Comparing the Academic Growth of Full-Day and Half-Day Kindergarten Students

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A Special Project

Presented to

Dr. Gordon Martinen

Heritage University

In Partial Fulfillment

Of the Requirement for the Degree of

Master of Education

Fallon K. King

2010

FACULTY APPROVAL

Comparing the Academic Growth of Full-Day

and Half-Day Kindergarten Students

Approved for the Faculty

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ABSTRACT

Access to full-day kindergarten programs in the United States was not universal, and children and families were usually only offered access to half-day kindergarten programs free of charge. Full-day kindergarten would increase learning time and greatly benefit all children. The researcher sought to determine whether or not a full-day kindergarten program had a significant positive impact on academic achievement. The study took place in a diverse elementary school in Burien, Washington. Students participated in a half-day kindergarten program during the 2007-2008 academic year, and a full-day kindergarten program during the 2008-2009 academic year. Following data analysis, the students in full-day kindergarten had an 80% probability of higher academic growth than the students in half-day kindergarten. Although this small study did not prove significance, it showed that full-day kindergarten programs should continue to be examined.

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CHAPTER 1

Introduction

Background for the Project

Traditionally, children and families in the United States were only offered access to half-day kindergarten programs free of charge, and in several states children were not required to enroll in any kindergarten program. This practice was a disservice to the youngest learners in the educational system. Full-day kindergarten would increase the time available for learning vital cognitive and academic skills, which would greatly benefit all children, but especially those students of low socio-economic status, often considered at higher than average risk for school failure. Several studies centered around the significance of a full-day kindergarten program on student achievement were conducted in educational research. Many of these studies supported the important impact of full-day kindergarten programs on academic achievement. According to Plucker and Zapf, full-day kindergarten students benefited from "increased performance on standardized tests, reduced grade retention, and reduced special education referrals," (2005, p. 2).

Teachers of kindergarten students in Washington State had struggled to obtain funding for full-day programs despite what they knew about the potential benefits. More time spent in school would mean more

opportunities for student centered instruction, differentiated learning, individual attention, and perhaps most important of all, play. According to Woolfolk (2004), Maria Montessori once said "play is children's work" (p. 42). During play children "learn cooperation, fairness, negotiation, winning, and losing as well as developing language" (Woolfolk, 2004, p. 42), all important skills for future school success and valuable tools for the workplace. The argument was that funding full-day kindergarten programs across Washington State would give all students a chance to do well in first grade, and throughout the rest of their school careers.

Statement of the Problem

Full-day kindergarten programs were not made available to all families in Washington State. This posed a dilemma when the benefits of increased instructional time for kindergarten students were considered. If increased instructional time for kindergarten students led to higher academic achievement, all students needed access to full-day kindergarten programs.

Purpose of the Project

The researcher sought to determine whether or not a full-day kindergarten program had a significant positive impact on academic achievement. The results of the study could help to verify the need for all students to have access to full-day kindergarten programs free of charge.

Delimitations

The study occurred at Cedarhurst Elementary School in Burien, Washington. Data gathering for half-day kindergarten students began in September 2007, and concluded in May 2008. Data gathering for full-day kindergarten students began in September 2008, and concluded in May 2009. Cedarhurst Elementary School received funding from Washington State to implement a full-day kindergarten program, and four certificated teachers were appointed to deliver the program. The teachers used *Open Court Reading* (Bereiter et al., 2000)*, Investigations in Number, Data, and Space* (Clements et al., 2004)*, Units of Study for Primary Writing: A Yearlong Curriculum* (Calkins et al., 2003), *Road to the Code: A Phonological Awareness Program for Young Children* (Blachman, Tangel, & Wynne Ball, 2000)*, Handwriting Without Tears* (Olsen, 2008)*, Systematic Instruction in Phoneme Awareness, Phonics, and Sight Words (SIPPS)* (Newman & Shefelbine, 2001), and science kits developed by the Highline School District as the program curriculum. Participants of the study were at least five years of age on or before August 31st of the year in which they began kindergarten, and lived within the established neighborhood service area boundaries of Cedarhurst Elementary School. The neighborhood encompassed a very diverse population with many families of low socioeconomic status.

Assumptions

The researcher assumed the instruction offered in the full-day kindergarten program was based on sound educational research and was age appropriate. The researcher also assumed that the teachers were properly prepared and trained to deliver the instruction to the participants, and adhered to the program guidelines as closely as possible. The researcher further assumed that the treatment group and control group were academically equivalent at the onset of the study, that the participants matured at an equivalent rate, and that the participants would arrive to school each day ready and eager to learn, with their basic human needs met prior to the start of the school day. The final assumption made by the researcher was that the results of the Dynamic Indicators of Basic Early Literacy Skills (DIBELS) test were valid and reliable.

Hypothesis

Full-day kindergarten programs had many early learning benefits for students. The author hypothesized that kindergarten students who participated in a full-day program would have higher academic achievement than kindergarten students who participated in a half-day program.

Null Hypothesis

Although full-day kindergarten programs provided many early learning benefits to students, this may not have impacted academic performance. The academic achievement of kindergarten students who participated in a full-day program was not significantly different from the academic achievement of kindergarten students who participated in a half-day program. Significance was determined for $p \geq .05, .01, .001$ (Gay, Mills, & Airasian, 2009).

Significance of the Project

Cedarhurst Elementary School was located in the Highline School District in Burien, Washington. Until the 2007-2008 school year, Washington State did not provide funding for full-day kindergarten programs, and the Highline School District only offered tuition-based full-day kindergarten programs at three schools. According to Coley (2002) West, Denton, and Reaney (2001), as cited in the "Early Learning in Washington Public Schools Report" (2008), "research has identified that children living in poverty often begin school behind their peers and students who are behind in early elementary have difficulty catching up in later years," (p. 6). This created a concern at Cedarhurst Elementary School because according to the Office of Superintendent of Public Instruction (OSPI) 71% of the population received free or reduced-price

meals during the 2007-2008 school year, which identified the students as living in poverty. Kindergarten teachers at Cedarhurst Elementary School were asked to cover as much material and push their students to reach the same end of year standards in a half-day program as other, more affluent schools in the district with full-day programs. That task was extremely difficult because students at Cedarhurst Elementary School came to school with much lower academic skills than those students in the more affluent schools in the district. The teachers urged the district to find a way to fund a full-day kindergarten program that was accessible to all students for several years prior to the 2008-2009 school year, on the basis that increasing instructional time would increase DIBELS scores.

Procedure

The study began on September 5, 2007. All students that were at least five years of age on or before August 31, 2007, and lived within the established neighborhood service area boundaries of Cedarhurst Elementary School were permitted to enroll in the half-day kindergarten program. There were two teachers instructing four sessions of half-day kindergarten, and those teachers provided a total of 145 minutes of instruction per day in reading, writing, math, and science. A typical day included:

1. Direct reading instruction for 45 minutes.

2. Small group reading work for 30 minutes.
3. Writing instruction for 20 minutes.
4. Math instruction for 30 minutes.
5. Science or social studies instruction for 20 minutes.

The DIBELS test was administered to that year's participants during September 17-28, January 14-25, and May 12-23. The academic year ended on June 18, 2008.

The next academic year began on September 3, 2008. All students that were at least five years of age on or before August 31, 2008, and lived within the established neighborhood service area boundaries of Cedarhurst Elementary School were permitted to enroll in the full-day kindergarten program. There were four teachers instructing four sessions of full-day kindergarten, and those teachers provided a total of 420 minutes of instruction per day in reading, writing, math, science, physical education, and music. A typical day included:

1. Direct reading instruction for 60 minutes.
2. Small group reading work for 45 minutes.
3. Independent student reading and guided reading group work for 30 minutes.
4. Writing instruction for 30-50 minutes.
5. Math instruction for 60 minutes.

6. Calendar math for 20 minutes.
7. Science or social studies instruction for 30 minutes.
8. Free play time for 30 minutes.
9. Library, physical education, or music instruction for 30 minutes.

The DIBELS test was administered to that year's participants during September 15-October 1, January 12-23, and May 11-27. The academic year ended on June 24, 2009.

Acronyms

DIBELS. Dynamic Indicators of Basic Early Literacy Skills

ELL. English Language Learners

ESL. English as a Second Language

GLAD. Guided Language Acquisition Design

GOM. General Outcome Measure

ISF. Initial Sound Fluency

LNF. Letter Naming Fluency

NICHD. National Institute of Child Health and Human Development

NRP. National Reading Panel

NWF. Nonsense Word Fluency

OSPI. Office of Superintendent of Public Instruction

PA. Phonemic Awareness

PSF. Phonemic Segmentation Fluency

SIPPS. Systematic Instruction in Phoneme Awareness, Phonics, and Sight Words

ZPD. Zone of Proximal Development

CHAPTER 2

Review of Selected Literature

Introduction

In kindergarten, children learned foundational cognitive and social skills important for future school success. Full-day kindergarten increased the time available for learning vital kindergarten skills and boosted academic achievement, which benefited all children, but especially those living in poverty and considered "at risk" for school failure. The lack of full-day kindergarten programs in Washington State was a disservice to the youngest learners in the educational system. If increased instructional time for kindergarten students led to higher academic achievement, all students needed access to full-day kindergarten programs. As a precursor to the project, the author reviewed bodies of literature to better understand kindergarten students and instruction. The first subtopic of this review concerned how children develop and learn in kindergarten, and what psychologists had discovered about early learning. Subtopic two focused on researched best practices in early childhood and literacy instruction, and how those practices helped to boost student achievement. The third subtopic of this review looked at similar research done in the years prior to the project, and the implications that research had for the future of full-day kindergarten programs.

Early Learning in Kindergarten

Insight into children's minds and patterns of thinking had long been of interest to educators. Knowledge of student's cognitive abilities and capacity for learning new concepts helped teachers shape curriculum to fit the needs of the students they encountered. Educators found that young children seemed to be hardwired for learning, and psychologists and researchers sought to discover the explanation behind this theory. Through repeated brain scans of children, Thompson and his colleagues found that "children's brains go through rapid, distinct bursts of growth between the ages of three and fifteen" (as cited in Santrock, 2007, p. 152). An important consideration for teachers of kindergarten was that "from three to six years of age, the most rapid growth occurs in the frontal lobe areas involved in planning and organizing new actions and in maintaining attention to tasks" (Santrock, 2007, p. 152). In addition, studies of brain development showed that "learning imposes new patterns of organization on the brain" (Bransford, Brown, & Cocking, 2000, p. 121), and that complex environments with plenty of opportunities for exploration and play were key. This research suggested that a rich learning environment was essential to maximize learning for young children, and helped kindergarten teachers organize their classrooms and teaching in a way that nurtured students' brain and language development.

Brain research was not the only insight to children's learning that educators needed to consider. Before the technology existed to scan an image of a child's brain, psychologists had been testing theories and performing studies in order to better understand how children developed. According to Piaget, individuals went through stages of development. These stages were age-related, and based on that information kindergarten students fell into the preoperational stage which lasted from approximately two to seven years of age (Berk, 2006, p. 231). During this stage children were able to begin using symbols (words, language, pictures, etc.) to represent objects that were not present (Woolfolk, 2004, p.33), and begin to use reasoning and seek answers to all sorts of questions (Santrock, 2007, p.220). However, children at this stage still had difficulty answering "what if" questions and using the principle of conservation. "Conservation refers to the idea that certain physical characteristics of objects remain the same, even when their outward appearance changes" (Berk, 2006, p. 236). This meant that kindergarten students would have a hard time explaining that there were still ten beads on the table, no matter how far apart or close together the objects were moved. Although this was an invaluable insight into children's cognitive capacity, research conducted after Piaget suggested that children knew more about this concept. For example, if young children worked with smaller amounts of objects (three

or four at a time) they could apply the concept of conservation (Woolfolk 2004, p. 43). The implication of more recent findings would suggest that kindergarten students were capable of much more than previously considered.

Another characteristic of Piaget's preoperational stage was egocentrism. Piaget assumed that children at this stage saw the world solely from their own point of view, and did not have the ability understand the feelings of others (Woolfolk, 2007, p. 34). A key characteristic of this theory was that children at this stage frequently talked to themselves, even when in a group setting. Piaget considered this a reflection of immaturity, but Vygotsky saw this private speech as a way to help children solve tasks, and self-regulate behavior (Santrock, 2007, p. 229). Vygotsky theorized that children needed to communicate externally with private speech before they could transition to internal speech (Santrock, 2007, p. 229). Vygotsky also regarded private speech as "the foundation for all higher cognitive processes, including controlled attention, deliberate memorization and recall, categorization, planning, problem solving, abstract reasoning, and self-reflection" (Berk, 2006, p. 259). Research after Vygotsky revealed that his theories on private speech hold much more weight than Piaget's, and kindergarten teachers viewed this form of speech as a vital tool to assist student learning.

Make-believe play was also found to be a valuable learning tool for early learners. According to Woolfolk (2004), Maria Montessori once said "play is children's work" (p. 42). During play children "learn cooperation, fairness, negotiation, winning, and losing as well as developing language" (Woolfolk, 2004, p. 42), all important skills for future school success and valuable tools for the workplace. The development of language during play was particularly important for English Language Learners (ELL). Vygotsky theorized that make-believe play influenced development by helping children to realize that thinking was separate from objects, and causing them to act against impulses to better understand social norms and rules (Berk, 2006, p. 261). According to Berk (2006), "many studies reveal that make-believe strengthens a wide variety of mental abilities, including sustained attention, memory, logical reasoning, language and literacy" (p. 233), thus play enhanced cognitive skills. These findings supported kindergarten teachers' conviction that the school day should include ample opportunities for children to engage in play.

Best Practices in Early Childhood Literacy Instruction

The work of Piaget and Vygotsky had a large impact on education. According to Piaget, education should "form not furnish" the minds of students (as cited in Woolfolk, 2004, p.40). Piaget noted that students construct their own understanding and that they should be actively

engaged in the learning process and seek solutions for themselves (Woolfolk, 2004, p. 41). Teachers were not to push students into learning, rather watch, listen, and question students to find out how they think and gauge their abilities. The teacher also needed to consider the knowledge that the student brought with them, and examine mistakes as well as correct thinking to respond near the student's level of cognitive ability (Santrock, 2007, p. 225). Piaget also observed that the classroom should be a place of exploration and discovery, and that teachers should use ongoing assessments (such as portfolios and individual conferences) rather than standardized tests (Santrock, 2007, p. 226). Kindergarten teachers used the recommendations of Piaget to structure the learning environment and assess students' individual reading abilities through questioning and individual conferences.

Vygotsky's work also had implications for education. Perhaps the most well known idea from his work was the idea of the zone of proximal development (ZPD). This referred to the area of instruction where a child could not learn on their own, but could learn with guidance (Bransford, Brown, & Cocking, 2000; Santrock, 2007; Woolfolk, 2004). Teachers should assess students' ZPD and use that information to inform instruction. "Students should be put in situations where they have to reach to understand, but where support from other students or from the

teacher is also available" (Woolfolk, 2007, p. 52). Vygotsky also stressed the importance of scaffolding, or changing the level of support given by the teacher as the students' ability increased (Bransford, Brown, & Cocking, 2000; Santrock, 2007; Woolfolk, 2004). The teacher would give information, prompts, and encouragement at strategic points during instruction in their ZPD to enhance student learning. As time went by and the student became more confident in their abilities, the teacher would slowly decrease the level of support until the student was able to take on the task independently. Assessment of students' ZPD allowed teachers to intentionally plan and instruct small group reading lessons.

Although these theories held weight and were widely implemented in classroom practice, educators saw the need to scientifically research various approaches to teaching children to read. In 1997, Congress asked the Director of the National Institute of Child Health and Human Development (NICHD) to assemble a national panel to assess such research, and the National Reading Panel (NRP) was formed. Through their work, the NRP intensively studied the following topics related to reading instruction: alphabetics, including phonemic awareness and phonics instruction, fluency, vocabulary, and comprehension (NICHD, 2000, pp. 2-3). In kindergarten classrooms alphabetics was the central area of instruction, and was examined more closely by the author. These

areas were of particular concern when addressing reading instruction for English Language Learners (ELL). When ELLs entered school their phonological awareness was developed in their native language, not English. Since it was necessary to have some PA abilities in English as a prerequisite to reading, ELLs needed additional time to develop these skills.

The first area of alphabetics that was examined was Phonemic Awareness (PA). A phoneme was defined as the smallest meaningful unit of sound in a language. According to the NRP report (NICHD, 2000), "teaching phonemic awareness to children significantly improves their reading more than instruction that lacks any attention to PA" (p. 7). A quality kindergarten program would incorporate PA into instruction by teaching children to listen for and manipulate phonemes in spoken words. Ehri (2004) described seven tasks that demonstrated PA ability: isolation, identity, categorization, blending, segmentation, deletion, and onset-rime manipulation. Blending (i.e., combining a sequence of separately pronounced sounds to make a known word), and segmentation (i.e., breaking a word into its individual component sounds) were described by McCardle, Chhabra, and Kapinus (2008) as being key skills for instructional focus (p. 105). In addition, research indicated that it was more effective for teachers to deliver PA instruction in small groups of two

to seven students (McCardle, Chhabra, & Kapinus 2008, p. 107). The research suggested that a full-day kindergarten program providing additional instructional time for small groups was well suited for PA training.

The second alphabetic area examined was phonics instruction. According to the NRP report (NICHD, 2000), "phonics instruction is a way of teaching reading that stresses the acquisition of letter-sound correspondences and their use in reading and spelling" (p. 8). This instruction was an integral part of kindergarten classrooms, and the NRP meta-analysis (NICHD, 2000) found that "systematic phonics instruction produces significant benefits for students in kindergarten" (p. 9). As stated by McCardle, Chhabra, and Kapinus (2008), "phonics instruction is referred to as systematic phonics when all of the major letter-sound correspondences are taught, including short and long vowels, and vowel and consonant digraphs, in a clearly defined sequence" (p. 109). This type of phonics instruction in kindergarten classrooms took place with individual children, small groups, and whole class, and was a primary learning focus along with Phonemic Awareness (PA). McCardle, Chhabra, and Kapinus (2008) suggested that each of these approaches was effective for students from both low and middle socioeconomic groups, and that phonics instruction was most effective when introduced in kindergarten

(p. 116). Full-day kindergarten programs allowed for more time to be intentionally spent on both PA and phonics activities.

Related Research on Full-Day Kindergarten

The nature of kindergarten programs was changing in the United States. According to Nowak and Saam (2005), "the traditional purpose of kindergarten was to begin the transition from home to school" (p. 27). Children learned to socialize, count, recite the alphabet, and write their names. However, as years passed the content standard demands placed on kindergarten students began to grow, and students were also expected to exit kindergarten with pre-reading skills, and basic mathematics computation skills. "Teachers feel that the additional time with the children that a FDK [Full-Day Kindergarten] program provides is necessary for the content standards to be appropriately addressed" (Nowak & Saam, 2005, p. 33). In addition, "more children are coming from preschool and early learning experiences, so it seems logical to provide the continuity of full-day kindergarten" (Kauerz, 2005, p. 2).

There were several studies concerning the significance of a full-day kindergarten program on student achievement. Many of these studies supported the importance of full-day kindergarten programs. In an education policy brief from the Center for Evaluation and Education Policy, a review of other studies found that there were many short-term

benefits to full-day kindergarten as compared to half-day kindergarten (Plucker & Zapf, 2005). According to Plucker and Zapf (2005), the benefits included "increased performance on standardized tests, reduced grade retention, and reduced special education referrals" (p. 2). Also, in a study written for the Education Commission of the States, Kauerz (2005) stated:

> Findings from the *Early Childhood Longitudinal Study - Kindergarten Class of 1998*-99, a major nationally representative data set, shows that children who participated in full-day kindergarten made statistically significant gains in both reading and mathematics when compared to children who participated in half-day programs (p. 3).

In addition, these studies showed that full-day kindergarten programs seemed to have a large pay off for disadvantaged students (such as those with a low socioeconomic status). According to Nowak and Saam (2005), looking at third grade test scores, "when students recorded as free meal code were compared with students recorded as paid meal code for all combinations of full-day, half-day, morning, or afternoon, no differences were found" (p. 34). This suggested that students with low socioeconomic status were keeping up with their peers, rather than falling behind as typically expected. However, there was still skepticism on whether the

benefits of the programs justified the expense that they brought. Law makers wanted more research conducted to determine if full-day kindergarten programs had benefits beyond third grade.

These studies seemed to agree that early intervention was vital to future school success. During a review of full-day kindergarten studies, Villegas (2005) found that full-day kindergarten benefits children by increasing school readiness, raising academic achievement, improving student attendance, supporting literacy and language development, benefiting children socially and emotionally, and reducing retention and remediation rates (pp. 1-2). According to Entwisle and Alexander (1998), "how well students do in the primary grades matters more for their future success than does their school performance at any other time" (as cited in Woolfolk, 2004, p. 92). Low socioeconomic groups, as well as ELL students, were particularly effected by differences in achievement test scores by the time they reached middle school. Educators needed to find a way to help close the achievement gap between low-income and ELL students and their peers. Woolfolk (2004) argued that "full-day kindergarten experiences are critical for helping children, especially from low-income homes, to do well in first grade" (p. 92). Villegas (2005) further supported the importance of full-day kindergarten, stating "full-day kindergarten can afford children the academic learning time needed to

prepare for mastery of primary-grade reading and math skills. In doing so, such programs help circumvent subsequent needs for remediation or grade retention" (p. 1).

Washington State had begun to make some strides to provide access to full-day kindergarten programs for all students. The state did not mandate kindergarten attendance, and school districts were not required to offer full-day kindergarten programs. However, the Washington Legislature included funding for full-day kindergarten in the Enhancing Student Learning Opportunities Senate Bill 5841 in 2007 (“Early learning,” 2008). This funding began with the schools that had the highest percentage of students living in poverty, also typically with a high percentage of ELL students, and provided them with developmentally appropriate instruction geared to enhance early learning. These schools set up full-day kindergarten programs and monitored students' academic progress using the Dynamic Indicators of Basic Early Literacy Skills (DIBELS). The “Early Learning in Washington Public Schools Report” (2008) reported that "students enrolled in full-day kindergarten made significantly greater progress than students in half-day kindergarten" (p. 18). The report also stated that the full-day kindergarten program was “having a significant impact on learning for children who are enrolled,”

but recognized “there is much more work to do” ("Early Learning," (2008), p. 30).

Summary

Through the literature review the author gained valuable insight into kindergarten students, instruction, and research relating to full-day kindergarten. It was established that kindergarten students were undergoing rapid brain development, and it was vital for teachers of that grade level to provide developmentally appropriate learning opportunities. Through instruction in a students' ZPD, teachers would meet the needs of all students, and offer phonemic awareness and phonics instruction to enhance early literacy skills. When full-day kindergarten programs were offered, teachers and students had more time to meet content standards, reduce retention, and prepare for first grade and beyond. The literature supported the work being done in the full-day kindergarten program at Cedarhurst Elementary. It was evident to the author that the additional time provided by full-day kindergarten would help teachers address increased demands on students while boosting academic achievement.

CHAPTER 3

Methodology and Treatment of Data

Introduction

The lack of full-day kindergarten programs in Washington State was a disservice to the youngest learners in the educational system. If increased instructional time for kindergarten students led to higher academic achievement, all students needed access to full-day kindergarten programs. The researcher sought to determine whether or not a full-day kindergarten program had a significant positive impact on academic achievement of students by comparing the amount of growth both half-day and full-day students had in standardized test scores. The results of the study could help to verify the need for all students to have access to full-day kindergarten programs free of charge.

Methodology

The researcher conducted an experimental research study. The academic performance of a group of half-day kindergarten students enrolled in the 2007-2008 school year, and a group of full-day kindergarten students enrolled in the 2008-2009 school year was compared. The goal was to determine if a full-day kindergarten program positively affected academic performance.

Participants

A convenient sample of participants were selected from a population of 148 kindergarten students enrolled at Cedarhurst Elementary School in Burien, Washington during the 2007-2008 and 2008-2009 school years. Participants of the study were at least five years of age on or before August 31st of the year in which they began kindergarten, and lived within the established neighborhood boundaries of Cedarhurst Elementary School. The population was considerably multicultural, composed of American Indian, Asian, Pacific Islander, Black, Hispanic, and White students. At the beginning of the 2007-2008 academic year, there were 34 males and 29 females, 33 of the 63 students enrolled were identified as English Language Learners (ELL), and 71% of the population received free or reduced-price meals. At the beginning of the 2008-2009 school year, there were 39 males and 46 females, 41 of the 85 students enrolled were ELL, and 70% of the population received free or reduced-price meals.

There were four Washington State Certified teachers involved in delivering instruction over the two years of the study. All four teachers held Elementary Education endorsements, and two of the teachers held English as a Second Language (ESL) endorsements on their teaching certificates. Collectively the teachers had over 30 years of teaching

experience, and all had been well trained in best practices for early childhood education.

Instruments

In order to measure the participants' academic achievement, the students were screened for early literacy skills using the Dynamic Indicators of Basic Early Literacy Skills (DIBELS). The DIBELS was developed at the University of Oregon in the 1980's, and used across the United States in "a range of schools, including high and low income, rural, urban, inner city, suburban schools, and encompassing high and low proportions of ELL students, and schools with high and low proportions of students from diverse ethnic/racial backgrounds," (Kaminski & Cummings, 2007). The DIBELS was a standardized, individually administered test that provided a measure of risk on key literacy indicators of children who experienced early reading success. As identified by the National Reading Panel (2000), these literacy skills were identified as: a) phonemic awareness, b) alphabetic principle and phonics, c) accuracy and fluency reading connected text, d) comprehension, and e) vocabulary/oral language. The participants in this study were screened for phonemic awareness using the Initial Sound Fluency (ISF) measure, which assessed a child's skill at identifying and producing the initial sound of a given word, and the Phonemic Segmentation Fluency (PSF) measure, which

assessed a child's skill at producing the individual sounds within a given word. The participants in this study were screened for alphabetic principle and phonics using the Letter Naming Fluency (LNF) measure, which assessed a child's skill at naming letters, and the Nonsense Word Fluency (NWF) measure, which assessed a child's knowledge of letter-sound correspondence. Each DIBELS measure had standardized administration and scoring procedures so that the measures were given and scored the same way each time for all students. Educational personnel were trained to reliably and accurately administer these measures.

Design

The researcher conducted an experimental research study, using a non-equivalent group design. The treatment group (T) was given a full-day kindergarten program, and the control group (C) was given only a half-day kindergarten program. The LNF measure of DIBELS was used as the pretest-posttest. According to Gay, Mills, and Airasian (2009), there were many possible threats to the validity of this experimental design, including history, maturation, testing, instrumentation, statistical regression, selection, mortality, pretest-treatment interaction, and multiple-treatment interference (pp. 242-247).

History was not a threat to the validity of this study. No major events occurred that affected the dependent variable. Testing, or pretest

sensitization (Gay, Mills, & Airasian, 2009, p. 244), was not a considerable threat to validity. The DIBELS test did not require that students memorize specific facts, and the time between each test was substantial. In addition, the instrument used for the pretest-posttest (DIBELS) was a research-based, standardized measure of early literacy skills. Pretest-treatment interaction did not have a measureable impact on the external validity of this study. The DIBELS was a General Outcome Measurement (GOM), which were "generic and draw content from sources other than any specific school's curriculum," (Kaminski & Cummings, 2007). Therefore, administering the pretest did not give the participants insight into the "nature of the treatment," (Gay, Mills, & Airasian, 2009, p. 246). Statistical regression was not a threat to the validity of this study. Participants were not selected based on their pretest scores.

A weakness in the design of this study was the lack of random assignment in the selection process. The groups naturally formed at the start of each academic year, however, the demographics of each group of participants were very similar because they were drawn from the same general population. Results of the pretest determined that the treatment and control groups were equivalent at the onset of the study. Maturation was a threat to the validity of this study. The participants were just five years old at the beginning of the academic year, and each matured over the

course of the study. However, being of similar age, it was assumed that the participants matured at an equivalent rate and could therefore be compared. Mortality was a slight threat to the validity of this study. Participants in both the treatment and control groups moved out of the Cedarhurst Elementary service area over the course of the academic year, and no longer attended the school. This variable could not be controlled.

Procedure

The study began on September 5, 2007. All students that were at least five years of age on or before August 31, 2007, and lived within the established neighborhood service area boundaries of Cedarhurst Elementary School were permitted to enroll in the half-day kindergarten program. There were two teachers instructing four sessions of half-day kindergarten, and those teachers provided a total of 145 minutes of instruction per day in reading, writing, math, and science.

Teachers performed direct reading instruction using *Open Court Reading* (Bereiter et al., 2000) for 45 minutes each day. During this time teachers worked on phonemic awareness, alphabetic principle, and phonics by teaching sounds and letters and using pre-decodable books linked to the *Open Court Reading* curriculum. Teachers also worked on comprehension, vocabulary, and oral language by reading stories aloud from the *Open Court Reading* curriculum and modeling reading

strategies, as well as shared reading of text where students tried on reading strategies with teacher guidance. This block of direct reading instruction was followed by 30 minutes of small group reading work where students meeting DIBELS benchmarks read grade level text independently with teacher conferring, and students below DIBELS benchmarks received targeted skill intervention in groups of three to five students using teacher generated materials.

Mathematics instruction occurred in a 30 minute block of time, during which teachers used the *Investigations in Number, Data, and Space* (Clements et al., 2004) curriculum and followed the Highline School District pacing guide. Students participated in a 20 minute writing workshop using the *Units of Study for Primary Writing: A Yearlong Curriculum* (Calkins et al., 2003), which included a three to five minute mini lesson focusing on a writing skill, student writing time with teacher conferring, and a three to five minute sharing session where students' use of the writing skill for that session was highlighted. The remaining 20 minutes of instructional time was spent on science and social studies instruction using Highline School District science kits, and Guided Language Acquisition Design (GLAD) strategies.

The DIBELS test was administered during three testing windows: September 17-28, January 14-25, and May 12-23. During the September

benchmark assessment period the participants were given the ISF and LNF measures. During the January benchmark assessment period the participants were given the ISF, LNF, PSF, and NWF measures. During the May benchmark assessment period the participants were given the LNF, PSF, and NWF measures. The academic year ended on June 18, 2008.

The next academic year began on September 3, 2008. All students that were at least five years of age on or before August 31, 2008, and lived within the established neighborhood service area boundaries of Cedarhurst Elementary School were permitted to enroll in the full-day kindergarten program. There were four teachers instructing four sessions of full-day kindergarten, and those teachers provided a total of 420 minutes of instruction per day in reading, writing, math, science, physical education, and music.

Teachers performed direct reading instruction using *Open Court Reading* for 60 minutes each day. During this time teachers worked on phonemic awareness, alphabetic principle, and phonics by teaching sounds and letters and using pre-decodable books linked to the *Open Court Reading* curriculum. Teachers also worked on comprehension, vocabulary, and oral language by reading stories aloud from the *Open Court Reading* curriculum and modeling reading strategies, as well as

shared reading of text where students tried on reading strategies with teacher guidance. This block of direct reading instruction was followed by 45 minutes of small group reading work where all students received targeted skill intervention in groups of three to five students using *Road to the Code: A Phonological Awareness Program for Young Children* (Blachman, Tangel, & Wynne Ball, 2000)*, Handwriting Without Tears* (Olsen, 2008)*,* and *Systematic Instruction in Phoneme Awareness, Phonics, and Sight Words (SIPPS)* (Newman & Shefelbine, 2001). All students then participated in 30 minute block of independent reading of grade level text with teacher conferring, with teacher guided reading of grade level text in groups of three to five students during the reading block.

Mathematics instruction occurred in a 60 minute block of time, during which teachers used the *Investigations in Number, Data, and Space* curriculum and followed the Highline School District pacing guide. An additional 20 minutes was spent on calendar math, which included a focus on number recognition, counting, and patterning. Students participated in a 30-50 minute writing workshop using the *Units of Study for Primary Writing: A Yearlong Curriculum*, which included a three to five minute mini lesson focusing on a writing skill, student writing time with teacher conferring, and a three to five minute sharing session where

students' use of the writing skill for that session was highlighted. Thirty minutes of instructional time was spent on science and social studies instruction using Highline School District science kits, and Guided Language Acquisition Design (GLAD) strategies. Students received 30 minute physical education and music classes two times per week, and visited the school library one time per week for 30 minutes. Teachers also allowed for 30 minutes of free play time each day.

The DIBELS test was administered during three testing windows: September 15-October 1, January 12-23, and May 11-27. During the September benchmark assessment period the participants were given the ISF and LNF measures. During the January benchmark assessment period the participants were given the ISF, LNF, PSF, and NWF measures. During the May benchmark assessment period the participants were given the LNF, PSF, and NWF measures. The academic year ended on June 24, 2009.

Treatment of the Data

The DIBELS data was collected and analyzed using a *t* test for independent samples. The *t* test for independent samples was used to compare the Fall LNF scores of the treatment and control groups, as well as the Fall LNF to Spring LNF delta scores of the treatment and control groups.

Summary

In this experimental study, the academic performance of a group of half-day kindergarten students enrolled in the 2007-2008 school year, and a group of full-day kindergarten students enrolled in the 2008-2009 school year was compared using a pretest-posttest design. The two groups were determined to be equivalent at the onset of the study based on demographic information and standardized test results. The half-day kindergarten students were given a total of 145 minutes of instruction per day in reading, writing, math, and science. The full-day kindergarten students were given a total of 420 minutes of instruction per day in reading, writing, math, science, physical education, and music. The goal was to determine if a full-day kindergarten program positively affected academic performance.

CHAPTER 4

Analysis of the Data

Introduction

Increased instructional time for kindergarten students was considered to have a positive impact on academic achievement. However, full-day kindergarten programs were not made available to all families in Washington State. If increased instructional time for kindergarten students led to higher academic achievement, all students needed access to full-day kindergarten programs. The researcher sought to determine whether or not a full-day kindergarten program had a significant positive impact on academic achievement. The results of the study could help to verify the need for all students to have access to full-day kindergarten programs free of charge.

Description of the Environment

The study occurred at Cedarhurst Elementary School in Burien, Washington. A total of 148 ethnically and culturally diverse students participated in the study, and were at least five years of age on or before August 31st of the year in which they began kindergarten. All participants lived within the established neighborhood service area boundaries of Cedarhurst Elementary School. Data gathering for half-day kindergarten students began in September 2007, and concluded in May 2008. Data

gathering for full-day kindergarten students began in September 2008, and concluded in May 2009. Cedarhurst Elementary School received funding from Washington State to implement a full-day kindergarten program, and four certificated teachers were appointed to deliver the program. The teachers used a variety of curriculum, including *Open Court Reading* (Bereiter et al., 2000)*, Investigations in Number, Data, and Space* (Clements et al., 2004)*, Units of Study for Primary Writing: A Yearlong Curriculum* (Calkins et al., 2003), *Road to the Code: A Phonological Awareness Program for Young Children* (Blachman, Tangel, & Wynne Ball, 2000)*, Handwriting Without Tears* (Olsen, 2008)*, Systematic Instruction in Phoneme Awareness, Phonics, and Sight Words (SIPPS)* (Newman & Shefelbine, 2001), and Highline School District science kits.

Hypothesis

Full-day kindergarten programs had many early learning benefits for students. The author hypothesized that kindergarten students who participated in a full-day program would have higher academic achievement than kindergarten students who participated in a half-day program.

Null Hypothesis

Although full-day kindergarten programs provided many early learning benefits to students, this may not have impacted academic performance. The academic achievement of kindergarten students who participated in a full-day program was not significantly different from the academic achievement of kindergarten students who participated in a half-day program. Significance was determined for $p \geq .05, .01, .001$ (Gay, Mills, & Airasian, 2009).

Results of the Study

As a result of the study, data was provided to address the hypothesis of the research. The treatment group and the control group completed the Fall DIBELS assessment. The DIBELS assessment results were analyzed using the Statpak, producing statistics and associated values. Based on the analysis, the treatment and control groups were not significantly different when each began kindergarten. Consequently, the data suggested the two groups were comparable. Appendix A contained a complete illustration of the data.

Table 1.

Fall Letter Naming Fluency (LNF) Scores

Treatment Group	Fall LNF	Control Group	Fall LNF
T1	0	C1	0
T2	3	C2	0
T3	14	C3	8
.	.	.	.
.	.	.	.
.	.	.	.
T67	0	C36	22
T68	11	C37	32
T69	29	C38	44

A *t* value of 1.10 was determined in the statistical analysis (Gay, Mills, & Airasian, 2009). The means of the treatment and control group's Fall LNF scores determined the value of *t*. The mean of the treatment group was 16.56, and the mean of the control group was 13.57. The degrees of freedom were 69. The data suggested that the treatment group had slightly better LNF scores than the control group on the Fall DIBELS assessment. However, based on the analysis, the treatment group and the control group were determined not to be significantly different when each began kindergarten. The researcher concluded that the LNF scores on the Fall DIBELS assessment for treatment group and the control group could therefore be compared.

Table 2.

Statpak Analysis

Statistic	Value
No. of scores in Group X	43
Sum of Scores in Group X	712.0000
Mean of Group X	16.56
Sum of Squared scores in Group X	16420.00
SS of Group X	4630.60
No. of Scores in Group Y	28
Sum of Scores in Group Y	380.0000
Mean of Group Y	13.57
Sum of Squared scores in Group Y	9100.00
SS of Group Y	3942.86
t-value	1.10
Degrees of freedom	69

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\left(\frac{SS_1 + SS_2}{n_1 + n_2 - 2}\right)\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}}$$

$$t = \frac{16.56 - 13.57}{\sqrt{\left(\frac{4630.60 + 3942.86}{43 + 28 - 2}\right)\left(\frac{1}{43} + \frac{1}{28}\right)}}$$

$t = 1.10$

Significance was determined for $p \geq .05$, .01, and .001 (Gay, Mills, & Airasian, 2009). The calculated value of *t*, 1.10, was .90 less than the threshold value provided by Gay, Mills, and Airasian (2009) at $p \geq .05$, which was 2.00 (p. 563). Although the *t* value of 1.10 suggested that the treatment group was slightly superior to the control group, the treatment and control groups were not significantly different when each entered kindergarten.

Table 3.

Distribution of t

	p		
df	.05	.01	.001
69	2.000	2.660	3.460

During the course of the study, the treatment group and the control group completed both the Fall and Spring DIBELS assessments. The Fall LNF to Spring LNF delta scores were calculated by the researcher, and analyzed using the Statpak, producing statistics and associated values. Based on the analysis, the treatment group did not demonstrate significantly higher academic growth compared to the control group. Appendix B contained a complete illustration of the data.

Table 4.

Fall and Spring Letter Naming Fluency (LNF) Scores

Treatment Group	Fall LNF	Spring LNF	Delta Score	Control Group	Fall LNF	Spring LNF	Delta Score
T1	0	32	32	C1	0	26	26
T2	3	35	32	C2	0	29	29
T3	14	56	42	C3	8	63	55
.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.
T67	0	30	30	C36	22	63	41
T68	11	73	62	C37	32	70	38
T69	29	60	31	C38	44	80	36

A *t* value of 1.56 was determined in the statistical analysis (Gay, Mills, & Airasian, 2009). The means of the treatment and control group's Fall LNF to Spring LNF delta scores determined the value of *t*. The mean of the treatment group was 35.26, and the mean of the control group was 30.5. The degrees of freedom were 105. The evidence suggested the full-day kindergarten program had a positive effect on the academic growth of the treatment group, but it was not noteworthy. The treatment group did not demonstrate significantly higher academic growth compared to the control group.

Table 5.

Statpak Analysis

Statistic	Value
No. of scores in Group X	69
Sum of Scores in Group X	2433.0000
Mean of Group X	35.26
Sum of Squared scores in Group X	107245.00
SS of Group X	21455.30
No. of Scores in Group Y	38
Sum of Scores in Group Y	1142.0000
Mean of Group Y	30.5
Sum of Squared scores in Group Y	41576.00
SS of Group Y	7255.89
t-value	1.56
Degrees of freedom	105

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\left(\frac{SS_1 + SS_2}{n_1 + n_2 - 2}\right)\left(\frac{1}{n_1} + \frac{1}{n_2}\right)}}$$

$$t = \frac{35.26 - 30.5}{\sqrt{\left(\frac{21455.30 + 7255.89}{69 + 38 - 2}\right)\left(\frac{1}{69} + \frac{1}{38}\right)}}$$

$t = 1.56$

Significance was determined for $p \geq .05$, .01, and .001 (Gay, Mills, & Airasian, 2009). The calculated value of *t*, 1.56, was .44 less than the threshold value provided by Gay, Mills, and Airasian (2009) at $p \geq .05$, which was 2.00 (p. 563). The null hypothesis was accepted at $p \geq .05$, therefore not supporting the hypothesis (Gay, Mills, & Airasian, 2009, p. 563). The treatment group did not demonstrate significantly higher academic growth compared to the control group. Notably, the calculated value of *t*, 1.56, was larger than the threshold value provided by Gay, Mills, and Airasian (2009) at $p \geq .20$, which was 1.296 (p. 563). The null hypothesis was rejected at $p \geq .20$, therefore supporting the hypothesis (Gay, Mills, & Airasian, 2009, p. 563). The data showed a significant positive effect on academic achievement of full-day kindergarten students at this threshold.

Table 6.

Distribution of t

	p			
df	.20	.05	.01	.001
105	1.296	2.000	2.660	3.460

Findings

According to the analysis, the Fall LNF DIBELS scores of the treatment group, which participated in a full-day kindergarten program, and the control group, which participated in a half-day kindergarten program, were comparable. The Statpak analysis calculated a *t* value of 1.10, which was .90 less than the threshold value provided by Gay, Mills, and Airasian (2009) at $p \geq .05$, which was 2.00 (p. 563). The data showed no significant difference between the two groups of students, and the researcher determined that the Fall LNF to Spring LNF delta scores could then be compared.

Upon comparing the Fall LNF to Spring LNF delta scores, it was found that students who participated in a full-day kindergarten program did not show significantly higher academic growth than students who participated in a half-day kindergarten program. The Statpak analysis calculated a *t* value of 1.56 (Gay, Mills, & Airasian, 2009). The results suggested that students who participated in a full-day kindergarten program had less than a 95% probability of higher academic growth than students who participated in a half-day kindergarten program.

Significance was determined for $p \geq .05$, .01, and .001 (Gay, Mills, & Airasian, 2009). The calculated value of *t*, 1.56, was .44 less than the threshold value provided by Gay, Mills, and Airasian (2009) at $p \geq .05$,

which was 2.00 (p. 563). The null hypothesis was accepted at $p \geq .05$, therefore not supporting the hypothesis (Gay, Mills, & Airasian, 2009, p. 563). The null hypothesis, academic achievement of kindergarten students who participated in a full-day program was not significantly different from the academic achievement of kindergarten students who participated in a half-day program, was accepted at $p \geq .05$ (Gay, Mills, & Airasian, 2009, p. 563). The hypothesis, kindergarten students who participated in a full-day program would have higher academic achievement than kindergarten students who participated in a half-day program, was not supported. The evidence suggested the full-day kindergarten program had a positive effect on the academic growth of the treatment group, but it was not noteworthy.

Discussion

It was the expectation of the researcher to find that participating in a full-day kindergarten program led to higher academic growth. Other studies, such as that of Plucker and Zapf (2005), stated that full-day kindergarten programs had many benefits, including "increased performance on standardized tests, reduced grade retention, and reduced special education referrals" (p. 2). However, the evidence gathered during the course of this study did not support those expectations.

The researcher previously noted that students who participated in a full-day kindergarten program had significantly higher academic growth at a lower threshold ($p \geq .20$). These findings are in line with the "Early Learning in Washington Public Schools Report" (2008), which stated that the full-day kindergarten program was "having a significant impact on learning for children who are enrolled," but recognized "there is much more work to do" (p. 30). Although this isolated study did not prove to have a significant impact, other studies of this kind implied noteworthy gains for students upon the conclusion of kindergarten.

Summary

In this chapter, the researcher compiled and analyzed the data collected during the course of the study. The treatment group, which participated in a full-day kindergarten program, and the control group, which participated in a half-day kindergarten program, were determined to be comparable as a result of the Statpak analysis of the groups' Fall LNF DIBELS scores. Upon comparing the Fall LNF to Spring LNF delta scores using the Statpak, it was found that students who participated in a full-day kindergarten program did not show significantly higher academic growth than students who participated in a half-day kindergarten program. The null hypothesis, academic achievement of kindergarten students who participated in a full-day program was not significantly different from the

academic achievement of kindergarten students who participated in a half-day program, was accepted at $p \geq .05$ (Gay, Mills, & Airasian, 2009, p. 563). The hypothesis, kindergarten students who participated in a full-day program would have higher academic achievement than kindergarten students who participated in a half-day program, was not supported.

CHAPTER 5

Summary, Conclusions and Recommendations

Introduction

As indicated in proceeding studies, increased instructional time for kindergarten students was considered to have a positive impact on academic achievement. Yet full-day kindergarten programs were not made available to all families in Washington State. In the event that increased instructional time for kindergarten students led to higher academic achievement, it was imperative that all students have access to full-day kindergarten programs. The researcher sought to verify whether or not a full-day kindergarten program led to increased academic growth. The results of the study could help to confirm the need for all students to have access to full-day kindergarten programs.

Summary

Chapter 1 outlined the need to conduct research on the effectiveness of full-day kindergarten. Full-day kindergarten programs were not offered to all children and families, but presented many possible benefits. The author hypothesized that kindergarten students who participated in a full-day kindergarten program would have higher academic achievement than kindergarten students who participated in a half-day program.

In Chapter 2 the author reviewed selected literature and gained valuable insight into kindergarten students, instruction, and research relating to full-day kindergarten. It was established that kindergarten students needed rich and developmentally appropriate learning opportunities in phonemic awareness and phonics to enhance early literacy skills. In addition, related research suggested that full-day kindergarten helped successfully prepare students for first grade and beyond.

Chapter 3 covered the study procedures and data gathering in detail. Over two academic years students from Cedarhurst Elementary School attended both half-day and full-day kindergarten programs. Each group was given the DIBELS assessment, and their scores from the fall and spring testing periods were used to measure academic growth.

Finally, Chapter 4 discussed the analysis of the data gathered from the DIBELS assessments. The evidence suggested the full-day kindergarten program had a positive effect on academic growth, but it was not noteworthy. Based on the data analysis the null hypothesis was accepted, thus not supporting the hypothesis.

Conclusions

This study did not show full-day kindergarten students as having significantly higher academic growth than half-day kindergarten students.

Upon comparing the Fall LNF to Spring LNF delta scores, the Statpak analysis calculated a *t* value of 1.56, which was less than the threshold value of 2.00 at $p \geq .05$ (Gay, Mills, & Airasian, 2009, p. 563). The results suggested that students who participated full-day kindergarten had less than a 95% probability of higher academic growth than students who participated in half-day kindergarten. However, the calculated value of *t*, 1.56, was larger than the threshold value provided by Gay, Mills, and Airasian (2009) at $p \geq .20$, which was 1.296 (p. 563). The data showed that full-day kindergarten had a significant positive effect on academic growth at this threshold.

Literature reviewed by the author suggested that other research studies had results more closely matched to the latter findings. Plucker and Zapf (2005) spoke to increases in test scores, and lower retention rates for students that participated in full-day kindergarten. The *Early Childhood Longitudinal Study - Kindergarten Class of 1998-99*, found full-day students had "statistically significant gains in both reading and mathematics" (as cited in Kauerz, 2005, p. 3) over half-day students. In short, the results of this study conflicted with the literature reviewed. Although this isolated study did not prove full-day kindergarten to have a noteworthy impact on academic growth, it was the conclusion of the author that the topic warranted further exploration.

Recommendations

It is the recommendation of the author that further research be completed on the effects of full-day kindergarten. Other research studies and bodies of literature suggest that full-day kindergarten provides many benefits for students, and data proving these benefits could help expand access to full-day kindergarten programs in the United States. Based on the outcome of this study, these future studies should include a larger number of participants, and full-day and half-day groups should be compared during the same academic year. Treatment and control groups should have similar numbers of participants, and teachers' alignment to the program curriculum should be closely monitored. Lastly, future studies of full-day kindergarten should follow students beyond the end of kindergarten. Research should be conducted that tracks both full-day and half-day students' test scores until the end of elementary school, and perhaps longer. This could shed light on whether or not full-day kindergarten has a lasting effect on academic achievement.

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APPENDIX A

Table 1.

Fall Letter Naming Fluency (LNF) Scores

Treatment Group	Fall LNF	Control Group	Fall LNF
T1	0	C1	0
T2	3	C2	0
T3	14	C3	8
T4	14	C1	17
T5	16	C2	28
T6	9	C3	0
T7	0	C4	10
T8	0	C5	4
T9	32	C6	7
T10	1	C7	2
T11	4	C8	2
T12	9	C9	17
T13	17	C10	0
T14	19	C11	2
T15	38	C12	2
T16	0	C13	24

T17	0	C14	30
T18	25	C15	2
T19	22	C16	0
T20	4	C17	0
T21	5	C18	0
T22	0	C19	20
T23	0	C20	34
T24	14	C21	1
T25	33	C22	1
T26	24	C23	5
T27	3	C24	8
T28	16	C25	25
T29	19	C26	4
T30	4	C27	9
T31	35	C28	0
T32	19	C29	10
T33	22	C30	10
T34	0	C31	0
T35	21	C32	0
T36	29	C33	22
T37	14	C34	32
T38	32	C35	44
T39	0		

T40	0
T41	0
T42	1
T43	0
T44	4
T45	6
T46	0
T47	15
T48	9
T49	34
T50	0
T51	0
T52	3
T53	0
T54	17
T55	0
T56	0
T57	0
T58	19
T59	0
T60	0
T61	0
T62	23

T63	0
T64	0
T65	24
T66	0
T67	0
T68	11
T69	29

APPENDIX B

Table 4.

Fall and Spring Letter Naming Fluency (LNF) Scores

Treatment Group	Fall LNF	Spring LNF	Difference	Control Group	Fall LNF	Spring LNF	Difference
T1	0	32	32	C1	0	26	26
T2	3	35	32	C2	0	29	29
T3	14	56	42	C3	8	63	55
T4	14	55	41	C1	17	30	13
T5	16	72	56	C2	28	34	6
T6	9	30	21	C3	0	6	6
T7	0	46	46	C4	10	40	30
T8	0	35	35	C5	4	36	32
T9	32	60	28	C6	7	36	29
T10	1	36	35	C7	2	20	18
T11	4	54	50	C8	2	46	44
T12	9	44	35	C9	17	42	25
T13	17	45	28	C10	0	23	23
T14	19	46	27	C11	2	37	35
T15	38	53	15	C12	2	23	21
T16	0	25	25	C13	24	78	54

T17	0	70	70	C14	30	56	26
T18	25	43	18	C15	2	63	61
T19	22	49	27	C16	0	25	25
T20	4	50	46	C17	0	11	11
T21	5	44	39	C18	0	61	61
T22	0	40	40	C19	20	44	24
T23	0	59	59	C20	34	51	17
T24	14	57	43	C21	1	29	28
T25	33	69	36	C22	1	14	13
T26	24	66	42	C23	5	35	30
T27	3	79	76	C24	8	46	38
T28	16	36	20	C25	25	66	41
T29	19	72	53	C26	4	33	29
T30	4	40	36	C27	9	36	27
T31	35	57	22	C28	0	18	18
T32	19	37	18	C29	10	32	22
T33	22	54	32	C30	10	29	19
T34	0	101	101	C31	0	42	42
T35	21	70	49	C32	0	49	49
T36	29	42	13	C33	22	63	41
T37	14	59	45	C34	32	70	38
T38	32	85	53	C35	44	80	36
T39	0	2	2				

T40	0	36	36
T41	0	5	5
T42	1	37	36
T43	0	38	38
T44	4	32	28
T45	6	45	39
T46	0	3	3
T47	15	35	20
T48	9	48	39
T49	34	62	28
T50	0	81	81
T51	0	59	59
T52	3	44	41
T53	0	15	15
T54	17	42	25
T55	0	14	14
T56	0	44	44
T57	0	32	32
T58	19	46	27
T59	0	26	26
T60	0	23	23
T61	0	22	22
T62	23	51	28

T63	0	34	34
T64	0	31	31
T65	24	33	9
T66	0	39	39
T67	0	30	30
T68	11	73	62
T69	29	60	31