Full-Day Kindergarten Effects on Later Academic Success

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Abstract

The purpose of this research was to investigate full-day kindergarten, as a means of improving later academic achievement. A total of 208 students who had continuous enrollment for three consecutive school years from a school district in southern California participated in the study. The sample contained 165 students who had attended the traditional half-day kindergarten program with 43 attending a hybrid all-day kindergarten program. All students were administered the California Standardized Testing and Reporting (STAR) assessment and the California Achievement Test 6th Edition (CAT 6) survey exams. Using stepwise multiple regression, several independent variables were introduced into the regression equation to obtain a Prediction Model of Student Success. The English language arts and math scores of the California STAR Assessment were used as the dependent variable separately. A significant model was not developed. Using an independent-sample T Test procedure, comparing the two groups, was also performed revealing that there were no significant differences in students who attended the all-day kindergarten program and students who attended a traditional kindergarten program.

Keywords

full day, kindergarten, achievement, success

Introduction

Full-day kindergarten is becoming the norm in elementary schools across the country. In fact, many education experts are now calling kindergarten the 13th year of school for U.S. students. Many states offer both full-day and half-day kindergarten, with the trend leading toward the full-day schedule. Only 8 states, the District of Columbia, Puerto Rico, and the Virgin Islands have a compulsory school age of 5 that effectively, if not explicitly, mandates kindergarten attendance for all children. Compulsory attendance ages in other states range from age 6 to 8. Forty-two states, the District of Columbia, Puerto Rico, and the Virgin Islands mandate that school districts offer at least half-day of kindergarten programs; however, only fourteen of those states, the District of Columbia, Puerto Rico, and the Virgin Islands mandate that age-eligible children attend at least a half-day of kindergarten. Of the 14 states, only 9 states mandate that school districts offer full-day kindergarten programs and only 2 of those 9 states mandate that age-eligible children attend full-day kindergarten (Kauerz & McMaken, 2003). However, in some instances where districts offer traditional half-day kindergarten, parents are willing to pay the difference to enable districts to provide a full-day program.

From East to West, promises of full-day kindergarten, addition of extra classrooms, the search for highly qualified teachers, and extra work absorbed by school committees concerned about funding are on the rise, while stating that in doing so, we will ensure the future academic success of our next generation. In contrast, research does not support this finding, but has identified a variety of factors that have contributed to this national trend. With the increasing pressure of school accountability and rigorous content standards imposed by No Child Left Behind (NCLB), educators have responded.

Background of the Study

With a call for accountability, many states are documenting the success or failure of their educational programs as they compete for funding. In 2001, President Bush’s education reform act, NCLB, was a solution for helping our nations
neediest children based on accountability, choice, and flexibility in federal education programs (Bush, 2001). As a direct result of NCLB, high-stake state assessments are now used to bring about curriculum and pedagogical change at an alarming pace. NCLB expects a high level of accountability from each state in specified areas. While K-12 education struggles to respond and demonstrate improvement, many kindergarten programs are either not evaluated or are measured with limited assessments and lack of consistency. Some states have gone so far as to mandate kindergarten content standards in all academic areas, while kinder-
tive data and without changes in curriculum and teaching methods. Some states have gone so far as to mandate kinder-
garten remains to be a noncompulsory grade.

**Statement of Problem**

School districts nationwide are attempting to meet the demands of NCLB by implementing full-day kindergarten, presuming that it will provide increased academic success and a rise in test scores for students in future grades. The implementation of full-day kindergarten is well received with minor exception, yet it is not mandated, funded, nor statistically proven to increase academic achievement for the general population of students.

**Purpose**

The purpose of this research is to provide longitudinal empirical data, to support or refute the body of research available for policy makers to either modify or continue their current kindergarten programs.

**Importance of Study/Significance of the Problem**

With no sound evidence that full-day kindergarten provides academic success for students in future grades, many districts would save millions of dollars in kindergarten programs. Academic achievement is first measured statewide in California at the second grade. It is, therefore, important for districts to determine the effectiveness in measured achievement as soon as practicable in an age of diminishing budgets.

**Research Questions**

The following research questions will guide this study:

*Research Question 1:* Will measurable achievement of second-grade students, who attended full-day kindergarten programs, display an increase in standardized scores when compared with their half-day peers?

*Research Question 2:* When considering the varied population of kindergarten students, which students will realize greater academic achievement in later grades?

*Research Question 3:* Will standardized test scores of second graders validate funding for full-day kindergarten programs?

**Assumptions**

One assumption is that all students in this study were instructed properly. It is assumed that the students have been performing on or near grade level throughout first and second grade. In addition, it is assumed that students considered at risk have been identified, referred to student assistant teams for review, and screened for learning disabilities, physical disabilities, environmental damage, or developmental delays.

**Historical Overview**

Invented by Friedrich Froebel in 1830, kindergarten was created to teach young students about art, design, mathematics, and natural history. Throughout the Austro-Hungarian Empire, kindergarten had become an intricate part of compulsory education for students less than 6 years of age and by 1909, Vienna had more than 72 kindergartens (Watson, 1997).

In 1840, kindergarten was first introduced but not until 1876 did it catch the eye of the American public (Watson, 1997). From that time and well in the 21st century, many laws were enacted, changed, and revoked before California established specific laws for kindergarten within its school system.

In 1890, an amendment was called to action by the Los Angeles School Board to establish and maintain kindergarten schools. In that same year, several charity kindergartens were taken over by the board and five new kindergartens were added to existing primary schools (de Cos, 2001). Previously, children as young as 2 or 3 had been permitted into the private kindergartens. With this no longer available, day nurseries, now known as preschools, were formed. Two years later, in 1893, a law was passed that kindergarten could be established as part of the primary education system and school boards were to use school funds for that purpose (de Cos, 2001). Now part of primary education, kindergarten became a means for children to receive necessary socialization and begin the transition from living at home to attending primary school, gradually adjusting to the academic rigors. During this period of time, the philosophy of kindergarten continued to focus on a child-centered approach, learning art, design, mathematics, and natural history rather than structured academic lessons teaching the Three R’s (de Cos, 2001).

Funding for the public kindergartens became an ongoing issue for school districts and the state. School boards could not see enough evidence of the benefits of kindergarten to support the heavy costs of small teacher to pupil ratio, expensive materials, and half-day classes. In 1905, the California Supreme Court ruled that kindergartens were no longer to be
considered as part of the common educational system. Because of this rule, state funding was no longer available to support kindergarten programs. However, the court did state that cities could support kindergarten programs as part of their primary schools with the condition that the funding came from other sources than the state. For the next 40 years, funding would be a constant battle in the legislation until 1946 when an amendment to the state constitution provided state aid. In addition, they also allowed attendance credit for the kindergarten programs. Not until 21 years later, in 1967, did the legislature mandate that districts incorporate kindergarten programs into their elementary schools making it available to all eligible children (de Cos, 2001).

Kindergarten in the early 1900s was not valued by the middle classes as it emphasized the importance of a trained instructor rather than the mother in training of a child, although this same group found it acceptable for immigrant children and the impoverished children of the slums. With kindergarten no longer operated privately but now funded by school districts and freely available to all, advocates for kindergarten education suggested that these children would greatly benefit. They believed that “proper education” would help to illuminate urban poverty. Furthermore, that by saving these children from the “irrevocable stamp of the slum” by instilling proper habits and virtue, these immigrant and impoverished children would not propagate a generation of poverty and crime (Watson, 1997).

Literature Review

Preventing Early School Failure, a study conducted in the 1970s and 1980s was one of the first attempts to provide evidence that full-day kindergarten was academically beneficial for all students (Karweit, Slavin, & Wasik, 1993). The research reported mixed results, yet consistent evidence regarding socioeconomic status (SES) and/or educationally disadvantaged students exhibited positive academic and social benefits (Burriss, 2000). Literature provides many studies throughout the 1990s furnishing evidence of the effectiveness of full-day kindergarten versus traditional half-day kindergarten discovering that the most benefit is gained by the SES, English language learner (ELL), and economically disadvantaged students. Although a study conducted in 1996 of 19 at-risk students displayed no significant difference in academic achievement, the conclusions state that further research with a larger sample was necessary and the results could not be applied to the general population.

Research evidence implies that full-day kindergarten offers longer lasting academic benefits for children from low-income families or others with fewer educational resources prior to kindergarten (Elicker, 2000). Researchers noted that by adding full-day kindergarten, the achievement gap narrows between children from different racial and ethnic backgrounds. With the additional standards added in California, kindergarten teachers have expressed a need to have more time (Editorial, 2006). All-day kindergarten provides the ability to effectively provide the type of instruction that allows for differentiation and other pedagogical approaches which benefits low-achieving students (Ray & Smith, 2010). Studies that focus on early childhood education often claim that those who graduated preschool had fewer children born out of wedlock, were less likely to be on welfare, and were more likely to be employed (Barnett & Escolar, 1987). Another study conducted for 19 years compared 989 disadvantaged children, mostly African American, who attended high-quality preschool with 550 similar children who attended full-day kindergarten (Ferrandino & Tirozzi, 2001). The extraordinary findings revealed that the preschool children had 41% fewer grade retention and special education referrals, had 29% higher high school graduation rate, and were 33% less likely to be arrested as juveniles. Both of these studies indicate that the earlier a child’s formal education begins, the more likely they are to be academically successful and productive citizens.

A 139,000-student district in Montgomery County, Maryland, instituted a series of reforms within the primary grades. The 2000-2001 initiatives included full-day kindergarten, Class Size Reduction (CSR), a revised curriculum, and increased communication between school officials and parents. Results indicated significant test-score gains. The district’s longitudinal study of its initiative, The Early Success Performance Plan, revealed that children who entered kindergarten with minimal abilities were able to meet or exceed the 50th percentile in reading and language by the end of second grade (Jacobson, 2003). These same pupils were also more likely to be successful if they remained in the same school more than 3 years. In contrast, those children who entered kindergarten with strong abilities were successful in second grade, regardless of whether they received any kindergarten reforms or changed schools.

A research study indicated that more time spent does not provide academic achievement gains beyond the first grade for all students (Elicker, 2000). Several studies have also concluded that any academic edge achieved by full-day kindergarten students dissipates in later years. Academic benefits of full-day kindergarten simply subside soon after children leave kindergarten (Hare, Howard, & Prince, 2001; Votruba-Drzal, Li-Grining, & Maldonado-Carren~o, 2008). Davies and Cress (2010) identify that a passable explanation to this lack of difference in achievement success could be attributed to the practice in many school districts of providing full-day kindergarten programs only to students who are identified as at risk of academic failure.

A study of the effects on achievement and classroom behavior in three different kindergarten schedules documented comparative data within one school district applying a common kindergarten curriculum to better understand the characteristics of an early childhood education program (Hildebrand, 2001). The study was conducted in central Nebraska and kindergarten schedules were based on the
superintendent’s perception of children’s needs. Teachers were asked to rate their perceptions of children’s social competence using a rating scale. A family reading inventory was distributed to survey parents’ participation in their children’s literacy development during the spring. No significant differences for group means were found for reading raw scores and reading percentile scores. The study’s findings suggest that there are no clear differential effects of kindergarten schedules on academic achievement and classroom social behaviors. In order for the results to generalize to other populations, school districts must consider SES, ethnicity, and other variables in their decisions regarding kindergarten schedule. Findings from this study suggest that more time spent “in school” did not ensure academic and social/emotional success for young children; that the quantity of time in a kindergarten day is no more important than the quality of time.

Despite the vague and unclear results, some parents are willing to pay for full day. Parents in Seattle, Washington, have agreed to pay for their children to attend full-day kindergarten. Some elementary schools within the Seattle area have been charging parents US$200 per month for 10 months to provide more full-day kindergarten slots than those financed with state and district money. The money covers the cost of hiring enough staff members to reduce class sizes to approximately 20 students. Seattle’s weighted student funding formula finances full-day kindergarten for students living in poverty and lower socioeconomic areas, yet the middle-class and upper-middle-class neighborhoods do not receive added funding. Due to the existing population of middle-class students attending private schools, public school administrators have offered parents the opportunity to redirect their monies to financing full-day kindergarten in their neighborhood schools. In Seattle, public schools are marketing themselves for paying competition (Gewertz, 2002). In documentation from the Education Commission of the States (2004), most states are bound to funding formulas through categorical funding. Though many schools nationwide offer full-day kindergarten, there are still many who are unable to offer it due to staffing, facilities, and costs of operation (Magnuson, 2002). Even if parents are willing to pay for Seattle’s extended full-day kindergarten program, it is obvious that kindergarten programs will continue to expand throughout the country provoking interest and controversy.

Some districts like it because it eliminates the need to provide buses and crossing guards at midday (Chmelynski, 1998). Not only is there concern with providing crossing guards and bussing but also facilities to house the students, salaries of teachers, supplies, and curriculum materials for newly imposed kindergarten standards in response to the NCLB. Most districts, however, estimate that the expansion of traditional half-day kindergarten to full-day kindergarten will cost hundreds of thousands of dollars.

Changes in American society have also encouraged the growth of full-day kindergarten. Pressure of high-stakes testing, double-income families, and single-parent homes have influenced educational system. One factor supporting the need for full-day kindergarten is the academic rigor required as schools become more accountable for the performance of their students. Another factor is the number of poor and non-English-speaking students. Some feel the benefits outweigh the costs. While there is an impressive amount of research supporting full-day kindergarten’s benefit during the kindergarten year and transition to first grade in the social-emotional development of children, opponents argue that having a longer school day will not help children improve. Without good teachers and a good curriculum, a full-day program could result in children spending more time in a bad environment. As more and more states propose and pass legislation establishing or expanding full-day kindergarten, principals need to analyze their schools’ programs to ensure that students are spending more time in a quality learning environment (Magnuson, 2002). “Just attending a kindergarten program three hours past lunchtime does not begin to address the dynamics of teaching five-year-olds, nor does it adequately prepare them for first grade. Doubling the time does not necessarily double the program quality” (Weast, 2001, p. 9). It is clear that in an age of diminishing funds, every program must be evaluated as an academic enterprise.

### Method

Is a full-day kindergarten program an effective means to increase student achievement in later grades? To answer this question, one must analyze and compare achievement of students over time. The purpose of this research is to investigate an all-day kindergarten program to increase student’s achievement. Another central question is the effect of an all-day kindergarten program on lower socioeconomically identified students.

The study focuses on the following three hypothesis statements:

**Hypothesis 1:** There is not a significant difference in language arts achievement as measured by the California Standards assessment between students attending an all day kindergarten program and those students who attended a traditional half-day kindergarten program.

**Hypothesis 2:** There is not a significant difference in math achievement as measured by the California Standards assessment between students attending an all day kindergarten program and those students who attended a traditional half-day kindergarten program.

**Hypothesis 3:** Attendance in an all-day kindergarten program is not a predictor of later achievement in second-grade students.

If there is a significant difference in achievement of second-grade students who attended a full-day kindergarten program and those who did not, school districts will be able
to meet the needs of more students. Furthermore, if attending
an all-day kindergarten program is a predictor in young
children and their future success, educators will be able to
use such a program for students who are at risk of failure and
do a better job of designing instruction and providing inter-
tentions to help them learn to succeed.

All-day kindergarten began at the district as a voluntary
pilot program at Elementary School F in 2000-2001. In
1999-2000, a parent survey was developed to determine
whether there was sufficient desire and need for an all-day
kindergarten program at Elementary School F. The survey
revealed that parents overwhelmingly felt that an all-day
kindergarten program would be beneficial to their students.
The all-day kindergarten option was discussed with teachers
and their approval was granted. The program was imple-
mented as a voluntary option for teachers involved. All kin-
dergarten teachers, along with one special education teacher,
wanted to participate. Parents had the option through the open-
enrollment process of sending their students to a different
school within the district if they did not want to participate in
the all-day kindergarten program. One parent used the open-
enrollment option at the beginning of the school year, and
one additional parent transferred his student at the middle of
the school year. The original kindergarten program at
Elementary School F consisted of two half-day morning ses-
sions and one half-day afternoon session. This program was
modified into three all-day kindergarten classes. No ad-
ditional classrooms were needed to implement the program.
The two morning sessions already had assigned classrooms.
The afternoon session was combined with a full-inclusion
special education class, and therefore no additional class-
room was needed.

Program Description

The full-day kindergarten program lasts between 6 hr and 20
min and 6 hr and 15 min depending on the school site. A full
week program consists of 1,875 to 1,900 min. Of that time,
approximately 26% (494 min) of the time is spent on
reading/language arts. Approximately 10% (190 min) of the
time is spent on math. A total of 7% of the time is spent on
science, social studies, and music/physical education (PE).
In all, 15% (285 min) of the time is spent on centers, library,
videos, and general classroom activities. Another 13% (247
min) of the time is spent on opening, attendance, pledge of
allegiance, calendar, and cleanup. A total of 29% (551 min)
is spent on recess, lunch, snack, and quiet time. All times
were established district program–recommended guidelines.

The partial-day kindergarten program lasts 3 hr and 15
min. A full week program consists of 975 min. Of that time,
approximately 7% (68 min) is spent on opening, attendance,
pledge of allegiance, and calendar. A total of 38% (370 min)
is spent on English/language arts. Another 13% (127 min) is
spent on math. Another 13% (127 min) is spent on PE/social
sciences. Approximately 6% (59 min) is spent on centers,
library, and computer lab and 8% (78 min) is spent on recess.

As with the all-day program, all times were district-
recommended guidelines.

Parents of students enrolled in schools in the district that
do not have an all-day kindergarten program may use the
open-enrollment option to enroll in Elementary School F’s
program, and parents are eager to enroll their students. The
full-inclusion classroom is very highly requested. Elementary
School F staff indicate that students receive a much more
enriching kindergarten experience because teachers can
address science, social studies, and fine arts in addition to
mathematics and English/language arts at a less frantic pace.
This is especially beneficial in light of expanded require-
ments and content standards. Teachers find that they can fit
everything in during the day, are able to address content stan-
dards more completely, and can instill good work habits,
procedures, and study skills. All-day kindergarten allows
teachers and students to end each day and each school year
with a feeling of completion.

Elementary School A began their all-day kindergarten
program in 2001-2002. In the 1st year of program implemen-
tation, only one of three (one full day, one morning, one
afternoon) kindergarten classrooms was an all-day program.
In 2002-2003, two of four kindergarten classrooms imple-
mented all-day programs. And in the 2003-2004 school year,
four of four kindergarten classrooms offered all-day pro-
grams. All-day kindergarten was offered on a voluntary basis
by teacher request and did not impact classroom space at the
school. The program began because of a local Charter School
offering a full-day program and Elementary School A wanted
to be competitive. Also, there were many parent inquiries,
and parent requested for the all-day program. Only one par-
ent did not want to participate and was offered the option of
open enrollment at another school.

Elementary School C implemented the all-day kinder-
garten program in the 2003-2004 school year. The program
was implemented by teacher request and consisted of one
all-day kindergarten, and one K-1 combination class. The
teacher felt a need for the full-day program to be able to
cover all of the California standards and requirements.
Elementary School C had adequate space and offered the open-
enrollment option to enroll in Elementary School F’s
program, and parents are eager to enroll their students. The
full-inclusion classroom is very highly requested. Elementary
School C implemented the all-day kinder-
garten program in the 2003-2004 school year. The program
was implemented by teacher request and consisted of one
all-day kindergarten, and one K-1 combination class. The
teacher felt a need for the full-day program to be able to
cover all of the California standards and requirements.
Teachers found that they can fit
everything in during the day, are able to address content stan-
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to be competitive. Also, there were many parent inquiries,
and parent requested for the all-day program. Only one par-
ent did not want to participate and was offered the option of
open enrollment at another school.

While achievement testing is limited in kindergarten and
first grade with teacher anecdotal assessment, statewide
standardizing testing was available in the second grade. The
decision was made to use an assessment that has strict stan-
dards for validity and reliability, which allows for a less sub-
jective program evaluation. The California Standardized
Testing and Reporting (STAR) Assessment Program was
selected as the vehicle for that assessment.

For the past several years, the California public schools
have been administering the STAR Testing program. The
purpose of the STAR program is to help measure how well
students are learning the California academic standards.
Beginning in 2003, California public schools are also under
the federal accountability system outlined in NCLB. Both
the Academic Performance Index (API) and Annual Yearly Progress (AYP) are reported each year. Teachers, parents, and administrators use these test results to monitor each student’s progress. The results are used in combination with other indicators of student achievement to help make decisions about ways to improve student learning and school programs.

The Public Schools Accountability Act (PSAA) was signed into law in California in April of 1999. This law authorized the establishment of the first statewide accountability system for California public schools. One major component of this accountability system is the API, which is the cornerstone of the PSAA. Both the California Standards Test (CST) and the California Achievement Test 6th Edition (CAT 6) test results are used to calculate each school’s API.

The No Child Left Behind (NCLB) act of 2001, which reauthorized the federal Elementary and Secondary Act (ESEA), requires all districts and schools to demonstrate Adequate Yearly Progress, with an eventual goal that 100% of all students will be proficient or above in reading/language arts and mathematics by 2013-2014.

The all-day kindergarten study included two custom groups of students. One group consisted of full-day kindergarten students and the second group included the traditional half-day kindergarten students who began in the 2003-2004 school year. STAR CST scores in English, reading and writing; and in math, number sense, algebra, measurement and geometry, statistics, data analysis, and probability; and (CAT 6) scores in reading, language arts, and math were gathered for each student and for each group of students as a result of the spring 2005 test administration. Data were disaggregated into categories including free and reduced meals, ELL, gender, and ethnicity. The data from each category were analyzed through Statistical Package Social Sciences (SPSS) software to determine results of any significance.

A total of 208 students from a K-12 school district in southern California participated in the study. This longitudinal study was conducted over 3 years. In all, 43 all-day kindergarten students and 165 randomly selected traditional kindergarten program students all who maintained continuous enrollment from kindergarten through second grade were administered the California Standards assessment in Grade 2. Two years later, when the students were in the second grade, language arts and math scores were obtained as measured by the California State-mandated State Standards Assessment as part of the California STAR Assessment. The independent-samples t-test was used to evaluate the difference in achievement in a variety of subjects. Reading, writing, algebra functions, number sense, measurement, and statistics and probability as well as normal curve equivalence (NCE) scores of the CAT 6 math and reading assessments were used in the means comparisons test. Also included as a variable is the achievement classification which uses a 5-point scale (5 being highest) in English language arts and math to determine if a student is functioning below, at, or above grade level. In addition, using stepwise multiple regression, several independent variables were introduced into the regression equation to obtain a Prediction Model of All Day Kindergarten Achievement. The assessment scores of the entire battery of test were used as the dependent variable in separate regression runs. The independent variables used were (a) SES (as determined by free/reduced lunch status), (b) ELL status, (c) all-day kindergarten status, and (d) gender status.

Setting and Sample

The participating school district resides in an urban area with a medium-size population. The city’s school district serves approximately 6,000 students in grade spans K-12th grade. The district’s demographic data are displayed in Table 1. Containing six elementary schools, the study district spans three city geographical areas. In addition, the district maintains a state-approved preschool that serves approximately 100 students. None of the participating students in the study participated in the preschool program.

All kindergarten students who attended the all-day program and were still maintaining attendance, within the district, participated in the study. The 165 students who participated in only the traditional program were randomly selected from the remaining total district population but had also attended the district school continually since kindergarten.

Data Collection Procedures

All students were administered the battery of tests required for California state students in Grade 2 in the spring of 2006.

CST

The CST is the cornerstone of the California STAR Program. Given in English, the CST is designed to assess how well students are doing with respect to the California academic standards in English-language arts, mathematics, history-social science, and science. These academic standards describe what students should know and be able to do at each grade level. The individual STAR Student Report provides overall scaled scores and performance levels for each CST. Overall scaled scores are reported on a scale ranging from 150 to 600. Performance levels are advanced, proficient, basic, below basic, or far below basic. The state target is for all students to attain the proficient or advanced level on the CSTs. The range of scores that belong to each performance standard varies by grade, content area, and year. However, regardless of grade and content area, the range for the basic level of performance is between 300 and 349. California assigns performance standards for content areas but not for standards and substandards.
The CAT 6 assesses the achievement of basic academic skills in key subjects that are commonly taught in public schools throughout the United States. The CAT 6 compares the performance of California students to the performance of students throughout the nation who take this assessment. Students in Grades 2 to 11 are tested in reading, language, and mathematics. Students in Grades 2 to 8 are also tested in spelling, and students in Grades 9 to 11 are tested in science. The CAT 6 reports student scores for each subject area as raw scores, scaled scores, and percentile ranks. The 50th percentile rank is the national average, and a score between the 40th and 60th percentiles is considered an average score.

Data Analysis Procedures

The study’s assessments yield data with either interval or Likert-type scaling. Given this type of data, the hypothesis was assessed using parametric statistical procedures. There were two procedures used: (A) the independent-samples t-test procedure comparing means for the two groups and (B) stepwise multiple regression. Measures of central tendency were also calculated. The significance level selected for this study is the conventional .05 level. This means that the results will not be termed significant unless only 1 out of 20 times the relationship could be obtained based on chance alone.

During the spring of 2005, students were administered the standardized tests of California Standards Assessment and the CAT 6. Descriptive statistics and frequency distributions were calculated using the statistical software package SPSS 11. All National Percentile Rankings (NPR) were converted to Normal Curve Equivalents (NCE) to perform all calculation, and then converted back to NPR. Using the method of mean substitution eliminated problems that might have occurred because of missing data. In addition, to avoid problems of multicollinearity, a tolerance level of .30 was utilized. Normal probability plots were used to examine the assumption of normality and the Levene test was used for equality of variances. All variables tested were found to be normal in their distributions.

Table 1. Districts Demographics

| Ethnicity            | School A | School B | School C | School D | School E | School F | Total |
|----------------------|----------|----------|----------|----------|----------|----------|-------|
| African American     | 22       | 32       | 13       | 20       | 29       | 40       | 156   |
| Caucasian            | 307      | 346      | 121      | 302      | 217      | 319      | 1,612 |
| Asian                | 3        | 10       | 1        | 10       | 6        | 9        | 39    |
| Filipino             | 10       | 7        | 0        | 8        | 10       | 14       | 49    |
| Hispanic             | 68       | 55       | 20       | 50       | 161      | 54       | 408   |
| Indian/Alaskan       | 9        | 7        | 2        | 10       | 4        | 9        | 41    |
| Other                | 16       | 33       | 12       | 26       | 27       | 0        | 114   |
| Pacific Islander     | 1        | 5        | 0        | 5        | 2        | 7        | 30    |
| Total                | 436      | 495      | 169      | 431      | 456      | 452      | 2,439 |

CAT 6

The results and discussions in this section are to assist in the development of programs to improve achievement in elementary school students by analyzing various independent variables a typical student may encounter in his or her future academic experience.

The results are presented in four parts. First, descriptive statistics of the entire sample and subsamples are discussed. Frequency distributions (Table 2) as well as measures of central tendency for all-day kindergarten students and traditional kindergarten are presented. Sample cross-tabulation are displayed (Tables 3, 4, and 5) to develop an understanding of the unique characteristics of each group (all day vs. traditional). Because the significance value for the Levene test was high (greater than 0.05), only the results that assume equal variances for both groups is displayed. Second, prior to performing hypotheses testing, each group must be separated into gender, ELL status, and free/reduced lunch status. Third, the independent-samples t test was used to evaluate the difference in achievement in the selected subject areas (Table 6) for all subjects and for each subgroup. Fourth, stepwise multiple regression runs were made using the dependent variable (Math Standards Level and English language arts [ELA] Standards Level) and the independent variables of gender, ELL status, free/reduced status, and all-day kindergarten status (Tables 7, 8, and 9).

Descriptive Statistics

Slightly less than 50% of the students in the sample were female (102), whereas 51% were male (106). In all, 48% of the students were participating in the free and reduced lunch program (100), whereas 52% were not (108). Although ethnicity
was not germane to this study, participants noted the race that they most closely identified with. The result of this information is reported in Table 10.

Language proficiency was also not the subject of this study but was used to create subgroups to avoid inaccurate analysis that may occur because of language proficiency. Table 4 displays the Language proficiency frequencies for the participants.

### Table 2. Descriptive Statistics

| All-day kinder program | N  | M   | SD  | SE M |
|------------------------|----|-----|-----|------|
| Math level             |    |     |     |      |
| No                     | 165| 3.61| 1.135| 0.088|
| Yes                    |  43| 3.60| 1.050| 0.160|
| ELA level              |    |     |     |      |
| No                     | 165| 3.39| 1.022| 0.080|
| Yes                    |  43| 3.60| 0.903| 0.138|
| Standards reading      |    |     |     |      |
| No                     | 165| 65.800| 17.8398| 1.3888|
| Yes                    |  43| 67.860| 15.7383| 2.4001|
| Standards writing      |    |     |     |      |
| No                     | 165| 65.2121| 20.74020| 1.61462|
| Yes                    |  43| 71.1163| 17.63412| 2.68918|
| Standards number sense |    |     |     |      |
| No                     | 165| 70.3152| 19.67721| 1.53187|
| Yes                    |  43| 67.5581| 17.82361| 2.71807|
| Standards algebra      |    |     |     |      |
| No                     | 165| 76.0545| 22.98097| 1.78907|
| Yes                    |  43| 80.9302| 23.11606| 3.52517|
| Standards measurement  |    |     |     |      |
| No                     | 165| 81.1697| 15.76644| 1.22742|
| Yes                    |  43| 84.1395| 13.01388| 1.98460|
| Standards statistics   |    |     |     |      |
| No                     | 165| 75.5394| 21.38084| 1.66450|
| Yes                    |  43| 76.0930| 20.14922| 3.07723|
| CAT 6 reading          |    |     |     |      |
| No                     | 164| 53.409| 26.7017| 2.0851|
| Yes                    |  43| 55.186| 24.6463| 3.7585|
| CAT 6 language         |    |     |     |      |
| No                     | 164| 56.079| 28.0348| 2.1892|
| Yes                    |  43| 55.395| 28.0418| 4.2763|
| CAT 6 math             |    |     |     |      |
| No                     | 164| 61.524| 29.5447| 2.3071|
| Yes                    |  43| 60.186| 29.6160| 4.5164|

Note: ELA = English language arts; CAT 6 = California Achievement Test 6th Edition.

### Table 3. Free and Reduced Lunch Cross-Tabulation: All Day Versus Traditional

| Free/reduced lunch status | No | Yes | Total |
|---------------------------|----|-----|-------|
| All-day kinder            |    |     |       |
| No                        | 87 | 78  | 165   |
| Yes                       |  21| 22  |  43   |
| Total                     | 108| 100 | 208   |

### Table 4. English Language Learner (ELL) Status Cross-Tabulation: All Day Versus Traditional

| ELL status | 0 | 1 | Total |
|------------|---|---|-------|
| All-day kinder |    |   |       |
| No          | 143| 22| 165   |
| Yes         |   39| 4 |  43   |
| Total       | 182| 26| 208   |

### Table 5. Gender Cross-Tabulation: All Day Versus Traditional

| Gender | F | M | Total |
|--------|---|---|-------|
| All-day kinder |    |   |       |
| No          |  84| 81| 165   |
| Yes         |   22| 21|   43   |
| Total       | 106| 102| 208   |

### Independent-Sample t-Test Analysis

Using all available assessment, there were no significant differences in the scores of students who attended an all-day kindergarten and those who did not (Table 6). These results remained the same for males and females as well as for each subgroup of students (ELL and free and reduced lunch). Only the Standards Measure score for non-ELL students approached significance (.058). Scores for all-day kindergarten students were slightly higher but none proved to test significant.

### Regression Analysis

While a significant model was developed, attendance in an all-day kindergarten program was not among the predictors. Free and reduced lunch status proved to be the most useful tool when predicting student reading success ($R^2$ of .052). Table 7 displays $R$, $R^2$, adjusted $R^2$, and the standard error. $R$, the multiple correlation coefficient, is the correlation between the observed and predicted values of the dependent variable. The values of $R$ for prediction models produced by the regression procedures range from 0 to 1. Larger values of $R$ indicate stronger relationships. $R^2$ is the proportion of variation in the dependent variable explained by the regression model. The values of $R^2$ range from 0 to 1. Small values indicate that the model does not fit the data well. The sample $R^2$ tends to optimistically estimate how well the model fits the population. Adjusted $R^2$ attempts to correct $R^2$ to more closely reflect the goodness of fit of the model in the population.

Table 8 displays the results of an ANOVA test. A model with a large regression sum of squares in comparison with
Table 6. Independent-Samples t-Test

|                    | Levene’s test for equality | t-test for equality of means | 95% confidence interval of the difference |
|--------------------|-----------------------------|-----------------------------|------------------------------------------|
|                    | F   | p   | t   | df | p (two-tailed) | M difference | SE difference | Lower  | Upper  |
| Math level         |     |     | 2.330 | .128 | 0.039 | 206 | .969 | 0.01 | .191 | −0.370 | 0.385 |
| ELA level          |     |     | 1.005 | .317 | −1.232 | 206 | .219 | −0.21 | .171 | −0.548 | 0.127 |
| Standards reading  |     |     | 2.121 | .147 | −0.690 | 206 | .491 | −2.060 | 2.984 | −7.9449 | 3.824 |
| Standards writing  |     |     | 1.581 | .210 | −1.712 | 206 | .088 | −5.9042| 3.44938| −12.70476| 0.8964 |
| Standards numbers  |     |     | 2.198 | .140 | 0.834 | 206 | .405 | 2.7570| 3.30691| −3.76271| 9.276 |
| Standards algebra  |     |     | 0.905 | .343 | −1.238 | 206 | .217 | −4.8757| 3.93954| −12.64267| 2.891 |
| Standards measure  |     |     | 2.521 | .114 | −1.138 | 206 | .257 | −2.9698| 2.61036| −8.11629| 2.176 |
| Standards statistics |   |     | 0.319 | .573 | −0.153 | 206 | .879 | −0.5536| 3.61884| −7.68834| 6.581 |
| CAT 6 reading      |     |     | 0.549 | .459 | −0.395 | 205 | .694 | −1.778 | 4.5048 | −10.6593 | 7.104 |
| CAT 6 language     |     |     | 0.004 | .950 | 0.142 | 205 | .887 | 0.684 | 4.8034 | −8.7865 | 10.15 |
| CAT 6 math         |     |     | 0.025 | 0.875 | 0.264 | 205 | .792 | 1.338 | 5.0643 | −8.6465 | 11.32 |

Note: ELA = English language arts; CAT 6= California Achievement Test 6th Edition.

Table 7. Regression Model Summary Dependant Variable Standards ELA Level

| Model Summary | R | R² | Adjusted R² | SE of the estimate |
|---------------|---|----|-------------|--------------------|
| 1             | .229 | .052 | .048 | .976 |

Table 8. ANOVA Dependant Variable Standards ELA Level

| Model | Sum of squares | df | M² | F   | p   |
|-------|----------------|----|----|-----|-----|
| 1     | 10.863         | 1  | 10.863 | 11.399 | .001 |
| Residual | 196.324   | 206 | 0.953 |
| Total  | 207.187       | 207 | 0.953 |

Note: ELA = English language arts.

Table 9. Coefficients Analysis Dependant Variable Standards ELA Level

| Unstandardized coefficients | Standardized coefficients |
|-----------------------------|---------------------------|
| Model | B   | SE | β   | t   | p   |
| 1    | Constant | 3.657 | .094 | 38.934 | .000 |
| Free | −0.457 | .135 | −.229 | −3.376 | .001 |

Note: ELA = English language arts.

Discussion and Conclusion

Hypothesis 1 is accepted; there is not a significant difference in language arts achievement as measured by the California Standards assessment between students attending an full-day kindergarten program and those students who attended a traditional half-day kindergarten program. Hypothesis 2 is accepted; there is not a significant difference in math achievement as measured by the California Standards assessment between students attending a full-day kindergarten program and those students who attended a traditional half-day kindergarten program. Hypothesis 3 is accepted, attendance in a full-day kindergarten program is not a predictor of achievement in second-grade students.
All three hypotheses of the current research are accepted and display results similar to that of a study that found no clear differential effects of kindergarten schedules in both academic achievement and classroom social behaviors (Hildebrand, 2001). These findings also replicate a recent meta-analysis of full-day kindergarten programs, which determined that most benefits fade after the third grade (Cooper, Allen, Patall, & Dent, 2010).

Both studies, however, agree that school districts need to consider SES, ethnicity, level of parent education, and other variables in their decisions regarding full-day kindergarten. In support of the current findings, a comprehensive literature review of full-day versus traditional half-day kindergarten programs found similar results in that the benefits of full-day programs were not apparent in later years (Lash, Bae, Barrat, Burr, & Fong, 2008). Participation in full-day kindergarten or traditional half-day kindergarten does not appear to be a predictor of a students’ overall math and reading scores in later grades.

Often parents are surveyed for their opinion or desire for full-day kindergarten, which usually results in an overwhelming favor of full-day kindergarten. Many principals feel the pressure to incorporate such programs when the public displays such desire, when the parent’s decision is not educationally sound but rather based on the need for afternoon day care. Likewise in the current research study, the district surveyed parents to determine if there was sufficient evidence to support a full-day kindergarten program. There was not one survey that did not support a full-day kindergarten program. Fortunately, there was no additional cost to the district as is felt by many school districts across the nation.

From the review of literature, research comparing full-day kindergarten versus traditional half-day kindergarten programs generally finds positive effects of full-day programs on end-of-year measures of reading readiness, language, and other objectives. However, few studies that have examined the benefits of full-day kindergarten effects in later years found evidence of benefits even as early as at the end of first grade (Karweit, Slavin, & Wasik, 1993).

Despite the increase in the popularity of kindergarten, very little research specifically examines the academic benefits of full-day kindergarten versus traditional half-day kindergarten in later grades. The vast majority of studies focus their research on the benefits of full-day kindergarten and the academic achievement gained at the end of kindergarten or first-grade students. There is a lack of literature that reports on the findings concerning the long-term effects of full-day kindergarten versus traditional half-day kindergarten in student math and reading scores in later grades. Regardless, full-day kindergarten is sweeping the nation, costing millions of dollars to school districts that have based their decisions on greater school achievement, pressure from day care family needs, and inconclusive research. Before policy makers mandate full-day kindergarten programs, they should seek longitudinal studies to substantiate their million dollar decisions.

Young children’s learning is intimately connected to and will depend on their cultures, languages, and communities. Nonacademic strengths such as emotional competence or positive approaches to learning when children enter kindergarten are strong predictors of academic skills in later grades. Many of the benefits associated with full-day kindergarten remain anecdotal; isolating the effects of extra class time from factors such as class size, teaching methodology, teacher experience, and parent involvement proves to be difficult.

As do most studies, additional questions for future research always arise. Would other all-day kinder programs generate the same effect? Would students of different demographics produce a more significant difference in achievement? Is using standardized testing the best way to determine a program’s success? This study may be one of many to provide information that leads researchers in new directions as the struggle to learn the most effective ways to increase achievement in children continues. In closing, to identify programs that produce lasting effects, longitudinal research must become an integral part and priority of the educational system. Perhaps it was best captured by a saying which was

| Table 10. Demographics of Study Participants |
|---------------------------------------------|
| School | School A | School B | School C | School D | School E | School F | Total |
|-----------------|----------|----------|----------|----------|----------|----------|-------|
| Ethnicity        |          |          |          |          |          |          |       |
| African American | 1        | 6        | 4        | 2        | 3        | 16       | 16    |
| Caucasian        | 22       | 28       | 16       | 26       | 23       | 14       | 129   |
| Asian            | 1        |          |          |          |          |          | 1     |
| Filipino         | 1        | 1        |          |          |          |          | 2     |
| Hispanic         | 8        | 6        | 9        | 19       | 5        | 47       | 6    |
| Indian/Alaskan   | 1        |          |          |          | 3        |          | 4     |
| Other            | 1        |          | 3        |          |          |          | 4     |
| Pacific Islander | 1        |          |          |          |          |          | 1     |
| Total            | 35       | 41       | 16       | 41       | 48       | 27       | 208   |
reported to have hung outside of Albert Einstein office at Princeton, “Not everything that can be counted counts, and not everything that counts can be counted” (Einstein, attributed).

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