Arizona Department of Education
Tom Horne, Superintendent of Public Instruction

Academic Impacts of Full-Day Kindergarten Instruction: A Comprehensive Review of Existing Research

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Contact Information:

Early Childhood Education
Educational Services and Resources
(602)364-1530

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The Arizona Department of Education acknowledges the following individuals for their contributions to this report:

Allison Landy, M.Ed., Principal Writer
Rolanda Bell, M.A., Contributor
Allison Larsen , Contributor
Karen Woodhouse, M.S., Editor
Sally Downing, M.Ed., Editor

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PURPOSE OF REVIEW

A review of the existing literature on full-day kindergarten instruction and its impacts on students' academic achievement was conducted by the Arizona Department of Education (ADE) as required by ARS §15-901.02.P. The review included an examination of research studies, academic literature and policy reports, with an emphasis on research studies that were longitudinal in nature and described the long-term academic impacts of full-day kindergarten instruction. As directed by ARS §15-901.02.P., this report includes a summary of research findings both supporting and not supporting full-day kindergarten.

METHOD OF REVIEW AND ORGANIZATION OF FINDINGS

ADE collected data from a variety of public and private resources including direct research, meta-analysis of research studies, and other summaries of existing data addressing the academic impacts of full-day kindergarten instruction. When available, ADE utilized research reports published in peer-reviewed journals. Research studies or reports addressing the effects of full-day kindergarten instruction other than academic impacts were not considered for the purpose of this report. Descriptions of studies and summaries of findings are organized into two sections: Longitudinal Studies Assessing Academic Impact of Full-Day Kindergarten, and Policy Reports.

All studies, reports, and information from various documents were synthesized to identify commonalities and consistencies among the reported effects and are included in the Findings and Conclusion section of this report.

OVERVIEW

Research on the effects of full-day kindergarten programs has been published with regularity since the 1980s. Many of the earlier studies reported mixed results regarding the effect on academic achievement, but were consistent in reporting findings on the positive effect on academic achievement for children identified as being at risk (Clark, 2001). In the 1990s, researchers began to develop more sophisticated study designs and therefore, began to show more consistent positive outcomes for all children. Walston and West (2004) further confirm the research has generally, but not consistently, suggested that full-day kindergarten programs compare favorably to half-day programs in terms of children's academic achievement.

An issue adding to the challenge of understanding the full effects of all-day kindergarten instruction is the fact that available data are based primarily on state policies related to the programs offered, the length of the kindergarten day, and attendance requirements (Vecchiotti, 2001). Although most individuals consider kindergarten as the entry point to public education, state policies often treat kindergarten as a non-mandated grade of attendance, either at a full or half-day of instruction, and vary greatly in implementation (Vecchiotti, 2001). Brewster and Railsback (2002) further explain that:

> "…drawing conclusions from the existing research on full-day kindergarten is not easy – in part because kindergarten practices and student populations vary so widely from school to school. Many of the benefits associated with full-day kindergarten remain

> anecdotal, or are based on single-district studies that failed to control for family income level, mobility, parents' level of education, or other factors that may affect student performance, regardless of kindergarten schedule."

Although more research is needed measuring the long-term effects of full-day kindergarten instruction on academic achievement, this report summarizes the data currently available.

LONGITUDINAL STUDIES ASSESSING LONG-TERM ACADEMIC IMPACT OF FULL-DAY KINDERGARTEN

1. Reducing the School Performance Gap Among Socio-economically Diverse Schools: Comparing Full-Day and Half-Day Kindergarten Programs (2003)

John C. Larson
Office of Shared Accountability, Montgomery County Public Schools

Study Overview

This comparison study was conducted by the Office of Shared Accountability for the Montgomery County Public Schools (MCPS). MCPS designed and implemented a variety of early childhood initiatives beginning in the 2000-01 school year with the intent of reducing the achievement gap among children of diverse backgrounds. The current report considers grade 2 performance and is one of three related reports on the initiatives' outcomes. Providing full-day kindergarten was one strategy implemented in the school district plan. Other strategies included: reduction of class sizes to 15 in all kindergarten classrooms and 17 in all first and second grade classrooms, a revised curriculum for K - grade 3, assessment aligned with curriculum and conducted three times per year, professional development, and additional staff development support personnel at each school. Beginning in 2000-01, full-day instruction was implemented in 17 schools, nine of which had full-day kindergarten in previous years. In 2001-02 an additional 17 schools implemented full-day kindergarten, and in 2002-2003, 22 more schools implemented the all-day instruction model. Schools were added based on their perceived level of need determined by the percentage of children receiving free and reduced-price meals service (FARMS) and students considered English for Speakers of Other Languages (ESOL). After the initial three-year phase-in period, 63 schools remained that continued to provide the half-day program. The specific issue of interest for this report was whether the changes in 2003 among the full-day kindergarten schools that received the kindergarten enrichment program exceeded the changes for 2003 found among the half-day kindergarten groups. An important point made in this study was that full-day kindergarten instruction and a reduction in class size was phased in over a three-year period, but other strategies were implemented in all the district schools in the first year. Larson (2003) explains:

> "The implementation of these initiatives, across years and among schools, makes it difficult to attribute the improvements in the class of 2003 second graders to any single component of the drive for early academic achievement. However, the net effect of these initiatives has been to reduce the persistent gap in school performance between schools in poorer and wealthier neighborhoods."

Study Design and Data
The author used a sample of students who were continuously enrolled in one school from grade K through second grade. The article examined growth in scale score points in reading from baseline (2000) through 2003 for students participating in all-day kindergarten.

Author's Findings

- Compared to an average of scale scores from the three years prior to implementing the early childhood program initiatives (which included full-day kindergarten), the full-day participants' grade 2 scale scores on the Comprehensive Test of Basic Skills increased by 8 points in reading, 9 points in language, 7 points in language mechanics, 13 points in mathematics, and 24 points in mathematics computations. Half-day participants' scale scores increased 2 points in reading, 4 points in language, 2 points in language mechanics, 3 points in mathematics, and 10 points in mathematics computations. The differences in scale score increases between full-day and half-day participants were statistically significant in all areas.
- "…the improvements for Grade 2 class of 2003 were significantly greater in the schools characterized by high poverty when compared with schools in wealthier neighborhoods. The net effect of this phenomenon was to reduce the disparities in achievement between those schools in the wealthy and those in the poor neighborhoods." (p.i)
- "A review of four successive years of Grade 2 test scores for students continuously enrolled since kindergarten in high-poverty schools showed that [full-day kindergarten students] attained an average scale score equivalent to the 78th national percentile level; whereas for the prior three years [when students attended only half-day kindergarten] students from those same schools produced average scale scores equivalent to just the 52nd national percentile level." (p.i)

2. Evaluation of the Longitudinal Impact of Comprehensive Early Childhood Initiatives on Student Academic Achievement (2003)
Theresa Alban, Jennifer Nielsen, and Carol Schatz
Office of Shared Accountability, Montgomery County Public Schools

Study Overview
This report was the second of three completed for the Montgomery County Public Schools to evaluate the long-term effectiveness of the district implemented early childhood initiatives. Full-day kindergarten was a key strategy among the initiatives for the purpose of improving student achievement, especially among students considered "at-risk." The longitudinal impact was studied by reviewing prior studies of children's progress in kindergarten as analyzed by Bridges-Cline in 2001 and comparing it to Grade 1 data as collected by Nielsen and Cooper-Martin (2002) and then comparing it to Grade 2 data collected for the current piece of the research. The study looks specifically at the children who participated in the first 17 schools to implement full-day kindergarten and follows their progress through Grade 2. The authors were interested in analyzing the contrast between the full-day and half-day programs and the interaction of the full-day and half-day program contrast with the group that received both free and reduced-price meals service (FARMS) and English for Speakers of Other Languages (ESOL) services in kindergarten.

Study Design and Data
The study used a sample of 7849 students in the state of Maryland, and their academic performance was tracked from kindergarten through second grade. The authors used a regression analysis to determine if benefits achieved in full day kindergarten were sustained when the students reached the second grade. Sustained effects were defined as the 50th percentile or above on the CTBS reading test.

The number of skills a student acquired in kindergarten was a significant predictor of whether a student ranked in the 50th percentile on the second grade CTBS reading test (t=16.1, p=.000). Approximately, 10% of the variance in second grade reading scores is accounted for by the foundational reading skills acquired in kindergarten.

Of the students that entered kindergarten with minimal skills, 36% met their 2nd grade benchmark in reading. For those kindergarten students entering with some foundational skills, 75% met their reading benchmark in the second grade. Ninety-three percent (93%) of the students who entered kindergarten with all foundational met their second grade benchmark in reading as defined by the grade 2 CTBS reading assessment.

Authors' Findings

- "The analysis of whether the spring Grade 2 CTBS Reading performance was at or above the 50th national percentile showed that the [full-day kindergarten] effect for students receiving both FARMS and ESOL services persisted. However, the beneficial [full-day kindergarten] effect seen for all students at the end of kindergarten is no longer seen in the spring of Grade 2." (p. 15)
- "In the highly impacted Phase 1 schools [schools with high percentage of children on FARMS and ESOL programs], more than one-third of students who entered kindergarten with minimal foundational skills were able to meet or exceed the national median percentile rank on CTBS Grade 2 reading and language. This increased to 75 percent for students who entered with some foundational skills and 93 percent for students who entered with all foundational skills." (p. 41)
- "[The author's] analysis of the spring kindergarten foundational reading skills verified the full-day kindergarten benefit reported previously for students receiving both [Free and Reduced Meals Services] FARMS and [English as a Second Language] ESOL services. This is in addition to a [full-day kindergarten] main effect that benefited all students in this sample [as compared to half-day kindergarten students]" (p. 15)
- "The implications of these results suggest the importance of ensuring that students enter kindergarten with established foundational skills. In these highly impacted 17 schools, nearly 70 percent of the students entered with no established foundational skills." (p. 42)

3. Arizona Reading First Evaluation Report (2005)
Wendy L. Wolfersteig
Arizona Prevention Resource Center

Study Overview
The Arizona Reading First report was compiled by the Arizona Prevention Resource Center and submitted to the Arizona Department of Education as evaluation of the effectiveness of the

implementation of the federal Reading First grant. Reading First programs were implemented in 63 Arizona schools in 2003-04 (cohort 1) and an additional nine schools in 2004-05 (cohort 2). Students' progress was measured using the Dynamic Indicators of Basic Early Literacy Skills (DIBELS), a set of standardized, individually administered measures of early literacy development. Based on their DIBELS test scores, students are categorized into one of three levels of need for instructional support: intensive (having the greatest need for support to reach grade level), strategic (needing targeted support of specific skills), and benchmark (needing minimal support to maintain grade level reading). The researchers conducted data analysis at each grade level and "matched" students so that only participants who had both beginning and end of year scores were included in the analysis. In addition to reporting findings at each grade level, the researchers broke out scores for kindergarten participants in both full-day and half-day programs.

Study Design and Data

The authors used a sample of 5746 Arizona kindergarten students and followed their academic progress from the beginning of the year to the end of the year. The kindergarten students were identified by their instructional level as defined by the Dynamic Indicators of Basic Early Literacy Skills (DIBELS). Students were grouped in the following instructional categories: 1) Benchmark, 2) Strategic, and 3) Intensive. Students also were grouped by program participation-half-day or full-day kindergarten.

The following table shows the change in kindergartners requiring instructional support from Fall 2004 to Spring 2005:

Instructional Level	Fall 2004		Spring 2005	
	Half-Day	**Full-Day**	**Half-Day**	**Full-Day**
Benchmark	12%	11%	67%	78 %
Strategic	35%	31%	13%	11%
Intensive	52%	57%	18%	10%

The following table shows the change in first grade students requiring instructional support from Fall 2004 to Spring 2005 (For 2003-2004 Reading First Cohort 1 Kindergarteners) (matched N=3918):

Instructional Level	Fall 2004		Spring 2005	
	Half-Day	**Full-Day**	**Half-Day**	**Full-Day**
Benchmark	49%	59%	49%	60%
Strategic	27%	27%	26%	24%
Intensive	22%	12%	24%	15%

Author's Findings

- "These results would indicate that, overall, students in full-day kindergarten made more progress in reading as measured by the DIBELS test than did the students in half-day kindergarten classes. Full-day kindergarten students in 2004-2005 ended the year with

78.1 percent at benchmark, 10.7 percent more students that those who had half-day kindergarten." (p. 1)

- "The full-day kindergarteners [in 2004-2005) began the year with 11.6 percent at benchmark and ended with 78.1 percent at benchmark (66.5 percent positive difference)." (p. 1)
- "The half-day kindergarteners [in 2004-2005] began the year with 12.2 percent at benchmark and ended with 67.4 percent at benchmark (55.2 percent positive difference)." (p. 1)
- "From the beginning to the end of the year, the full-day group at intensive decreased by 46.1%; the half-day group at intensive decreased by 33.5 percent." (p. 2)
- "Students who were in Reading First in kindergarten and first grade and were full-day kindergarten students, ended kindergarten with 10 percent more students at benchmark than did the half-day kindergarten group, and this positive difference was maintained throughout first grade as shown by the end of first grade year benchmark scores (full-day students with 60.2 percent at benchmark and half-day with 49.9 percent at benchmark)." (p. 2)
- "Of the 2004-2005 first graders who participated in full-day kindergarten, 15.6 percent were at intensive at the end of first grade, 8.4 percent less than for the half-day group at 24.0 percent." (p. 3)

4. The Effects of Full Day Versus Half Day Kindergarten: Review and Analysis of National and Indiana Data (2004)
Jonathan A. Plucker, Jessica J. Eaton, Kelly E. Rapp, Woon Lim, Jeffrey Nowak, John A. Hansen, and Amy Bartleson
Center for Evaluation and Education Policy

Study Overview
The authors were contracted by the Indiana Association of Public School Superintendents to conduct a research review of full-day kindergarten. The report looked at three questions: What are the results of full-day kindergarten according to the national research? What are the results of full-day kindergarten according to Indiana data? And how is time used to provide instruction in full-day kindergarten? The authors conducted a comprehensive review of state research data collected by previous evaluations of five districts in Indiana that have been providing full-day kindergarten in some form. They also included data from two additional districts, one rural and one urban, to add depth to the information collected. The researchers set specific criteria for state studies to be included in their report. The first criterion required that data be available for both full-day kindergarten students *and* a control group of students. The second criterion stipulated that full-day programs run daily and not be alternate-day type programs. The final criterion was that extended-day programs could not be included unless the extended day was substantially instructional. After compiling both anecdotal and quantitative data from each of the studies, the reviewers analyzed the information and made overall conclusions regarding the outcomes of full-day kindergarten in Indiana.

Study Design and Data
This study was a summary of previously reported research related to full-day kindergarten nationally and in Indiana.

Authors' Findings

- "Significant results in support of full-day kindergarten over half-day kindergarten were found in many of the comparisons within the studies." (p. 22)
- "When analyzed for long-term effects such as grade level retention, special education referrals, and social and behavioral effects, the benefits of full-day kindergarten programs are apparent." (p. 22)
- "There are no negative outcomes associated with full-day kindergarten instruction and at the worst, full-day and half-day programs yield similar effects." (p. 22)

5. Full-day and Half-day Kindergarten in the United States: Findings from the Early Childhood Longitudinal Study, Kindergarten Class of 1998-99 (2004)
Jill Walston and Jerry West
National Center for Education Statistics

Study Overview

The "Full-day and Half-day Kindergarten in the United States" document reports on the findings from the first year of the Early Childhood Longitudinal Study, Kindergarten Class of 1998-99 (ECLS-K). Walston and West report the ECLS-K study was sponsored by the U.S. Department of Education, National Center for Education Statistics (NCES), and began following a nationally representative sample of about 22,000 kindergartners in the fall of 1998. "The ECLS-K includes nationally representative samples of schools offering kindergarten, kindergarten teachers, and kindergarten classrooms" (Walston & West, 2004). The sample of participating schools encompassed a variety of programs both private and public. Although the sample of students was nationally representative, findings reported for cognitive gains were limited to children who attended public kindergarten programs for the first time in 1998-99, did not change teachers during the school year, and who were assessed in English in both the fall and spring. This report is descriptive in nature and details information related to program type, classroom demographics and academic gains of participants in language arts and mathematics. The report is the most comprehensive of the research to date and is the most often cited report among subsequent research studies and projects. Along with providing an analysis of the ECLS-K data, the report also includes information on policy issues and findings from related research. The study describes the findings of the ECLS-K, but the analysis does not offer a formal evaluation of the impact of full-day kindergarten, and therefore limits the ability to draw causal conclusions from the information presented. The study does control for other variables that may be related to achievement outcomes such as family income and ethnicity, as well as uses a nationally representative sample of children who speak English and are in their first year of kindergarten. The sample representation and the variable controls add strength to the study's findings.

Study Design and Data

Participants were involved in the Early Childhood Longitudinal Study, Kindergarten Class of 1998-99 (ECLS-K), which was sponsored by the U.S. Department of Education. This study began following approximately 22,000 kindergartners from across the nation attending both private and public kindergarten programs. Data were collected about the students, their families, their teachers, and their schools.

The following research question was examined in this study:

1) Do differences exist in math and reading achievement for students participating in full-day and half-day kindergarten programs?

For this particular study, students were included if they were enrolled in a regular kindergarten program, if they had been exposed to the same teacher for the full year, and if they demonstrated a certain level of English proficiency. Additionally, students with missing class-level data were excluded. The sample for the reading score analyses consisted of 8,062 students, while the math score analyses consisted of 6,768 students.

Assessment information was obtained using a computer-assisted personal interview (CAPI) that included measures of reading (basic reading skills, vocabulary, and reading comprehension) and mathematics (number sense, number properties, operations, measurement, data analysis, probability, shapes and patterns, and problem solving). First, the student is administered a routing test to approximate skill level. Based on the performance on this test, the child is then administered one of three skill level assessments.

Multilevel regression analyses were conducted to examine nested data with three levels: child, class, and schools. At the class level, students in full-day programs gained 10.6 scaled score points in their reading scores from fall to spring, compared to students in half-day programs who gained 9.4 scaled score points. In math, students in full-day programs gained 8.6 scaled score points from fall to spring, compared to students in half-day programs who gained 7.8 scaled score points.

Authors' Findings

- ". . .children in full-day kindergarten classes make greater gains in both reading and mathematics compared to those in half-day classes, while accounting for gain score differences associated with race/ethnicity, poverty status, initial ability, sex, class size, amount of time for subject area instruction, and the presence of an instructional aide. These findings support prior research that attributes full-day kindergarten to greater academic progress." (p. 67)

6. From Kindergarten Through Third Grade: Children's Beginning School Experiences (2004)
Amy Rathbun, Jerry West and Elvira Germino Hausken
National Center for Education Statistics

Study Overview

This study utilizes the reports on the findings from the first four years of the Early Childhood Longitudinal Study, Kindergarten Class of 1998-99 (ECLS-K). The ECLS-K study was sponsored by the U.S. Department of Education, National Center for Education Statistics (NCES), and began following a nationally representative sample of about 22,000 kindergartners in the fall of 1998. "The ECLS-K includes nationally representative samples of schools offering kindergarten, kindergarten teachers, and kindergarten classrooms" (Walston & West, 2004). The ECLS-K study is described in detail in the preceding report section (Number 5). This particular

report highlights the gains in reading and math, beginning in kindergarten to the end of third grade.

Study Design and Data
Participants included 10,500 public and private school students who entered kindergarten for the first time in the fall of 1998. All participants were administered the English version of the ECLS-K cognitive assessments in the fall of 1998, spring of 1999, spring of 2000, and spring of 2002. Students were included in the study if they demonstrated sufficient English proficiency, as determined by their performance on the Oral Language Development Scale.

The purpose of the study was to examine the change in children's knowledge in skills from kindergarten to third grade.

The following table shows the mean reading scale scores and score gains for participants who attended half-day and full-day kindergarten programs at the different assessment points:

Program Type	Fall 1998	Spring 1999	Spring 2000	Spring 2002	Score gains: k-3
Half-day	27	37	68	110	83
Full-day	27	39	69	108	80

The following table shows the mean math scale scores and score gains for participants who attended half-day and full-day kindergarten programs at the different assessment points:

Program Type	Fall 1998	Spring 1999	Spring 2000	Spring 2002	Score gains: k-3
Half-day	22	31	56	86	64
Full-day	22	32	55	84	62

Author's Findings

- "Initial findings from this report did not detect any substantive differences in children's 3rd grade achievement relative to the type of kindergarten program (full-day vs. half-day) they attended." (p. 33)

7. Summary of Research: Full-Day Kindergarten (2001)
Sherrill Martinez and Lue Ann Snider
Kansas State Department of Education, Planning and Research

Study Overview
This research summary was prepared by the Planning and Research Division for the Kansas State Department of Education. The paper collected research to address five key issues surrounding full-day kindergarten instruction. The authors posed two questions of particular relevance to this report. 1) What are the benefits of full-day kindergarten for the children and 2) if there are benefits for children from attending full-day kindergarten, do these benefits continue into the children's subsequent years of schooling? To answer the questions posed, Martinez and Snider conducted a research review and then summarized the key findings related to each question.

Study Design and Data
This study was a summary of research related to full-day kindergarten. Specific data were not included in this summary.

Authors' Findings
The authors summarized previous research illustrating the various results of full-day kindergarten.

7a. Fusaro's (1997) meta-analysis of kindergarten studies illustrated:

- "Significantly greater academic achievement occurs among full-day participants relative to half-day participants." (p. 8)
- "True experimental design and random assignment of students would be needed to make causal conclusions from the findings." (p. 8)

7b. Cryan et al. (1992), Housden and Kam (1992), and the Evansville-Vanderburgh School Corporation (1988) were cited as having found:

- "Positive effects of full-day kindergarten on student achievement include: kindergarten students exhibiting more independent learning, classroom involvement, productivity in work with peers, and reflectiveness in their work than their half-day kindergarten peers." (p. 8)

7c. Evansville-Vanderburgh School Corporation – Indiana Superintendent, Phil Schoffstall commentary:

- "In the 11 years the full-day kindergarten program has been offered, only one parent has chosen a half-day versus a full-day option for his kindergartner." (p. 9)
- "Evansville students consistently outscore the rest of the state in [state achievement] testing, and [Mr. Schoffstall] contributes a lot of their success to the better preparation of their students from full-day kindergarten." (p. 9)

7d. Hough & Bryde (1995) concluded:

- "Students in full-day kindergarten performed better than the half-day students on 5 out of 9 reading criteria, 4 of 11 Language Arts criteria, 2 of 13 mathematics criteria and 2 of 9 personal Development criteria and on every criterion measured by the Early School Assessment norm-referenced achievement test." (p. 8)
- "Half-day students outperformed full-day students on 2 of 8 Social and Physical Development criteria." (p. 8)

7e. Martinez and Akey (1998-99) results indicated:

- ". . .students were given a norm-referenced achievement test. The full-day kindergarten students received significantly higher math and listening scores and slightly higher reading scores than half-day students." (p. 8)
- "Full-day kindergarten students were referred for special education placement less frequently." (p. 9)

The authors also made the following conclusions:

- "Other benefits of full-day kindergarten include a greater level of learning involvement, greater demonstration of original thought, and deeper engagement and independence in learning experiences in first grade."
- "Research shows that most full-day kindergarten students demonstrate somewhat higher academic and social achievement than half-day kindergarten students; however, the higher academic achievement seems to diminish somewhat over time. . . Now that half of the nation's kindergartners are in full-day programs, research should be able to show which children benefit the most and if the benefits last throughout a student's school career." (p. 9)

8. Effects of Three Kindergarten Schedules on Achievement and Classroom Behavior (2001)
Charlene Hildebrand
Phi Delta Kappa Center for Evaluation, Development, and Research

Study Overview
This study was conducted within a single school district in central Nebraska in collaboration with a nearby university. The purpose of the study was to assist district personnel in effective policy decision-making regarding full-day kindergarten options. The study looked at three different kindergarten schedules, including half-day, full-day and an alternate-day program, to determine the relative effects of each schedule. The participating district consisted of seven elementary schools with only three schools participating. Academic achievement outcomes were measured using two standardized assessments in reading and math. Children were assigned to a particular school by the principals and superintendent based on the administrators' perceptions of children's needs. Each school provided one of the three schedule types for kindergarten, and in total, 147 children participated in this non-randomized design. Although the non-randomized method was appropriate for the purpose of guiding the district, findings should not be generalized to a state or national level due to the project's design and the small, non-representative sample used.

Study Design and Data
The following research question related to academic achievement was explored:

1) What is the academic progress of young children in the three different kindergarten schedules?

Participants consisted of 147 kindergarten students attending three different elementary schools in a central Nebraska school district. School principals and the superintendent assigned participants to one of three kindergarten schedules (e.g., full-day program, half-day program, or alternate-day program) based on their perceptions of the student's needs. Forty-seven students (29 males and 18 females) with a mean age of 5.7 years participated in the full-day program; 44 students (24 males and 20 females) with a mean age of 5.7 years participated in the half-day program; and 56 students (31 males and 25 females) with a mean age of 5.9 years participated in the alternate-day program.

Assessment methods included: two standardized assessments in reading and math (the Test of Early Reading Ability-2 and the Test of Early Mathematics Ability), teacher rating scale of social behaviors in the classroom (Hahnemann Elementary School Behavior Rating Scale), an informal writing assessment (the Concepts of Writing), classroom observation rating scale (Developmentally Appropriate Practice), parent questionnaire (Family Reading Inventory), and teacher questionnaire regarding reading orientation (Theoretical Orientation to Reading Profile).

To address the first research question regarding academic differences between students participating in the different kindergarten schedules, an ANCOVA was conducted with pretest scores and chronological age as covariates. No significant differences were found between group means for reading raw score (p <.014) or reading percentile (p <.050). Follow-up analyses were conducted using t-tests and found a significant difference in reading between all-day and half-day groups (p < .01). No significant differences were found for math and writing.

Based on the results of the Theoretical Orientation to Reading Profile, alternate-day teachers were found to be "whole-language" oriented, while full-day and half-day teachers were found to be "skills" level-oriented. Also, alternate-day teachers were more likely to provide developmentally appropriate practices than the half-day or full-day teachers.

Author's Findings

- "The full-day kindergarten group scored significantly higher in reading than did the alternate-day and half-day groups." (p. 5)
- "No significant differences between the standardized test scores of children in each group were found in math and writing." (p. 5)
- ". . . teachers on this schedule [full-day] used developmentally appropriate practices with young children inconsistently." (p. 5)
- "Children's academic achievement was positively correlated with mothers being full-time homemakers." (p. 6)

9. Full-Day Kindergarten: Exploring an Option for Extended Learning (2002)
Cori Brewster and Jennifer Railsback
Planning and Program Development, Northwest Regional Educational Laboratory

Study Overview

The report was written as one in a series of topics of interest to educators and policymakers. Compiled by the Northwest Regional Educational Laboratory, the document includes among other resources, a review and discussion of research related to full-day kindergarten. Two of the studies reviewed for data on the academic impact of full-day instruction were longitudinal in nature. In compiling their data related to full-day kindergarten research, the authors collected information from "…the Educational Resource and Information Center (ERIC), databases, the Educational Research Service (ERS), the National Association for the Education of Young Children (NAEYC), and peer-reviewed educational journals, as well as from Northwest educators themselves" (Brewster & Railsback, 2002).

Study Design and Data
This report consisted of a summary of research related to full-day kindergarten. Specific data were not included in this summary.

Authors' Findings
9a. The authors cite Elicker's (2000) critical review of full-day kindergarten research and found:

- "Students participating in full-day kindergarten consistently progress further academically during the kindergarten year, as assessed by achievement tests, than students in either half-day or alternate-day programs." (p. 11)
- "There is tentative evidence that full-day kindergarten has stronger, longer-lasting academic benefits for children from low-income families or others with fewer educational resources prior to kindergarten." (p. 11)
- "There is not current, strong evidence that the academic achievement gains of full-day kindergarten persist beyond first grade for all students." (p. 11)
- "There is no evidence for detrimental effects of full-day kindergarten. The full-day curriculum, if developmentally appropriate for five-and six-year-olds, does not seem to overly stress or pressure kindergarten children." (p. 11)
- "Kindergarten teachers and parents strongly value the increased flexibility and opportunities to communicate and individualize instruction for children offered by the full-day schedule." (p. 11)

9b. A summary of Stofflet's (1998) findings includes:

- "There were no major long-term effects related to the length of the kindergarten day." (p. 47)
- "Students from Title I schools who attended full-day kindergarten were generally 'better prepared for first grade than were their [half-day] counterparts." (p. 47)

9c. Weiss and Offenberg's (2002) findings include:

- "Students who attended kindergarten for a full day were 26 percent more likely to make it to 3rd grade without being retained compared to previous half-day participants." (p. 48)
- "Full-day kindergarten students had significantly higher achievement scores in reading, math, and science, as well as higher marks on report cards and better attendance by third grade. They also demonstrated higher achievement in science and better attendance extending into fourth grade." (p. 48)

9d. Welsh's (2002) findings were summarized as:

- "Full-day kindergarten students of Native American, Hispanic and African American backgrounds made significant gains in literacy achievement compared with their peers in half-day programs." (p. 48)

10. The Effect of Kindergarten Program Types and Class Size on Early Academic Performance (2004)

Wenfan Yan and Qiuyun Lin
Indiana University of Pennsylvania
Mount Aloysius College

Study Overview

The study used data from the ECLS-K to explore the relationship between kindergarten program organizations (class size and length of school day) and kindergartners' cognitive gains in reading, math, and general knowledge during the kindergarten year. The report was compiled to provide more available data from a large, representative sample of children who attended full-day kindergarten. After excluding children who didn't meet the study's criteria, 15,577 children remained in the sample. Children who were maintained as part of the study were non-repeaters, children who did not attend a transitional kindergarten program, and children who did not change schools or classes during the kindergarten year. Children who could not partake in the assessments due to limited English proficiency were also excluded.

Study Design and Data

The following research questions were examined in this study:

1) Do achievement gains differ for students enrolled in full-day or half-day kindergarten programs?
2) Does a relationship exist between achievement gains and program characteristics?

Data were obtained from the Early Childhood Longitudinal Study, Kindergarten Class of 1998-99 (ECLS-K). This study began following approximately 22,000 kindergartners from across the nation attending both private and public kindergarten programs. Data were collected about the students, their families, their teachers, and their schools. For this particular study, students were included if they were enrolled in a regular kindergarten program, if they had been exposed to the same teacher for the full year, and if they demonstrated a certain level of English proficiency. Additionally, students with missing class-level data were excluded. The final sample consisted of 15,577 students.

Assessment information was obtained using a computer-assisted personal interview (CAPI) that included measures of reading (basic reading skills, vocabulary, and reading comprehension) , mathematics (number sense, number properties, operations, measurement, data analysis, probability, shapes and patterns, and problem solving), and general knowledge. First, the student is administered a routing test to approximate skill level. Based on the performance on this test, the child is then administered one of three skill level assessments for each domain. For the purposes of this study, the three cognitive gain scores were factor analyzed to create a composite (alpha = .72) of mean kindergarten score gain. The independent variables were program type (part-day vs. full-day) and class size (small = 17 or fewer; medium = 17-24; and large = 24 or more). Gender, family structure, race, and poverty level were used as control variables.

After weighting data, 8,286 cases remained and were included in the analyses. Descriptive statistics indicated that students participating in full-day kindergarten programs made slightly higher gains (M = .54) than students participating in a half-day program (M = .46).

Authors' Findings

- "Past full-day kindergarten research findings were substantiated showing that young children in full-day kindergarten made greater achievement gains than half-day participants." (p. 14)
- "The results showed some slight positive relationship between small class size and achievement gain, and a positive relationship between full-day program and the gain scores. It is also found that these effects are more pronounced for children from minority, low-income backgrounds." (p. 2)

11. The Effects of Full-Day Kindergarten on Student Achievement and Affect (1996)
David Hough and Suzanne Bryde

Study Overview

The authors used a quasi-experimental design to explore possible benefits or detrimental effects of full-day kindergarten as compared to half-day programs. Twelve schools participated with six providing full-day instruction and the other six providing half-day instruction. Schools were then paired based on geographic location, school size, student data, and socioeconomic status of the student body. Both quantitative and qualitative data was collected.

Study Design and Data

The author used a matched pairs design. Full-day schools and half-day schools were matched on geographic location, sized, student norm referenced data, and socioeconomic status of parents of participating students. The author conducted and analysis of variance (ANOVA) to determine if students attending kindergarten a full-day outperformed students who only attended kindergarten for half the day. The results indicated that there were significant differences between the students attending kindergarten for full and half-days on the Early School Assessment norm Referenced Achievement Test in reading and math.

NCE	**Program Type**		**Difference**	**Significance**
	Full	Half		
Reading	68.6	62.5	6.1	p=.001
Math	75.8	67.8	8.0	p=.001

Authors' Findings

In addition to the findings listed in the Kansas State Department of Education review, Hough and Bryde concluded:

- Full-day kindergarten students, on average, demonstrated a 6.1 point higher score in reading and an 8.0 point higher score in math than their half-day counterparts. Both differences were considered statistically significant.
- "School attendance of full-day students was more regular than for other students." (p. 15)
- "Teachers had greater utilization of small group activities in the full-day programs." (p. 6)

12. What Do They Do All Day? Comprehensive Evaluation of a Full-Day Kindergarten (1997)

James Elicker and Sangeeta Mathur
Department of Child Development & Family Studies, Purdue University

Study Overview

Elicker and Mathur conducted a comprehensive evaluation of a newly implemented full-day kindergarten program. The study was carried out over the course of a 2-year period. The researchers compiled data through quantitative (e.g. test data) and qualitative (e.g. teacher interview) methods.

Study Design and Data

The sample consisted of 247 kindergarten children in a middle class Midwestern community. Sixty-nine students were enrolled in the full day program and 110 students were enrolled in a half-day program. The school district implemented a full day kindergarten as part of a 2-year pilot program. The authors used kindergarten report cards to assess academic outcomes. During year 1, students were assessed on reading, writing, math/science, creative learning, social development, work habits and motor skills. Each of these areas was given a point value of 3 (almost always), 2 (part of the time), or 1 (not yet). During the second year, students were provided a rating on a developmental continuum. Areas assessed included literacy, reading, math, general learning, physical development, and social skills. The authors assigned a value of 1-6 for the levels on the developmental scale. In addition, the teachers were asked to rate a student's first grade readiness on a scale of 1 (significantly delayed readiness) to 5 (advanced readiness).

By the end of the second year, the author reported significant mean differences in the areas of literacy, math, general learning, social skills, and physical in favor of the full-day kindergarten students on the school report card. On average, teachers reported higher first grade readiness ratings to students that attended full-day kindergarten (Mean=3.92) than to students who attended kindergarten for half-day (Mean=3.63).

Subject	**Post-test Means**	
	Full Day	Half Day
Literacy	38.5	37.5
Math	13.7	12.7
General learning	18.6	17.0
Social skills	13.0	12.9

Authors' Findings

- ". . .systematic observations of children's classroom activities over the entire implementation period revealed that the full-day program resulted in more child-initiated learning activity, more teacher-directed individual activity, higher levels of active engagement, and higher levels of positive affect, in both absolute and proportional terms." (p. 477)

- "Teachers saw children in full-day classrooms as better able to initiate and engage flexibly in a variety of classroom activities, and to explore deeply and respond to challenges that were well matched to individual interests and abilities." (p. 477)
- "Finally, academic outcomes at the end of the kindergarten year indicated slightly greater progress in kindergarten and higher levels of first grade readiness among children in the full-day program. The short-term nature of these outcome assessments and the possible biases inherent in having teachers (i.e., the program implementers) provide the outcome data must be acknowledged." (p. 478)

13. A Comparison of the Literacy Effects of Full-Day vs. Half-Day Kindergarten (2001)
Jose L. da Costa and Susan Bell

Study Overview
The authors conducted a small study of two schools offering full-day kindergarten and one school offering half-day kindergarten. Schools were located in Alberta, Canada. The full-day kindergarten schools were comprised of inner-city students from similar backgrounds and having similar socioeconomic status. The half-day program school served children with a broad range of socioeconomic needs and was located in a suburban area. Data was collected using interviews with teachers and pre-post testing of children's literacy skills.

Study Design and Data
The author collected data on 700 students from 4 schools (2 half-day and 2 full-day kindergarten programs). The Clay's Observation Survey was used as the outcome measure for this analysis. The survey has six subscales including: 1) letter identification, 2) concepts about print, 3) ready to read word test, 4) writing, 5) hearing and recording sounds in words, and book reading level.

By the end of the year, the author observed that the student attending all day kindergarten achieved higher mean scores on Clay's Observation survey than students who attended kindergarten for half day.

Subject	**Pre-test Means**		**Post-test Means**	
	Full Day	Half Day	Full Day	Half Day
Letter Identification	23.04	33.83	50.6	46.8
Concepts about print	7.36	12.0	16.6	16.1
Ready to read word test	.43	.86	5.9	3.8
Writing	1.04	3.86	13.9	12.9
Hearing and recording sounds in words	1.39	6.11	23.1	18.1
Book Reading Level	0.00	.17	1.8	1.8

Authors' Findings
- "Students in the full-day programs experienced significantly greater growth in the prerequisite skills for reading than did children in the half-day program." (p. 16)

POLICY REPORTS

14. Assessing Proposals for Preschool and Kindergarten: Essential Information for Parents, Taxpayers, and Policymakers (2005)
Darcy Olsen
Goldwater Institute

Summary
This policy paper written by Darcy Olsen for the Goldwater Institute was written in response to Governor Janet Napolitano's School Readiness Action Plan. In her paper, Ms. Olsen discusses a variety of early childhood education issues including the adoption of full-day kindergarten in Arizona. Ms. Olsen questions the efficacy of full-day kindergarten instruction and its long-term benefits citing similar concerns about early research as many of the research authors themselves cite and are now beginning to address in more current research. In summarizing the issues of full-day kindergarten, Ms. Olsen includes in her discussion a longitudinal study by Rathbun, et. al. (2004) on full-day kindergarten and other position statements from academic and policy level sources. In conclusion, Ms. Olsen explains that "…fundamentally changing the school system through the powerful mechanism of school choice" would better benefit children in schools than would funding full-day kindergarten.

15. Full-Day Kindergarten: Expanding Learning Opportunities (2005)
Malia Villegas
WestEd

Summary
The policy brief written by Malia Villegas for WestEd is intended to serve as a tool for policy development and decision-making regarding issues of full-day kindergarten funding and implementation. The author reviews seven recent research studies, five of which were conducted after 1995. Ms. Villegas writes that "Research comparing half-day and full-day kindergarten shows that children benefit from a developmentally appropriate, full-day program, most notably in terms of early academic achievement – a foundation for school and life success." In addition to increased school readiness, higher academic achievement, and improved student attendance, Ms. Villegas points out that the research also demonstrates that full-day kindergarten students make faster gains on literacy and language measures than do their half-day peers. The author continues to note this finding is of "…particular importance for the growing numbers of English language learners" (Villegas, 2005). Of the seven studies reviewed by the author, one used an experimental design with random assignment to full- and half-day programs. Although the other studies did not use the same rigor in their design, the findings were consistent with the experimental design study findings. In conclusion, Ms. Villegas' paper illustrates a variety of benefits for children who attend full-day kindergarten programs. Recommendations for future policy include making access universal with the option to participate left to parents. Other recommendations include the identification of potential cost savings, use of pilot programs, and development of a comprehensive strategic plan for early care and education, birth to age 8.

16. Making the Most of Kindergarten: Present Trends and Future Issues in the Provision of Full-day Programs (2005)
Debra J. Ackerman, W. Steven Barnett, and Kenneth B. Robbon
National Institute of Early Education Research (NIEER)

Summary
This policy report was written for NIEER to provide information and recommendations to policymakers and administrators related to full-day kindergarten programming. The document highlights four specific areas including: trends in the provision of full-day kindergarten programs, activities in full-day and in half-day kindergartens, research on children's social and academic outcomes in full-day and half-day programs, and the need for continued research. The report outlines the prevalence of full-day kindergarten across the country and discusses schools by region. After summarizing the research to date, the NIEER report recommends: 1) that better designed research on full-day kindergarten be conducted; 2) that research continues on the benefits of high-quality preschool programs; and 3) that the impact of full-day and half-day kindergarten on enrollment rates be explored. The NIEER report also notes the need for an understanding of the financial benefits versus the cost of full-day kindergarten.

FINDINGS AND CONCLUSION

The insufficient number of well-designed research studies documenting the duration of full-day kindergarten benefits beyond second grade creates a challenge for making sound conclusions related to students' academic outcomes. Many studies describe full-day kindergarten and its short-term academic benefits, but more longitudinal studies exploring the long-term effects of full-day kindergarten are needed. In response to this need, researchers out of Indiana University are conducting a study through the Field Initiated Evaluations of Education Innovations Research Grant Program. Indiana University received funding in FY05 from the US Department of Education to carry out an experimental design project comparing the academic effects of full-day kindergarten through third grade (Indiana University Project Abstract FY2005). This research will be integral to understanding the effects of full-day instruction, as its design addresses many of the issues for which other studies have been criticized. Although many researchers conclude that some existing studies lack rigor in design and do not always factor in other issues that may affect the study results (i.e. socioeconomic status, language, etc.), the majority of these studies have resulted in similar enough findings to allow for general agreement of the following:

- Children who participate in full-day kindergarten demonstrate greater achievement gains during their kindergarten year than do their half-day peers. This is especially true for children from disadvantaged backgrounds.
- Full-day kindergarten may help reduce the achievement gap between minority or low-socioeconomic status students and non-minority students or students who are not disadvantaged.
- Participation in a full-day kindergarten program that utilizes age appropriate instructional practices is not detrimental to a child's growth and development.

In addition to the body of research and information examined in this report, researchers are also investigating best practices that lead to the documented academic gains made by children in full-day kindergarten. Research related to instructional strategies and scheduling of daily activities in

full-day kindergarten programs were not reviewed in detail for the purpose of this report due to their descriptive nature. However, instructional methodology is an influential component in building children's skills and achieving positive student outcomes. Further exploration is needed related to curriculum and instruction and how to best achieve long-lasting results from a full-day kindergarten program.

Related to instructional practices in the kindergarten year are the strategies and methods utilized by teachers in first grade and beyond. The long-term effects of the academic benefits gained in full-day kindergarten may be influenced by curricula and instructional methodology experienced in the early elementary years. Therefore, researching early elementary practices for the most effective strategies is integral to understanding how gains made in full-day kindergarten can be sustained.

Researchers are also beginning to look at the academic benefits of full-day kindergarten as they relate to known predictors of school success. The following results have been found in some studies but require further investigation because the results cannot yet be generalized beyond the districts in which the findings were made:

- Full-day kindergarten participants receive higher grades than their half-day peers on their report cards at the intermediate grade level.
- Participation in full-day kindergarten reduces the likelihood of being retained a grade level.
- Full-day kindergarten participants are referred for special education services less often.

As the issue of full-day kindergarten continues to be a matter of interest among educators and policymakers, researchers are continuing to explore the long-term benefits of full-day instruction using more rigorous and well-designed studies. Sufficient evidence documenting the longitudinal effects of full-day kindergarten will enable policymakers and practitioners to make sound decisions affecting kindergarten instruction.

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