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ABSTRACT

This study examined differences between 326 students enrolled in a full-day kindergarten program and 311 students in a half-day program. Data were obtained from six measures of academic achievement from the California Achievement Tests, administered in the spring. Results indicated no significant differences between the two groups on four measures of academic achievement--visual recognition, sound recognition, vocabulary, and language expression. Significant differences were found on two scores, comprehension and mathematics concepts and applications. Further analysis determined that the difference in comprehension scores was due to girls in the half-day program scoring higher than boys in the full-day program and could not be attributed to differences in the programs. The difference in mathematics concepts and applications scores was due to boys in the full-day program significantly outscoring boys in the half-day program. (Includes 23 references.) (MDM)

Full-day versus Half-day Kindergarten: An Experimental Study*

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The first kindergarten was established by Friedrich Froebel in Germany in 1837. Much of Froebel's thinking was later to influence the development of kindergarten education in the United States. In 1855, the first American kindergarten, a private one, was established in Wisconsin. Public school kindergarten in the United States was inaugurated in 1873 when the city of St. Louis incorporated kindergarten into its public school system (Hill, 1967).

Froebel operated his kindergarten for two hours in the afternoon and focused little attention on the length of the school day. Although kindergarten in the United States has traditionally been full-day, most of them became half-day in order to accommodate more children during the teacher shortage of World War II. Full-day programs began to re-emerge in the 1960s and 1970s (Oelerich, 1979).

Nationally, the trend is again toward full-day kindergarten programs. From 1969 to 1982, the number of children in full-day programs rose from less than 10% to over 30%. By 1984, two states had full-day kindergarten programs for all of their kindergarten students, while 11 were providing the lengthened program for 50% or more, and 10 other states had full-day programs for 25% or more (McConnell & Tesch, 1986). By 1989 nearly half the 5-year olds in the country were enrolled in full-day programs (Olsen & Zigler, 1989).

Proponents of full-day programs offer findings of a number of researchers and experts in child development who claim that five-year olds need a six-hour day.

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According to these experts, this is the time in a child's life when the brain is most receptive to learning, and it is imperative that the child be exposed to a broader curriculum than can be offered in a half-day program (Gorton & Robinson, 1968). On the other hand, Hoffman and Daniels (1986) found that half-day and full-day programs were more similar than different in what and how they taught; and Brierly (1987) claimed that half-day kindergarten pupils showed better adjustment skills associated with personal and social growth than did full-day kindergarten pupils.

Another argument offered by supporters of full-day programs is that it is a prudent use of tax money (Rothenberg, 1984). It is asserted that declining student enrollment makes available additional classroom space and qualified teachers; The elimination of mid-day busing saves money; And, many states' school funding formulae provide more money to local districts for full-day students than for those enrolled in half-day programs. Additionally, it has been argued that working parents find a longer school day attractive (Rothenberg, 1984). However, as Olsen and Zigler (1989) pointed out, full-day programs do not eliminate day care needs.

There are differences in opinions of educators about the value of full-day programs. Smith (1974) and Dean (1988) found that teachers of kindergarten students disagreed about the benefits of full-day and half-day kindergarten programs, while in Evansville (Humphrey, 1983b), children, parents, and teachers had positive attitudes toward the full-day program. Parents, too, are concerned about the benefits of a full-day program. They are being advised by one group of professional educators that their children's academic progress will be negatively affected if they are not enrolled in a full-day kindergarten program, while another group is claiming that the academic benefits are uncertain and that emotional and social welfare of their children may be negatively affected (Rothenberg, 1984). Parent beliefs about the advantages of one program over the other seem determined by experiences with one or the other of the programs (Humphrey, 1983a; Anderson, 1985).

The question of whether or not longer days in kindergarten is associated with increased achievement has also not been answered. While Adcock (1980), Humphrey (1983a), Goodwin (1989), Gullo et al. (1986), Gullo and Clements (1984), and Hamilton Township (1984) reported higher achievement among pupils in full-day programs, Evans and Marken (1983), Lysiak and Evans (1976), and Mongiardo (1988) found no significant differences attributable to the full-day program. Long range benefits and disadvantages are being debated by groups who claim that full-day kindergarten programs do not appears to benefit

all children, particularly those from middle and upper-middle class backgrounds (Gray, 1985).

Purpose

The purpose of this study was to determine differences between students after a full-day kindergarten program and students after a half-day program on six measures of academic achievement obtained from a Spring administration of the California Achievement Tests.

Method

A large metropolitan school system's board of education had decided to move from a half-day kindergarten program to a full-day program over a two-year period. Since it was possible, an experimental design was chosen. Approximately half of the schools in the system were chosen at random to lengthen their kindergarten day the first year, the year of this study.

Subjects

From the elementary schools within the system 10 were randomly chosen from the group of schools that had been selected to move to the full-day and an additional 10 schools were randomly selected from the group that were to remain on a half-day schedule. Half of the schools in selected for both groups were chosen from schools designated as Chapter I schools and half were from schools in affluent areas. In all, scores from 637 students were used; 311 enrolled in half-day program and 326 in full-day programs. Although the groups had been obtained randomly, scores from the Brigance Inventory of Early Development which was administered in October were used to check for equivalence among the groups ($t = .28$).

Data Collection

The California Achievement Tests were administered in April. Students t-tests were used to compare the academic achievement of the two groups on each of the six CAT scores (Visual Recognition, Sound Recognition, Vocabulary, Comprehension, Language Expression, and Mathematics Concepts and Applications). Analysis of covariance was used to determine if there was a statistically significant interaction between length of the school day and sex, with scores from the CAT serving as the dependent variables. Scheffe pairwise comparisons were

used as post hoc tests. As part of the agreement with the school system, teachers could not be contacted directly. It appeared, however, that there was little curricular difference among any of the schools other than longer periods of more of the same.

Results

Of the six achievement comparisons there were no significant differences between the groups on four of the measures (See Tables 1-7). Significance was obtained on two measures: (a) Comprehension and (b) Mathematics Concepts and Applications. On further investigation it was determined that the difference in Comprehension subtest scores was due to girls in the half-day program scoring higher than boys in the full-day program and could not be attributed to differences in the programs. The one remaining difference resulted from males in the full-day program significantly outscoring males in the half-day program on the Mathematics Concepts and Applications subtest.

It is a matter of speculation as to why students enrolled in full-day programs scored statistically significantly higher on only one measure of the California Achievement Tests – Mathematics Concepts and Applications. It may be that mathematics is the area with which parents are least likely to deal and therefore the additional practice and repetition that a full-day program may provide are most beneficial in that area.

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Table 1
Achievement of Full-day versus Half-day Kindergarten Pupils on the California Achievement Test

Dependent Variable	Independent Variable	n	X(sd)	t	p
Visual Recognition	Half-day	311	523.91(84.19)	1.14	.26
	Full-day	326	516.21(86.80)		
Sound Recognition	Half-day	311	513.33(79.67)	.60	.55
	Full-day	326	509.74(70.92)		
Vocabulary	Half-day	311	520.86(73.36)	1.24	.22
	Full-day	326	513.88(68.95)		
Comprehension	Half-day	311	551.27(81.98)	3.03	.01*
	Full-day	326	530.56(90.05)		
Language Expression	Half-day	311	506.76(61.30)	1.05	.30
	Full-day	326	501.74(59.67)		
Math Concepts & Applications	Half-day	311	495.59(64.58)	3.64	.001**
	Full-day	326	512.77(53.75)		

* statistically significant at $p < .01$
** statistically significant at $p < .001$

Table 2
ANCOVA on Visual Recognition Scores with Scheffé Pairwise Comparisons

Source	df	ss	F	p
CAT-Visual Recognition	3	41,093	1.95	.12
Covariate (Brigance)	1	132,357		

Status/Sex	Mean	SD
Full-day/Female	528.93	83.80
Half-day/Female	529.03	78.80
Full-day/Male	508.31	87.89
Half-day/Male	519.77	88.31

Table 3
ANCOVA on Sound Recognition Scores with Scheffé Pairwise Comparisons

Source	df	ss	F	p
CAT-Sound Recognition	3	55,983	3.46	.016
Covariate (Brigance)	1	132,357		

Status/Sex	Mean	SD
Full-day/Female	526.52	69.65
Half-day/Female	517.29	68.12
Full-day/Male	499.31	69.87
Half-day/Male	510.13	87.98

	Full-day/ Female	Half-day/ Female	Full-day/ Male	Half-day/ Male
Full-day/ Female	----------		*	
Half-day/ Female		----------	*	
Full-day/ Male	*	*	_____	
Half-day/ Male				_____

* statistically significant at $p < .05$

Table 4
ANCOVA on Vocabulary Scores with Scheffé Pairwise Comparisons

Source	df	ss	F	p
CAT-Vocabulary	3	57,960	4.08	.007
Covariate (Brigance)	1	159,949		

Status/Sex	Mean	SD
Full-day/Female	529.60	66.66
Half-day/Female	526.73	64.14
Full-day/Male	504.11	68.70
Half-day/Male	516.13	79.90

	Full-day/ Female	Half-day/ Female	Full-day/ Male	Half-day/ Male
Full-day/ Female	----------		*	
Half-day/ Female		----------	*	
Full-day/ Male	*	*	_____	
Half-day/ Male				_____

* statistically significant at $p < .05$

Table 5
ANCOVA on Language Comprehension Scores with Scheffé Pairwise Comparisons

Source	df	ss	F	p
CAT-Language Comprehension	3	78,251	3.72	.011
Covariate (Brigance)	1	266,435		

Status/Sex	Mean	SD
Full-day/Female	573.32	82.97
Half-day/Female	558.05	75.34
Full-day/Male	526.35	94.14
Half-day/Male	545.78	86.80

	Full-day/ Female	Half-day/ Female	Full-day/ Male	Half-day/ Male
Full-day/ Female	---------			
Half-day/ Female		----------	*	
Full-day/ Male		*	_____	
Half-day/ Male				_____

* statistically significant at $p < .05$

Table 6
ANCOVA on Language Expression Scores with Scheffé Pairwise Comparisons

Source	df	ss	F	p
CAT-Language Expression	3	34,844	3.43	.017
Covariate (Brigance)	1	145,643		

Status/Sex	Mean	SD
Full-day/Female	513.78	61.45
Half-day/Female	512.31	57.57
Full-day/Male	494.26	57.37
Half-day/Male	502.27	63.97

	Full-day/ Female	Half-day/ Female	Full-day/ Male	Half-day/ Male
Full-day/ Female	----------		*	
Half-day/ Female		----------	*	
Full-day/ Male	*	*	_____	
Half-day/ Male				_____

* statistically significant at $p < .05$

Table 7
ANCOVA onMath Concepts & Applications Scores with Scheffé Pairwise Comparisons

Source	df	ss	F	p
CAT-Math Concepts & Applications	3	88,380	8.67	.0001
Covariate (Brigance)	1	43,118		

Status/Sex	Mean	SD
Full-day/Female	523.14	46.14
Half-day/Female	504.01	56.11
Full-day/Male	505.96	57.04
Half-day/Male	488.77	70.12

	Full-day/ Female	Half-day/ Female	Full-day/ Male	Half-day/ Male
Full-day/ Female	----------			*
Half-day/ Female		----------		
Full-day/ Male			_____	*
Half-day/ Male	*		*	_____

* statistically significant at $p < .05$