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Examining the core: Relations among reading curricula, poverty, and first through third grade reading achievement ☆

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Abstract

Policy changes at the federal and state level are endeavoring to improve student achievement at schools serving children from lower-SES homes. One important strategy is the focus on using evidence-based core reading curricula to provide a consistent framework for instruction across schools. However, rarely have these curricula undergone rigorous comparative testing. Therefore, the purpose of this study was to compare the effects of six core reading curricula on oral reading fluency growth, while appraising whether these effects differ by grade level and for children living in lower

Published core curricula, although based on scientific research, likely target typically developing children. Many children living in lower-SES homes begin school with weaker language and literacy skills than their more affluent peers (McCoach et al., 2006; NICHD-ECCRN, 2002; USDOE, 2006). Hence, curricula targeted toward typically developing, middle- and higher-SES children may not provide the generally more intensive and targeted instruction needed by children with weaker initial skills (Connor, Piasta, Glasney, Schatschneider, Fishman, Underwood, 2007; Torgesen et al., 2001). Therefore, research clarifying the effects of different reading curricula on students of varying SES is of vital importance to assuring an equitable educational experience. The following research questions guided the current investigation: 1) What are the effects of different core curricula on children's reading fluency growth? 2) Do the effects of curricula on oral reading fluency outcomes differ by grade level? And, 3) does growth in achievement for lower-SES students vary depending on curriculum and grade level? Since curricula aim to follow state standards and federal guidelines for reading instruction, each should produce adequate reading skill growth for most students. However, it is possible that student growth may vary depending on grade and student characteristics (lower- or higher-SES) as a function of differing reading curricula.

Method

Participants: Reading First, students, and schools

The Reading First initiative

Reading First provides extensive funding for the improvement of schools demonstrating chronically low reading achievement, affecting approximately 264,254 students and 16,114 teachers within the state of Florida (Miller, 2007). Extensive funding is also provided for the improvement of schools demonstrating chronically low reading achievement, wherein monies are designated for teacher training, the purchase of scientifically based reading curricula, and assessment instruments (both norm-referenced and curriculum-based measures). Teacher training is intended to support the improvement of reading instruction, alongside a mandated 90 min, language-arts instructional period, state-selected core curriculum adoption, and the use of assessments to guide instruction.

Students and schools

Each year, 10% of Florida Reading First schools (38 in this sample) are randomly selected to participate in site visits aimed at monitoring implementation of Reading First. Students included in this study were a randomly selected sample of 10% of those who attended Reading First schools during the 2005–2006 school year; specifically, 9993 first grade students in 942 classrooms, 9869 second grade students in 962 classrooms, and 10,141 third grade students in 954 classrooms. Students were not significantly different from sample statistics of Reading First schools overall. Student demographic data is presented in Table 1.

Table 2
Descriptive statistics for oral reading fluency by grade.

	September ORF		April ORF	
	Mean	SD	Mean	SD
First grade				
All students	18	20	50	32
Higher-SES	25	16	63	35
Lower-SES	16	17	46	30
Open Court	14	17	45	30
Reading Mastery	22	20	57	32
Harcourt	18	20	51	32
Houghton Mifflin	16	19	44	31
Scott Foresman	19	21	52	32
Success for All	19	23	50	34
Second grade				
All students	53	31	89	35
Higher-SES	63	34	77	34
Lower-SES	50	29	62	30
Open Court	51	26	89	35
Reading Mastery	55	30	88	35
Harcourt	54	31	88	36
Houghton Mifflin	51	31	90	35
Scott Foresman	54	31	89	36
Success for All	56	30	92	33
Third grade				
All students	73	34	101	35
Higher-SES	85	34	113	35
Lower-SES	69	32	97	34
Open Court	78	32	100	35
Reading Mastery	79	32	109	34
Harcourt	74	34	103	35
Houghton Mifflin	68	34	96	36
Scott Foresman	73	33	102	34
Success for All	79	32	101	35

Table 2 for fall and spring ORF score averages by curriculum and grade level. Passages were drawn from the Dynamic Indicators of Basic Early Literacy Skills (DIBELS) progress monitoring materials at first, second, and third grade levels (Good & Kaminski, 2002). Assessments were conducted by reading coaches who were trained by Florida Reading First assessment teams and staff. Students were assessed at four time points during the school year (September, December, February, and April).

Florida Reading First benchmarks for ORF measures were designed to identify students at risk for reading failure by the end of the year and, for the purposes of this study, are used as benchmarks for adequate achievement in ORF. Risk levels were established by the authors of DIBELS reading fluency tests (Hasbrouck & Tindal, 1992; Fuchs, Fuchs, Hamlett, Walz, & Germann, 1993) and were revised by Florida Reading First to include an above-average reading benchmark. Benchmark levels include high, medium, and low risk for reading failure as well as above average ORF achievement at each grade level. The above-average benchmark level was added to DIBELS norms for Florida Reading First

and focus on its vocabulary. Inquiry allows students to ask questions about the content presented in daily readings, including strategies to organize facts and information. Language Arts instruction focuses on more complex phonics skills, writing strategies, and daily grammar lessons.

In third grade, the same general format of second grade is followed, with more discussion of stories and comprehension strategies, followed by word study rather than phonics. Key differences from second grade include a greater use of critical thinking and comprehension strategies during Reading and Responding. Inquiry activities require students to think and apply information learned from text readings, while Language Arts instruction maintains a similar focus, providing daily writing and grammar lessons.

Reading Mastery

Reading Mastery lessons are scripted and characterized by a direct style of instruction (https://www.sraonline.com/). For first grade, daily instruction begins with a review of previously introduced phonics and phonemic awareness skills. Next, an opportunity to use those sounds within the context of real words is presented as a precursor to later inclusion in story readings. Sight words which later appear in texts for practice reading are introduced, and identified as irregular or regular. Once the items specific to daily stories are introduced, the story is read. Students participate in multiple readings of text for each lesson with specific aims, such as reading to practice decoding skills and reading for comprehension. Last, activities for further review of daily concepts are offered. Expansion activities for reading are also introduced after each lesson, as an option for the teacher, and are often integrated with subjects aside from reading or language arts. Other daily lesson plan components include Spelling and Language.

Second and third grade follow a similar framework, with different emphases. Like first graders, second and third graders are presented with phonics, word families, or word segments; however, instead of a focus on high frequency words, vocabulary related to the daily story is introduced and reviewed. Irregular and regular words are also taught and reviewed. Daily practice reads are conducted in the same format as first grade, followed by comprehension activities and strategies. Practice activities also are offered, along with seatwork for additional independent learning. Spelling and language lessons for each day are followed by literature lessons and independent readers, as an option for further extension.

Scott Foresman

The following components make up Scott Foresman lessons: Reading, Oral Language, Writing, and Sel3(an333I-523ict)-3.8(ew)-486.6(peading)/-10.7(iRad)-249.3(aAlous)-240.1(a(TJ.1303

grader daily rexts for eeading,-352.8(e2(ar)47.7(.)-lttp53(an333Ion)-42ige,)23n3725.121579e2(ar)aSed

Socioeconomic status

Students' eligibility for free or reduced price lunch (lower-SES) was used as a proxy for students' SES status. Lower-SES students were designated as those who applied and were eligible for free or reduced lunches. Students who did not apply or applied but were not eligible were not considered to be lower-SES in our analyses. To qualify for free or reduced price lunches

Level-3:

$B_{00j} = \gamma_{001}$(Open Court) + γ_{002}(Reading Mastery) + γ_{003}(Harcourt) + γ_{004}(Houghton Mifflin) + γ_{005}(Scott Foresman) + γ_{006}(Success for All) + u_{00j}

$\beta_{10j} = \gamma_{101}$ (Open Court) + γ_{102} (Reading Mastery) + γ_{103} (Harcourt) + γ_{104}(Houghton Mifflin) + γ_{105} (Scott Foresman) + γ_{106} (Success for All) + u_{10j}

$\beta_{20j} = \gamma_{201}$ (Open Court) + γ_{202} (Reading Mastery) + γ_{203} (Harcourt) + γ_{204} (Houghton Mifflin) + γ_{205} (Scott Foresman) + γ_{206} (Success for All)

Where Y_{tij} is the fitted spring ORF score at time t for child i in classroom j and is a function of the linear ($Time_{tij}$; γ_{101} ... γ_{106}) and quadratic ($Time^2_{itj}$; γ_{201} ... γ_{206}) growth terms for each curriculum added to the intercept or fitted mean for a particular curriculum (γ_{001} ... γ_{006}). Residuals were assumed to be normally distributed.

Table 3
Grade 1–3 HLM overall growth model for spring oral reading fluency, where ME = main effect, CO = coefficient, SE = standard error, and df = degrees of freedom.

ME	First grade			Second grade			Third grade		
	CO	SE	p value(df)	CO	SE	p value(df)	CO	SE	p value(df)
OC	44.16	2.43	<.01(936)	80.63	3.96	<.01(956)	92.17	4.42	<.01(948)
RM	54.99	2.73	<.01(936)	90.74	3.51	<.01(956)	104.98	3.44	<.01(948)
HC	50.06	0.85	<.01(936)	85.66	1.06	<.01(956)	98.76	1.10	<.01(948)
HO	42.52	1.26	<.01(936)	79.34	1.81	<.01(956)	92.30	1.58	<.01(948)
SF	51.44	1.15	<.01(936)	84.00	1.69	<.01(956)	97.69	1.66	<.01(948)
SA	49.92	4.00	<.01(936)	90.84	3.82	<.01(956)	96.69	4.33	<.01(948)
Linear									
OC	6.97	.51	<.01(936)	6.95	.45	<.01(956)	.76	.54	.17 (948)
RM	5.36	.29	<.01(936)	6.46	.51	<.01(956)	2.04	.45	<.01(948)
HC	6.03	.12	<.01(936)	6.11	.13	<.01(956)	3.07	.15	<.01(948)
HO	5.17	.21	<.01(936)	5.99	.17	<.01(956)	2.98	.23	<.01(948)
SF	6.14	.18	<.01(936)	5.63	.21	<.01(956)	2.90	.23	<.01(948)
SA	5.18	.38	<.01(936)	5.67	.44	<.01(956)	2.17	.44	<.01(948)
Quadratic									
OC	.34	.06	<.01(39789)	.30	.05	<.01(39308)	−.33	.06	<.01(40391)
RM	.05	.04	.19(39789)	.10	.05	.07(39308)	−.32	.06	<.01(40391)
HC	.17	.01	<.01(39789)	.15	.02	<.01(39308)	−.15	.02	<.01(40391)
HO	.17	.02	<.01(39789)	.19	.02	<.01(39308)	−.14	.03	<.01(40391)
SF	.20	.02	<.01(39789)	.12	.02	<.01(39308)	−.19	.03	<.01(40391)
SA	.11	.05	.04(39789)	.08	.06	.18(39308)	−.16	.06	.01(119374)

Random effects

	First grade			Second grade			Third grade		
	Var	X^2	p-value	Var	X^2	p-value	Var	X^2	p value
Class	176.2	323.4	<.01	363.1	4084.4	<.01	777.3	528642.7	<.01
Linear	52.4			71.7			71.9		
Child	814	225845.9	<.01	916.5	18239.4	<.01	858.2	22541.5	<.01

Note. CO = coefficient, SE = standard error, and df = degrees of freedom. OC = Open Court, RM = Reading Mastery, HC = Harcourt, HO = Houghton Mifflin, SF = Scott Foresman, SA = Success for All.

Fig. 1. First grade oral reading fluency growth by curriculum (top). First grade oral reading fluency score differences at the spring assessment time point (April) for lower and higher-SES students (bottom).

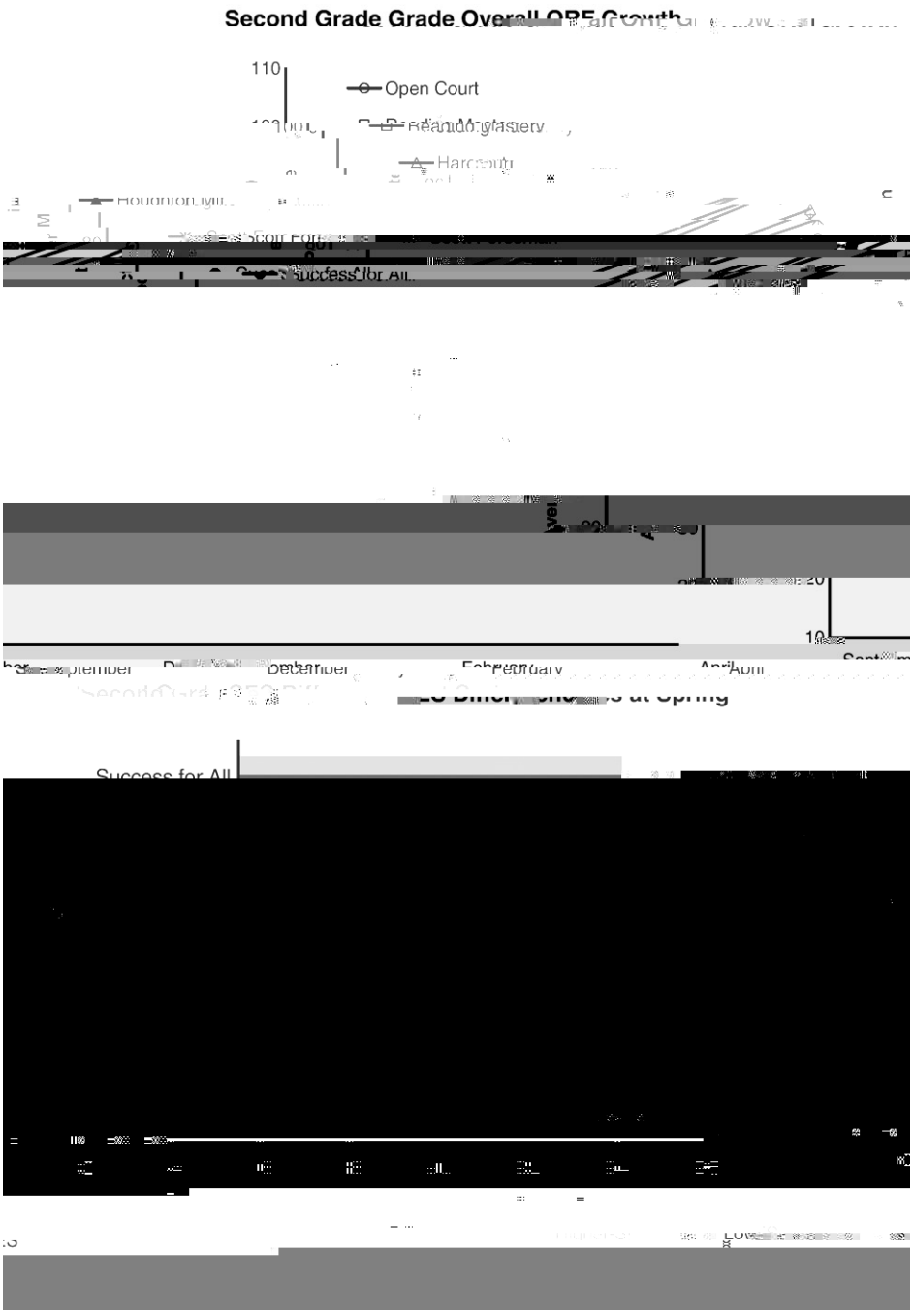

Fig. 2. Second grade oral reading fluency growth by curriculum (top). Second grade oral reading fluency score

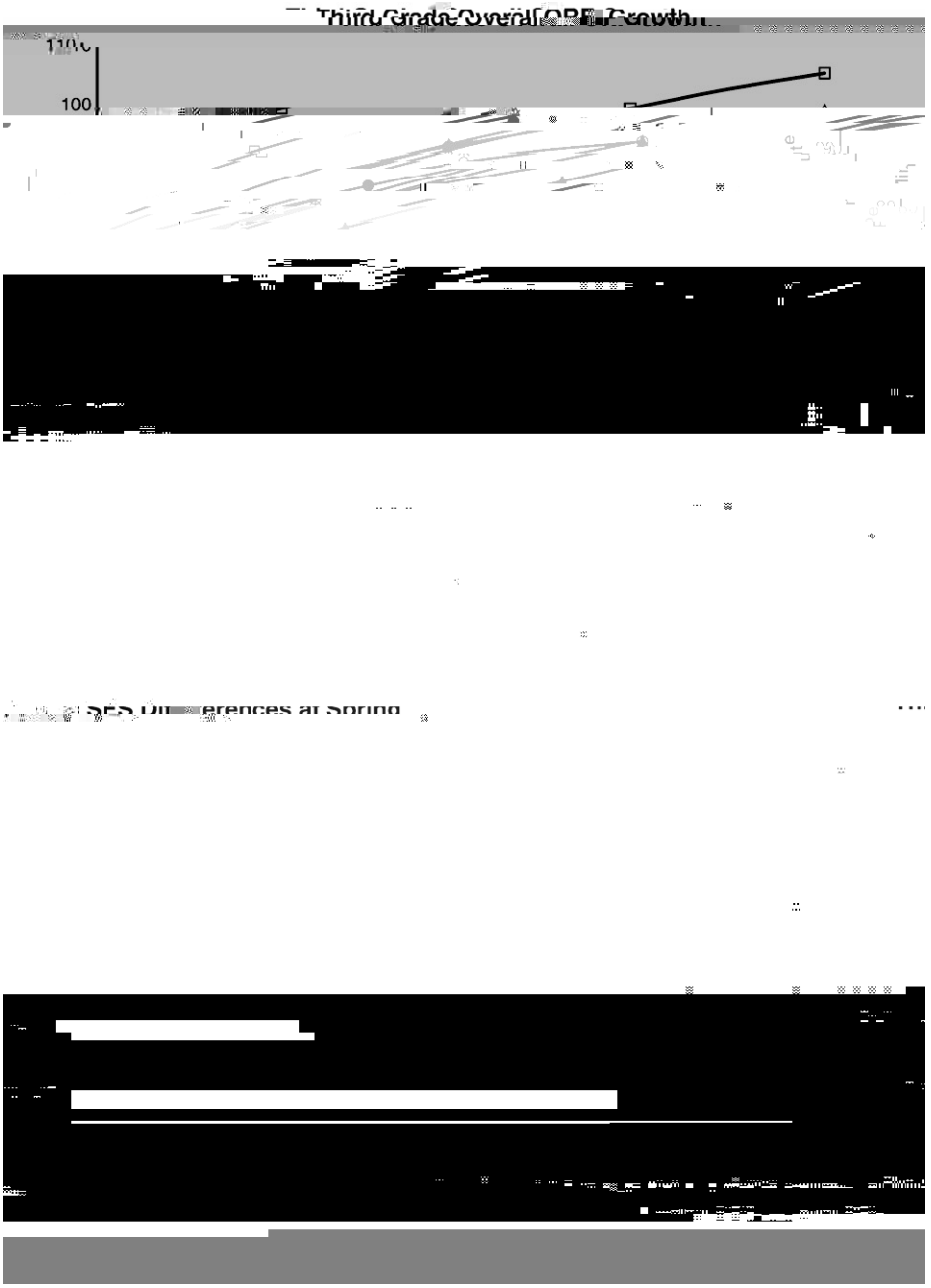

Fig. 3. Third grade oral reading fluency growth by curriculum (top). Third grade oral reading fluency score differences at the spring assessment time point (April) for lower and higher-SES students (bottom).

Level-3:

$$\beta_{00j} = \gamma_{000} + \gamma_{001}(\text{Open Court}) + \gamma_{002}(\text{Reading Mastery}) + \gamma_{003}$$

Research questions I and II: what are the effects of different core curricula on children's reading fluency growth? Do the effects of curricula on ORF outcomes differ by grade level?

On average, first grade ORF scores increased from September to April, characterized by growth that was generally linear with some acceleration. Overall, students were at or above ORF benchmarks of adequate achievement at the April assessment (see Fig. 1 top; 40 CRW/min). Reading Mastery students were, on average, reading 55 CRW/min at the final first grade assessment time point (April) followed by Scott Foresman (51), Harcourt (50), Success for All (50), Open Court (44), and Houghton Mifflin (43). On average,

Significant differences were detected between students using Houghton Mifflin and those using Harcourt and Reading Mastery. Although linear growth (change in CRW/min between assessment time points) for first and second graders did not vary across curricula, in third grade significant differences were apparent. Results suggest that Open Court students had significantly less linear growth (.76 CRW/min) than Harcourt (3.07 CRW/min), Houghton Mifflin (2.98 CRW/min), and Scott Foresman (2.90 CRW/min) (p values $< .01$). Acceleration parameters (quadratic trend) also varied significantly for Open Court (.06) and Reading Mastery (.06) students who experienced more deceleration in CRW/min than Harcourt (.02) and Houghton Mifflin (.03) (p values $< .01$).

Research question III: does growth in achievement for lower-SES students vary depending on curriculum and grade level?

In first grade, higher-SES students using Open Court, Reading Mastery, and Scott Foresman did not significantly differ from higher-SES Harcourt students (52 CRW/min at April) while higher-SES Houghton Mifflin (46 CRW/min; effect size = 0. 20) and Success for All students (48 CRW/min; effect size = 0.16) scored significantly lower. Lower-SES

Table 4
Grade 1 HLM model for spring oral reading fluency, controlling for oral reading fluency initial status and SES.

Curriculum	Coefficient	S.E.	df	p value	Calculated score
Higher-SES intercept					
Harcourt	51.91	0.50	935	0.00	51.91
Open Court	−0.73	1.75	935	0.68	51.91

and Scott Foresman (5 CRW/min). Within curricula, no significant differences in growth between lower and higher-SES students were detected. Therefore, on average, second grade, lower-SES students were growing at the same rate as their higher-SES peers who used the same curricula.

In third grade, higher-SES Reading Mastery and Scott Foresman students did not differ significantly from those using Harcourt (102 CRW/min) while Open Court (95 CRW/min; effect size = 0.19), Success for All (97 CRW/min; effect size = 0.14), and Houghton Mifflin students (100 CRW/min; effect size = 0.05) scored significantly lower than those using

Harcourt. Concomitantly, lower-SES students using Scott Foresman scored slightly higher (104 CRW/min) than their higher-SES peers (102 CRW/min) who were also using Scott Foresman (effect size = 0.05). Overall, third grade ORF scores at the last assessment time point (April) indicate that students were approaching ORF achievement benchmarks (110 CRW/min), but on average, and regardless of curricula, students did not reach this goal (Fig. 3, bottom; Table 5).

In third grade, students using Harcourt grew, on average, 3.85 CRW/min/month. Only Open Court and Success for All differed significantly from this rate (2.2 and 2.82,

Table 5

Table 6

respectively). Across curricula, no differences in growth were detected between lower- and higher-SES students (see Table 6).

Discussion

The purpose of this study was to investigate the effect of six core reading curricula on students' ORF growth while considering possible influences of students' grade and SES. Results for each grade were compared to achievement benchmarks for the end of the school year which were set by the test authors and the State of Florida. In first grade, students were

achieving adequate reading fluency skill growth and achieved adequate achievement (final benchmark = 40 CRW/min) by the end of first grade; however, significant differences among curricula were detected. Those differences are discussed below. By the end of second grade, on average, students' reading skills fell only slightly below the benchmark of adequate achievement (90 CRW/min); although, in second grade, this depended on the core curriculum used in the classroom. By the end of third grade, on average, students did not meet set benchmarks (110 CRW/min) regardless of the curriculum their teachers used. It was hypothesized that ORF growth would be similar across curricula used in Reading First schools in the state of Florida. However, results suggest that for first-, second-, and third-grade students, ORF growth differed by curriculum as well as by grade level. Even controlling for students' initial ORF score and SES status, some differences among curricula and across grades remained.

Overall, students in the Reading Mastery curriculum demonstrated generally greater overall ORF growth than students in other curricula. Also, they more frequently met or exceeded benchmarks for adequate achievement in first, second, and third grade. In first grade, regardless of SES status, students generally met adequate achievement benchmarks. Among second graders, on average, only students using Reading Mastery and Success for All met benchmarks, while the lowest scores for students were among those using Houghton Mifflin. In third grade, on average, students did not reach the adequate achievement benchmark. However, Reading Mastery students came closest to the benchmarks because scores among these students were the highest across curricula.

Taken together, overall results indicate that some reading curricula seem to be associated with higher ORF scores. Specifically, students in Reading First schools and classrooms using Reading Mastery demonstrated stronger ORF skills when compared to students in cimilarO(benchm)-8.59v7ate curricula. T9(some-354.7(MasTc2r376(ste)-mer)-2(witamon.2(met349.e)-

were not randomly assigned to schools. Thus, bias associated with curriculum selection could exist. For example, schools may have selected a particular curriculum for a particular reason. Indeed, the results suggest that schools might have selected a curriculum specifically because they had many children beginning school with weak early reading skills. For example, in first grade, students whose schools selected Reading Mastery tended to have lower initial reading scores than students whose schools selected other curricula.

The third research question led us to investigate the possible differential impact of curricula for children from lower-SES homes compared to their more affluent peers. Results indicate that, as expected, differences in ORF existed between lower and higher-SES readers. Although some differences were small, albeit significant, it appears that certain curricula may be associated with higher ORF growth, especially for lower-SES students. This depended, however, on grade level. For example, in first and second grades, children from lower-SES homes achieved generally lower ORF scores regardless of curriculum. However, in second grade there were fewer differences and by third grade there was generally no difference in lower- and higher-SES students' performance across curricula, with the notable exception of Scott Foresman, for which children from lower-SES homes

role of the core. Third, because only one measure of reading was used (ORF), the relation of curricula to other literacy or language skills could reveal different results than those presented here. Although the ORF measure was administered by trained staff who had been instructed on proper administration procedures, differences across sites could impact the reported results of the ORF assessments. In terms of benchmarks, those used for Reading First schools are based on norm-reference estimates of student performance and did not originate as a result of experimental analyses. Results might vary depending on the benchmarks used.

Implications

As teachers and instructional leaders make decisions about reading instruction and materials for purchase and use, particularly for students from lower-SES homes, these results suggest that a well-designed, evidence-based core curriculum can assist in raising and sustaining students' achievement. There were differences in curriculum effects on

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