

**KINDERGARTEN EFFICACY:
A COMPARATIVE ANALYSIS OF LITERACY ACHIEVMENT OUTCOMES AND LENGTH
AND TIME OF KINDERGARTEN PROGRAMS**

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Abstract

Abstract: This study explores the impact of full-day kindergarten versus half-day kindergarten on student literacy achievement. The participant samples were drawn from a suburban school district in the Midwest. This study uses the district's mandated DIBELS (Dynamic Indicators of Basic Early Literacy Skills) assessment for letter fluency. The assessment aims to identify students who may need additional literacy support early. The literacy data obtained were examined, in this case, to measure possible relationships between full-day kindergarten and half-day kindergarten programs. Evidence revealed in this study suggests that those students exposed to full-day kindergarten display greater literacy growth than their peers in half-day kindergarten. Unlike previous research that looked at the impact of all-day kindergarten on urban and low-income students, this study took place in a more affluent district. Still students in the all-day classes showed significant differences in their letter fluency achievement when compared to either only AM or PM half-day kindergarten students.

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CHAPTER 1. INTRODUCTION

“Kindergarten originated in 1837 when Friedrich Froebel created a child’s garden for children between the ages of three and seven to develop their mental, social, and emotional faculties through play, music, movement, interaction with the outdoors, and opportunities to engage in independent and creative pursuits” (Lee, Burkam, Ready, Honigman, and Meisels, 2006, p. 166). As kindergarten evolved in the United States as did the programs popularity. More and more educators were influenced by the program and believed that children flourished and developed holistically in classrooms where they explored, manipulated, and interacted with their peers in a play based, self-directed environment. Froebel’s intended philosophy persisted until 1970s when the educational value and focus of early childhood programs was recognized (Lee et al.). Votruba-Drzal, Li-Grining, and Maldonado-Carreno (2008) reported that kindergarten programs in the United States have transformed since the 1960s. As a result, kindergarten programs began to shift from a play-based curriculum to a formal teacher-directed approach of specific skills that included standards in teaching, learning, and assessment. Kindergarten programs began to look more and more like first grade classrooms which emphasized reading and math instruction. Controversy exists (Lee et al.) regarding the purposes and goals behind kindergarten programs as well as the overall equality among program options such as full-day versus half-day programs.

The study intends to add depth and new knowledge to existing research focused on the examinations of achievement outcomes from full- and half-day kindergarten programs. When considering the equality and effectiveness of educational programs, there lies another important factor in addition to the length of school day. Time of day may also influence students’ academic achievement. Davis (1987) reported that time of day of instruction has been found to be an important variable related to students reading development. In addition, research has revealed that students’ alertness and ability to pay attention were influenced by time of day preferences (Ammons, Booker, and Killmon, 1995). Research studies in this area have been found to be both contradicting and outdated. Therefore, the research study

investigated a combination of factors when examining student achievement including length and time of day of kindergarten programs.

Problem Statement

Although opposing views regarding kindergarten philosophies may exist, it can be said that preparing students for future school readiness in regards to academic achievement is a widely shared goal among kindergarten programs (Davies & Cress, 2010). However, current debates continue to exist regarding the efficacy and length of kindergarten programs within the United States (Carnes & Albrecht, 2007). Davies and Cress reported kindergarten as a mandatory requirement in only 14 states. In addition, most states were found to require only optional half-day kindergarten programs. However, it was also reported that there was an increasing trend for school districts to provide students with a full-day kindergarten option. Additional research supported that over the past decade a number of states have implemented full-day kindergarten requirements as a means to increase students' academic achievement (Cannon, Jackowitz, & Painter, 2006). The shift in program offerings may stem from a variety of factors such as increased accountability for educational programs, increased pressure from high-stakes testing, and increased number of working mothers. Nevertheless, there stands a plethora of research comparing full- and half-day kindergarten programs. One might assume that full- day kindergarten would better prepare students academically as students may be allowed to spend more time on educational activities. However, past studies regarding the equality among full- and half-day kindergarten programs have presented mixed results. While some evidence showed increased academic achievement from students who attended full-day compared to half-day kindergarten, other studies have found little to no difference in academic achievement (Davies & Cress, 2010). In addition, conflicting evidence has been found regarding the best time of day for student learning as well as a distinct lack of research comparing morning and afternoon kindergarten instruction and student achievement. Moreover, there stands a need for continued research in order to provide educators, policymakers, and the public with updated knowledge regarding the examination and comparison of kindergarten programs. The proposed study

intends to contribute to the educational field through the collection and analysis of aggregate kindergarten data. Data were retrieved from the Dynamic Indicators of Basic Early Literacy Skills (DIBELS) assessment (Good & Kaminski, 2007) given to students in the 2012-13 school year. The research study aims to explore potential correlations among data and length and time of kindergarten programs. Conclusions are to be grounded by data analysis and supported by current research trends.

Purpose of the Study

The purpose of this study is to investigate literacy achievement of students attending varying kindergarten programs (full- and half-day kindergarten and morning and afternoon kindergarten) as measured by the DIBELS (Good & Kaminski, 2007) letter identification fluency assessment. The exploratory research study focuses on the comparison of letter identification fluency scores of kindergartners and the unique variations of kindergarten programs at Fernbrook Elementary in Maple Grove, Minnesota. The study seeks to contribute and to advance knowledge in the educational field by examining possible connections between student data and kindergarten programs in hopes of providing the best educational options for students.

Hypotheses

Two hypotheses are examined in this research study. First, the additional time during full-day kindergarten would lead to relatively higher literacy achievement rate of growth compared to half-day kindergarten. Second, that time of day of instruction will influence students literacy growth and whether students increased or decreased achievement shows a connection with morning or afternoon half-day kindergarten programs.

Nature of the Study

The study is based on quantitative research as the researcher reviewed and utilized data in order to signify possible relationships existing among student literacy scores and kindergarten program variations. The researcher used data analysis procedures in order to examine possible patterns and draw inferences to support or to relinquish the projected hypotheses. In order to better understand the interrelationships between student literacy scores and kindergarten programs, numeric data was essential and meaningful evidence. This data is collected annually among all district kindergarten students and did not constitute additional or unusual assessments.

Significance of the Study

Lee et al. (2006) reported a trend concerning the types of students served by full-day kindergarten programs. It was found that less advantaged students (students of color, students of lower socio-economic status, and children who enter kindergarten with less proficient academic skills) are more likely to attend full-day kindergarten programs. Additional evidence showed full-day programs are more commonly found in schools within large cities which may increase enrollment of minority students. Similarly, many past research studies examining full- and half-day kindergarten programs have focused on less advantaged students and their academic achievement. This study was unique in that the majority of students included are not less advantaged. This study differed from others due to the school location, student make up, student sample size, and research methodology. While past research has attested to the benefits of full-day kindergarten for less advantaged students, the research study examined data from more advantaged full- and half-day attending kindergarteners in order to investigate possible connections between scores and length and time of kindergarten program. This study can enhance the educational field by representing a new population of student data and updated

results that may suggest a certain type of kindergarten program may lead to increased academic achievement or not. Furthermore, school districts may be able to make informed decisions related to funding and kindergarten program options to ensure equitable educational programs for all students.

Definition of Terms

Dynamic Indicators of Basic Early Literacy Skills (DIBELS). A widely used reading assessment and intervention instrument (Good & Kaminski, 2007).

Full-day Kindergarten. Programs in which students are in school for approximately 32 hours a week (Lee et al. 2006).

Letter Naming Fluency (LNF). A measure used within the DIBELS assessment to indicate early reading skills. The term fluency is used in regards to the speed and accuracy with which letters are produced and identified orally (Speece, Mills, Ritchey, & Hillman, 2003).

Half-day Kindergarten. Programs in which students are in school for approximately 16 hours a week (Lee et al. 2006).

Assumptions, Limitations, and Delimitations

Assumptions

For the purpose of this study, it is assumed that the kindergarten teachers who participated in the study followed the proper procedures for administering and recording the DIBELS (Good & Kaminski, 2007) assessment. Procedures include using the appropriate monthly letter templates, reading the teacher script, following the one minute implementation, and abiding by proper procedures when administering and recording results. All of the materials and instructions were provided in the DIBELS assessment manual (Good & Kaminski).

Limitations

The most significant limitation of this study is that analyses of data were limited to the specific school studied and derived from a one year span. Long term inferences will not be made as there will be no evidence of data beyond the kindergarten year. It is therefore impossible to determine if any patterns which may be discovered continued or declined in future grade levels. The student sample represented in this study is specific to mid-west suburban populations and may not generalize to other nationally represented school districts.

The DIBELS assessment used for this study is just one measurement tool used to track students' literacy achievement. While DIBELS (Good & Kaminski, 2007) is research based and a nationally represented assessment method, the results may not provide an entirely accurate indication of students' literacy achievement throughout kindergarten.

Student characteristics such as age, ethnicity, gender, and background are not identified in the study. In addition family influences and supplemental educational programs are not controlled in the study. It is impossible to determine if data were influenced by such outside factors.

Delimitations

The primary delimitation that exists is this study does not seek to evaluate the effectiveness of kindergarten programs relating to curriculum, instruction, and teacher performance. The study will not account for these factors when drawing inferences regarding student achievement. In addition, the study does not seek to assess additional areas of development commonly associated with early childhood programs such as social, behavioral, and emotional development. This

study focuses exclusively on literacy achievement as measured by the DIBELS assessment (Good & Kaminski, 2007).

Through data collection and analysis, this exploratory study seeks to identify possible relations between student literacy achievement and a combination of kindergarten program elements including length and time of school day. Assuming this research study shows significant connections regarding student literacy achievement and length and time of kindergarten, these potential findings can assist individuals who wish to enhance and equalize academic preparation for all students. If no differences are found this research will raise new questions about the validity of the assessment tool as an appropriate measure and also question whether the findings are due to SES differences between this sample and other research samples.

The following chapter provides an overview of past research studies focusing on the topic of educational efficacy pertaining to length and time of academic instruction. An analysis of the studies suggests conflicting results and a need for further research focused on this educational topic.

CHAPTER 2. LITERATURE REVIEW

Lee et al. (2006) reported a major national concern regarding students and their access to equal educational programs, regardless of their diverse social or economic backgrounds. The proposed study involves the collection and examination of kindergarten student literacy data throughout the 2012-2013 school years in order to draw inferences regarding possible relations between students who attended full- and half-day kindergarten and scores based on the DIBELS assessment. Furthermore, conclusions will be drawn in relation to student data and additional time of day (morning and afternoon) factors. There stands a need for continued research surrounding the kindergarten efficacy debate to provide policy makers and educators with evidence needed to make informed decisions regarding the most effective kindergarten programs.

Lee et al. (2006) reported nearly all children in the U.S. experience kindergarten. Likewise, Lee et al. stated “Public school districts across the nation are actively debating whether to increase kindergarten from a half-day to a full-day program, whether access to full-day programs should be restricted to low-income children, and how to finance this change” (p. 165). As a result of this ongoing debate, there have been many research studies associated with this topic. This literature review examines research studies related to efficacy of full- and half-day kindergarten programs as well as studies focusing on time of day effects on student literacy achievement.

This literature review is organized into three sections and the research presented in each section is in chronological order. The first section analyzes research studies that have shown evidence of academic benefits from full-day kindergarten attendees. The second section analyzes

research studies that have shown evidence of little to no academic differences between students who attended full- or half-day kindergarten. The third section analyzes research studies that have shown evidence of connections between time of day and student academic achievement. The research studies presented in this literature review were summarized and vital research components such as purpose, methodology, population, measurements, limitations, results, and conclusions were addressed. The intent of including this information was to learn from what research has been done in relation to the current study and draw informed conclusions that may support or reject the current hypothesis.

Academic Benefits Associated With Full- Day Kindergarten

A longitudinal examination study conducted by Zvoch (2009) collected literacy data over the course of two academic years were used in order to evaluate literacy rates of full- and half-day kindergarteners through the summer and into first grade. Zvoch cited other longitudinal studies where limited data (one or more status scores) were presented and followed to the end of the later school year. The author reported the need for correlation between the distinction of the academic school year and summer learning rates as disadvantaged students displayed decreased summer rate of growth due to limited educational resources and opportunities at home and in their community. The author identified a need for additional research to enhance the efficacy debate of kindergarten programs.

Zvoch (2009) hypothesized that additional instructional time in kindergarten would enable students to achieve increased literacy growth compared to rate of growth of students in half-day programs. In addition, the author theorized that economically disadvantaged (full-day kindergarten) students would experience an increased rate of literacy decline over the summer compared to their more advantaged (half-day kindergarten) peers and that the advantage the full

day students may have had would level out during the first grade school year. The author identified the Dynamic Indicators of Basic Early Literacy Skills (DIBELS) as the outcome measure. The author used a piecewise growth modeling approach to compare literacy growth of full- and half-day students across the 3 time periods (kindergarten, summer break, and first grade).

Zvoch's study (2009) revealed the economically disadvantaged (full-day) students acquired literacy skills more quickly than their economically advantaged (half-day) peers. What the author discovered supported the main idea represented in this section of the literature review and strengthens the claim of proponents of full-day kindergarten who may believe a lengthened school day can improve academic skills of students. However, Zvoch found the scores of the full-day kindergarten students declined over the summer while the half-day kindergarten students showed no such regression leading to an academic balance among students at the beginning of first grade. In conclusion, the author reported a short-term academic achievement displayed by full-day kindergarten students but with summertime losses.

Nowak, Nichols, and Coutts (2009) studied the effects of full-day kindergarten compared to half-day kindergarten on student math and English/language arts achievement. More specifically, their exploratory study sought out to analyze and compare academic achievement of low-socioeconomic status, inner city youth attending full-day and half-day kindergarten. The research was unique in that it presented the achievement of inner-city minority youth who were bused to suburban schools to attend full-day kindergarten, and they identified that the busing trend resulted from a lawsuit settlement aimed to desegregate local schools. The authors reported additional programs that have adopted the approach of bussing students to schools outside of their neighborhoods in order to attain ethnic equality in schools. In addition, the authors cited

previous studies supporting the idea that economically disadvantaged youth show increased academic achievement in full-day kindergarten programs.

Nowak et al. (2009) explored the state-mandated third grade test scores from 773 students in a large urban school in Indiana in order to perform a statistical examination of student achievement. The authors reported a total of 243 half-day kindergarten students and 530 full-day kindergarten students were examined over the two year study. Statistical analyses of the data were conducted using two-sample t-tests in order to draw conclusions between student scores and the previously attended full-day and half-day kindergarten programs. The authors found the average math scores for full-day students to be approximately 28 points higher than half-day students. In addition, the average English/language arts scores for full-day students were approximately 17 points higher than half-day students.

Nowak et al. (2009) examined the mean differences in math and English/language arts results for full-day and half-day students. They concluded that inner-city minority youth who attended full-day kindergarten programs showed increased performance on the state-mandated third grade tests in both subject areas when compared with other inner city half-day kindergarten students. Thus, the authors' study showed that academic benefits from full-day kindergarten may continue through at least third grade. The authors claimed that low-socio economic status inner-city youth showed increased academic progress in full-day kindergarten programs compared to half-day kindergarten programs. Last, the authors questioned the merit of bussing economically disadvantaged inner-city youth away from their neighborhood schools. The authors cited previous research suggesting that full-day kindergarten programs supported pro-social and positive behavior models.

Lee et al. (2006) conducted an in depth, mixed method study designed to answer two research questions: (1) Do young children who attend public schools that offer full- day kindergarten programs learn more over the school year, in terms of achievement in the domain of literacy and mathematics, than their counterparts who attend schools with half-day programs? (2) Are the learning benefits associated with enrollment in public schools offering full-day or half-day kindergarten different for schools of varying academic composition or in schools with different social compositions? (p. 176) The questions addressed in the study are quite complex as is the data and methodology.

Lee et al. (2006) utilized a conceptual model to guide inquiry and investigate how certain characteristics of programs, children, and schools influence students' academic achievement. The authors reported data were collected from the Early Childhood Longitudinal Study- Kindergarten Class of 1998-99 (ECLS-K). According to Lee et al., "The purpose of ECLS-K is to document the educational status and progress of a nationally representative cohort of U.S. children from kindergarten through fifth grade" (p. 179). Thus, the authors identified a large and diverse sample of schools (870) offering kindergarten programs were selected. Kindergarten student samples were randomly limited to approximately 8,455 kindergarten students with an average of 17 children per school; weights were assigned to certain types of schools limiting results to meet the specific needs of the authors study. Students were measured at the beginning and end of kindergarten using individually administered, untimed cognitive assessments designed to measure the overall outcome of basic literacy and math skills. Last, the authors included qualitative measures in their study as they collected information from parents, teachers, and an administrator through telephone interviews and written surveys.

Lee et al. (2006) explored the results of the study and discovered the following significant outcomes. (1) Full-day kindergarten was more common in schools located in larger cities or rural areas, in certain geographic areas such as the South and Midwest, and in schools with increased numbers of minority students. (2) Black children, students repeating kindergarten, and children from economically disadvantaged families were much more likely to attend full-day kindergarten. (3) Full-day kindergarten students entered kindergarten with fairly lower academic achievement scores. However, by the end of the year students began to even out with their half-day peers. (4) The effect on learning in full-day kindergarten may differ according to factors such as region and racial composition of a school. Lee et al. provided evidence suggesting overall advantages in full-day classrooms in most regions of the country excluding the West. In addition, the authors found advantages in full-day kindergarten settings with increased minority enrollments. Last, the authors examined results collected from interviews and surveys regarding the generalized assumption that full-day kindergarten offers double the academic instruction than half-day. The results showed a moderate increase among full-day instructional time compared to half-day.

In conclusion, Lee et al. (2006) conducted a multimethod study with increased external validity meaning the results from the authors study may apply to more schools and districts other than those represented in the authors study. The authors' conclusions were drawn from a strong research design with a large sample size. Therefore their findings may be generalized and related to additional studies in order to extend research and knowledge.

In addition, Lee et al. (2006) highlighted and cited several research studies and literature which explored full-and half-day kindergarten programs and outcomes. However, much of the research was outdated. The authors conclusions clearly added depth and new knowledge to the

debate surrounding efficacy of kindergarten programs as the main focus explored how different types of kindergarten programs influenced students' academic achievement. The authors presented a need for additional studies as kindergarten programs cannot be evaluated on their research alone.

In closing, the purpose of the present study is to investigate possible correlations between kindergarten program variations (including but not limited to full-and half-day classrooms) and letter identification fluency scores. Although the reviews in this section analyzed studies that have indicated academic benefits associated with full-day kindergarten, there was an absence of current, up-to-date studies representing the most recent discoveries among kindergarten programs. The studies presented in this section supported a lengthened school day as evidence showed it can lead to increased academic achievement. One might wonder why all students are not enrolled in a full-day kindergarten program. Thus, there stands a need for continued research focusing on the complex kindergarten efficacy debate. Lee et al. (2006) found that many school districts have debated whether to increase the length of kindergarten programs from half-day to full-day and whether full-day options should be confined to low-income students and how to finance these programs. Zvoch (2009) also reported that full-day kindergarten options have become increasingly available and in some states it has been mandated. However, Zvoch revealed differences among full-day kindergarten funding from state to state as some states required adequate full-day funding while others utilized Title I federal funds in providing a full-day kindergarten option for specified student populations. In addition, and similar to the present study, some districts full-day kindergarten programs have been financed by parents paying tuition. These options remain. While research presented in this section has shown positive academic achievement relating to full-day kindergarten programs justification behind the

disparity in kindergarten programs can be found in conflicting research studies presented in the following section.

Academic Similarities Associated With Full- And Half-Day Kindergarten

Zvoch, Reynolds, and Parker (2007) designed and carried out a study to assess connections between kindergarten programs (full-vs. half-day) and student literacy results. Opposed to past research designs, the authors included a multilevel modeling technique to assess student literacy skills for the entire 2004-2005 school year. Data were collected from a large school district with 188 elementary schools that provided kindergarten programs. An optional full-day kindergarten was funded by Title I support and offered to students in the most economically disadvantaged schools. The authors' analytic sample included 6 Title I funded full-day kindergarten schools compared to 6 half-day kindergarten schools that fell just below the identified poverty level. In order to increase content validity all of the sampled students received the same literacy curriculum. The authors used a multilevel modeling technique comprised from student literacy scores collected by DIBELS and classroom measures (class size and class calendar), and individual student differences such as age, ethnicity, and gender. The authors used a three-level longitudinal growth model to measure the varied components.

Zvoch et al. (2007) summarized the results of their study. They found that kindergarten students in the full-day kindergarten classroom showed increased literacy achievement compared to their half-day peers. However, the authors discovered the overall value of full-day kindergarten was dependent on class size. The authors found that in small class size full-day kindergarten classrooms, the literacy achievement doubled those found among half-day kindergarten classrooms. In addition, the authors found students in large class size full-day kindergarten classrooms showed literacy skills progressing at a slower rate compared to students

in smaller class size full-day kindergarten. The authors also found similarities among the literacy growth of students in large size full-day kindergarten classrooms and students in large class size half-day kindergarten classrooms.

In summary, Zvoch et al. (2007) discovered a negative correlation between class size and literacy achievement in full-day kindergarten classrooms. The authors addressed the trend of lengthening kindergarten programs and suggested the possibility of lowering class sizes as an adequate factor in providing students with quality early childhood education. Last, the authors report a need for additional research relating to full-day kindergarten practices in order to discover which programs are most beneficial for which students.

Davies and Cress (2010) also found an increasing trend among districts around the nation to provide children with a full-day kindergarten option and more and more states are contemplating taking responsibility of covering the costs involved. However, the authors reported mixed results from studies focused on the efficacy of kindergarten programs. The authors cited research that claimed some studies found no difference in comparing student achievement of full- and half-day kindergarten. In addition, the authors found academic differences disappeared as soon as first grade. Davies and Cress conducted a mixed-method research study as they summarized the findings of 16 case studies conducted among 16 different elementary schools in northern Indiana. School demographics varied but included mainly urban and suburban populations and represented a variety of minority groups. The authors found each study used a casual-comparative analysis of literacy achievement to determine long-term advantages of full-day kindergarten students. In addition, the authors found the studies used interpretative analysis to draw inferences from patterns identified in teacher interviews. The authors conducted the study in two phases. The first phase involved quantitative analysis of

student achievement results which were compared. The second phase included qualitative analysis based on teacher interviews regarding kindergarten programs and ways teachers worked with students among differing programs. The authors' research was designed to draw conclusions on whether or not there were differences in literacy achievement related to kindergarten program attendance.

The following summary of results highlighted phase one evidence as the current study has a quantitative focus. Davies and Cress (2010) summarized the phase one results and discovered that students who attended pre-school showed higher academic achievement as they entered kindergarten programs. However, by the end of kindergarten there was no longer a difference and all students in the study regardless of preschool or kindergarten experiences, appeared equally prepared for first grade. In addition, the authors looked at literacy achievement at the beginning and end of first grade. Once again, results showed no differences in academic achievement at the end of first grade based on student attendance in full- or half-day kindergarten programs with the exception of one case study which found an increased performance at the end of first grade from students who attended half-day kindergarten. In cases focused on long term achievement (to the end of third grade) Davies and Cress found little to no differences in academic achievement among full- and half-day kindergarten attendees. The one exception found students who attended half-day kindergarten outperformed their full-day peers at the end of third grade. However, the authors noted some specifics to this specific study stating the school district policy of limiting full-day kindergarten only to schools with large populations of students of low socio-economic status. Therefore, the differences among students may have had an effect on literacy scores rather than type of kindergarten program.

In conclusion, Davies and Cress (2010) reported most cases in their study did not indicate significant differences between student academic performance and type of kindergarten program. In addition, their qualitative analysis showed both full- and half-day programs provided similar academics with full-day kindergarten having more time to focus on non-academic activities. It could be perceived that students of low socio-economic status may benefit from a full-day kindergarten program in order to help them catch up with their more advantaged peers. However, the results from the authors study provided evidence supporting the increased student academic achievement gained began to fade out over time. The authors cited research in support of the idea of quality over quantity in relation to kindergarten programs and curriculum. The authors suggested important issues to be considered such as quality of teachers, quality of curriculum, and quality of classroom environment as these factors may play a role in kindergarten academic achievement.

Raskin, Harr, and Zierdt (2011) reported student achievement gains of full-day kindergarten students and, most importantly, on the fade out of students experience by second grade. Raskin et al. cited research stating fade out occurs when academic achievement gains disappear as students' progress through elementary grades. The authors' article analyzed a case study that outlined one districts' experience with dissipating academic gains in relation to kindergarten programs. The authors reported the intent of the case study to align students in pre-school through third grade by implementing full-day kindergarten for all students. The authors stated the sampled school was midsized and located in southern Minnesota. In addition, the school faced challenges related to student populations such as increasing special education students, English as Second Language (ESL) students, and students eligible for the federal free and reduced lunch program. Raskin et al. described the 2005 full-day kindergarten implemented

as center-based and it was reported to be an effective means of closing the achievement gap among the increasingly diverse student population.

Raskin et al. (2011) reported phase one of the case study used assessments to track academic performance. The authors stated the measurement was determined by the district as they selected the Gates MacGinitie Reading Assessment. Data were collected in the fall from 2004 to 2008 in order to measure students' academic progress longitudinally. The authors reported the analysis of data indicated students were better prepared to enter first grade based on reading skills. Hence, phase 1 of the case study validated that full-day kindergarten benefited students by raising their reading achievement. However, the authors reported an analysis of the phase 2 data indicating the gains made in phase 1 were not sustained in first grade. Therefore, when students entered second grade there was no longer a difference in reading achievement between students who attended full-and half-day kindergarten.

In summary, Raskin et al. (2011) concluded that the full-day kindergarten program implemented in their case study was not working as evidence showed academic gains faded out by the end of first grade and the money invested in the implementation of full-day was not worthwhile. The authors suggested a different problem solving approach by taking the whole school system into consideration rather than focusing on kindergarten programs. The authors suggested the need for further research and analyses focused on what was done with the full-day program as evidence of academic gains and expand those practices beyond the kindergarten classroom.

In conclusion, it is essential to understand kindergarten efficacy research studies that have been conducted and their varying results. The reviews in this section analyzed studies which indicated the limited differences in academic achievement among full- and half-day

kindergarten programs. The studies reviewed in this section are slightly more current than the previous section. The studies presented in this section did not necessarily support a lengthened school day as evidence showed other factors may be responsible for academic achievement such as class size, student population, and school curriculum.

The current study seeks to analyze student data and draw conclusions regarding possible correlations between kindergarten programs variations such as full-and half day and time of day (morning vs. afternoon). The preceding sections outlined research studies focused on full-and half-day kindergarten. The following section reviews studies related to time of day learning and instruction.

Time Of Day Effects On Student Academic Achievement

Davis (1987) reported that long-term memory functions (necessary for reading comprehension) are better during the afternoon than in the morning. The author cited research claiming that short term memory (STM) performance is increased in the morning and long term memory (LTM) is enhanced in the early evening. The author reported a gap in research regarding whether or not time-of-day instruction is related to the reading development of elementary school students.

Therefore, the author conducted a study and examined potential effects of time of day instruction on the LTM achievement of beginning readers. The low-ability readers and high-ability readers were evenly distributed among the two sample groups.

Davis (1987) collected and analyzed data from a randomly collected sample of 100 students in the six year old age range. The students attended 39 first grade classrooms in California where reading was taught in either the first period or last period of the day. The author reported using the Comprehensive Test of Basic Skills (CTBS) pre-test (level A) and

post-test (level B) to measure students reading ability of the two equally divided morning and afternoon reading groups.

Davis (1987) displayed the collected data in a series of tables and after further examination, the author concluded the last period instruction appeared to be more beneficial than the first period instruction. The evidence of the study supported the author's hypothesis stating beginning readers who received afternoon instruction benefit from increased reading achievement compared to beginning readers who received morning instruction. However, the author also asserted what the evidence did not show; High-ability readers would not benefit from afternoon instruction at an increased rate compared to low-ability readers. The author suggested a need for continued research regarding time of day instruction and the effects of learning differences among students varying in age, grade, race, and gender. Although the authors study showed some evidence there was significant interaction between instruction times and beginning readers, there were potential limitations. The author suggested further comparison studies to control the time of day of measurement outcomes as this was not controlled in the authors study and could potentially extend future research.

Barron, Henderson, and Spurgeon (1994) found evidence similar to the research of Davis (1987) previously reviewed. Barron et. al. cited contradicting research theorizing reading instruction was best taught in the early morning when students were most alert, especially for students who achieved below grade level. The authors study explored correlations between time of day reading instruction and the effect on below grade level student skills.

Barron et al. (1994) explained the methodology surrounding study conducted over a two year time period. The sampled population of 128 below level students enrolled in first grade through fourth grade were part of a Chapter 1 reading program at an elementary school.

According to the authors, the 128 students were randomly designated to an experimental group or a control group as reading was taught to each group in the morning and each group in the afternoon. The author reported data were collected using a pre- and post-test of the California Achievement Test (CAT). In addition, the tests administered to the groups of students correlated with their instructional reading level.

Barron et al. (1994) reported an analysis of the collected data indicating an increase in the average scores of below grade level students instructed in the afternoon compared to similar academic achieving students who received instruction in the morning. In addition, the author found evidence suggesting an overall average difference in grade level scores as a larger increase in scores was shown among first through third grade compared to fourth grade. Evidenced suggested that time of day instruction has a larger impact on primary students achieving below grade level. In conclusion, the author indicated the need for educators to think about time schedules as an important factor when teaching reading instruction. Last, the author mentioned using a reading style inventory in order to determine when increased individual learning occurs. This theory is represented in the following review.

Ammons et al. (1995) developed a study investigating how time of day may affect student learning and attention. The authors noted research theorizing that time of day affects individual students rather than groups of students. Therefore, the authors revised the study to include individual preferences for time of day instruction and learning. The authors' literature review summarized mostly outdated studies related to biological rhythms and individual learning style and how these influence learning throughout different times of the day. Ammons et al. created a mixed methods approach including quiz scores, questionnaires, and Learning Styles Inventory (LSI) reports in order to study the overall hypothesis which stated "If students are able

to predict their peak time, then the results of the Learning Styles Inventory and a simple time related questionnaire should show the same time preferences for each student on both indicators” (p. 7). In addition, the authors predicted students would score higher on science quizzes when taught and tested at their indicated time preference. The authors study took place in a rural prekindergarten through fifth grade school in Virginia. Most of the 36 sampled fifth grade students were of low socio-economic status. The authors collected and analyzed data drawn from quizzes as well as preferences found from the LSI.

Ammons et al. (1995) reported results collected from the LSI indicating 26 students with an afternoon preference, two students with a morning preference, and six students without a time preference. The authors summarized the results of the study and evidence shows a correlation between matching instruction to students preferred learning times and academic achievement. When students were taught at times that matched their learning style preference determined by the LSI, they scored significantly higher overall. In addition, the authors’ study showed students may have the ability to predict their preferred time of day for optimal learning. The author suggested the LSI as a positive means for educators to determine strong preferences among students which may lead to instructional benefits. However, the authors discouraged any substantial conclusions to be drawn due to the limited sample size and subject area of the study.

In conclusion, it is essential to understand past research efforts designed to predict relationships between time of day and student learning. Evidence from the studies in this section show that time of day may impact student learning. One could infer that afternoon instruction benefits most students from the research presented in this section. However, the research and data were outdated and included restricted sample sizes. In addition, there appears to be a gap in the research specifically pertaining to kindergarten as kindergarten students were not represented

in the reviewed studies. This study searched for new, up-to-date correlations regarding time of day and kindergarten student achievement. A substantial number of kindergarten students were represented in hopes to contribute new research to the educational field and improve student learning.

Summary of the Literature Review

In summarizing the literature review, there was not an absence in research comparing the efficacy of full- and half-day kindergarten programs. In addition, much of the research presented in the first two sections represented diverse student samples, detailed research designs, and appropriate analysis methods. However, most studies were dated and a considerable number of studies summarized in the literature review focused solely on students of low socio-economic status. In addition, much of the research related to this topic presents discrepancies among results. It could be presumed that some studies have shown a relation between student academic achievement and full-day kindergarten. Lee et al. (2006) supported this conclusion as it was reported that no studies had shown significant evidence linking academic advantages for children in half-day kindergarten. However disparities remain regarding access to full day kindergarten for all students.

As a result, Lee et al. (2006) stated “The topic remains a great deal of interest and debate as as policy makers, researchers, and educators search for ways to improve the educational experience for young children” (p. 170). In addition to expanding this debate, the present study aims to investigate possible relations between time of day instruction and academic achievement. Ammons et al. (1995) reported varying teacher opinions centered on what time of day students learn best. It appears unknown if there was a specific time of day where most students show increased academic achievement. Rather, the studies reviewed in the third section focused on

individualized differences. It could be assumed that students may demonstrate increased academic achievement in the afternoon. However, all of the reviewed studies were outdated, included a limited sample of students, and results were dependent on a variety of individual factors. Ammons et al. found evidence linking student learning styles, time of day, and performance in school. This research could be used by educators as they consider scheduling, planning and individualized instruction. This study intended to advance knowledge and research related to efficacy among kindergarten programs. The study aimed to expand knowledge in order to help researchers and educators provide the best possible educational programs for all students as they begin their academic career.

CHAPTER 3. METHODOLOGY

Introduction

Zvoch et al. (2007) stated the limitations identified in prior kindergarten investigations suggest that additional study of kindergarten programs with diverse samples, better controls, repeated measures, and use of appropriate analytic techniques is required to reveal the manner and degree to which a complete day of instruction benefits students. Given the need for research, this study addressed multiple efficacy issues related to kindergarten program options by examining data obtained from students attending full- and half-day kindergarten. This study serves as an extension and in some aspects, an updated replication of previous research in this area.

This study also built and extended prior examinations by employing a relatively controlled design, a sample of diverse students, and longitudinal measuring techniques to assess the literacy achievement of students' exposed to full- or half-day kindergarten instruction. Many research studies examining the associations between kindergarten programs and student achievement have used measurements limited to two repeated assessments similar to a pre- and post-test and therefore, these studies were not able to adequately measure students' academic trajectories throughout the full- or half-day kindergarten program (Votruba-Drzal et al., 2008). Thus, the quantitative study gathered data at the three scheduled points in time and utilized data analysis in order to examine and compare literacy achievement outcomes from full- and half-day kindergarten students, and then use further analysis methods and draw possible inferences in order to better understand the relationship between student literacy achievement and divergent kindergarten programs.

The hypothesis presented in this study were that the additional time during full-day kindergarten would lead to relatively higher literacy achievement rate of growth compared to half-day kindergarten and that time of day instruction will influence students reading achievement and if so, whether students increased or decreased achievement shows a connection with morning or afternoon half-day kindergarten programs.

Research Design

This study focused on an exploratory quantitative approach in which the researcher was searching to form inferences based on student data collected from the DIBELS assessment and length and time of kindergarten programs. Student data was collected in the fall, winter and spring. Data was formulated into three groups based on the type of kindergarten program. The data analysis included averages of words per minute and averages of student rate of growth. Furthermore, the data was analyzed using an ANCOVA. The use of multiple data collection was used to increase the internal consistency reliability of the study. The data included in the study was based upon student literacy achievement scores derived from the DIBELS assessment explained in the instrumentation section of this chapter. The statistical process can be described by grouping data and using computational procedures to enable the researcher to find possible relations from a set of numbers (Leedy & Ormrod, 2013). The study performed a descriptive comparison by identifying and examining multiple variables based upon student literacy achievement and varying the length and time of day of kindergarten programs. Furthermore, the study contributes to existing research studies concentrating on similar educational topics.

Research Participants

The data to be used in the study was sampled from the 2012-2013 kindergarten class at Fernbrook Elementary School in Maple Grove, Minnesota. Fernbrook Elementary is a suburban public school serving approximately 918 students in preschool through sixth grade. The table provided below displays the student demographics based upon the 2009-2010 *information provided by publicschools12.com utilizing data were retrieved from the U.S. Department of Education, U.S. Census Bureau, Bureau of Labor and Statistics and other external sources.*

Student Demographics for Fernbrook Elementary School

Asian	6%
Black	11%
Hispanic	3%
White	80%

Fernbrook does not qualify for additional Title I funding due to the general demographics and school statistics. Students at Fernbrook elementary are predominantly white with less than 15 percent of students qualifying for free and reduced lunch. In addition, full-day kindergarten is a tuition based option fully funded by parents. There are two full-day kindergarten classrooms and four half-day sections equaling a total of six kindergarten classes represented in this study. Student samples originated from approximately 75 half- day attending kindergarten students and 37 full-day attending kindergarten students creating a total sample of 112 students to be represented in this study. The study explored possible kindergarten program effects on student achievement throughout a one year timespan. Therefore, the analytic sample was restricted to those students who remained in the same classroom for the entire school year. Last, although students sampled in the study represented a more affluent and less racially diverse population

than many previous studies, specific individual student characteristics were not represented or measured throughout the study.

Research Instrumentation

Student literacy achievement was measured using the district mandated Dynamic Indicators of Basic Early Literacy Skills (DIBELS) assessment (Good & Kaminski, 2007). DIBELS is a measurement tool used to assess the growth and development of students' early literacy skills. In addition, the assessment helps to identify and monitor the progress of students who are unlikely to meet state reading standards in third grade. Student results may be used to predict how students will do in the future in areas such as high stakes testing and overall reading achievement (Good, Kaminski, Moats, Laimon, Smith & Dill, 2002-2003). It is reported that students in kindergarten through third grade are to complete three sets of benchmarks each year in the months of September, January, and May and this remained consistent with the current study. Benchmarks may include: Letter Naming Fluency, Nonsense Word Fluency, Oral Reading Fluency, and Oral Retelling Fluency, and Word Use Fluency (Good et al.).

This study focused on data from the Letter Naming Fluency (LNF) portion of the DIBELS assessment. The LNF assessment consisted of a set of three letter pages containing randomly ordered upper and lower case alphabet letters including different letter pages for the three yearly assessments. The sampled kindergarten students were to name as many letters as possible in one minute. Speece et al. (2003) affirmed that letter fluency tasks may be an accurate measure for predicting later reading ability because both accuracy and speed are assessed as students are expected to provide the names of the letters of the alphabet. To ensure external validity participating teachers were supplied with an administration and scoring guide providing a script to read prior to administration. In addition, all of the LNF assessments were individually

administered by trained educators. Scores were determined by the total number of correct responses in one minute. Correct responses were determined by students' verbal identification of the correct letter in less than three seconds of wait time. The numerical scores correspond with three identified categories; at risk, some risk, and no risk. The table below shows an example of a yearly recording sample. Hoffman, Jenkins, and Dunlap (2009) reported that DIBELS results can be used to identify at-risk learners, intervention development, and progress monitoring. This study focused on aggregate data from all of the sampled kindergarten students rather than restricting the sample to a specific categorical set. Furthermore, the number of correct responses for each task will be used for the analysis process.

Example of Kindergarten Letter Naming Fluency Assessment Categories

Testing Dates	LCPM (letters calculated per minute)	At Risk	Some Risk	Low Risk
Sept.		0-1	2-7	8+
Jan.		0-14	15-26	27+
May.		0-28	29-39	40+

Research Procedure

Approval for this study was obtained from the administration of the Osseo Area School District prior to analyzing the research study (See Appendix C.). This DIBELS is routinely used with the District kindergarten students. In this case no names of students or teachers were used and only raw scores were used for statistical analysis. All other data appears in aggregate form, thereby protecting all student identities. All kindergarten students were subjected to similar educational curriculum. In addition, students were assessed using the same timed DIBELS assessment template with a teacher script to follow. In addition, the principal of Fernbrook Elementary school as well the kindergarten teachers were informed of the study and its purpose months prior

to the development and implementation. As an insider and kindergarten teacher at Fernbrook Elementary, the researcher held discussions between the involved individuals reviewing the studies intention and the process. It was agreed that the DIBELS assessment would be administered by the researcher and kindergarten colleagues and that the data were collected and utilized for the purpose of the current study.

Statistical Analysis

After data were collected, it was organized in order to draw inferences and test the hypotheses. First, nominal scales were utilized to separate student scores into groups reflecting the featured kindergarten classroom (Full-day, half-day morning, and half-day afternoon). Therefore, students were categorized into three sub-groups including one full-day kindergarten group, one morning kindergarten group, and one afternoon kindergarten group. Next, meta-analysis was conducted using the Analysis of variance (ANOVA) statistical procedure in order to examine differences among multiple factors including length of kindergarten day and time of day (morning and afternoon). Results are presented both in an analytic and a descriptive manner. Descriptive results present information regarding potential patterns found among student scores and kindergarten experience. In addition, a significance level of .05 will be represented using statistical software in order to organize and interpret results from the study. Leedy and Ormrod (2013) suggested assigning a significance level in order to enhance research studies and help researchers decide whether results are due to chance or something further. In addition, inferences were drawn based on the present study and current findings and supported by pre-existing literature and research studies. A combination of statistical significance and practical significance were put into place to conclude if the results were indeed significant and useful. Last, after conclusions are drawn, limitations outline potential weaknesses of the study.

Chapter 4: Results

The purpose of this study was to investigate possible correlations between kindergarten school day variations (full- and half-day kindergarten and morning and afternoon kindergarten) and student's letter identification fluency scores. The exploratory research study focuses on the comparison of letter identification fluency scores of kindergartners attending Fernbrook Elementary during the 2012-2013 school year. The study seeks to contribute to and expand the field of research in regards to equitable educational programming. The study aims to examine possible connections between student data and contrasting kindergarten programs in order to provide evidence advocating the most effective academic preparation for future students. In order to achieve this goal, information regarding student scores (letter identification fluency) was first collected.

Results

The participants in this study consisted of four kindergarten teachers employed with the Osseo Area Schools, District 279 in Maple Grove, Minnesota along with their kindergarten students. The participating teachers voluntarily agreed to complete the required assessments and provide the scores necessary for the study. The DIBELS assessment was administered at three separate time periods (fall, winter, and spring) throughout the 2012-2013 school year. The DIBELS assessment was completed by all 2012-2013 regular education students enrolled in full- and half -day kindergarten for a total sample size of 100 students. For the purpose of the study student scores were divided into groups reflecting the featured kindergarten classroom (full- day, half- day morning, and half-day afternoon). No significant changes were made to either the full-day kindergarten or half-day kindergarten programs throughout the year of data collection. Since, the same curriculum, teaching strategies, and assessments were implemented among all of the kindergarten classrooms, the classrooms were combined to increase the statistical power to be used in the comparisons between the full-day and half-day kindergarten programs.

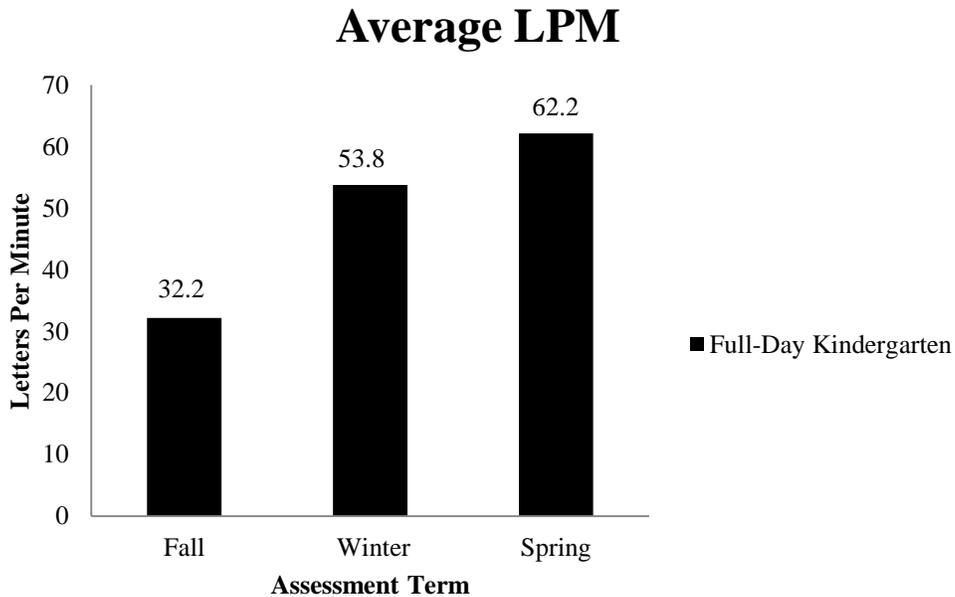
Students were categorized into three sub-groups including one full-day kindergarten group, one morning kindergarten group, and one afternoon kindergarten group. The two full -day kindergarten sections of students were grouped together for a total of 35 full-day kindergarten students. Additionally, the two half-day morning kindergarten sections were grouped together for a total of 30 half-day morning kindergarten students. Finally, the two half-day afternoon kindergarten sections were grouped together for a total of 35 half-day afternoon kindergarten students. In summary, the six total kindergarten sections were consolidated into three comparable groups.

All student scores represent literacy growth as determined by the district mandated DIBELS assessment. Results of this section are displayed in Table 1 (Appendix A). Classroom groups are divided into the three sections described above. Data is displayed listing the number of letters correctly identified by each individual student in the fall, winter, and spring. As shown in Table 1, the number of words per minute increases from fall to spring. Table 1 shows differences in regards to overall averages and growth rate (See Appendix A).

Analysis of Data

In order to determine the differences among literacy scores and the corresponding kindergarten programs, the average words per minute were calculated for the fall, winter, and spring of each subgroup as shown in Graphs 1-3. To begin, Graph 1 reveals the average scores for full-day kindergarten throughout the three identified assessment periods. Graph 1 shows the average for full-day kindergarten started at 32.2 words per minute during the fall assessment period. The average increased to 53.8 words per minute at the winter assessment period indicating a calculated 21.6 letter increase from fall to winter. Graph 1 also displays the spring assessment average of 62.2 words per minute. This reveals an average increase of 8.4 letters per minute from the winter to the spring assessment period. As Graph 1 shows, the average increases throughout the year from 32.2 to 62.2 words per minute. There stands an overall average increase of 30 letters per minute from the start of the year to the end of the year as shown by the Graph 1 full-day kindergarten data.

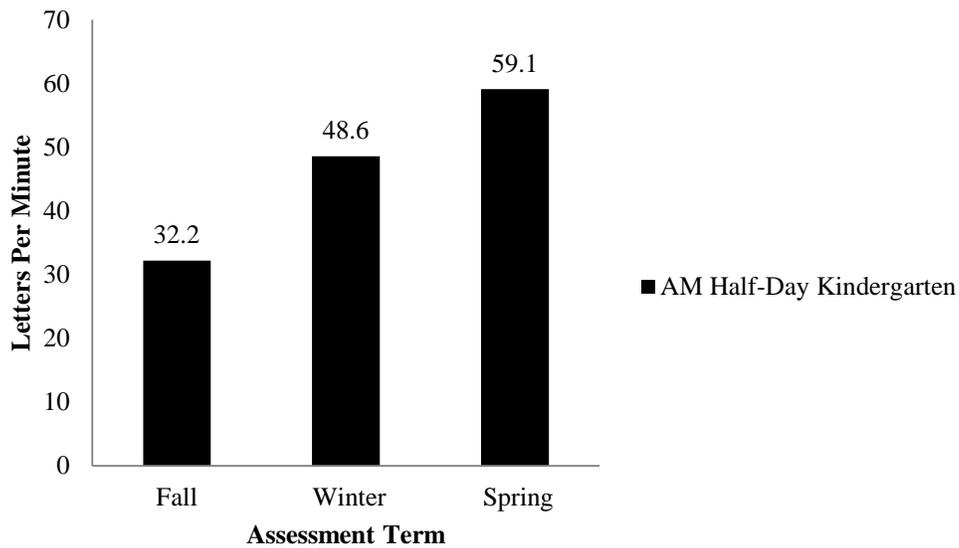
Graph 1. Results of average letters per minute (LPM) for 2012-2013 full-day kindergarten students as measured by the DIBELS assessment.



In comparison, average scores were calculated for the morning kindergarten programs offered at Fernbrook elementary. Graph 2 reveals the AM half-day kindergarten average words per minute scores throughout the three identified assessment periods. Graph 2 shows the average AM half-day kindergarten started at 32.2 words per minute during the fall assessment period. The average increased to 48.6 words per minute at the winter assessment period indicating a calculated 16.4 letter increase from fall to winter. In addition, Graph 2 displays a spring assessment average of 59.1 words per minute. This reveals an average increase of 10.5 letters per minute from the winter to the spring assessment period. As Graph 2 shows, the average increases throughout the year from 32.2 to 59.1 words per minute. There stands an overall average increase of 26.9 letters per minute from the start of the year to the end of the year as determined from the AM half-day kindergarten data.

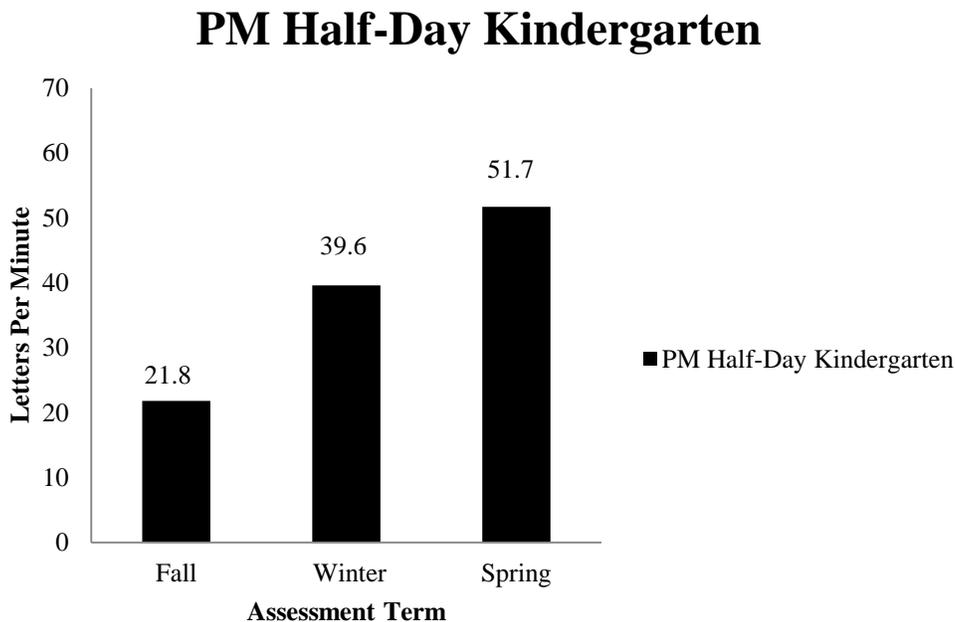
Graph 2. Results of average letters per minute (LPM) for 2012-2013 AM half-day kindergarten students as measured by the DIBELS assessment.

Average LPM



The average scores were calculated for the third kindergarten program at Fernbrook elementary. Graph 3 reveals the PM half-day kindergarten average words per minute scores throughout the three determined assessment periods. Graph 3 shows the average PM half-day kindergarten started at 21.8 words per minute during the fall assessment period. The average increased to 39.6 words per minute at the winter assessment period indicating a calculated 17.8 letter increase from fall to winter. In addition, Graph 3 displays a spring assessment average of 51.7 words per minute. This reveals an average increase of 21.1 letters per minute from the winter to the spring assessment period. As Graph 3 shows, the average increases throughout the year from 21.8 to 51.7 words per minute. There stands an overall average increase of 29.9 letters per minute from the start of the year to the end of the year as determined from the PM half-day kindergarten data.

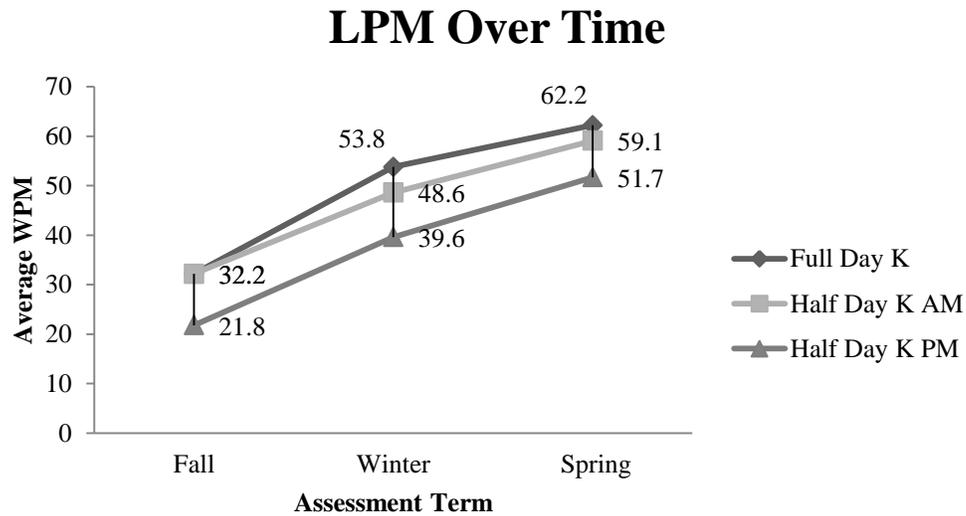
Graph 3. Results of average letters per minute (LPM) for 2012-2013 PM half-day kindergarten students as measured by the DIBELS assessment.



After calculating the average number of letters per minute throughout the year for the three groups of kindergarten programs and creating Graphs 1-3, the data was then combined in order to enhance the comparison process. Graph 4 reveals the average letters per minute throughout the year for all three kindergarten groups. As shown in Graph 4, both full-day and half-day AM kindergarten have a fall average of 32.2. However, even though both groups started off at the same average number of words per minute in the fall; the winter and spring scores did not support a continued pattern of similarity. The full-day kindergarten average measured at 53.8 in the winter and 62.2 in the spring. The AM half-day averages measured at 48.6 in the winter and 59.1 in the spring. Graph 4 visually displays the differences among the data averages and kindergarten programs. The graph shows that full-day kindergarten has the highest average for the winter (53.8) and spring (62.2) testing periods. In contrast, the lower average scores for fall (21.8), winter (39.6) and spring (51.7) are those of PM half-day kindergarten. However,

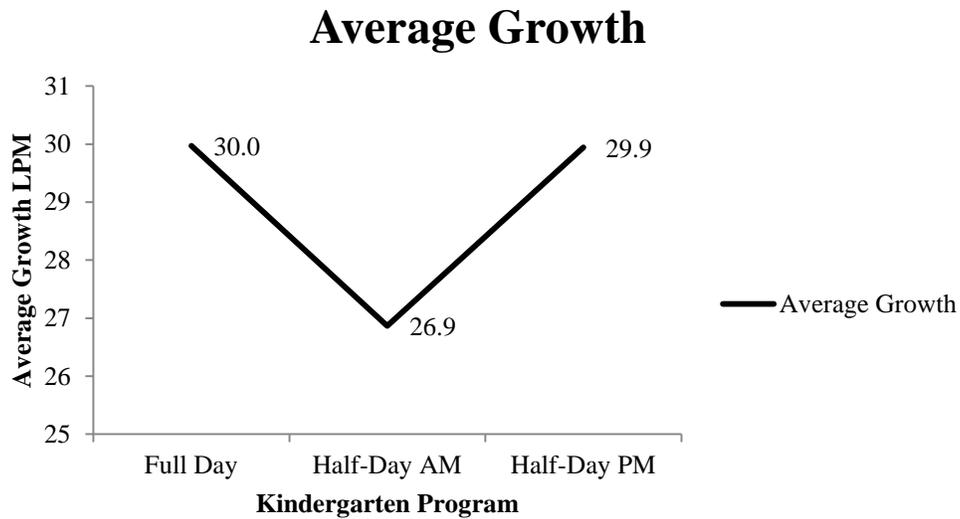
before inferences were drawn, the data was further examined in order to measure and compare average growth rates between the fall and spring assessment periods.

Graph 4. Results of average letters per minute (LPM) for 2012-2013 kindergarten students as measured by the DIBELS assessment.



Average letters per minute scores during each assessment period were previously calculated and displayed in graphs 1-4. Subsequently, the average growth rate measurements were recorded. Graph 5 displays the data pertaining to average growth rate or how many letters per minute were gained from the beginning of the year (fall) to the end of the year (spring) for each of the three corresponding kindergarten programs. Graph 5 reveals the average growth rate of full-day kindergarten to be 30 letters per minute. Furthermore, the average growth rate of AM half-day kindergarten measured in at 26.9 words per minute. Finally, the average growth rate of PM half-day kindergarten was determined to be 29.9. To conclude, the full-day kindergarten growth rate is 0.1 greater than the half-day kindergarten growth rate and this evidence indicates that AM half-day kindergarten measures in with a lower average growth rate compared to the other two groups.

Graph 5. Results of average growth rate for letters per minute (LPM) for 2012-2013 kindergarten students as measured by the DIBELS assessment.



The final measurement was conducted to explore the whether or not there was a statistical significance among student scores. The Analysis of Variance (ANOVA) was chosen to measure the differences and derive possible conclusions. The variables were acceptable for such a study: (a) because there were similar numbers of students represented in each of the three groups, and (b) the groups were not altered in regard to age, race, gender, or socioeconomic status, and (c) because the DIBELS assessment was used consistently among all 3 groups. The results from the ANCOVA are presented in Table 2 (Appendix B). The ANCOVA analyzed the data collected from the fall to the winter as most growth was detected between the two assessment periods. (See Appendix B, Table A.) The analysis of letter fluency results were found to be significant $p=.005$ indicating that students attending full-day kindergarten produce higher letter fluency scores than students in either half-day kindergarten sections.

Chapter 5: Discussion

Discussion

The purpose of this study was to examine for the potential difference in the literacy growth of full-day kindergarten and half-day kindergarten students in order to discover whether length or time of day has a relationship to student learning. This study aimed to enhance the educational field by presenting current research and providing new evidence that may advocate for a kindergarten framework that is effective in supporting student learning. Similarly populated suburban school districts may want to consider and test current findings in order to make informed decisions related to funding and to various kindergarten program options to ensure equitable education for all students.

The results of this study support the research hypothesis that the additional time during full-day kindergarten will lead to relatively higher literacy growth compared to half-day kindergarten, whether AM or PM kindergarten. The results of this study seem to show significance as found in the ANCOVA. This data was collected at Fernbrook elementary school in Maple Grove, Minnesota during the 2012-1013 school year. This study presents findings somewhat similar to those of Zvoch (2009) who's study suggested that a lengthened school day effectively improves the short-term academic readiness of disadvantaged students, except that the present study was not with disadvantaged students. Although Zvoch's population sample focused on disadvantaged students the overall findings are comparable. As the literature review revealed, past researchers have focused their attention on disadvantaged students, students of color, and students of low socio-economic status. The significance of this study is represented

by both the population of students and the results. The evidence suggests that students of middle to upper income brackets, living in an affluent suburban community, displayed increased reading achievement when exposed to a full-day kindergarten program. This builds upon previous research by alluding that all students, regardless of who they are, where they come from, and what their background, may benefit from a full-day kindergarten program when examining early literacy skills.

The ANCOVA analyzed data collected from the fall to the winter because this is where most growth was detected amongst all three kindergarten programs. The full-day kindergarten average growth from fall to winter calculated in at 21.6 compared to the 8.4 average increase from winter to spring. The AM half-day kindergarten average growth from fall to winter calculated in at 16.4 compared to the 10.5 average increase from winter to spring. Finally, the PM half-day kindergarten average growth from fall to winter was calculated to be 17.8 compared to the 12.1 average increase from winter to spring. Inferences can be drawn based on the evidence supporting the idea that students make the most gains in regards to letter identification fluency in the beginning of the kindergarten school year. Not having exact data on instructional practice makes it difficult to determine the specific reasons why the average growth rates increased at a higher rate between the first and second assessment periods. However, Davis (1987) asserts that kindergarten is becoming an academic experience more similar to what was once taught in first grade. Furthermore, there is an increased expectation for children to be able to know and identify the letters of the alphabet as these are prerequisite skills needed in order to succeed future academic challenges. Davis adds that kindergarten teachers are expected to prepare their students to meet rigorous academic standards. This may support the idea that teachers focus their instruction on letter identification skills early in the year as this provides a

foundation for early reading skills. Students increasing scores may reflect what they are learning and practicing on a daily basis. Teachers striving to meet the academic demands may focus on letter identification fluency early on and then adjust their instruction and adapt their curriculum to provide students with the next set of pre-reading skills such as letter sounds, syllables, and rhyming patterns. The use of an alternative literacy measure more sensitive to the instructional practices of teachers throughout the kindergarten year may have produced different averages of students literacy growth.

The remaining hypothesis was that time of day of instruction would influence students literacy growth by examining whether students increased or decreased achievement corresponded with morning or afternoon half-day kindergarten programs. There was no evidence found to support a significant relation between student achievement and time of day instruction in this study. At first glance it may appear that AM half-day kindergarten produced higher averages in terms of letters identified per minute. However, the ANCOVA determined that there was not a significant difference between the variables. The calculated fall average (letters per minute) for AM kindergarten was 32.2 and the fall average (letters per minute) for PM kindergarten was 21.8. What this may suggest is that even though the average of AM kindergarten is higher at the initial assessment period, the overall growth levels out considering all of the collected data. This may justify why a significant difference was not detected. The overall growth rate among the 2 half-day kindergarten groups balanced out throughout the year. The findings in this study differ from the findings of Davis (1987) which reported that beginning readers who received instruction in the afternoon benefit in terms of reading achievement gains compared to readers who receive instruction in the morning.

Conclusions

Results of this study also revealed a substantial growth rate increase between the fall and winter assessment periods. In other words, average scores (letters per minute) increased at a faster rate in the beginning of the school year among all 3 sample groups. This suggests that there is an emphasis on teaching letter identification in the beginning months of kindergarten. Lee et al. (2006) addressed the evolution of early childhood education and the overall shift focusing on academic elements opposed to play-based curriculum. Current kindergarten classrooms emphasize formal reading and math instruction rather than social skills and play based learning. This may explain why students show increased letter identification fluency in the beginning of kindergarten as teachers concentrate on teaching these skills so students are able to develop into readers as the year progresses.

Lee et al. (2006) speaks to the existing debate among educators, policy makers, and the public about the purposes and the goals of kindergarten. The expectations and general make up of kindergarten are evolving and children must be prepared for first grade academics. Lee et al. points out that full-day kindergarten classes spend 30 percent more time on reading and language arts instruction than half-day kindergarten classes. School readiness expectations are increasing and districts feel increasing pressure for students to be prepared and pre-literate in order to be successful. Full-day kindergarten not only offers students increased instructional time but evidence from this study implies that reading achievement will increase at a faster rate compared to students attending half-day kindergarten.

According to Lee et al. (2006), there are two noticeable trends regarding access to full-day kindergarten. The first trend concerns the types of children served. Full day programs are most likely to serve less advantaged children. The second trend relates to location. Full day

kindergarten programs are more often located in larger cities (Lee et al.). An explanation of these trends could be that larger cities, serving less advantaged children, require full-day kindergarten in order to provide social equity. Yet, evidence gathered from this study suggests that there may be a connection between full-day kindergarten programs and increased reading achievement among students who are not considered less advantaged. The efficacy of kindergarten programs should not be evaluated based solely on the outcomes of this study alone. However, policy makers, parents, and teachers can consider the results, and the results of past studies, when evaluating or implementing kindergarten programs.

Limitations and Summary of Research

As results from this study contribute to present and past literature focusing on early childhood development and kindergarten efficacy, considerations of the current sample and data limitations are necessary. Specifically, it should be noted that the current study was based on student literacy growth on one assessment measure (DIBELS) which exclusively looks at letter identification fluency. The use of additional measures could potentially produce varying results. Although this study presented data gathered from 3 kindergarten programs differing in time and length of day, there was no data on the actual use of instructional time during the day. This may include distinct aspects of classroom process, practice, and management that may differ from teacher to teacher and makes it difficult to distinguish additional factors (other than length and time of day) that may affect students learning. Although all 3 groups represented in the study implemented the same reading curriculum, not all factors remain constant in each classroom (teacher experience, parental involvement, etcetera). A related point follows from the absence of specific student details as far as age, race, gender, socioeconomic status, and educational background. As a result, it is unclear whether selection effects, class size, or other unmeasured

factors may explain the increased literacy growth rates for students attending full-day kindergarten. Had this data have been presented, the literacy growth rates may have been interpreted differently. Although the aforementioned limitations suggest a need for additional research on the literacy growth of students in full- and half-day kindergarten programs, the current study does present evidence concerning the academic benefits of full-day kindergarten.

Lee et al. (2006) explained that research shows that many parents and teachers have positive views regarding full-day kindergarten. In addition, Nowak et al. (2009) stated that full day advocates point out advantages of a longer kindergarten day: (1) teachers are allowed more opportunities to assess children's needs and individualize their instruction, (2) small group learning experiences are more feasible, (3) children are exposed to a broader range of learning experiences, (4) it provides opportunities for closer teacher relationships, and (5) it benefits working parent who may need a longer school day. Nowak et al. suggested that educators continually debate the advantages and disadvantages of full- and half-day kindergarten programs. There is no question regarding the complexity among these debates in terms of funding and resources and this study alone cannot determine whether schools should implement full-day kindergarten programs for all students. However, this study confirms what Lee et al. argued that expanding half-day kindergarten programs seems to be a straightforward change in order to make schools more effective for children and also give them a good start on their overall schooling experience. This research can provide educators with useful and current data from which they can make informed decisions on how to improve and reform our schools in order to provide equitable education of all students.

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APPENDIX

Appendix A Raw Scores

Table 1. Data Results (words per minute) for 2012-2013 kindergarten students at Fernbrook elementary school as measured by the DIBELS assessment.

Class	Fall	Winter	Spring	Class	Fall	Winter	Spring	Class	Fall	Winter	Spring
Full Day 1	29	46	61	half-day AM 1	48	58	59	half-day PM 1	36	44	58
Full Day 2	13	43	54	half-day AM 2	15	48	50	half-day PM 2	36	45	65
Full Day 3	37	54	49	half-day AM 3	31	54	51	half-day PM 3	49	54	56
Full Day 4	8	32	34	half-day AM 4	34	53	65	half-day PM 4	6	31	40
Full Day 5	62	73	81	half-day AM 5	65	45	80	half-day PM 5	25	40	54
Full Day 6	47	71	64	half-day AM 6	20	41	37	half-day PM 6	26	38	51
Full Day 7	19	33	49	half-day AM 7	47	57	71	half-day PM 7	32	39	48
Full Day 8	7	33	37	half-day AM 8	69	70	86	half-day PM 8	5	30	37
Full Day 9	32	67	76	half-day AM 9	19	43	61	half-day PM 9	16	45	54
Full Day 10	14	60	55	half-day AM 10	67	81	77	half-day PM 10	13	43	60
Full Day 11	0	14	29	half-day AM 11	16	44	56	half-day PM 11	28	49	69
Full Day 12	12	44	54	half-day AM 12	32	39	70	half-day PM 12	3	25	29
Full Day 13	21	52	58	half-day AM 13	23	70	89	half-day PM 13	27	55	56
Full Day 14	24	48	59	half-day AM 14	49	71	71	half-day PM 14	24	43	49
Full Day 15	73	76	92	half-day AM 15	16	44	40	half-day PM 15	12	36	59
Full Day 16	46	57	68	half-day AM 16	48	57	77	half-day PM 16	20	41	55
Full Day 17	22	59	63	half-day AM 17	16	33	33	half-day PM 17	3	28	42
Full Day 18	29	64	70	half-day AM 18	36	58	66	half-day PM 18	20	40	49
Full Day 19	29	44	60	half-day AM 19	29	36	47	half-day PM 19	45	30	53
Full Day 20	10	41	54	half-day AM 20	40	52	61	half-day PM 20	42	61	59
Full Day 21	25	30	41	half-day AM 21	31	44	45	half-day PM 21	24	48	69
Full Day 22	23	42	51	half-day AM 22	3	26	38	half-day PM 22	31	50	51
Full Day 23	20	57	56	half-day AM 23	12	32	48	half-day PM 23	1	21	30
Full Day 24	56	74	82	half-day AM 24	47	52	70	half-day PM 24	24	45	57
Full Day 25	64	75	76	half-day AM 25	25	47	65	half-day PM 25	13	26	23
Full Day 26	82	92	95	half-day AM 26	6	24	36	half-day PM 26	3	40	54
Full Day 27	37	74	76	half-day AM 27	30	60	70	half-day PM 27	19	44	67
Full Day 28	51	82	91	half-day AM 28	37	33	53	half-day PM 28	21	45	59
Full Day 29	49	60	70	half-day AM 29	21	37	41	half-day PM 29	32	47	68
Full Day 30	50	56	72	half-day AM 30	35	50	60	half-day PM 30	25	49	48
Full Day 31	23	40	49					half-day PM 31	2	22	36
Full Day 32	50	58	72					half-day PM 32	40	40	45
Full Day 33	0	40	60					half-day PM 33	20	42	50
Full Day 34	38	52	59					half-day PM 34	2	23	30
Full Day 35	25	40	59					half-day PM 35	38	27	81

Appendix B ANCOVA

Table 2. ANCOVA of Literacy Achievement and Kindergarten Programs

ANCOVA analysis for 3 groups:						
Full Data Set Statistics:						
	SS_X	SS_Y	b_tot	SS_error_R	degrees of freedom of error_R	
	31464.51	22302.16	0.642979662	9294.012742	98	
Restricted Data Set Statistics:						
	AVG X	AVG Y	SS_X	SS_Y	regression slope	b num term
Full Day	32.2	53.8	14187.6	9877.6	0.690843	9801.4
AM	32.23333333	48.63333333	8603.366667	5420.966667	0.558801	4807.56667
PM	21.8	39.6	6205.6	3396.4	0.455266	2825.2
		sum	28996.56667	18694.96667		17434.1667
b_S/A	0.601249343					
SS_error_F	8212.685407					
DoF error_F	96					
F num	540.6636674					
F den	85.54880632					
F	6.319944026					
DoF of F stat 2 and 96						
p	0.005					

Appendix C – District Approval

Staci -

You have my official approval to use the assessment results identified in your email communication for the purposes of completing your Masters thesis.

Jeremy M. Willey, Principal

John F. Kennedy Elementary

School | jeremy.willey@isd194.org | 952.232.2800 | <http://www.jfk.isd194.k12.mn.us> |

@PrincipalWilley

On Thu, Sep 11, 2014 at 4:17 PM, Huck, Staci (FB) <HuckS@district279.org> wrote:

Hi Jeremy,

I am working on my Master's Degree through UW-Superior. I'm currently in the process of completing my thesis which I started last summer. The focus of my thesis is to investigate possible relationships between kindergarten school day variations (full- and half-day kindergarten and morning/afternoon kindergarten) along with student's letter identification fluency scores. The exploratory research study focuses on the comparison of DIBLES scores. My plan is to gather and compare letter identification fluency scores from kindergarteners at Fernbrook elementary throughout the 2012-2013 school year. The kindergarten teachers have shared the scores with me for the purpose of my study. The scores will be used for research purposes only. Teachers names will not be used or connected with student scores in anyway. In addition, student names will not be associated with their scores or used in any way. The analysis will focus solely on scores. Could I please get your approval to use the DIBELS scores for my study? If you need any more information please let me know. Thank you so much for your time!

Staci Huck

2nd Grade Teacher

Fernbrook Elementary