



**Evaluation of the Longitudinal Impact of
Comprehensive Early Childhood Initiatives on
Student Academic Achievement**

Office of Shared Accountability

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Evaluation Of The Longitudinal Impact Of Comprehensive Early Childhood Initiatives On Student Academic Achievement

Executive Summary

Second grade students from the 17 elementary schools with the highest level of poverty and the full continuum of services provided through the Early Success Performance Plan performed at remarkably high levels on the Comprehensive Tests of Basic Skills (CTBS). The Early Performance Plan is a series of interwoven early education initiatives, including reduced class size, full-day kindergarten, revised curriculum, assessments aligned with curriculum, professional development, and increased family/school communication.

Notably, when students entered kindergarten with some or all of the four foundational skills, they met with great success in Kindergarten through Grade 2. More notably, those students who lacked foundational reading skills and participated in the Early Performance Plan performed well on the CTBS. Additionally, regardless of the level of skills upon entering kindergarten, performance on the CTBS is further increased when students attend the same school for Kindergarten through Grade 2.

This report examines the longitudinal data of students receiving the programs of the Kindergarten Initiative and the Montgomery County Public Schools (MCPS) Primary Reading Assessment Program. This report focuses on a closer examination of the performance of students in the 17 schools that first received full-day kindergarten services. The following are the key findings:

The full-day kindergarten benefit for students who participate in both the Free and Reduced-price Meals System (FARMS) and English as a Second Language (ESOL) programs continues into Grade 2.

- In the highly affected Phase 1 schools, 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 of students who entered with some foundational skills and 93 percent of students who entered with all foundational skills.
- Students who entered kindergarten with minimal or some foundational skills are more likely to be successful on the CTBS in reading and language in Grade 2, if they remain continuously enrolled in the same school. This is evident for all racial/ethnic groups and for groups of students receiving special services.

- Students who enter kindergarten with all four foundational skills are equally likely to be successful on the CTBS in reading and language in Grade 2, regardless of their enrollment pattern. When students enter kindergarten with all four foundational skills in place, their chance for achieving benchmark performance on subsequent measures, including the CTBS, is greatly enhanced.
- Students who receive FARMS and/or ESOL services who enter kindergarten with minimal or some foundational skills are more likely to perform at or above the national median on the CTBS in reading if they were enrolled in a full-day kindergarten program and remained in the same school for kindergarten, first, and second grade.
- Students from all racial/ethnic groups were more likely to perform at or above the national median on the CTBS in reading if they were enrolled in a full-day kindergarten program and remained in the same school for kindergarten, first, and second grade.
- While prekindergarten programs may have an impact on the performance of students in kindergarten, there is no evidence to suggest that prekindergarten programs will have an impact on achievement on benchmark performances in later grades.

The implications of these results suggest the importance of ensuring that students enter kindergarten with established foundational skills. In these 17 highly affected schools, nearly 70 percent of the students entered with minimal foundational skills. The combined effects of the Kindergarten through Grade 2 program helped as many as one-third of these students to perform at or above the national median on the CTBS in reading and language. By comparison, nearly all students who entered these 17 schools with established foundational skills went on to perform at or above the national median on the CTBS in reading and language. This contrast makes evident the need for high-quality preschool programs in order to continue closing the achievement gap.

The Montgomery County Public Schools Early Success Performance Plan outlines a vision for the continuous development of curriculum, assessment, training, extended learning opportunities, and on-going research to support a goal that all students read on grade level by Grade 3. Key components of this plan have been implemented at various stages since the 2000–01 school year. Many of these components have been and continue to be the focus of evaluation projects conducted by the MCPS Office of Shared Accountability.

Program Description

The Montgomery County Public Schools Kindergarten Initiative

During the 2000-01 school year, Montgomery County Public Schools (MCPS) launched its Kindergarten Initiative. This initiative employed multiple strategies including full-day kindergarten, reduced class size, revised kindergarten curriculum, ongoing professional development through the summer and school year, and increased communication between parents of kindergarten students and school staff.

During the 2000–01 school year, a group of 17 elementary schools was identified as having the highest levels of need. Nine of those schools already had a full-day kindergarten program. The original nine and eight additional schools were provided with an enhanced full-day kindergarten-(FDK) component. During the following year, the FDK program was added to an additional group of 17 schools identified as those next most in need. And, during the 2003 school year, the FDK program was added to an additional group of 22 schools.

A new reporting tool was developed and implemented to facilitate effective communication between school staff and parents regarding these assessments. In addition, comprehensive staff development programs were developed so that all kindergarten teachers would receive training to ensure that the revised curriculum (and the accompanying assessments) would be delivered consistently to our students countywide. More than 400 teachers were provided with up to 100 hours of staff development time per teacher, with a major portion of this training devoted to procedures for administering and scoring the assessments.

The redesigned kindergarten curriculum, based on a review of the literature, included more time for balanced literacy instruction and emphasized sustained high-quality teaching during the language arts time block. The revised curriculum equipped each kindergarten classroom in the county with consistent core materials and assessments that would be administered during the fall and spring. These assessments, known as Montgomery County Public Schools Assessment Primary Reading, were designed to make it possible for teachers to closely monitor student progress and to effectively direct their instructional efforts toward the students with the greatest needs and weakest skill areas.

The Montgomery County Public Schools Assessment

Program Primary Reading

The MCPS Assessment Program Primary Reading is a locally developed assessment that provides formative information to help schools and teachers monitor students' progress in reading from Prekindergarten through Grade 2. The stated goals of this assessment program are to provide continuous confirmation of a student's reading development and some understanding of oral reading fluency, accuracy, and comprehension. The MCPS Assessment Program Primary Reading consists of two components—Foundational Reading Skills and Reading Proficiency. Elementary school teachers have received training in the administration and scoring of the tools used in the reading program. The process for examining the reliability and validity of the assessment tools is described in both the (Bridges-Cline, (August 2001)) and Nielsen & Cooper-Martin (2002) reports issued by the Office of Shared Accountability (OSA).

Foundational Reading Skills

The foundational reading skills component assesses basic skills that a student needs to become a strong, fluent reader. Students are assessed in these foundational skills in kindergarten until they meet benchmark performance. Students in Grades 1 and 2 who have not yet met benchmark performance will continue to be assessed in foundational skills.

Kindergarten students were assessed in four foundational skill areas, during the 2000-01 school year.

- Letter knowledge—the ability to identify alphabet letters—is assessed based on a student’s ability to name uppercase and lowercase letters using the Letter Identification Assessment Tool.
- Print concepts—the ability to demonstrate book-handling skills and print awareness concepts—are assessed based on a student’s understanding of how printed language works in books (e.g., directional movement, one-to-one matching, book conventions such as the front and back of the book) using the Concepts About Print Assessment Tool.
- Phonics—the ability to use knowledge of letter/sound relationships to decode and write words—is assessed based on a student’s ability to associate and write letters for sounds heard in words in a dictated sentence using the Hearing and Recording Sounds Assessment Tool.

- Word knowledge—the ability to identify high-frequency words in print and decode unknown words—is assessed based on a student’s ability to read basic sight words using the Word Recognition Assessment Tool.

These tools and the empirical evidence used to establish benchmark performance levels were described in detail in the Bridges-Cline report (August 2001). The following is a summary of the benchmark performances for Foundational Skills discussed in this report:

- 1) Letter Identification requires a student to identify 45 of 54 letters correctly.
- 2) Concepts about Print require a score of 13 or more out of 16 possible points.
- 3) Hearing and Recording Sounds requires a score of 8 or more out of 14 possible points.
- 4) Word Recognition requires a score of 8 or more out of 22 possible points.

Reading Proficiency

The reading proficiency component assesses students’ ability to read text aloud fluently and accurately and to demonstrate comprehension of the text, either orally or in writing. The Running Record Assessment Tool is administered individually to each student in the class to determine text-reading level. The text-reading levels are indicated numerically to represent Reading Recovery levels, using ratings in a range from 1 to 20. In addition, these levels correlate to the Fountas and Pinnell alphabetical book leveling, with a maximum rating to Grade 6 (Fountas & Pinnell, 1999). Therefore, both numbers and letters represent student text-reading levels.

When a student achieves 90 percent accuracy at a reading level, the student is asked to answer questions about the text. These questions are answered orally at the early levels of reading and in writing for later levels. The Grade 1 proficiency benchmark for 2001–02 was reading at a level 14 text or higher with 90 percent accuracy or higher, along with a score of partial or essential comprehension on the written comprehension questions.

TerraNova Comprehensive Tests of Basic Skills

The CTBS is a component of the TerraNova series of assessments, published by CTB/McGraw-Hill. The TerraNova CTBS was nationally normed in 1996. The CTBS Survey and Survey editions of the CTBS have been administered in Grade 2 throughout the state of Maryland since 1999–2000, as part of the state’s assessment program. All of the items in these editions are selected-response items. The Reading/Language Arts subtests taken by Grade 2 students include the following objectives (CTB/McGraw-Hill, 1997):

- Basic understanding
- Text analysis
- Evaluation and extension of meaning
- Identification of reading strategies
- Introduction to print
- Sentence structure
- Writing strategies,
- Editing skills

The relationship between students' performance on the MCPS Assessment Program Primary Reading and the CTBS has not been investigated fully , because the current Grade 2 students are the first group of students for whom data on the MCPS Assessment Program Primary Reading for Kindergarten, Grade 1, and Grade 2 as well as CTBS scores are available.

A preliminary examination of the correlation between kindergarten foundational skill performance and scale score on the CTBS Grade 2 reading subtest revealed a Spearman's rho coefficient of .458, which was statistically significant at the .01 level. A similar analysis between kindergarten foundational skill performance and scale score on the CTBS Grade 2 language subtest indicated a Spearman's rho coefficient of .456, which was statistically significant at the .01 level. These significant relationships on tests, which are administered two years apart, suggest alignment between the local assessments and the state-mandated assessments.

The Pearson correlation between performance on the MCPS Assessment Program Primary Reading, for students who were reading with 90 percent accuracy and adequate comprehension, and the CTBS Grade 2 reading subtest was .482, which was statistically significant at the .01 level. A similar result was found between the MCPS Assessment Program Primary Reading, for students who were reading with 90 percent accuracy and adequate comprehension, and the CTBS Grade 2 language subtest. That Pearson correlation was .486 and was statistically significant at the .01 level. Once again, these significant relationships demonstrate alignment between the local assessments and the state-mandated assessments.

Scope of the Evaluation

This report examines the longitudinal effect of the Kindergarten Initiative and use of the Montgomery County Public Schools (MCPS) Assessment Program Primary Reading. This report, one in a series of three, examines the performance of those students who received full-day kindergarten (FDK) in the 2002 school year on the Grade 2 CTBS and attempts to answer four key questions:

- 1) Are the benefits of a full-day kindergarten program sustained in Grade 2?
- 2) How have students who entered Kindergarten in a full-day kindergarten program in 2000 performed on the CTBS?
- 3) What are the performance patterns for students of various racial/ethnic groups and for those receiving FARMS and ESOL services?
- 4) How do students who attended an MCPS prekindergarten program perform on grade-level benchmarks and CTBS compared with those who did not attend?

This report focuses primarily on the students who entered one of the first 17 schools that offered FDK, providing them with the most intensive kindergarten program. The performance of these students is tracked using both descriptive and inferential statistics. A future report will address program implementation issues as well as the performance of all students on the local assessments in Grade 2.

The first section of this report continues to examine the effects of FDK programs that were discussed in the Bridges-Cline report (August 2000) and the Nielsen & Cooper-Martin, report (September 2001). For the rest of the report, the focus is on examining students who entered the 17 schools that first offered FDK. These students were divided

into two groups—students who were continuously enrolled versus students who were non-continuously enrolled. Continuously enrolled students were operationally defined as students who remained in the same school for all of their Kindergarten, Grade 1, and Grade 2 programs. These students received the most consistent delivery of all of the kindergarten initiatives as well as the MCPS Assessment Program Primary Reading. Any students who withdrew from their school of original enrollment and returned later to either the same school or another MCPS school were defined as non-continuously enrolled, because there was a disruption in services for these students. Comparisons using both descriptive and inferential statistics between these two groups of students revealed interesting patterns of performance.

Major Evaluation Questions and Results

1. Are the benefits of a full-day kindergarten program sustained in Grade 2?

Methodology

Previous studies (Bridges-Cline, 2001; Nielsen & Cooper-Martin, 2002) found that full-day kindergarten benefits were most pronounced for students who received both FARMS and ESOL services. The following analyses examine whether the differential full-day kindergarten benefit to those students is sustained in their Grade 2 performance on the CTBS Reading subtest.

Sample.

The progress of the students in the Bridges-Cline (2001) MCPS kindergarten evaluation study has been followed during their first and second grade years for this longitudinal study. Table 1 shows descriptive information for 7849 students in the 2000–01 kindergarten evaluation study for each school group in the Kindergarten Initiative—1407 in Phase 1 schools, 1155 in Phase 2 schools, 1376 in Phase 3 schools, and 3911 in Later Phase schools. Of the different school groups of the Kindergarten Initiative, Table 1 shows that students entering Phase 2 schools were most similar to those entering Phase 1 schools in terms of their kindergarten entry foundational skills and their continuous enrollment for Kindergarten through Grade 2 in one school. Therefore, for the 2000–01 kindergarten cohort, students in Phase 2 schools will provide the half-day kindergarten (HDK) program comparison for the Phase 1 FDK students.

Table 1
Description of 2000–01 Students in MCPS Kindergarten Evaluation Study, by School Group in Kindergarten Initiative

		Phase 1 Schools FDK in 2000-01		Phase 2 Schools HDK in 2000-01		Phase 3 Schools HDK in 2000-01		Later Phase Schools HDK in 2000-01	
		Count	Col %	Count	Col %	Count	Col %	Count	Col %
TOTAL		1407	100%	1155	100%	1376	100%	3911	100%
GENDER	Female	668	47%	560	48%	674	49%	1944	50%
	Male	739	53%	595	52%	702	51%	1967	50%
Racial/ethnic Group	American Indian	6	0%	7	1%	4	0%	12	0%
	Asian Am.	132	9%	152	13%	181	13%	518	13%
	African Am.	370	26%	361	31%	408	30%	421	11%
	White	240	17%	327	28%	528	38%	2677	68%
	Hispanic	659	47%	308	27%	255	19%	283	7%
ESOL / FARMS Groups	Not ESOL or FARMS	451	32%	681	59%	971	71%	3431	88%
	FARMS Only	477	34%	277	24%	225	16%	240	6%
	ESOL Only	92	7%	98	8%	88	6%	190	5%
	ESOL and FARMS	387	28%	99	9%	92	7%	50	1%
MCPS Pre-K	Yes	716	51%	448	39%	334	24%	306	8%
	No	691	49%	707	61%	1042	76%	3605	92%
Entry K Foundational Skills	Minimal	966	69%	740	64%	775	56%	1720	44%
	Some	410	29%	389	34%	555	40%	1938	50%
	All Four	31	2%	26	2%	46	3%	253	6%
Continuous Enrollment	Yes	773	55%	685	59%	868	63%	2805	72%
	No	634	45%	470	41%	508	37%	1106	28%

Not all of the 2000–01 kindergarten students in the Bridges-Cline (2001) kindergarten evaluation study were enrolled in Grade 2 of MCPS schools in 2002–03. Table 2 shows descriptive information for the 2095 Grade 2 students in 2002–03 that have reading measures from both Kindergarten and Grade 2 and who were enrolled in Phase 1 or Phase 2 schools for kindergarten for 2000–01. Of the original 1407 kindergarten students in the Bridges-Cline (2001) study who received the FDK program in Phase 1 schools, 1158 (82.3%) were in MCPS schools in Grade 2 for 2002–03 with CTBS Reading scores. Of the original 1155 kindergarten students in the Bridges-Cline (2001) study who received the HDK program in Phase 1 schools, 937 (81.1%) were in MCPS schools in Grade 2 for 2002–03 with CTBS Reading scores. The longitudinal data

of the students described in Table 2 are examined to address the question regarding sustained benefits from FDK.

Table 2
Description of 2000–01 Kindergarten Students in Phase 1 and 2 Schools for MCPS Kindergarten Evaluation Study Who have Grade 2 CTBS Measures in 2002–03

		Phase 1 Schools FDK in 2000-01		Phase 2 Schools HDK in 2000-01	
		Count	Col %	Count	Col %
TOTAL		1158	100%	937	100%
GENDER	Female	562	49%	465	50%
	Male	596	51%	472	50%
Racial/ethnic Group	American Indian	4	0%	5	1%
	Asian Am.	110	9%	138	15%
	African Am.	304	26%	281	30%
	White	189	16%	254	27%
	Hispanic	551	48%	259	28%
ESOL / FARMS Groups	Not ESOL or FARMS	359	31%	541	58%
	FARMS Only	399	34%	233	25%
	ESOL Only	79	7%	82	9%
	ESOL and FARMS	321	28%	81	9%
MCPS Pre-K	Yes	614	53%	383	41%
	No	544	47%	554	59%
Entry K Foundational Skills	Minimal	788	68%	589	63%
	Some	342	30%	324	35%
	All Four	28	2%	24	3%
Continuous Enrollment	Yes	771	67%	676	72%
	No	387	33%	261	28%

Measures.

The regression analyses to examine sustained effects used the following student outcome measures—number of foundational skills tests in which students met the benchmark for fall and spring testing and whether the student scored at the 50th national percentile rank or higher on Grade 2 CTBS reading. Additionally, student variables for kindergarten program, services received, and enrollment were used. See the Appendix for details on the variable coding.

Analysis.

The first analysis is to verify the previously reported FDK effect for students receiving both FARMS and ESOL services in kindergarten. The number of foundational skills attained by the spring of kindergarten will be analyzed in a model that includes the number of foundational skills during the fall of kindergarten, FDK or HDK, the kindergarten ESOL and FARMS group contrasts, and the school group by kindergarten ESOL and FARMS group interaction variables. The variables of interest in this analysis are the full-day/half-day program contrast and the interaction of the FDK/HDK program contrast with the student group that received both FARMS and ESOL services in kindergarten (FDK_KEF3). A positive effect for FDK_KEF3 would indicate that the group that received both FARMS and ESOL services did better in FDK than in HDK.

The next analysis examines whether students scored at or above the 50th National Percentile on the CTBS Reading test in Grade 2. The model includes the number of foundational skills during the fall of kindergarten, full-day or half-day kindergarten, the kindergarten ESOL and FARMS group contrasts, the school group by kindergarten ESOL and FARMS group interaction variables, continuous versus non-continuous enrollment, school group by continuous enrollment interaction, and continuous enrollment by kindergarten ESOL and FARMS group interaction variables. The variables of interest are the FDK/HDK program contrast, the interaction FDK_KEF3, the continuous versus non-continuous enrollment contrast, and the continuous enrollment interaction variables.

Finally, whether students scored at or above the 50th national percentile on the CTBS Reading test in Grade 2 will be examined separately for students who were continuously enrolled and those not continuously enrolled. The model includes the

number of foundational skills during the fall of kindergarten, FDK or HDK, the kindergarten ESOL and FARMS group contrasts, and the school group by kindergarten ESOL and FARMS group interaction variables.

Results

Analysis of the spring kindergarten foundational reading skills (see Table 3) verified the full-day kindergarten benefit reported previously for students receiving both FARMS and ESOL services. This is in addition to a FDK main effect that benefited all students in this sample. The most important predictor of the number of foundational reading skills in the spring was the number of foundational reading skills in the fall, accounting for nearly 9 percent of the score variance. The average number of foundational skills in the spring was lower for students receiving both FARMS and ESOL services compared with students receiving neither. Finally, the average number of foundational skills in the spring was also lower for students receiving only FARMS compared to students receiving neither FARMS nor ESOL services.

The analysis of whether the spring Grade 2 CTBS Reading performance was at or above the 50th national percentile showed that the FDK effect for students receiving both FARMS and ESOL services persisted (Table 3). However, the beneficial FDK effect seen for all students at the end of kindergarten is no longer seen in the spring of Grade 2. The most important predictor of whether the spring Grade 2 CTBS Reading performance was at or above the 50th national percentile was the number of foundational reading skills in the fall of kindergarten, accounting for 10.1 percent of the variance. The results also showed that students who received both FARMS and ESOL services in kindergarten

were less likely to perform at or above the 50th national percentile on the CTBS Reading test in Grade 2 than students not receiving services. Finally, a positive effect was seen for students who were continuously enrolled in the same school for Kindergarten through Grade 2 for 10 months per year.

Table 3
Evidence for Full-day Kindergarten Benefit in Grade 2 Reading Performance, for Kindergarten Students Receiving Both FARMS and ESOL Services

	Spring Kindergarten Foundational Skills (0-4) N=2095	Spring Grade 2 CTBS Reading 50 th NP or higher (0,1) N=2095
Fall K Foundational Skills	B>0, t=14.7, p=.000, sr ² =.088	B>0, t=16.1, p=.000, sr ² =.101
Full-day / Half-day K	B>0, t=2.5, p=.012, sr ² =.003	
KEF1 (FARMS / Neither)	B<0, t=-2.3, p=.022, sr ² =.002	
KEF2 (ESOL / Neither)		
KEF3 (Both / Neither)	B<0, t=-6.6, p=.000, sr ² =.017	B<0, t=-4.1, p=.000, sr ² =.006
FDK KEF1		
FDK KEF2		
FDK KEF3	B>0, t=3.0, p=.003, sr ² =.004	B>0, t=2.1, p=.034, sr ² =.002
Continuous / Non-continuous Enrollment		B>0, t=2.4, p=.015, sr ² =.002
FDK ENRL		
ENRLKEF1		
ENRLKEF2		
ENRLKEF3		
Total Model	R ² = .155	R ² = .182

To better understand how continuous enrollment and non-continuous enrollment have an impact on the persistence of the beneficial effects of FDK, students in these groups were analyzed separately (see Table 4). The results show that the benefits of FDK are sustained for students who were continuously enrolled in one school for Kindergarten through Grade 2 and who received both FARMS and ESOL services in kindergarten. Moreover, the size of the effect is similar to the one observed for foundational skills in the spring of kindergarten. For students who were not continuously enrolled, only the number of foundational skills measured in the fall of kindergarten predicted whether they would perform at or above the 50th National Percentile on the CTBS Reading test in

Grade 2. The number of foundational skills in the fall of kindergarten was an important predictor for students who were continuously enrolled, accounting for 9.4 percent of the variance. Finally, among continuously enrolled students, students who received FARMS and/or ESOL services in kindergarten were less likely to perform at or above the 50th national percentile on the CTBS Reading test in Grade 2 than students not receiving those services.

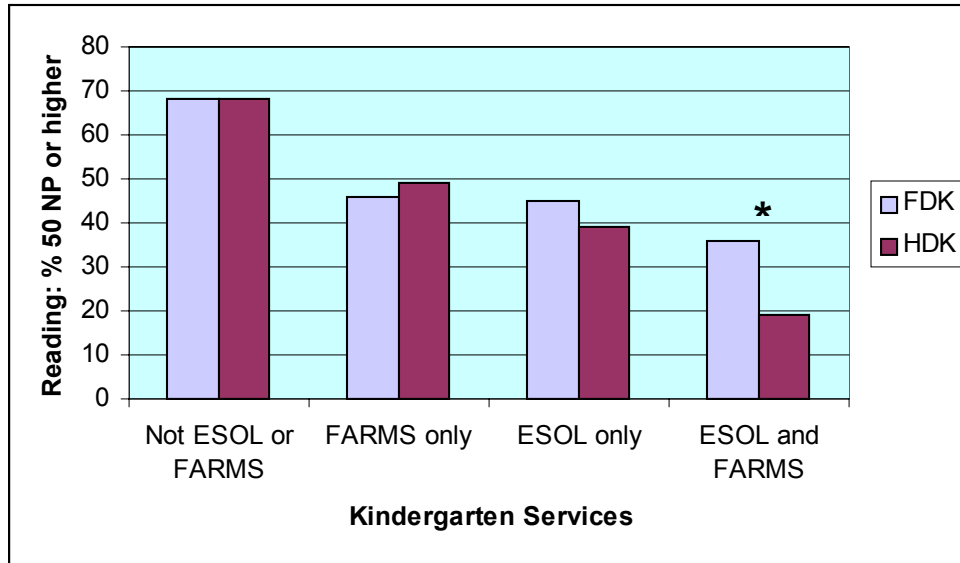
Table 4
Full-day Kindergarten Benefit for FARMS and ESOL Services Kindergarten Students Seen in Grade 2 Reading Performance, for Students Continuously Enrolled in Same School for K-2

	Spring Grade 2 CTBS Reading 50 th NP or higher (0,1) Continuously enrolled in same school K-2 N=1447	Spring Grade 2 CTBS Reading 50 th NP or higher (0,1) Not continuously enrolled in same school K-2 N=648
Fall K Foundational Skills	B > 0, t=12.8, p=.000, sr ² =.094	B>0, t=10.0, p=.000, sr ² =.128
Full-day / Half-day K		
KEF1 (FARMS / Neither)	B < 0, t=-3.0, p=.003, sr ² =.005	
KEF2 (ESOL / Neither)	B < 0, t=-3.1, p=.002, sr ² =.005,	
KEF3 (Both / Neither)	B < 0, t=-6.0, p=.000, sr ² =.020,	
FDK KEF1		
FDK KEF2		
FDK KEF3	B > 0, t=2.6, p=.009, sr ² =.004	
Total Model	R ² = .179	R ² = .172

Figure 1 contrasts the percentages of continuously enrolled students in Grade 2 attaining the 50th national percentile or higher on CTBS Reading that were in FDK and HDK. The FDK/HDK comparison is shown for each of the four ESOL/FARMS groups. The FDK/HDK contrast for the group of students who received ESOL and FARMS services in kindergarten is evident. That FDK made a difference for that group of students illustrates the FDK_KEF3 interaction observed in the results shown in Table 4 for students who were continuously enrolled in one school for Kindergarten through Grade 2. The illustration shows the unadjusted effect, as it does not take into account the

foundational skill level with which students entered Kindergarten or other variables in the analyses.

Figure 1
Differential Reading Performance in Grade 2 Among Students Continuously Enrolled in One School for K through Grade 2 for FDK Students Who Received ESOL and FARMS Services



*Statistically significant difference with $t=2.6$ and $p=.009$

2. How have students who entered kindergarten in a full-day kindergarten program in 2000 performed on the CTBS?

Methodology

Previous studies examined the performance of these students in Kindergarten and Grade 1. The following analyses were used to examine student performance as they progressed from the beginning of Kindergarten through Grade 2.

Sample.

The group of students identified in the original kindergarten report (Bridges-Cline, 2001, August) is maintained for this report in order to monitor longitudinal student performance data. This group of 7,849 students is described in Table 1. The focus of this study will be on the 1,407 students in the 17 schools that first received full-day kindergarten (FDK). The population in these schools is highly affected by poverty and second language learning, with 62 percent of the students receiving FARMS and 35 percent receiving ESOL services.

Measures.

Kindergarten performance measures used the Foundational Skills component of the MCPS Assessment Program Primary Reading and included tests of letter identification, concepts about print, hearing and recording sounds, and word recognition. Teachers recorded the raw score a student received on each assessment, and this score was then coded as having met or not met benchmark performance. In this study, students who met benchmark performance in all four foundational skills assessments were considered to have met the overall kindergarten benchmark.

Grade 1 performance measures used the Reading Proficiency component of the MCPS Assessment Program Primary Reading and included tests of reading fluency and comprehension. Once again, teachers recorded the raw score a student received on each component of the assessment, and this score was then coded as having met or not met benchmark performance. The Grade 1 proficiency benchmark for 2001–02 was reading at least a Level 14 text with 90 percent accuracy, along with a partial or essential comprehension score.

Student scores on the TerraNova Comprehensive Tests of Basic Skills were used as the measure of Grade 2 performance. The median national percentile rank traditionally is used to report student performance at the local and state levels. For this report, students achieving a national percentile rank of 50 or above in the reading or language subtests are categorized as having met the Grade 2 benchmarks.

Analysis.

A series of descriptive analyses were used to examine the percentage of students who were able to meet benchmark performance on the MCPS Assessment Program Primary Reading at the end of kindergarten and Grade 1, and on the Grade 2 CTBS. These percentages were examined based on skill level upon entering kindergarten, enrollment status, ESOL services, and racial/ethnic group. A test of proportions was used to examine the statistical significance of these percentages.

Results

The students who entered a full-day kindergarten program in the 2000–01 school year included many students affected by poverty and second language learning. The information in Table 1 shows how these students looked compared with other students who entered kindergarten that year.¹

The 1,407 students who entered the full-day kindergarten program varied in level of performance. By the end of Grade 2, only 773 had remained in the same school for Kindergarten, Grade 1, and Grade 2. In order to track the progress of these 1,407 students, their performance on the foundational skill assessments administered by classroom teachers in fall 2000 was used to categorize the students into three groups:

1. 966 students who had minimal foundational skills and were unable to meet benchmark performance on any of the foundational skills assessments,
2. 410 students who met benchmark performance on some (one to three) of the foundational skills assessments
3. 31 students who met benchmark performance on all four of the foundational skills assessments.

¹ Phase 1 schools offered full-day kindergarten in 2000–01. Phase 2 schools offered full-day kindergarten in 2001–02, and Phase 3 began in 2002–03. HDK refers to schools with half-day kindergarten programs.

The profile of these students is outlined in Tables 5 to 7.

Table 5
Comparison of Students Entering Kindergarten with Minimal Foundational Skills, by Enrollment

	Continuously Enrolled (N=514)		Non-Continuously Enrolled (N=452)	
	n	%	n	%
Ethnicity				
Amer. Indian	--	--	5	1
African American	121	24	114	25
Asian American	29	6	38	8
Hispanic	291	57	254	56
White	73	14	41	9
ESOL/FARMS				
Not ESOL/ FARMS	124	24	102	23
FARMS Only	179	35	147	33
ESOL Only	37	7	38	8
ESOL & FARMS	174	34	165	37
Gender				
Male	266	52	260	57
Female	248	48	192	43
Pre-Kindergarten Program				
MCPS Pre-K*	288	56	208	46
No MCPS Pre-K	226	44	244	54

*MCPS Pre-K programs include Head Start and the Extended Elementary Education Program, a locally developed program.

Table 6
Comparison of Students Entering Kindergarten with Some of Four Foundational Skills, by Enrollment

	Continuously Enrolled (n=238)		Non-Continuously Enrolled (n=172)	
	N	%	N	%
Ethnicity				
African American	67	28	57	33
American Indian	1	<1	0	0
Asian American	27	11	33	19
Hispanic	66	28	42	24
White	77	32	40	23
ESOL/FARMS				
ESOL	7	3	10	6
FARMS	79	33	65	38
ESOL & FARMS	23	10	24	14
Gender				
Male	110	46	86	50
Female	128	54	86	50
Pre-Kindergarten Program				
MCPS Pre-K	122	49	87	51
No MCPS Pre-K	116	51	85	49

Table 7
Comparison of Students Entering Kindergarten with all Four Foundational Skills, by Enrollment

	Continuously Enrolled (N=21)		Non-Continuously Enrolled (N=10)	
	n	%	n	%
Ethnicity				
African American	10	48	1	10
Asian American	3	14	2	20
Hispanic	2	10	4	40
White	6	29	3	30
ESOL/FARMS				
Not ESOL/FARMS	15	71	8	80
ESOL	--	--	--	--
FARMS	6	29	1	10
ESOL & FARMS	--	--	1	10
Gender				
Male	12	57	5	50
Female	9	43	5	50
Pre-Kindergarten Program				
MCPS Pre-K	10	48	1	10
No MCPS Pre-K	11	52	9	90

There were marked differences in performance of the benchmark periods for students who entered kindergarten with minimal, some, or no foundational skills, as illustrated in Table 8. For students with minimal foundational skills, 46 percent met benchmark performance at the end of Kindergarten, while 33 percent met benchmark performance on Grade 2 CTBS Reading. If students entered with some foundational skills, 81 percent met benchmark performance at the end of Kindergarten, while 75 percent met benchmark performance on Grade 2 CTBS Language. Students who entered with all foundational skills had met the greatest success, with 97 percent meeting Kindergarten benchmark performance and 93 percent meeting benchmark performance on Grade 2 CTBS Language.

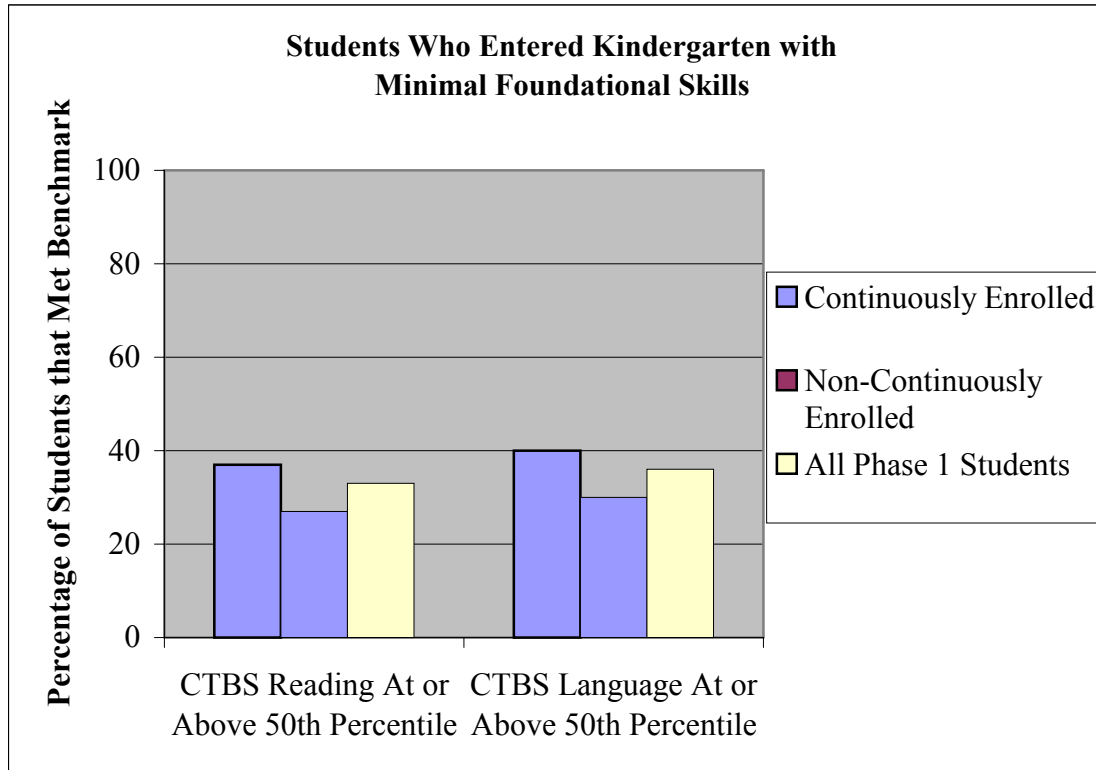
Table 8
Progress of Students in a Full-Day Kindergarten Program, by Level of Foundational Skill Performance When Entering Kindergarten

Foundational Skills in Fall 2000	Foundational Skills in Spring 2001		Met Grade 1 Reading Benchmark		Met Grade 2 CTBS Reading Benchmark		Met Grade 2 CTBS Language Benchmark	
	N	%	N	%	N	%	N	%
Minimal (0 of 4)	445	46	283	35	263	33	287	36
Some (1 to 3 of 4)	332	81	268	75	259	76	255	75
All (4 of 4)	30	97	27	96	27	96	26	93

The difference in benchmark performance on the Grade 2 CTBS between students who were continuously enrolled in the same school and those who were non-continuously enrolled is illustrated in Figures 2 through 6. The importance of being continuously enrolled is most evident for those students who enter kindergarten with minimal foundational skills. There was a statistically significant difference between the

percentage of students meeting benchmark performance on CTBS Reading and Language who were continuously enrolled versus those who were non-continuously enrolled.²

Figure 2
Benchmark Performance Achievement of Students with Minimal Foundational Skills, by Enrollment Status



² For CTBS Reading, $t=2.617$ with $p=.009$ and for CTBS Language $t=2.934$ and $p=.003$.

Figure 3
 Benchmark Performance Achievement of Students with Some of Four Foundational Skills, by Enrollment Status

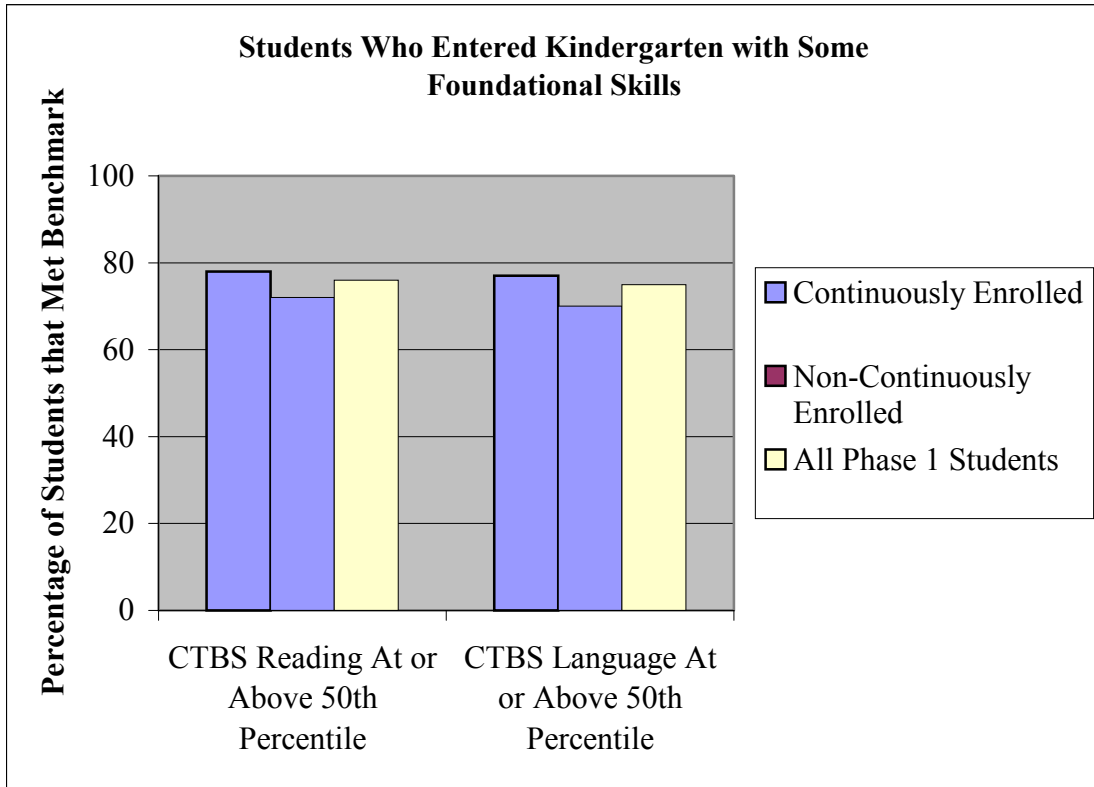


Figure 4
 Benchmark Performance Achievement of Students with All Four Foundational Skills, by
 Enrollment Status

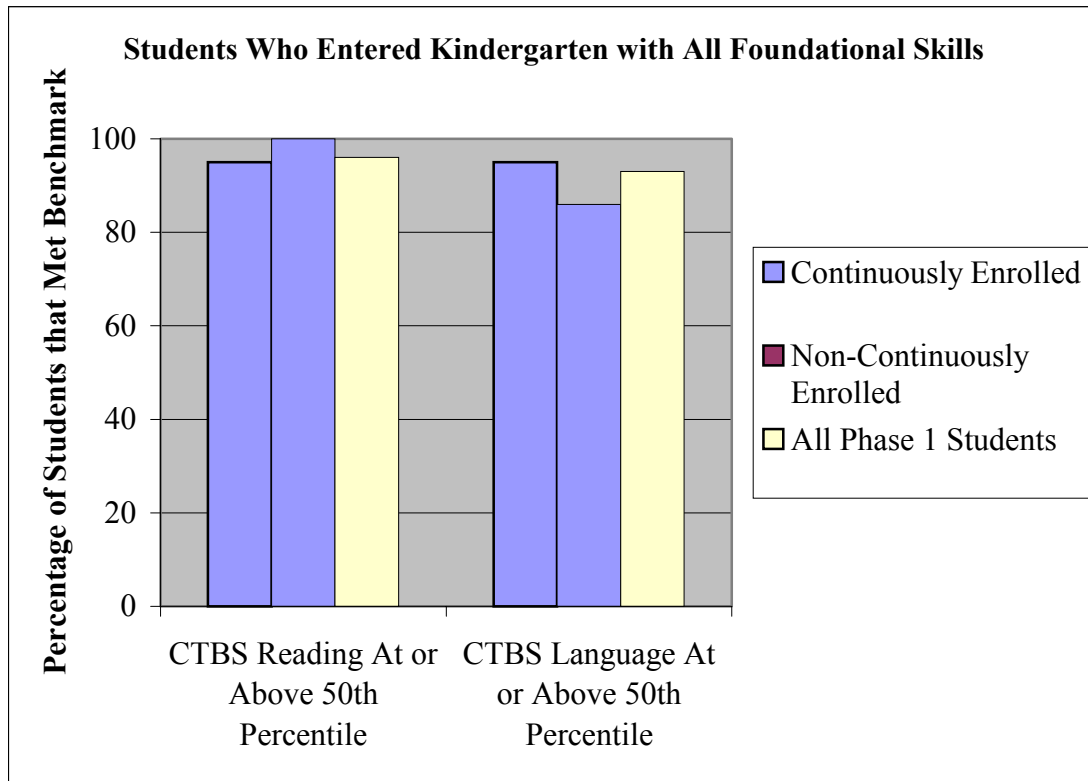


Figure 5
 Benchmark Performance Achievement on Grade 2 CTBS Reading, by Kindergarten Entry Level

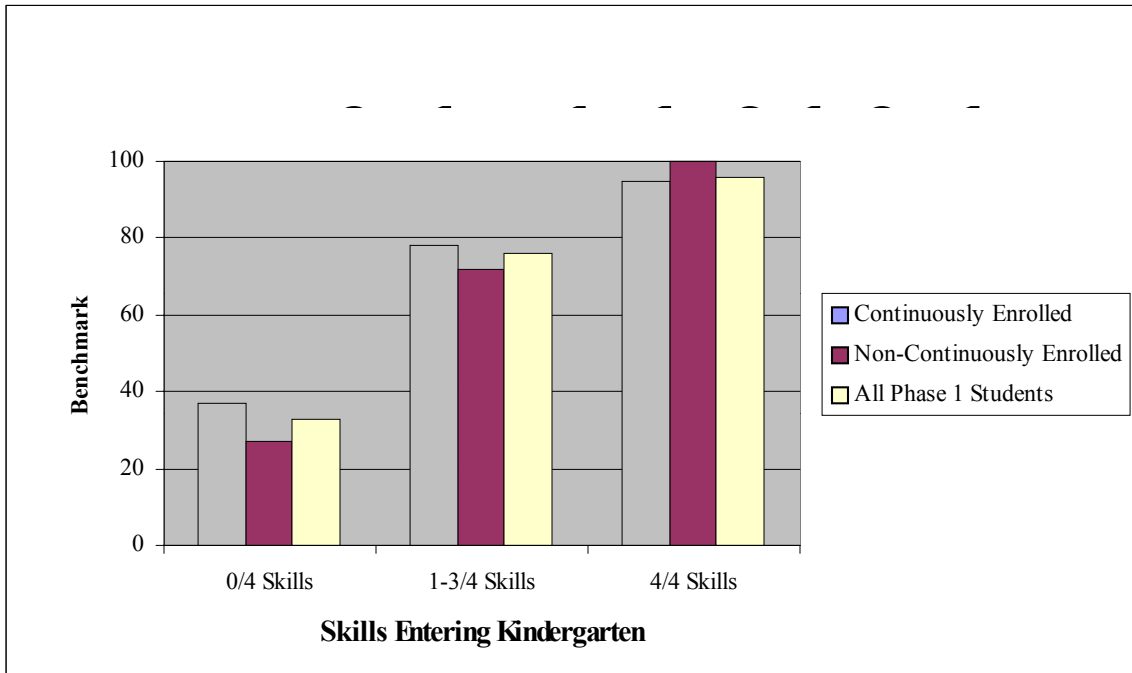
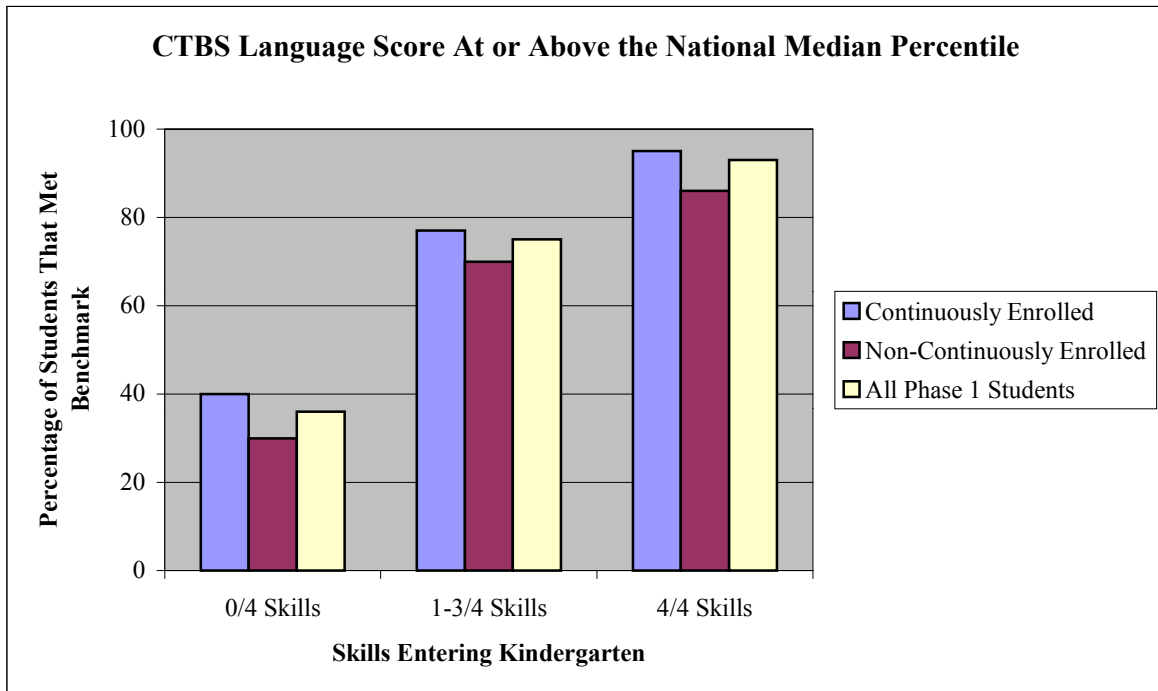


Figure 6
 Benchmark Performance Achievement on Grade 2 CTBS Language, by Kindergarten Entry Level



These results indicate the importance of entering kindergarten with foundational skills in place. Nearly 90 percent of these students are able to continue to meet all benchmark performances in subsequent grades. Students with minimal foundational skills upon entry to kindergarten continue to lag behind their second grade peers. However, the combined effects of the Kindergarten through Grade 2 program helped as many as one-third of these students to perform at or above the national median percentile rank on the CTBS in reading and language. For these students, their best chance of reaching benchmark performance levels occurred if they remained in the same school throughout their kindergarten, first grade, and second grade experiences.

3. What are the performance patterns for students of various racial/ethnic groups and for those receiving FARMS and ESOL services?³

Methodology

Previous studies compared the performance of students from various racial/ethnic groups with those who received FARMS and ESOL services in Kindergarten and Grade 1. The analyses for this report will focus on the benchmark performance established for the Grade 2 CTBS.

³ An examination of results based on services received does not include Special Education services because, with the limited number of students receiving these services in kindergarten, making generalizations would not be appropriate.

Sample.

Descriptive analyses to examine patterns in performance were run using the longitudinal sample of students described in the previous section of this report. Students were categorized based on racial/ethnic group and whether or not they had received FARMS and/or ESOL services.

Measures.

Student scores on the TerraNova Comprehensive Tests of Basic Skills were used as the measure of Grade 2 performance. The median national percentile rank traditionally is used to report student performance at the local and state levels. For this report, students achieving a national percentile rank of 50 or above in the reading or language subtests are categorized as having met the Grade 2 benchmarks.

Analysis.

A series of descriptive analyses were used to examine the percentage of students who were able to meet benchmark performance on the Grade 2 CTBS. These percentages were examined based on skill level upon enrollment status. Since the total number of students who entered kindergarten with all four foundational skills was so small, that group was not considered for these analyses by subgroup. A test of proportions was used to examine the statistical significance of these percentages.

Results

One important goal of the Early Success Performance Plan is to offer additional support to students affected by poverty and second language learning so that all groups are able to meet success on benchmark measures. The percentage of students who were able to meet the Grade 2 CTBS benchmark in reading and language is presented by racial/ethnic groups in Tables 9 and 10.

Table 9
Comparison of Students Entering Kindergarten with Minimal Foundational Skills, by Race/Ethnicity

	Met Benchmark for CTBS Reading		Met Benchmark for CTBS Language	
	N	%	N	%
African American	69	36	64	33
Asian American	20	38	24	46
Hispanic	134	30	161	36
White	40	44	38	42

Table 10
Comparison of Students Entering Kindergarten with Some Foundational Skills, by Race/Ethnicity

	Met Benchmark for CTBS Reading		Met Benchmark for CTBS Language	
	N	%	N	%
African American	67	68	65	66
Asian American	42	78	45	83
Hispanic	66	68	65	67
White	83	91	79	87

These results parallel findings discussed earlier in this report. Regardless of racial/ethnic group, students who enter kindergarten with more foundational skills are more likely to perform at the national median percentile rank on the CTBS in Grade 2. An examination of differences in performance based on enrollment is presented in Tables 11 and 12.

Table 11

Comparison of Students Entering Kindergarten with Minimal Foundational Skills and Achieving the Grade 2 CTBS Reading Benchmark, by Race/Ethnicity and Enrollment Status

	Continuously Enrolled		Non-Continuously Enrolled	
	N	%	N	%
African American	44	36	25	34
Asian American	13	45	7	30
Hispanic*	97	33	37	23
White	34	47	6	35

*Statistically significant difference with $t=2.2$ and $p=.028$

Table 12

Comparison of Students Entering Kindergarten with Minimal Foundational Skills and Achieving the Grade 2 CTBS Language Benchmark, by Race/Ethnicity and Enrollment Status

	Continuously Enrolled		Non-Continuously Enrolled	
	N	%	N	%
African American	40	33	24	33
Asian American*	17	59	7	30
Hispanic**	117	40	44	28
White	32	44	6	35

*Statistically significant difference with $t=2.069$ and $p=.044$.

**Statistically significant difference with $t=2.622$ and $p=.009$.

In every racial/ethnic group examined, students who entered kindergarten with minimal foundational skills and were continuously enrolled were more likely to achieve the Grade 2 benchmark performance. This difference was statistically significant for Hispanic students in both reading and language and for Asian American students in language.

As noted in earlier results tables, students with more foundational skills tend to show less difference in performance based on enrollment. A similar pattern is shown for each racial/ethnic group in Tables 13 and 14, except for one instance. Asian American students with some foundational skills showed a statistically significant difference based on enrollment.

Table 13

Comparison of Students Entering Kindergarten with Some Foundational Skills and Achieving the Grade 2 CTBS Reading Benchmark, by Race/Ethnicity and Enrollment Status

	Continuously Enrolled		Non-Continuously Enrolled	
	N	%	N	%
African American	45	68	22	67
Asian American	23	85	19	70
Hispanic	44	68	22	69
White	70	91	13	93

Table 14

Comparison of Students Entering Kindergarten with Some Foundational Skills and Achieving the Grade 2 CTBS Language Benchmark, by Race/Ethnicity and Enrollment Status

	Continuously Enrolled		Non-Continuously Enrolled	
	N	%	N	%
African American	44	67	21	64
Asian American*	26	96	19	70
Hispanic	44	68	21	66
White	66	86	13	93

*Statistically significant difference with $t=2.675$ and $p=.010$.

Monitoring the progress of students receiving FARMS and/or ESOL services has been the focus of several previous reports by the MCPS Office of Shared Accountability. The performance of students who faced the double impact of receiving both FARMS and ESOL services has been of particular interest and has resulted in the refinement of several pieces of the Kindergarten Initiative and the MCPS Assessment Program. The progress of these students in achieving the Grade 2 CTBS benchmarks is presented in Tables 15 and 16.

Table 15

Comparison of Students Entering Kindergarten with Minimal Foundational Skills, by FARMS/ESOL

	Met Benchmark for CTBS Reading		Met Benchmark for CTBS Language	
	N	%	N	%
FARMS only	159	29	182	33
ESOL only	100	29	116	34
FARMS and ESOL	78	28	91	33

Table 16

Comparison of Students Entering Kindergarten with Some Foundational Skills, by FARMS/ESOL

	Met Benchmark for CTBS Reading		Met Benchmark for CTBS Language	
	N	%	N	%
FARMS only	115	70	109	66
ESOL only	37	66	36	64
FARMS and ESOL	21	51	24	59

These results parallel earlier findings that students who enter kindergarten with more foundational skills are more likely to meet benchmark performance. Nearly twice as many of the students requiring special services were able to perform at the national median percentile rank on CTBS in Grade 2 when they entered kindergarten with some foundational skills compared with students who entered kindergarten with minimal foundational skills. An examination of differences in performance based on enrollment for students receiving special services is presented in Tables 17 and 18.

Table 17

Comparison of Students Entering Kindergarten with Minimal Foundational Skills and Achieving the Grade 2 CTBS Reading Benchmark, by Special Services and Enrollment Status

	Continuously Enrolled		Non-Continuously Enrolled	
	N	%	N	%
FARMS only	111	31	48	25
ESOL only*	70	33	30	23
FARMS and ESOL	55	31	23	22

*Statistically significant difference with $t=2.079$ and $p=.038$.

Table 18

Comparison of Students Entering Kindergarten with Minimal Foundational Skills and Achieving the Grade 2 CTBS Language Benchmark, by Special Services and Enrollment Status

	Continuously Enrolled		Non-Continuously Enrolled	
	N	%	N	%
FARMS only*	129	37	53	27
ESOL only	79	37	37	28
FARMS and ESOL	61	35	30	29

*Statistically significant difference with $t=2.235$ and $p=.026$.

For those students who entered kindergarten with minimal foundational skills, continuous enrollment offered an advantage for them in achieving the Grade 2 CTBS benchmarks. That advantage was statistically significant in two cases—ESOL students in reading and FARMS students in language. The comparison of students entering kindergarten with some foundational skills by enrollment is presented in Tables 19 and 20.

Table 19

Comparison of Students Entering Kindergarten with Some Foundational Skills and Achieving the Grade 2 CTBS Reading Benchmark, by Special Services and Enrollment Status

	Continuously Enrolled		Non-Continuously Enrolled	
	N	%	N	%
FARMS only	73	72	42	67
ESOL only	20	67	17	65
FARMS and ESOL	10	65	11	61

Table 20

Comparison of Students Entering Kindergarten with Some Foundational Skills and Achieving the Grade 2 CTBS Language Benchmark, by Special Services and Enrollment Status

	Continuously Enrolled		Non-Continuously Enrolled	
	N	%	N	%
FARMS only	69	68	40	63
ESOL only	19	63	17	65
FARMS and ESOL	13	56	11	61

As noted in other results tables, students with more foundational skills tend to show less difference in performance based on enrollment than students who enter with minimal foundational skills. None of the groups receiving special services that entered with some foundational skills show a statistically significant difference based on enrollment status. However, once again the results show that students entering with some foundational skills are more likely to achieve the national median percentile rank on the CTBS than students who enter with minimal foundational skills.

4. How do students who attended an MCPS Prekindergarten program perform compared to those who did not attend?

Methodology

Previous studies compared the performance of students who had received MCPS prekindergarten programs with those who had not received these programs in Kindergarten and Grade 1. The following analyses were used to compare the performance of these students as they progressed from the beginning of Kindergarten through Grade 2.

Sample.

Only students from the original longitudinal study who were continuously enrolled were used for these analyses to ensure scores on all benchmark measures. Students were then categorized based on whether or not they had attended an MCPS prekindergarten program, which includes Head Start and the Extended Elementary Education Program.

Measures.

Kindergarten performance measures included four locally developed and administered tests of foundational skills in letter identification, concepts about print, hearing and recording sounds, and word recognition. In this study, students who met benchmark performance in all four foundational skills assessments were considered to have met the overall kindergarten benchmark.

Grade 1 performance measures were scores on the locally developed and administered tests of reading fluency and comprehension. The Grade 1 proficiency benchmark for 2001–02 was reading at least a Level 14 text with 90 percent accuracy, along with a partial or essential comprehension score.

Student scores on the TerraNova Comprehensive Tests of Basic Skills were used as the measure of Grade 2 performance. The median national percentile rank traditionally is used to report student performance at the local and state levels. For this report, students achieving a national percentile rank of 50 or above in the reading or language subtests are categorized as having met the Grade 2 benchmarks.

Analysis.

A series of descriptive analyses were used to examine the percentage of students who were able to meet benchmark performance at the end of kindergarten, at the end of Grade 1, and on the Grade 2 CTBS. These percentages were examined based on skill level upon entering kindergarten and enrollment status. Since the total number of students who entered kindergarten with all four foundational skills was so small, that group was not considered for these analyses by subgroup.

Results

The MCPS prekindergarten programs offered to students in 1999–2000 were based on standards from the Head Start program, which emphasized social competency elements and limited literacy elements. In 2000–01, the standards used in the prekindergarten programs were linked to the MCPS kindergarten program. Other reforms occurring in the kindergarten program also were incorporated in the pre-kindergarten programs.⁴ The prekindergarten programs continue to undergo refinement and will be evaluated extensively in the 2003-04 school year. Therefore, it is important to note that the findings related to pre-kindergarten programs in this study are based on the programs offered prior to improvement efforts.

In examining the progress of students who entered kindergarten with minimal foundational skills, there is no evidence of a pre-kindergarten program benefit, as seen in Table 21. For students entering kindergarten with some foundational skills, there is a slight difference between students who experienced prekindergarten in MCPS and those who did not.

The percentage of students who were able to meet the Grade 2 CTBS benchmark of achieving the 50th national percentile rank was examined based on prekindergarten enrollment and whether or not students were continuously versus non-continuously enrolled. The findings in Table 22 illustrate little or no effect for the prekindergarten program.

⁴ A more detailed explanation of these reform efforts is presented in the document *Early Success Performance Plan: Educational Reform in the MCPS*.

Table 21

Comparison of Performance of Continuously Enrolled Students on Benchmark Measures, Based on Attending MCPS Prekindergarten Programs

		Met Kindergarten Benchmark		Met Grade 1 Benchmark		CTBS Reading 50%ile or Above		CTBS Language 50%ile or Above	
	N	N	%	N	%	N	%	N	%
Minimal Foundational Skill									
MCPS Pre-K	288	95	47	82	30	93	32	107	37
No MCPS Pre-K	226	113	50	95	47	95	42	99	44
Some Foundational Skills									
MCPS Pre-K	121	102	84	92	76	94	78	89	74
No MCPS Pre-K	115	93	80	89	79	89	77	92	80

Previous studies by the Office of Shared Accountability have indicated a benefit from Head Start programs in kindergarten for students receiving both FARMS and ESOL services. The benefit of pre-kindergarten programs based on services received is not as marked in benchmarks for Grade 2. The comparison of students who enter with different foundational skills levels by services received is presented in Tables 22 and 23.

Table 22

Comparison of Performance of Continuously Enrolled Students Who Entered with Minimal Foundational Skills, by Prekindergarten Program and Services Received

	Met Benchmark for CTBS Reading		Met Benchmark for CTBS Language	
	N	%	N	%
FARMS only				
MCPS Pre-K	34	31	40	67
No MCPS Pre-K	22	31	28	40
ESOL only				
MCPS Pre-K	7	41	7	41
No MCPS Pre-K	8	40	11	40
FARMS and ESOL				
MCPS Pre-K	33	29	41	36
No MCPS Pre-K	22	37	20	33

Table 23

Comparison of Performance of Continuously Enrolled Students Who Entered with Some Foundational Skills, by Prekindergarten Program and Services Received

	Met Benchmark for CTBS Reading		Met Benchmark for CTBS Language	
	N	%	N	%
FARMS only				
MCPS Pre-K	40	74	39	72
No MCPS Pre-K	18	75	17	70
ESOL only				
MCPS Pre-K	3	75	3	75
No MCPS Pre-K	2	67	3	100
FARMS and ESOL				
MCPS Pre-K	15	75	11	55
No MCPS Pre-K	3	100	2	67

Summary and Major Findings

Previous studies have monitored the progress of students who entered kindergarten in the 2000–01 school year. Fall-to-spring gains in foundational skills were analyzed in August 2001 (Bridges-Cline, 2001, August). The progress of these students as they entered Grade 1 was analyzed in September 2002 (Nielsen & Cooper-Martin, 2002) and evidence of a full-day kindergarten (FDK) benefit for every racial/ethnic group was discussed. This benefit continues to be evident in Grade 2. Regression analyses revealed a statistically significant FDK benefit for those students who receive both Free and Reduced-price Meals (FARMS) and English as a Second Language (ESOL) services.

This report represents a closer examination of the performance of students in the 17 schools that first received FDK services. These schools have been identified as having the highest level of need. Monitoring the performance of those students who entered these 17 schools in 2000 and were still enrolled in an MCPS school in 2003 revealed these key findings:

- The FDK benefit for students who participate in both the FARMS and ESOL programs continues into Grade 2.
- In the highly impacted Phase 1 schools, 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.

- Students who entered kindergarten with minimal or some foundational skills are more likely to be successful on the Comprehensive Tests of Basic Skills (CTBS) in reading and language in Grade 2, if they remain continuously enrolled in the same school. This is evident for all racial/ethnic groups and for groups of students receiving special services.
- Students who enter kindergarten with all four foundational skills are equally likely to be successful on the CTBS in reading and language in Grade 2, regardless of their enrollment pattern. When students enter kindergarten with all four foundational skills in place, their chance for achieving benchmark performance on subsequent measures, including the CTBS, is greatly enhanced.
- Students who receive FARMS and/or ESOL services who enter kindergarten with minimal or some foundational skills are more likely to perform at or above the national median on the CTBS in reading if they were enrolled in an FDK program and remained in the same school for kindergarten, first grade and second grade.
- Students from all racial/ethnic groups were more likely to perform at or above the national median on the CTBS in reading if they were enrolled in a FDK program and remained in the same school for kindergarten, first grade and second grade.
- While prekindergarten programs may have an impact on the performance of students by the end of kindergarten, there is no evidence to suggest that they will affect achievement on benchmark performances in later grades.

The implications of these results suggest the importance of ensuring that students enter kindergarten with established foundational skills. In these 17 highly impacted

schools, nearly 70 percent of the students entered with no established foundational skills. The combined effects of the Kindergarten through Grade 2 program helped as many as one-third of these students to perform at or above the national median on the CTBS in reading and language. By comparison, nearly all of the students who entered these 17 schools with established foundational skills went on to perform at or above the national median on the CTBS in reading and language. This contrast makes evident the need for high-quality preschool programs in order to continue closing the achievement gap.

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APPENDIX

SPSS Variable Coding for Regression Analysis

Appendix: SPSS Variable Coding for Regression Analysis

- 1) Fall Grade K Foundational Skills in Reading: Number (0 - 4) of skills that met the benchmark
- 2) Spring Grade K Foundational Skills in Reading: Number (0-4) of skills that met the benchmark
- 3) Spring Grade 2 TerraNova CTBS Reading: 0 = Below 50th National Percentile; 1 = At/Above 50th National Percentile
- 4) School Group: 0 = Half-day Kindergarten; 1 = Full-day Kindergarten (FDK)
- 5) Free and Reduced-price Meals (FARMS) and ESOL services:

Four groups dummy coded so that the reference group received neither FARMS nor English for Speakers of Other Languages (ESOL) services in kindergarten.

- KEF1 contrasts students receiving only FRRD services in Kindergarten to the reference group.
 - KEF2 contrasts students receiving only ESOL services in Kindergarten to the reference group.
 - KEF3 contrasts students receiving both FRRD and ESOL services in kindergarten to the reference group.
- 6) School Group by FRRD/ESOL services interaction variables:
 - FDK_KEF1 = School group x KEF1
 - FDK_KEF2 = School group x KEF2
 - FDK_KEF3 = School group x KEF3
 - 7) Continuous Enrollment: 0 = NOT enrolled in one school for K, 1, and 2 for 10 months/year and 1 = Enrolled in one school for K, 1, and 2 for 10 months/year,
 - 8) School Group by Continuous Enrollment interaction variable:
 - FDK_ENRL = School group x Continuous Enrollment
 - 9) Continuous Enrollment by FRRD/ESOL services interaction variables:
 - ENRLKEF1 = Continuous Enrollment by KEF1
 - ENRLKEF2 = Continuous Enrollment by KEF2
 - ENRLKEF3 = Continuous Enrollment by KEF3