 3, 4, 5, 6, 7 and 8).



*Figure 1 - Number of Students*

The number of second grade students during the 2007-2008 school year who attended full-day or half-day kindergarten at Pond Elementary School

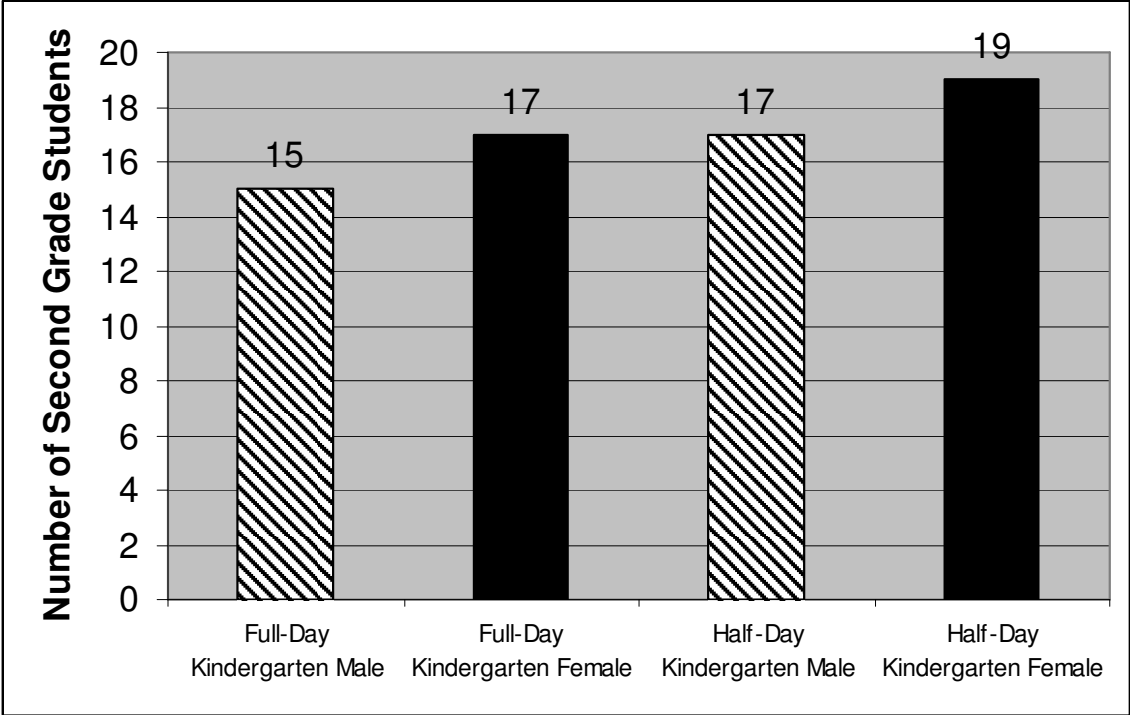


Figure 2 - Gender of Students

The gender of second grade students who attended full-day and half-day kindergarten at Pond Elementary

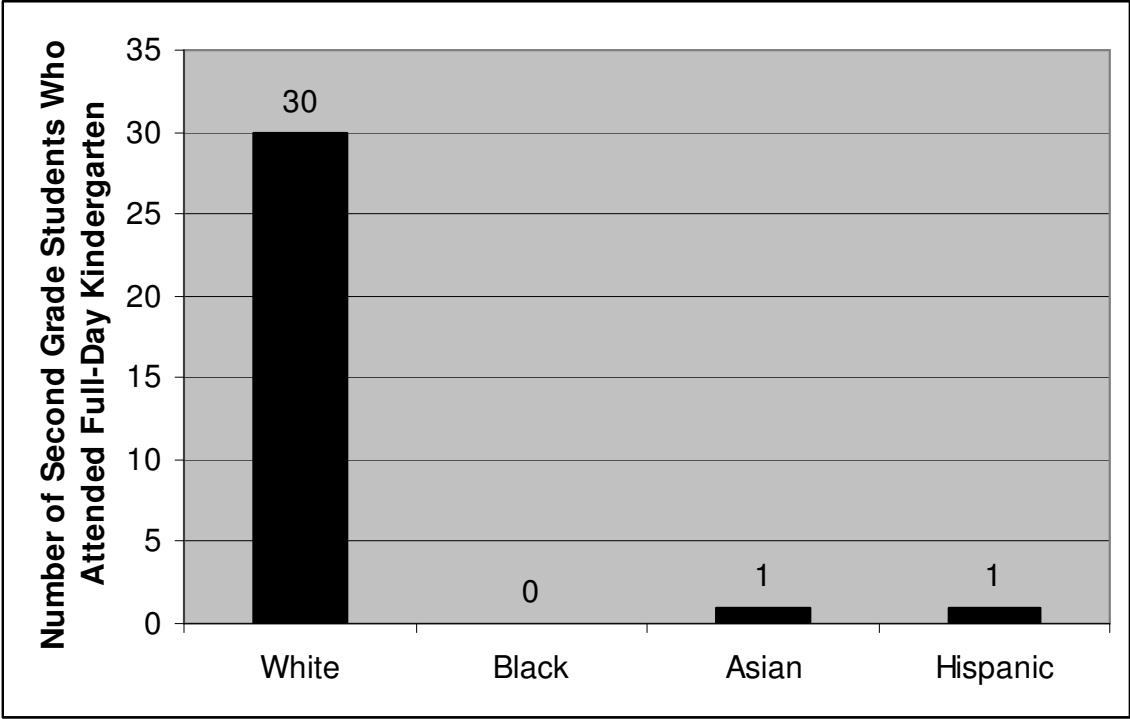


Figure 3 – Ethnicity of FDK Students

The ethnicity of second grade students who attended full-day kindergarten at Pond Elementary in the fall of 2007

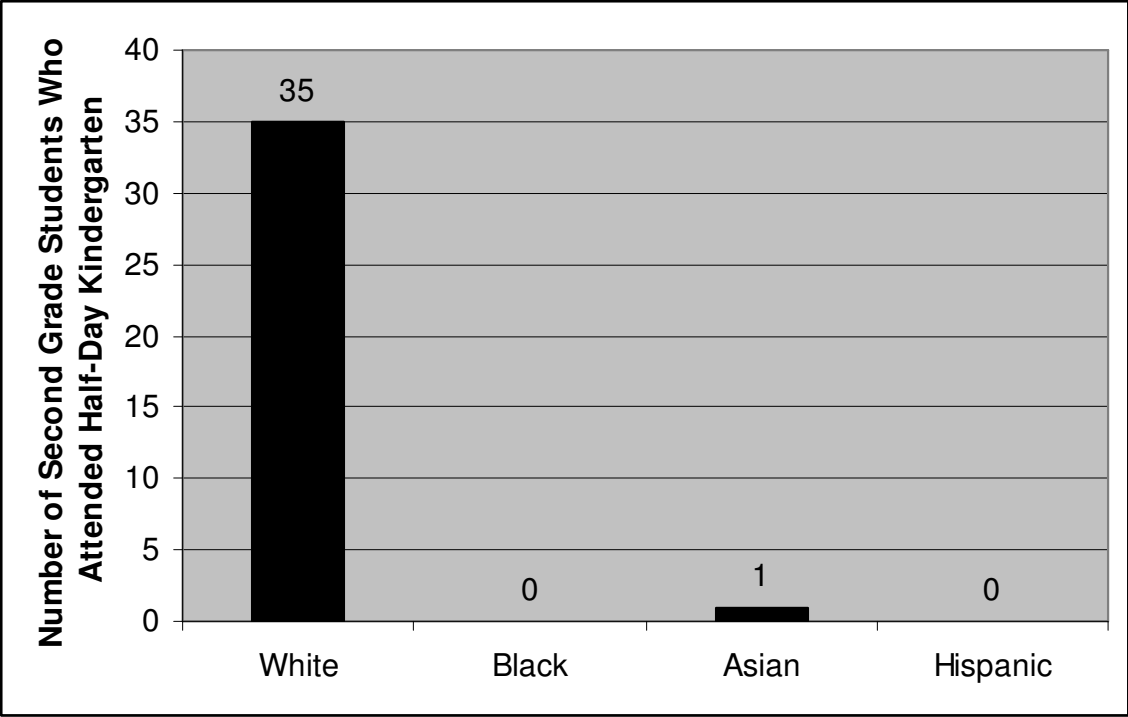


Figure 4 – Ethnicity of HDK Students

The ethnicity of second grade students who attended half-day kindergarten at Pond Elementary in the fall of 2007

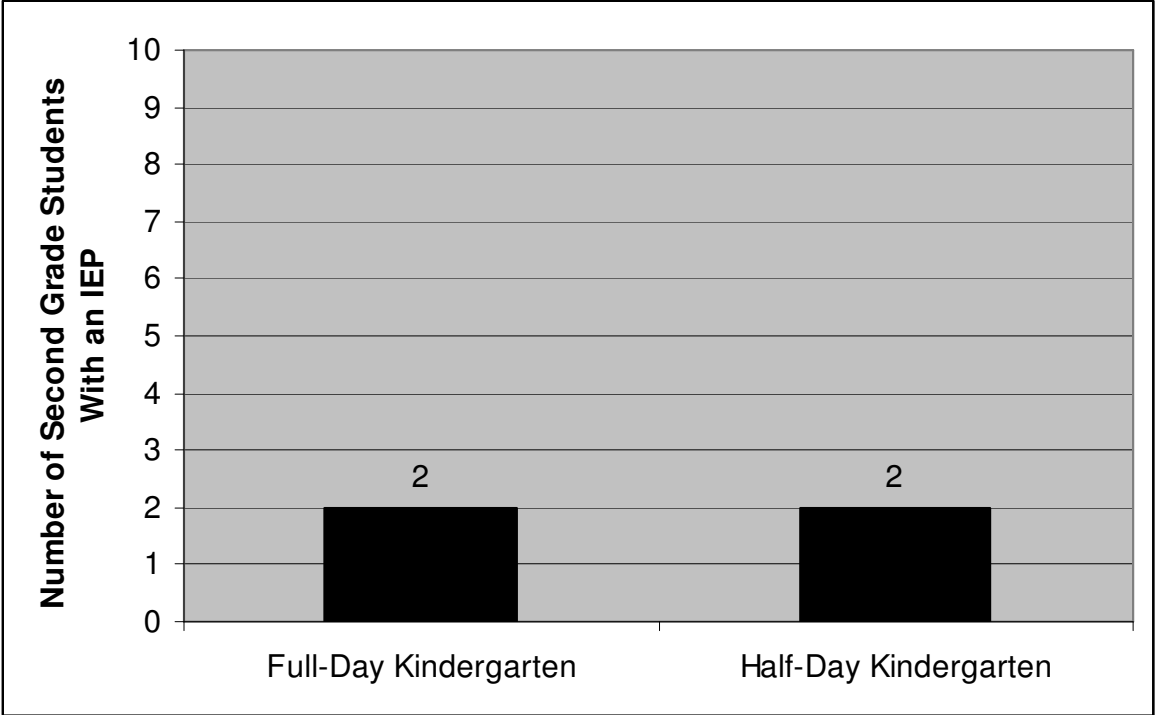


Figure 5 - IEP Students

The number of second grade students who qualified for Individualized Education Plans based on their full-day or half-day kindergarten enrollment at Pond Elementary School



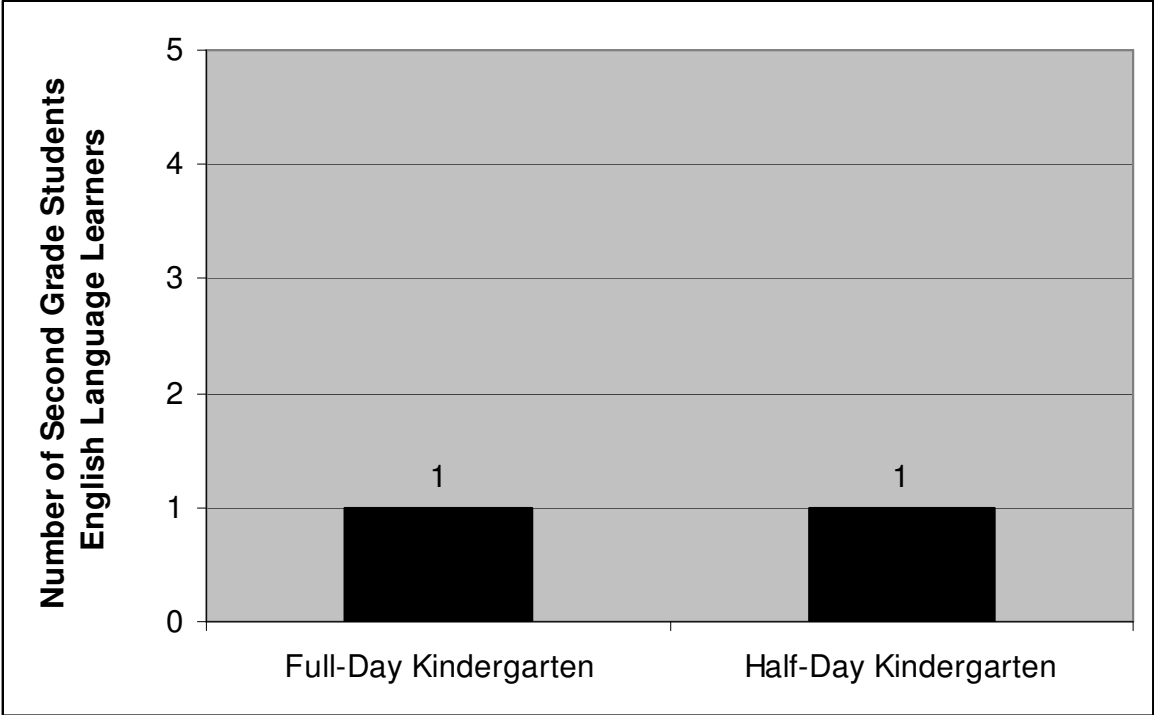


Figure 6 – ELL Students

The number of second grade students who qualified as English Language Learners based on their full-day or half-day kindergarten enrollment at Pond Elementary School

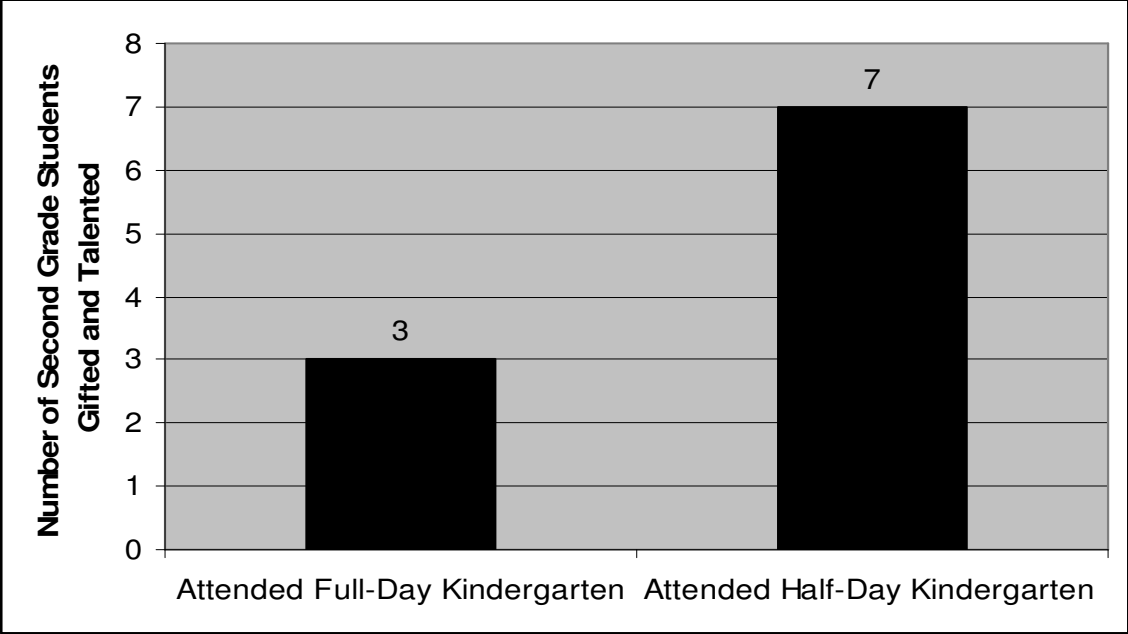


Figure 7 – Gifted and Talented Students

The number of second grade students who qualified as Gifted and Talented Students based on their full-day or half-day kindergarten enrollment at Pond Elementary School

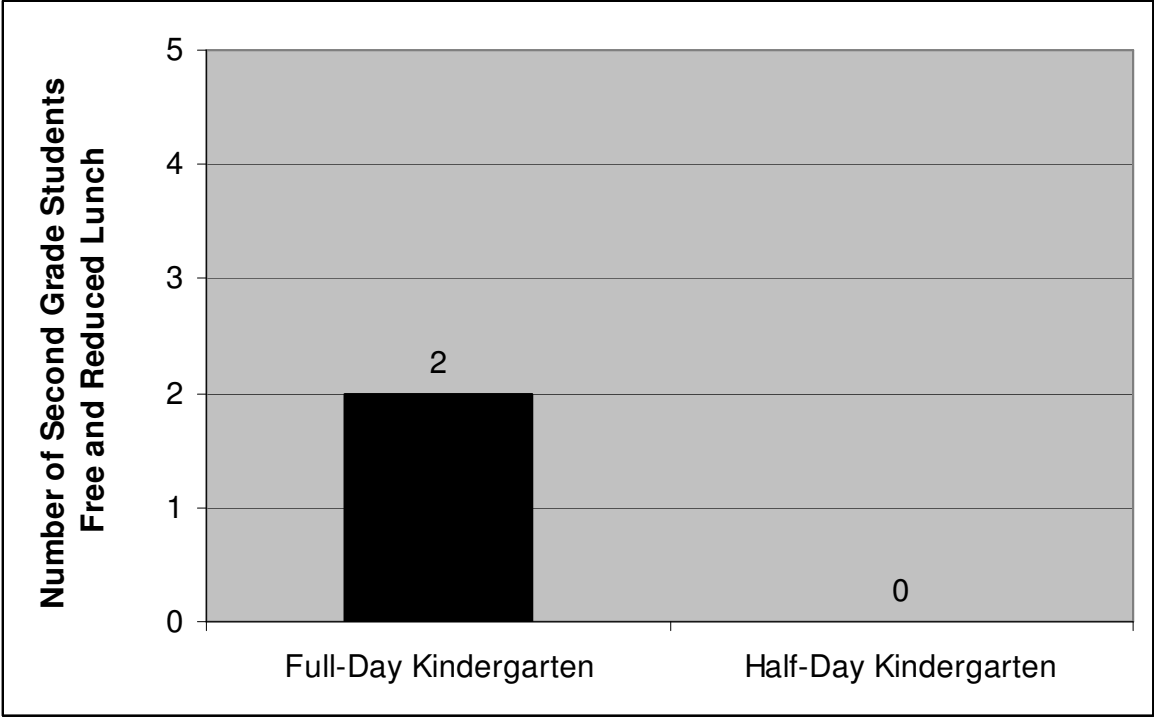


Figure 8 – Free and Reduced Meal Students

The number of second grade students who qualified for free and reduced meals based on their enrollment in full-day or half-day kindergarten at Pond Elementary School

*Instruments*

The Stanford Achievement Test, Tenth Edition (SAT) was used to measure the groups' literacy and math achievement in second grade. This standardized test is well-recognized in the educational field as a valid source of student data. According to the Harcourt Assessment Corporation, the company has provided reliable, innovative and valid student assessments for students for over 70 years (2007). In the Rockwood School District, students are given the norm-referenced SAT 10 in the fall of the school year. These scores are used as benchmark assessments, as well as for teaching and learning assessments. The data show that the SAT 10 is a reliable test and that an individual test-taker would tend to earn similar scores on repeated testing. The SAT 10 is shown to be appropriately difficult for the intended test-taking population.

*Assessment Administration Procedures*

This research was a causal-comparative study. It attempted to determine if a relationship existed between the reading and math achievement levels of students of second graders who attended full-day kindergarten versus students who attended half-day kindergarten. This study was conducted using data derived from second grade students at Pond Elementary School who had been previously enrolled in either a half-day kindergarten program or a full-day kindergarten program during the 2005-2006 school year.

The educators in the Rockwood School District mandate that all second through fifth grade students take the Stanford Achievement Test. This test is a

nationally recognized, research-based exam that provides vital information concerning students' strengths and weaknesses and allows teachers, parents, administrators and counselors to analyze the test data to effectively differentiate instruction to meet the needs of the students. The SAT 10 results are also utilized by the district's gifted facilitators to identify students who qualify for further academic testing to identify gifted learners as well as students who may need remediation. On a district level, administrators use the test data to identify weaknesses and strengths in the curriculum and identify needs for professional development based on student achievement.

The Stanford Achievement Test, Tenth Edition (SAT) was administered at Pond Elementary in the Rockwood School District by four second grade teachers during the fall of 2007. Grade-level classroom teachers administered the test. Students with Individualized Education Plans (IEPs) had their accommodations met by resource teachers in small group settings (see Figure 9).

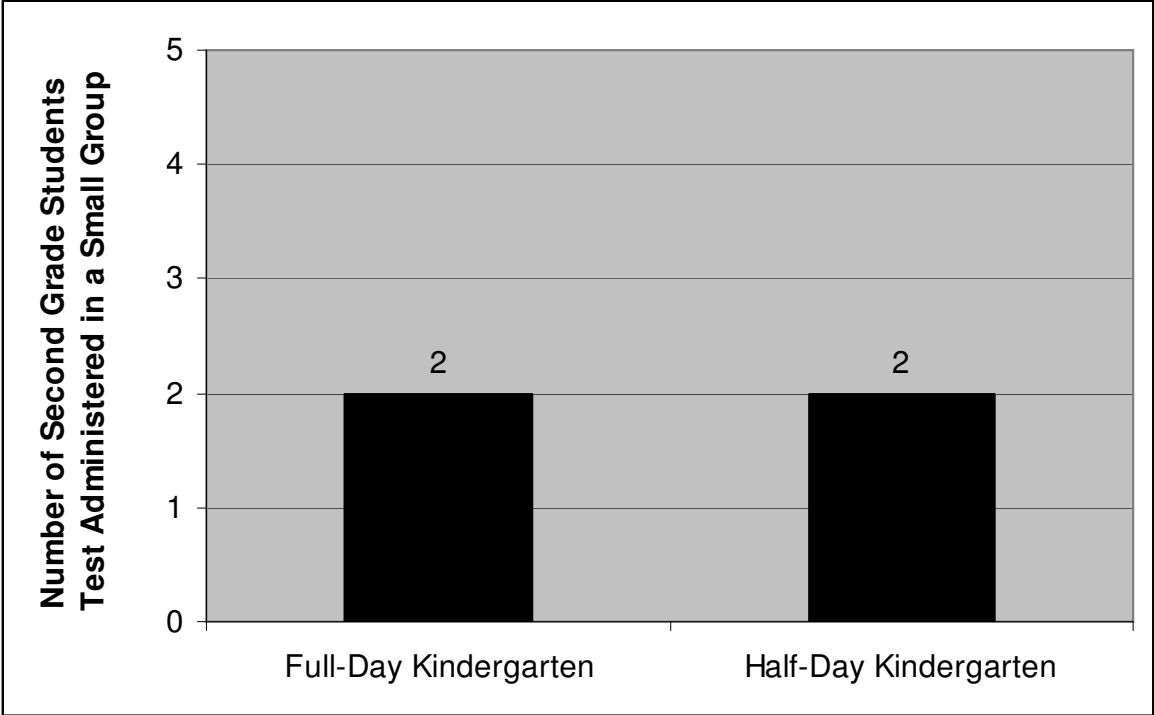


Figure 9 – Small Group Tested Students

The number of second grade students who had the Stanford Achievement Test, Tenth Edition administered in a small group setting based on the students' Individual Education Plan

This figure compares the students based on their full-day or half-day kindergarten enrollment at Pond Elementary School.

*Standardization of Test Administration*

The Building Test Coordinator (BTC) conducted a Pond Testing Meeting on August 21, 2007 to review standardized testing procedures. The testing window for Pond Elementary School was August 27 through September 7. Test administration was strictly controlled by the classroom teachers, the BTC (researcher) and Rockwood School District's Director of Data Analysis and Quality Management. Test administration guidelines set forth by Harcourt Assessment Corporation (2007) were followed completely and accurately.

*Data Analysis Procedures*

Results from the 2007 Standardized Achievement Test Tenth Edition were examined and evaluated in a causal-comparative study to determine if second grade student literacy and math achievement differed based on whether students attended half-day kindergarten versus full-day kindergarten. The results from the SAT test were available for analysis in October of 2007. During the study, there was no involvement with human participants. It was through annual SAT testing that secondary data results were acquired. Test results of students who attended a half-day kindergarten program were collected and compared to the results of students who attended full-day kindergarten. This secondary data was gleaned from the administrative office at Pond Elementary. The results were analyzed using the students' raw score percentages in the areas of Total Reading with an analysis of the subtest scores from Word Study Skills, Word Reading, Sentence Reading, Reading Comprehension and Total Math with an analysis of

subtest scores from Mathematics Problem Solving and Mathematics Procedures. The scores were evaluated by comparing the students' National Percentile results. *T*-Tests were performed during this causal comparative study in an effort to determine if student literacy achievement differed in respect to the type of kindergarten program attended.

There were no potential risks from the study. The results of this research did not affect current students or participants directly. Future students will be affected due to potential district decisions on implementation of full-day kindergarten.

#### *Observed*

Following are anecdotal opinions and the opinions of Pond's full-day kindergarten teacher regarding full-day and half-day kindergarten. The full-day kindergarten program at Pond Elementary School is instructed by one teacher. The full-day kindergarten teacher has been teaching kindergarten for the past 20 years. She taught half-day kindergarten for 17 of the 20 years, and has been teaching full-day kindergarten for the past three years. In an interview with the teacher (personal communication, November 2, 2007), she spoke passionately about the full-day kindergarten program. In her professional opinion,

Full-day kindergarten students have the time and opportunity to express themselves in a creative manner. They are given the time to develop the skill sets necessary to reason with themselves and with other students.

When working on a group project, the students in full-day kindergarten



have the privilege of hashing out differences in a controlled social setting and devising their own solutions without much teacher intervention. As a former half-day kindergarten teacher, there was not enough time in the day for students to have open-ended projects and for students to be given the time to work out their own conflicts. Many times, the teacher directed the resolutions and made project-based decisions for the students because there just wasn't enough time. Full-day kindergarten students truly benefit socially and emotionally from a full-day kindergarten program. The setting is more relaxed and since Rockwood does not expect more from full-day kindergarten students compared to half-day kindergarten students, full-day students have more opportunities and time for exploration, social interaction, fine motor practice and character education lessons. All of these experiences help students develop into better, well-informed, more socially astute citizens (personal communication, November 2, 2007).

The teacher (2007) continued by explaining, "Students are given 'down-time' after lunch and recess. This may take the form of an educational movie or story. Students have the option to relax on the carpet or sit at their tables." It is the opinion of the researcher and the kindergarten teacher that down-time is a necessary aspect to the full-day kindergarten schedule. It allows students the opportunity to process what has been taught and time to relax and prepare for the afternoon. Full-day kindergarten students have the equivalent number of

minutes for special classes as grades first through fifth. Full-day kindergarten students in the Rockwood School District have the privilege to attend the following special classes on a weekly basis: 60 minutes of art, 60 minutes of music, 150 minutes of physical education/health, 30 minutes of library and 30 minutes of technology class time. Full-day kindergarten students have at least one 20 minute recess per day and a 20 minute lunch period. A two hour project time is scheduled five afternoons per week.

Half-day kindergarten students in the Rockwood School District are tested and taught the same kindergarten curriculum as full-day kindergarten students. In their two and one half hour time span every day, half-day kindergarten students attend art class once a week for 30 minutes, physical education/health class twice a week for 30 minutes, library class once a week for 30 minutes and technology class 30 minutes weekly. On average 30 minutes per day is spent on language and 30 minutes is spent on math instruction. Half-day kindergarten students do not eat lunch or have recess time.

Students have the opportunity to socialize in a structured setting during social center time in both kindergarten programs; literacy and math are abundant in each center. Students in half-day kindergarten programs spend most of their day on literacy and math instruction, but the reduced number of hours in the classroom greatly constrains project time. District curriculum expectations are the same for both half-day kindergarteners and full-day kindergarteners. The observed changes in programming between the half-day

kindergarten session and the full-day kindergarten session may directly affect the results of the standardized second grade literacy and math achievement tests.

### *Summary*

The purpose of this study was to determine if a relationship existed between students who attended full-day kindergarten and their literacy and math achievement in second grade versus students who attended half-day kindergarten and their literacy and math achievement. Students who attended half-day kindergarten in the 2005-2006 school year were administered the Stanford Achievement Test, Tenth Edition during the fall of their second grade year. These results were compared to those who attended full-day kindergarten in the 2005-2006 school year and were administered the Stanford Achievement Test during the fall of their second grade year. The second grade SAT results from the two groups were compared and analyzed for significant relationships. This quantitative project employed a causal-comparison research design to determine the relationship between students who attended full-day kindergarten and their literacy and math achievement in second grade versus students who attended half-day kindergarten and their literacy and math achievement in second grade. Information and data gleaned from this study may impact the future of full-day kindergarten curriculum programming in the Rockwood School District and other districts interested in the effects of the length of the kindergarten school day.

## CHAPTER FOUR - RESULTS

*Introduction*

In an effort to meet the desire in our nation for increased student achievement, policy makers and educators have questioned the effectiveness of half-day kindergarten versus full-day kindergarten. Bruno and Adams (1994, p. 1) have noted, "The transition from half-day to full-day has increased steadily in the past 40 years, however, the debate continues about the effectiveness of the program." Parents, teachers and law-makers are still asking the question, "Are students who attend full-day kindergarten better prepared for future academic success than their peers who attend half-day kindergarten programs?"

The purpose of this study was to determine if a relationship existed between students who attended full-day kindergarten and their literacy and math achievement in second grade versus students who attended half-day kindergarten and their literacy and math achievement in second grade. Morrow et al. (1998, p. 1) defined a half-day kindergarten program "as one operating for three hours per day or less, either morning or afternoon schedule, five days a week. A full-day kindergarten program was one that operated for more than three hours a day, five days a week."

Subjects for this study were second grade students from Pond Elementary School located in the Rockwood School District in Wildwood, Missouri. Eighty-three second grade students enrolled in second grade were administered the Stanford Achievement Test, Tenth Edition during the fall of 2007. Only sixty-eight of these second grade students attended kindergarten at Pond Elementary during the 2005-2006 school year. The SAT results from those sixty-eight students were used for data analysis purposes. Thirty-two students in second grade attended Pond full-day kindergarten, while thirty-six second grade students attended Pond half-day kindergarten.

An analysis was conducted of the National Percentile Rank results of Total Reading and Total Math, as well as subtest scores, from the Stanford Achievement Test, Tenth Edition administered to second grade students during the fall of the 2007-2008 school year. The Reading subtests Word Study Skills, Word Reading, Sentence Reading and Reading Comprehension were also analyzed for significant differences to determine a relationship between students who attended full-day kindergarten and higher literacy achievement in second grade. Math subtests Mathematics Problem Solving, and Mathematics Procedures were also analyzed for significant differences to determine a relationship between students who attended full-day kindergarten and higher math achievement in second grade.

The SAT Reading National Percentile Ranks of thirty-two second graders who attended full-day kindergarten (control group) were entered into an Excel

spreadsheet along with the SAT Reading National Percentile Ranks of thirty-six second graders who attended half-day kindergarten (treatment group). The means, variances and a p-value were calculated by conducting an f-test to determine if the variances of the treatment and the control groups differed significantly.

*Analysis of Data*Table 1 - Total Reading F-Test

F-Test Two-Sample for Variances

|                     | HDK         | FDK      |
|---------------------|-------------|----------|
| Mean                | 52.97222222 | 53.84375 |
| Variance            | 578.9420635 | 475.878  |
| Observations        | 36          | 32       |
| df                  | 35          | 31       |
| F                   | 1.216576589 |          |
| P(F<=f) one-tail    | 0.291438236 |          |
| F Critical one-tail | 1.800483939 |          |

Note. HDK = Half-Day Kindergarten Results; FDK = Full-Day Kindergarten

## Results

$$H_0: \sigma_{hd}^2 = \sigma_{fd}^2$$

$$H_1: \sigma_{hd}^2 \neq \sigma_{fd}^2$$

$$F(35,31) = 1.22, p = 0.2914$$

$$p > 0.05$$

The National Percentile Rank results of the students' Total Reading scores derived from the Stanford Achievement Test, Tenth Edition were tested for equal or unequal variances using an *f*-test. The calculated *p*-value of the *f*-test was 0.2914 so the decision was to accept the null hypothesis. The *p*-value of 0.2914 was more than 0.05 which led to the conclusion that there was not a statistically significant difference in the variances. Thus, an Equal Variance *t*-test was conducted to determine if the means differed significantly.

Table 2 – Total Reading *t*-Test*t*-Test: Two-Sample Assuming Equal Variances

|                              | HDK          | FDK         |
|------------------------------|--------------|-------------|
| Mean                         | 52.97222222  | 53.84375    |
| Variance                     | 578.9420635  | 475.8780242 |
| Observations                 | 36           | 32          |
| Pooled Variance              | 530.5331965  |             |
| Hypothesized Mean Difference | 0            |             |
| df                           | 66           |             |
| t Stat                       | -0.155738768 |             |
| P(T<=t) one-tail             | 0.438357148  |             |
| t Critical one-tail          | 1.668270515  |             |
| P(T<=t) two-tail             | 0.876714296  |             |
| t Critical two-tail          | 1.996564396  |             |

Note. HDK = Half-Day Kindergarten Results; FDK = Full-Day Kindergarten

## Results

$$H_0: \mu_{hd} = \mu_{fd}$$

$$H_1: \mu_{fd} > \mu_{hd}$$

$$t(66) = -0.155, p = 0.438357148$$

The equal variance *t*-test showed a *p*-value of 0.438357148; thus, the null hypothesis was not rejected. Since the *p*-value of 0.438357148 was greater than 0.05, there was not a statistically significant difference in mean Total Reading scores on the standardized test between the second grade group who attended half-day kindergarten and those second graders who attended full-day kindergarten.



Table 3 - Word Study Skills *F*-Test*F*-Test Two-Sample for Variances

|                     | HDK         | FDK      |
|---------------------|-------------|----------|
| Mean                | 53.19444444 | 52.71875 |
| Variance            | 641.4753968 | 586.5313 |
| Observations        | 36          | 32       |
| df                  | 35          | 31       |
| F                   | 1.093676418 |          |
| P(F<=f) one-tail    | 0.402285308 |          |
| F Critical one-tail | 1.800483939 |          |

Note. HDK = Half-Day Kindergarten Results; FDK = Full-Day Kindergarten

## Results

$$H_0: \sigma_{hd}^2 = \sigma_{fd}^2$$

$$H_1: \sigma_{hd}^2 \neq \sigma_{fd}^2$$

$$F(35,31) = 1.09, p = 0.4023$$

$$p > 0.05$$

The National Percentile Rank results of the students' subtest Word Study Skills scores derived from the Stanford Achievement Test, Tenth Edition were tested for equal or unequal variances using an *f*-test. The calculated *p*-value of the *f*-test was 0.4023 so the decision was to accept the null hypothesis. The *p*-value of 0.4023 was more than 0.05 which led to the conclusion that there was not a statistically significant difference in the variances. Thus, an Equal Variance *t*-test was conducted to determine if the means differed significantly.

Table 4 – Word Study Skills *t*-Test*t*-Test: Two-Sample Assuming Equal Variances

|                              | HDK         | FDK       |
|------------------------------|-------------|-----------|
| Mean                         | 53.19444444 | 52.71875  |
| Variance                     | 641.4753968 | 586.53125 |
| Observations                 | 36          | 32        |
| Pooled Variance              | 615.6682976 |           |
| Hypothesized Mean Difference | 0           |           |
| df                           | 66          |           |
| t Stat                       | 0.078908987 |           |
| P(T<=t) one-tail             | 0.468671888 |           |
| t Critical one-tail          | 1.668270515 |           |
| P(T<=t) two-tail             | 0.937343776 |           |
| t Critical two-tail          | 1.996564396 |           |

Note. HDK = Half-Day Kindergarten Results; FDK = Full-Day Kindergarten

## Results

$$H_0: \mu_{hd} = \mu_{fd}$$

$$H_1: \mu_{fd} > \mu_{hd}$$

$$t(66) = 0.078, p = 0.468671888$$

The equal variance *t*-test showed a *p*-value of 0.468671888; thus, the null hypothesis was not rejected. Since the *p*-value of 0.468671888 was greater than 0.05, there was not a statistically significant difference in Word Study Skills subtest scores on the standardized test between the second grade group who attended half-day kindergarten and those second graders who attended full-day kindergarten.

Table 5 – Word Reading *F*-Test

| <i>F</i> -Test Two-Sample for Variances |             |            |
|---|-------------|------------|
|   | <i>HDK</i>  | <i>FDK</i> |
| Mean                                    | 54.13888889 | 57.625     |
| Variance                                | 764.6373016 | 411.7258   |
| Observations                            | 36          | 32         |
| df                                      | 35          | 31         |
| <i>F</i>                                | 1.857151749 |            |
| P( <i>F</i> ≤ <i>f</i> ) one-tail       | 0.041806015 |            |
| <i>F</i> Critical one-tail              | 1.800483939 |            |

Note. *HDK* = Half-Day Kindergarten Results; *FDK* = Full-Day Kindergarten

### Results

$$H_0: \sigma_{hd}^2 = \sigma_{fd}^2$$

$$H_1: \sigma_{hd}^2 \neq \sigma_{fd}^2$$

$$F(35,31) = 1.86, p = 0.0418$$

$$p < 0.05$$

The National Percentile Rank results of the students' subtest Word Reading scores derived from the Stanford Achievement Test, Tenth Edition were tested for equal or unequal variances using an *f*-test. The calculated *p*-value of the *f*-test was 0.0418 so the decision was to reject the null hypothesis. The *p*-value of 0.0418 was less than 0.05 which led to the conclusion that there was a statistically significant difference in the variances. Thus, an Unequal Variance *t*-test was conducted to determine if the means differed significantly.

Table 6 – Word Reading *t*-Test*t*-Test: Two-Sample Assuming Unequal Variances

|                              | HDK          | FDK         |
|------------------------------|--------------|-------------|
| Mean                         | 54.13888889  | 57.625      |
| Variance                     | 764.6373016  | 411.7258065 |
| Observations                 | 36           | 32          |
| Hypothesized Mean Difference | 0            |             |
| df                           | 64           |             |
| t Stat                       | -0.596930214 |             |
| P(T<=t) one-tail             | 0.276329955  |             |
| t Critical one-tail          | 1.669013026  |             |
| P(T<=t) two-tail             | 0.55265991   |             |
| t Critical two-tail          | 1.997729633  |             |

Note. HDK = Half-Day Kindergarten Results; FDK = Full-Day Kindergarten

## Results

$$H_0: \mu_{hd} = \mu_{fd}$$

$$H_1: \mu_{fd} > \mu_{hd}$$

$$t(64) = -0.59, p = 0.276329955$$

The Unequal Variance *t*-test on the two samples showed a *p*-value of 0.276329955; therefore, the null hypothesis was not rejected. Since the *p*-value of 0.276329955 was greater than 0.05, there was not a statistically significant difference in mean Word Reading Skills subtest scores on the standardized test between the second grade group who attended half-day kindergarten and those second graders who attended full-day kindergarten.

Table 7 – Sentence Reading *F*-Test*F*-Test Two-Sample for Variances

|                     | HDK         | FDK      |
|---------------------|-------------|----------|
| Mean                | 47.13888889 | 50.625   |
| Variance            | 514.465873  | 560.4355 |
| Observations        | 36          | 32       |
| df                  | 35          | 31       |
| F                   | 0.917975196 |          |
| P(F<=f) one-tail    | 0.400996752 |          |
| F Critical one-tail | 0.562033953 |          |

Note. HDK = Half-Day Kindergarten Results; FDK = Full-Day Kindergarten

## Results

$$H_0: \sigma_{hd}^2 = \sigma_{fd}^2$$

$$H_1: \sigma_{hd}^2 \neq \sigma_{fd}^2$$

$$F(35,31) = 0.92, p = 0.4001$$

$$p > 0.05$$

The National Percentile Rank results of the students' Sentence Reading subtest scores derived from the Stanford Achievement Test, Tenth Edition were tested for equal or unequal variances using an *f*-test. The calculated *p*-value of the *f*-test was 0.4001 so the decision was to accept the null hypothesis. The *p*-value of 0.4001 was more than 0.05 which led to the conclusion that there was not a statistically significant difference in the variances. Therefore, an Equal Variance *t*-test was conducted to determine if the means differed significantly.

Table 8 – Sentence Reading *t*-Test*t*-Test: Two-Sample Assuming Equal Variances

|                              | HDK          | FDK         |
|------------------------------|--------------|-------------|
| Mean                         | 47.13888889  | 50.625      |
| Variance                     | 514.465873   | 560.4354839 |
| Observations                 | 36           | 32          |
| Pooled Variance              | 536.0576599  |             |
| Hypothesized Mean Difference | 0            |             |
| df                           | 66           |             |
| t Stat                       | -0.619736757 |             |
| P(T<=t) one-tail             | 0.268782432  |             |
| t Critical one-tail          | 1.668270515  |             |
| P(T<=t) two-tail             | 0.537564864  |             |
| t Critical two-tail          | 1.996564396  |             |

Note. HDK = Half-Day Kindergarten Results; FDK = Full-Day Kindergarten

## Results

$$H_0: \mu_{hd} = \mu_{fd}$$

$$H_1: \mu_{fd} > \mu_{hd}$$

$$t(66) = -0.62, p = 0.268782432$$

The equal variance *t*-test showed a *p*-value of 0.268782432; thus, the null hypothesis was not rejected. Since the *p*-value of 0.268782432 was greater than 0.05, there was not a statistically significant difference in mean Sentence Reading subtest scores on the standardized test between the second grade group who attended half-day kindergarten and those second graders who attended full-day kindergarten.

Table 9 – Reading Comprehension *F*-Test*F*-Test Two-Sample for Variances

|                                   | <i>HDK</i>  | <i>FDK</i> |
|-----------------------------------|-------------|------------|
| Mean                              | 60.52777778 | 57.53125   |
| Variance                          | 755.5134921 | 537.87     |
| Observations                      | 36          | 32         |
| df                                | 35          | 31         |
| <i>F</i>                          | 1.404639687 |            |
| P( <i>F</i> ≤ <i>f</i> ) one-tail | 0.170001013 |            |
| <i>F</i> Critical one-tail        | 1.800483939 |            |

*Note.* *HDK* = Half-Day Kindergarten Results; *FDK* = Full-Day Kindergarten

## Results

$$H_0: \sigma_{hd}^2 = \sigma_{fd}^2$$

$$H_1: \sigma_{hd}^2 \neq \sigma_{fd}^2$$

$$F(35,31) = 1.40, p = 0.1700$$

$$p > 0.05$$

The National Percentile Rank results of the students' Reading Comprehension subtest scores derived from the Stanford Achievement Test, Tenth Edition were tested for equal or unequal variances using an *f*-test. The calculated *p*-value of the *f*-test was 0.1700 so the decision was to accept the null hypothesis. The *p*-value of 0.1700 was more than 0.05 which led to the conclusion that there was not a statistically significant difference in the variances. Thus, an Equal Variance *t*-test was conducted to determine if the means differed significantly.

Table 10 – Reading Comprehension *t*-Test*t*-Test: Two-Sample Assuming Equal Variances

|                              | HDK         | FDK         |
|------------------------------|-------------|-------------|
| Mean                         | 60.52777778 | 57.53125    |
| Variance                     | 755.5134921 | 537.8699597 |
| Observations                 | 36          | 32          |
| Pooled Variance              | 653.2869844 |             |
| Hypothesized Mean Difference | 0           |             |
| df                           | 66          |             |
| t Stat                       | 0.482545298 |             |
| P(T<=t) one-tail             | 0.315507631 |             |
| t Critical one-tail          | 1.668270515 |             |
| P(T<=t) two-tail             | 0.631015263 |             |
| t Critical two-tail          | 1.996564396 |             |

Note. HDK = Half-Day Kindergarten Results; FDK = Full-Day Kindergarten

## Results

$$H_0: \mu_{hd} = \mu_{fd}$$

$$H_1: \mu_{fd} > \mu_{hd}$$

$$t(66) = 0.48, p = 0.315507631$$

The equal variance *t*-test showed a *p*-value of 0.315507631; thus, the null hypothesis was not rejected. Since the *p*-value of 0.315507631 was greater than 0.05, there was not a statistically significant difference in Reading Comprehension subtest scores on the standardized test between the second grade group who attended half-day kindergarten and those second graders who attended full-day kindergarten.



Table 11 – Total Math *F*-Test*F*-Test Two-Sample for Variances

|                                   | <i>HDK</i>  | <i>FDK</i> |
|-----------------------------------|-------------|------------|
| Mean                              | 61.94444444 | 66.96875   |
| Variance                          | 883.5396825 | 546.999    |
| Observations                      | 36          | 32         |
| df                                | 35          | 31         |
| <i>F</i>                          | 1.615249197 |            |
| P( <i>F</i> ≤ <i>f</i> ) one-tail | 0.089407745 |            |
| <i>F</i> Critical one-tail        | 1.800483939 |            |

*Note.* *HDK* = Half-Day Kindergarten Results; *FDK* = Full-Day Kindergarten

## Results

$$H_0: \sigma_{hd}^2 = \sigma_{fd}^2$$

$$H_1: \sigma_{hd}^2 \neq \sigma_{fd}^2$$

$$F(35,31) = 1.62, p = 0.0894$$

$$p > 0.05$$

The National Percentile Rank results of the students' Total Math test scores derived from the Stanford Achievement Test, Tenth Edition were tested for equal or unequal variances using an *f*-test. The calculated *p*-value of the *f*-test was 0.0894 so the decision was to accept the null hypothesis. The *p*-value of 0.0894 was more than 0.05 which derived the conclusion there was not a significantly statistical difference in the variances. Therefore, an Equal Variance *t*-test was conducted to determine if the means differed significantly.

Table 12 - Total Math *t*-Test*t*-Test: Two-Sample Assuming Equal Variances

|                              | HDK          | FDK         |
|------------------------------|--------------|-------------|
| Mean                         | 61.94444444  | 66.96875    |
| Variance                     | 883.5396825  | 546.9989919 |
| Observations                 | 36           | 32          |
| Pooled Variance              | 725.46754    |             |
| Hypothesized Mean Difference | 0            |             |
| df                           | 66           |             |
| t Stat                       | -0.767783605 |             |
| P(T<=t) one-tail             | 0.222677015  |             |
| t Critical one-tail          | 1.668270515  |             |
| P(T<=t) two-tail             | 0.445354029  |             |
| t Critical two-tail          | 1.996564396  |             |

Note. HDK = Half-Day Kindergarten Results; FDK = Full-Day Kindergarten

## Results

$$H_0: \mu_{hd} = \mu_{fd}$$

$$H_1: \mu_{fd} > \mu_{hd}$$

$$t(66) = -0.77, p = 0.222677015$$

The equal variance *t*-test showed a *p*-value of 0.222677015; therefore, the null hypothesis was not rejected. Since the *p*-value of 0.222677015 was greater than 0.05, there was not a statistically significant difference in Total Math test scores on the standardized test between the second grade group who attended half-day kindergarten and those second graders who attended full-day kindergarten.

Table 13 – Math Problem Solving *F*-Test*F*-Test Two-Sample for Variances

|                                   | <i>HDK</i>  | <i>FDK</i> |
|-----------------------------------|-------------|------------|
| Mean                              | 57.5        | 59.875     |
| Variance                          | 826.5428571 | 537.0161   |
| Observations                      | 36          | 32         |
| df                                | 35          | 31         |
| <i>F</i>                          | 1.539139725 |            |
| P( <i>F</i> ≤ <i>f</i> ) one-tail | 0.113135983 |            |
| <i>F</i> Critical one-tail        | 1.800483939 |            |

*Note.* *HDK* = Half-Day Kindergarten Results; *FDK* = Full-Day Kindergarten

## Results

$$H_0: \sigma_{hd}^2 = \sigma_{fd}^2$$

$$H_1: \sigma_{hd}^2 \neq \sigma_{fd}^2$$

$$F(35,31) = 1.54, p = 0.1131$$

$$p > 0.05$$

The National Percentile Rank results of the students' Math Problem Solving subtest scores derived from the Stanford Achievement Test, Tenth Edition were tested for equal or unequal variances using an *f*-test. The calculated *p*-value of the *f*-test was 0.1131 so the decision was to accept the null hypothesis. The *p*-value of 0.1131 was more than 0.05 which led to the conclusion that there was not a statistically significant difference in the variances. Therefore, an Equal Variance *t*-test was conducted to determine if the means differed significantly.

Table 14 – Math Problem Solving *t*-Test*t*-Test: Two-Sample Assuming Equal Variances

|                              | HDK          | FDK        |
|------------------------------|--------------|------------|
| Mean                         | 57.5         | 59.875     |
| Variance                     | 826.5428571  | 537.016129 |
| Observations                 | 36           | 32         |
| Pooled Variance              | 690.5530303  |            |
| Hypothesized Mean Difference | 0            |            |
| df                           | 66           |            |
| t Stat                       | -0.371994809 |            |
| P(T<=t) one-tail             | 0.355544221  |            |
| t Critical one-tail          | 1.668270515  |            |
| P(T<=t) two-tail             | 0.711088442  |            |
| t Critical two-tail          | 1.996564396  |            |

Note. HDK = Half-Day Kindergarten Results; FDK = Full-Day Kindergarten

## Results

$$H_0: \mu_{hd} = \mu_{fd}$$

$$H_1: \mu_{fd} > \mu_{hd}$$

$$t(66) = -0.37, p = 0.355544221$$

The equal variance *t*-test showed a *p*-value of 0.355544221; therefore, the null hypothesis was not rejected. Since the *p*-value of 0.355544221 was greater than 0.05, there was not a statistically significant difference in Math Problem Solving subtest scores on the standardized test between the second grade group who attended half-day kindergarten and those second graders who attended full-day kindergarten.

Table 15 – Math Procedures *F*-Test*F*-Test Two-Sample for Variances

|                                   | <i>HDK</i>  | <i>FDK</i> |
|-----------------------------------|-------------|------------|
| Mean                              | 63.94444444 | 67.34375   |
| Variance                          | 856.3968254 | 625.1361   |
| Observations                      | 36          | 32         |
| df                                | 35          | 31         |
| <i>F</i>                          | 1.369936628 |            |
| P( <i>F</i> ≤ <i>f</i> ) one-tail | 0.188373172 |            |
| <i>F</i> Critical one-tail        | 1.800483939 |            |

*Note.* *HDK* = Half-Day Kindergarten Results; *FDK* = Full-Day Kindergarten

## Results

$$H_0: \sigma_{hd}^2 = \sigma_{fd}^2$$

$$H_1: \sigma_{hd}^2 \neq \sigma_{fd}^2$$

$$F(35,31) = 1.37, p = 0.1884$$

$$p > 0.05$$

The National Percentile Rank results of the students' Math Procedures subtest scores derived from the Stanford Achievement Test, Tenth Edition were tested for equal or unequal variances using an *f*-test. The calculated *p*-value of the *f*-test was 0.1884 so the decision was to accept the null hypothesis. The *p*-value of 0.1884 was more than 0.05 which led to the conclusion that there was not a statistically significant difference in the variances. Therefore, an Equal Variance *t*-test was conducted to determine if the means differed significantly.

Table 16 – Math Procedures *t*-test*t*-Test: Two-Sample Assuming Equal Variances

|                              | HDK          | FDK         |
|------------------------------|--------------|-------------|
| Mean                         | 63.94444444  | 67.34375    |
| Variance                     | 856.3968254  | 625.1360887 |
| Observations                 | 36           | 32          |
| Pooled Variance              | 747.7743582  |             |
| Hypothesized Mean Difference | 0            |             |
| df                           | 66           |             |
| t Stat                       | -0.511654388 |             |
| P(T<=t) one-tail             | 0.305300305  |             |
| t Critical one-tail          | 1.668270515  |             |
| P(T<=t) two-tail             | 0.61060061   |             |
| t Critical two-tail          | 1.996564396  |             |

Note. HDK = Half-Day Kindergarten Results; FDK = Full-Day Kindergarten

## Results

$$H_0: \mu_{hd} = \mu_{fd}$$

$$H_1: \mu_{fd} > \mu_{hd}$$

$$t(66) = -0.51, p = 0.305300305$$

The equal variance *t*-test showed a *p*-value of 0.305300305; therefore, the null hypothesis was not rejected. Since the *p*-value of 0.305300305 was greater than 0.05, there was not a statistically significant difference in Math Procedures subtest scores on the standardized test between the second grade group who attended half-day kindergarten and those second graders who attended full-day kindergarten.

*Deductive Conclusion*

The null hypothesis was not rejected. The above data did not support the researcher's expectation that there would be a statistically significant difference in the second grade reading and math achievement scores on the Stanford Achievement Test of the students who attended full-day kindergarten versus those students who attended half-day kindergarten. According to this research, second grade students who attended a full-day kindergarten program will not have increased literacy and math achievement scores on second grade SAT standardized tests when compared to students who attended a half-day kindergarten program.

*Summary*

The Stanford Achievement Test, Tenth Edition Reading and Math test (and subtest) results were collected from the two groups of second grade students at Pond Elementary School in the fall of 2007. The results were organized into the eight test and subtest sections in an Excel spreadsheet and analyzed using  $f$ -tests for two-samples for variances to examine the population for equal or unequal variances. After determining the statistical differences in variances between the half-day kindergarten group and the full-day kindergarten group, equal and unequal variance  $t$ -tests were conducted. Equal variance  $t$ -tests were conducted on seven of the eight test and subtest groups. All eight of the  $t$ -tests yielded no statistically significant difference between the two kindergarten groups' reading and math SAT results in fall 2007.

## CHAPTER FIVE - DISCUSSION

*Introduction*

This study was conducted in an effort to determine if there was a relationship between the length of kindergarten day and its effect on student achievement. The researcher investigated other studies, examined student characteristics of the sample, dissected the methodology of the test administration and analyzed the assessment results for statistical significance. After evaluating the data, the null hypothesis that full-day kindergarten would not have a positive effect on second grade literacy and math achievement was accepted in all seven separate analyses. In an effort to determine the positive aspects of full-day kindergarten, the researcher examined other aspects of student achievement: discipline and attendance. The analysis of discipline incidents from the two groups illustrated full-day kindergarten students had fewer (zero) discipline referrals in their second grade year compared to students who had attended half-day kindergarten. Parallel to this analysis, the average daily attendance for second grade students who attended full-day kindergarten was 97.8% while the average daily attendance for second grade students who attended half-day kindergarten was only 97.3%. The discipline information and



the average daily attendance records did not indicate a significant difference between the two test groups.

### *Implications*

The educators in the Rockwood School District implemented full-day kindergarten at the beginning of the 2005-2006 school year. This implementation occurred after a three-year committee, consisting of many different stakeholders, evaluated finances, early childhood theory, facilities, staffing and curriculum. Information was gathered from neighboring districts and reported to the committee. It was concluded that full-day kindergarten academic curriculum would mirror half-day kindergarten and it would not be enriched with additional objectives. The intent of full-day kindergarten was to offer the same curriculum as that offered to students who attend half-day kindergarten. As stated on the Rockwood School District website,

Full-day kindergarten provides additional opportunities to practice and apply concepts and skills in contexts that are meaningful to children.

Students who participate in full-day kindergarten follow the same class format as students in grades 1-5. The students have 60 minutes of art and music and 150 minutes of Physical Education each week" (2007).

While the researcher's initial expectation was to find a direct relationship between full-day kindergarten and higher student achievement, this study supported Rockwood's commitment to providing a full-day program that offered the same curriculum, and same student achievement results, as the half-

day kindergarten program. However, it did not support a relationship between full-day kindergarten and increased academic achievement in second grade.

#### *Recommendation*

Across the nation, school districts are responding to the increased pressures for higher student achievement. The implementation of full-day kindergarten ranks high on researchers' and educators' lists as a viable strategy to meet such demands. As suggested in this study, however, students who attend full-day kindergarten do not necessarily have increased standardized test achievement scores.

Before school districts can implement full-day kindergarten programs, the following must be considered:

1. Community and District Interests – Do district staff and families desire a full-day kindergarten program? A community and staff survey is recommended to gauge the interest.
2. Financial Implications – Based on state funding, will the district require families to pay tuition to attend full-day kindergarten? A survey of neighboring school districts would provide valuable information regarding tuition fees and practices.
3. Enrollment Guidelines – How many students constitute another full-day kindergarten classroom? What is the minimum number of students? What process is used to handle requests that exceed the maximum number of full-day kindergarten students?

4. Curriculum Considerations- If the district decides to implement a tuition-based full-day kindergarten program, what curriculum changes will occur, if any? If the district decides to implement a free full-day kindergarten program accessible to all students, what curriculum changes will occur, if any? Does the district want to adopt a curriculum-based program or a developmentally-based program?
5. Facilities and Transportation Needs- An evaluation of building space needs to be conducted in order to effectively determine the possible locations for full-day kindergarten. With the implementation of full-day kindergarten, districts must evaluate bus routing and capacity limitations in regards to transportation.
6. Teacher Selection and Staffing Requirements - Human resources personnel must consider full-day kindergarten staffing when implementing the new program.

As a result of this study, the researcher recommends the formation of a committee consisting of parents, teachers, administrators and community members in order to evaluate and answer the above questions. It is suggested that the committee meet over a period of at least one year prior to the implementation of the program. This time period allows for proper communication to all stakeholders, preparation of facilities and teacher training. It is also advisable that surveys be conducted throughout the process to gather

opinions and make necessary adjustments to the program to ensure optimum success.

### *Summary*

This study was conducted using test data derived from the SAT 10 scores of second grade students. Results from the Stanford Achievement Test, Tenth Edition (SAT 10) were examined and evaluated in this causal-comparative study to determine if student literacy and math achievement differed in respect to a half-day kindergarten program versus a full-day kindergarten program. SAT results collected in September of the 2007-2008 school year from students who attended a half-day kindergarten program were compared to the results of second grade students who attended full day kindergarten.

National accountability standards will only increase as time moves forward. In order for American students to compete globally, it is necessary for students to obtain the very best academic and social foundation in their education. This begins with kindergarten. Parents, teachers and administrators must work collaboratively to identify and implement the best instructional strategies and methods to instruct a wide variety of learners in order to meet and hopefully exceed national educational standards. Districts where staff members have successfully implemented full-day kindergarten serve as a role model for other districts where staff members are just beginning the process. The information gleaned from this study could inform researchers in pursuit of information regarding full-day kindergarten programs.

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APPENDIX A  
IRB APPROVAL FORM

07-047 IRB  
Dissertation Number

Lindenwood University  
Institutional Review Board Disposition Report

To: Cheri Oliver  
CC: Dr. Cynthia Bice  
Title: The Relationship Between Length of Kindergarten Day and Student Literacy and Math Achievement

The Institutional Review Board has reviewed the proposal for research:

The Institutional Review Board:

XXXX Approves the proposal as submitted.

\_\_\_\_\_ Approves the proposal pending the following minor changes are made:

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*Please submit the revised proposal for IRB records.*

Does not approve the proposal as submitted because:

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*Please submit a revised protocol for IRB review.*

\_\_Tammi Pavelec\_\_\_\_\_05/09/2007\_\_

*Signature IRB Chair*

*Date*

APPENDIX B



*Growing Together,  
Learning for Life*

APPLICATION TO PERFORM RESEARCH

Date: February 4, 2007

I. Name of Investigator: Cheri Oliver – Administrative Intern, Pond Elementary

Institutional Affiliation: Lindenwood University

Office Address: Lindenwood University – 209 South Kingshighway St. Charles, MO 63301

Home Address: 1078 Dardenne Woods Drive O’Fallon, MO 63368

Office Phone: 636-458-7264

Home Phone: 636-561-2344

If your research will be in partial fulfillment of a degree requirement, what degree is sought?

Doctor of Education

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II. Project Title: The Relationship Between Length of Kindergarten Day and Student Literacy and Math Achievement

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Description: The purpose of this study is to determine the relationship between students attending full-day kindergarten and their literacy and math achievement versus students attending half-day kindergarten and their literacy and math achievement. Academic achievement results will be compared using second grade Stanford Achievement Tests.

Proposed Starting Date: February, 2007

Proposed Completion Date: December, 2007

### III. Participants

Number of Subjects Required    Form of Participation  
(include treatments, tests, observations, etc.)

Students: Secondary test data (68 second grade students)  
Review of SAT scores

Administrators: Director of Elementary Schools      Interview

Teachers: 1 kindergarten teacher                                  Interview

Parents: None

Student Time Required: None per class/ per student

Time required of Other Participants: 15 minutes

If particular schools are being requested, please list: Pond Elementary

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Cite one or two major studies that have been published or reported in your chosen area of research.

While a multitude of journal articles have been written about the length of the kindergarten day, few longitudinal studies have been performed focusing on math and literacy achievement. One example is comprehensive study performed by the National Center for Education Statistics in 1998-1999 studied over 3,000 kindergarten teachers in more than 1,000 schools. The following journal citations highlight researchers who continue to author articles and books on the kindergarten subject.

Cryan, J.R., Sheehan, R., Wiechel, J., & Bandy-Hedden, I.G. (1992). Success Outcomes of Full Day Kindergarten: More Positive Behavior and Increased Achievement in the Years After. *Early Childhood Research Quarterly, 7*, 187-203.

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Fusaro, J. (1997). The Effect of Full-Day Kindergarten on Student Achievement: A Meta-Analysis, *Child Study Journal, 27* (4), 269-277.

Harrison-McEachern, R. (1989). *Half-Day Kindergarten and Its Effects on First Grade Reading Achievement*. M.A. Thesis, Kean College, New Jersey (ERIC Document Reproduction Service No. ED 313 684.)

Attach a brief proposal of your research study explaining the important methodological features of the study (e.g., sampling methods, assessment tools, how confidential

information will be handled, data analysis procedures, etc.). If you will be using a survey instrument, please enclose a complete copy.

I have attached a copy of my Institutional Review Board Application. The IRB itemizes the important methodological features of the study.

IV. Results

What is the anticipated value of this research? The anticipated value of this research is to determine the relationship between second grade students who attended full-day kindergarten and their literacy and math achievement versus second grade students who attended half-day kindergarten and their literacy and math achievement.

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V. IF YOU HAVE EXTENDED CONFIDENTIALITY, NAMES MAY BE OMITTED FROM THIS ITEM.

Have you conducted research in other school systems? Yes

Please name: City of St. Charles School District St. Charles, MO 63301

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Are other school systems involved in this research? No

Please name: non-applicable

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VI. UPON COMPLETION OF THE RESEARCH, YOU WILL BE REQUIRED TO SUBMIT TWO COPIES OF THE REPORT (OR SUMMARY).

A MEMORANDUM INDICATING PROCEDURAL PROBLEMS, UNUSUAL EXPERIENCES, RECOMMENDATION, COMMENTS AND OBSERVATIONS WOULD ALSO BE WELCOMED.

The documents can be expected by (date): January 2008

## VITAE

Cheri Nicole Oliver was born in St. Charles, Missouri, on March 2, 1979, the daughter of Charles and Sue Oehler. After graduating from St. Charles High School in 1997, she completed her Bachelor of Arts degree in Elementary Education from Lindenwood University in 2000. Continuing her academic pursuit at Lindenwood University, she completed her Master of Arts degree in Elementary Administration in 2004 and her Specialist in Administration in 2007. Cheri has thoroughly enjoyed impacting the lives of many children during her six years as a fifth grade and full-day kindergarten teacher in the City of St. Charles School District. As a teacher in St. Charles, she was instrumental in the development of the district's technology, social studies and communication arts curriculum guides. With the implementation of full-day kindergarten, she led the charge to restructure the curriculum based program and raise student expectations in the district. During the summers of 2001-2006, she shared her love of learning with first through fifth grade students as an enrichment and remedial summer school instructor in St. Charles. Since August 2006, she has been an administrator in the Rockwood School District located in St. Louis County. Cheri enjoys reading, traveling and spending time with her family. She and her husband, Adam, share a home with their two cats, Oreo and Sylvester, in O'Fallon, Missouri.