

The Effects of Read Naturally on Fluency and Reading
Comprehension: A Supplemental Service Intervention
(Four-School Study)

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Introduction

The link between fluency training and comprehension skills is well documented (see Pinnell et. al., 1995; Snow et.al, 1998; Adams, M., J. 1998; Strecker, S., et. al.). In the National Assessment of Educational Progress (NAEP) study in 1995, Gay Pinnell and her colleagues documented the large degree of disfluency in students across the nation and the relative neglect of fluency building programs to address this problem. The Pinnell study a close relationship between reading fluency and measures of reading comprehension. Clearly, students who are low in fluency may have great difficulty in getting meaning from text (Langenberg, et. al, 2000). The National Research Council report, Preventing Reading Difficulties in Young Children (Snow, Burns, & Griffin, 1998) states:

“Because the ability to obtain meaning from print depends so strongly on the development of word recognition accuracy and reading fluency, both should be regularly assessed in the classroom, permitting timely and effective instructional response when difficulty or delay is apparent.” (p.7)

This research base provides the rationale for evaluating proven fluency building programs in Minneapolis Public Schools where many different supplemental services provided throughout the district have yet to be evaluated.

During the 2003-04 school year, Minneapolis Public Schools embarked on program evaluations of the most frequently used supplemental reading programs. A survey of all 60 Elementary schools found three programs to be most frequently used for supplemental intervention. These three programs were Accelerated Reader[®], Read 180[®], and Read Naturally[®]. Read Naturally is a program designed to develop fluent reading in Elementary and Middle School students. The program was begun by a Minneapolis Public Schools teacher¹ and was been implemented and studied at Hale Elementary School. Key components of the program include reading aloud with a fluent model, repeated reading of passages at individual student reading levels, literal and inferential comprehension questions, and continuous progress self-monitoring using charts and graphs.

¹ Candyce Ihnot was a teacher in Minneapolis Public Schools at Hale Elementary who developed the Read Naturally program as an outgrowth of her Master’s Degree on effective reading strategies.

Methods

Four schools volunteered to participate in the Read Naturally (RN) program evaluation. Two of the schools used the Read Naturally Master's Edition (cassettes and blackline masters), and two schools used the Software Edition. Two schools proposed a “pull out” program for supplemental reading support within the regular school day while the two other schools proposed after school programs. None of these schools were forced to provide supplemental services under the provisions of the *No Child Left Behind Act*. Rather, these programs were supported through Compensatory Education Funds provided by the State of Minnesota.

One supervising teacher in each of the four schools was trained in the appropriate procedures by a RN certified instructor. This training included initial assessment of student level of instruction using curriculum-based measurement procedures, placement procedures, use of comprehension assessments and strategies, student goal setting, and progress monitoring procedures.

Students were selected for inclusion in the RN supplemental services based on school team and parent recommendations. Students selected were generally considered to not be “on course” to be proficient on MN Comprehensive Assessments given in the Spring of Grade 3 and Grade 5. The 96 students in this study received RN interventions throughout the 2003-04 School Year.

Program

The first section of Read Naturally instruction involves a student choosing a story from his/her individual instructional level and making a prediction. The student then writes what s/he already knows about the subject of the story. Next, the student takes a “cold timing” on the passage where s/he reads for one minute and records difficult words. The student then graphs the number of words read correctly per minute.

During the next component of instruction the student reads along with prerecorded audio of a fluent reader on the same passage three consecutive times, with each reading slightly faster than the previous reading. The student then reads the story independently without audio support. The student sets the timer for one minute for each reading and practices the passage several times until the predetermined rate (i.e. words read correctly) is reached.

The final part of the process occurs once the target fluency is reached. The student then answers multiple choice and constructed response questions that pertain to the story. Passages at each grade level include non-fiction themes. The questions tap inferential and literal passage comprehension. After answering the questions, the student retells the story in writing. The entire process is monitored by the instructor with corrective feedback and guided practice provided as needed.

Subjects

Students were selected for inclusion in the RN supplemental services based on school team and parent recommendations. Students selected were not considered to be “on course” to be proficient on MN Comprehensive Assessments given in the Spring of Grade 3 and Grade 5. A total of 96 students received RN interventions throughout the 2003-04 School Year. Of these 96 students, 78 had both pretest and posttest scores available and their test scores were used in the analysis of reading effects. Student characteristics of the RN intervention groups are displayed in Table 1.

Table 1. Demographic Characteristics of Read Naturally Students vs. Minneapolis District Totals

Grade/Category	Number/Percentage of Participants					District Total
	School 1	School 2	School 3	School 4	Read Naturally Total	
Grade 3	17	3	3		23	3552
Grade 4		9	6	18	33	3734
Grade 5		3	3	16	22	3749
Total (Grades 3–5)	17	15	12	34	78	11035
Male	47%	67%	25%	66%	56%	52%
Special Education	6%	27%	25%	3%	12%	14%
English Language Learner (ELL)	0%	20%	17%	66%	35%	25%
Free or Reduced Price Lunch	47%	67%	67%	75%	65%	61%
African American	24%	47%	58%	28%	35%	44%
American Indian	18%	0%	0%	0%	4%	4%
White American	53%	33%	25%	0%	22%	25%
Hispanic American	6%	20%	8%	72%	39%	14%

Test Instruments

Reading achievement in this study was assessed using three types of reading assessment. The first assessment given to all students was the Northwest Achievement Levels Tests (NALT). The NALT reading assessment is a standardized paper and pencil test that is given to all Minneapolis Public School (MPS) students in grades 2-7 in the Spring of the year. It is an adaptive assessment where each student receives a level (i.e. form) of the test appropriate to his or her reading achievement level as determined by prior assessment. Estimates of the appropriate level are made from prior year NALT or state tests for students enrolled in MPS the previous year. Students new to the district take a short “locator” assessment to place them in the correct level of assessment. All items in the NALT are multiple choice and are chosen from a large item bank by expert reading teachers to match the state standards in vocabulary, inferential, or literal comprehension standards. NALT raw scores are converted to scale scores using Rasch Model IRT scaling procedures. Traditional norms with means, standards errors, and reliability and validity coefficients are published by the Northwest Evaluation Association (NWEA).² In addition Minneapolis Public Schools has conducted its own validity studies. In a 1999 study concurrent validity of NALT reading with the Minnesota Comprehensive Assessment (MCA) test of reading in grade 3 (n= 3,785) and grade 5 (n= 3,383) was .87 and .88 respectively.

The second assessment instrument given to all students in grades 3 and 5 was the Minnesota Comprehensive Assessments (MCA). MCA assessments are required by Federal *No Child Left Behind* (NCLB) adequate yearly progress (AYP) provisions. The reading assessment includes multiple choice and constructed response items designed to tap comprehension and vocabulary skills. MCAs are designed to assess the full range of reading achievement from below grade level to well above grade level. The state of Minnesota has minimum competency exams for graduation requirements. These assessments were designed to measure the “high standards” comparable to the National Assessment of Educational Progress (NAEP) standards. Evidence of technical adequacy of the MCAs is available at the Minnesota Department of Education website (education.state.mn.us/html/intro_dist_mca_tech.htm).

The third assessment instrument given to only Read Naturally students was the *Reading Fluency Monitor*[®] developed by Read Naturally, Inc. The *Reading Fluency Monitor* is an efficient, valid, and reliable way for teachers to measure a student's reading fluency skills. A student reads aloud from three grade-level passages for one minute each. The average number of words read correctly in one minute on three grade-level passages is the total score. Reliabilities for grades 3-5 reported in the technical manual were .97 to .98 for the three passages at each grade level. Validity coefficients were also very high. Correlations with the Minnesota Comprehensive reading assessment were .84 for grade 3 and .75 for grade 5.³ Correlations with the NALT reading

² Northwest Evaluation Association 1999 Norms Technical manual.

³ Correlations were calculated on 24 and 37 students in grade 3 and 5 in Minneapolis Public Schools during the 2002-03 school year.

assessment were .93 (grade 3), .91 (grade 4) and .79.⁴ Predictive validity with the Stanford-9 reading assessment (one year later) were .75 (grade 4), .55(grade 5), and .79 (grade 6).⁵

The high reliability and validity of oral reading passages in the *Reading Fluency Monitor* is consistent with large scale studies of curriculum based measures of oral reading.

Data Collection

Achievement data for this study were collected using standardized procedures which insured accuracy and independence of outcome from program staff. MCAs and NALTs were administered by test proctors under the supervision of highly trained test coordinators. Passages were administered and scored by well trained testers who were independent of the interventions. All demographic variables used in the matching of treatment and control students were obtained from the district student information system.

Experimental Design

Schools involved in the Read Naturally supplemental services were not on the *No Child Left Behind* (NCLB) list of schools failing to make adequate progress (AYP) in 2003. Students matched were chosen only from schools in Minneapolis within the same AYP status. That is, no schools that were forced to provide school choice busing or supplemental service provided students to the matched sample control group.

Each student receiving Read Naturally services was matched with a student not receiving Read Naturally services. Students were matched first on NALT pretest score from spring of 2003 (i.e. matches needed to be within 3 scale score points of the target student) followed by the following demographic factors:

- 1) Grade
- 2) English Language Learner status
- 3) Special Education status
- 4) Free or reduced price lunch
- 5) Racial/Ethnic category
- 6) Home Language
- 7) Sex

Perfect matches of RN and control students were accomplished for 73 (93%) of the pairs, 3 (4%) pairs were matched on 7 of 8 variables, and 2 pairs (3%) were matched on 6 of 8 variables. NALT reading gains and MCA 2004 post-tests for RN vs. Control were analyzed with dependent t-tests. RFM data were analyzed using an independent t-test for differences in learning slopes versus the user norm group.

⁴ Correlations were calculated on 23, 34, and 32 students respectively in grades 3,4,5 in Minneapolis Public Schools during the 2002-03 school year.

⁵ Correlations were calculated on 23, 25 and 26 students respectively in grades 4,5,6 in a suburban district in California.

NALT Results

Analysis of 2003 NALT reading scores found that the matching of pretest scores was done successfully. Mean scale scores and standard deviations for the 2003 pretest were as follows:

Table 2. Northwest Achievement Levels Test 2003 Reading Scale Score for Read Naturally and Control Students

Group	N	NALT Mean SS	NALT St. Dev.
Read Naturally	78	184.6	11.02
Matched Control	78	184.6	10.58

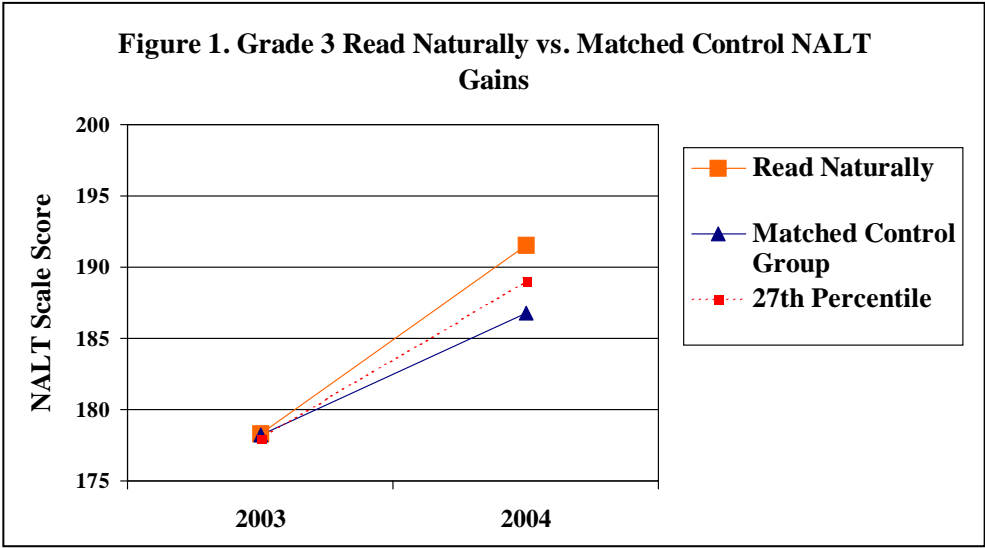
Table 3. Paired Samples Descriptive Statistics on NALT 2004 Scale Scores for Read Naturally and Control Students

Group	Mean	N	Std. Deviation	Std. Error Mean
Matched Control	192.8987	78	11.22923	1.27146
Read Naturally	195.4038	78	9.21697	1.04362

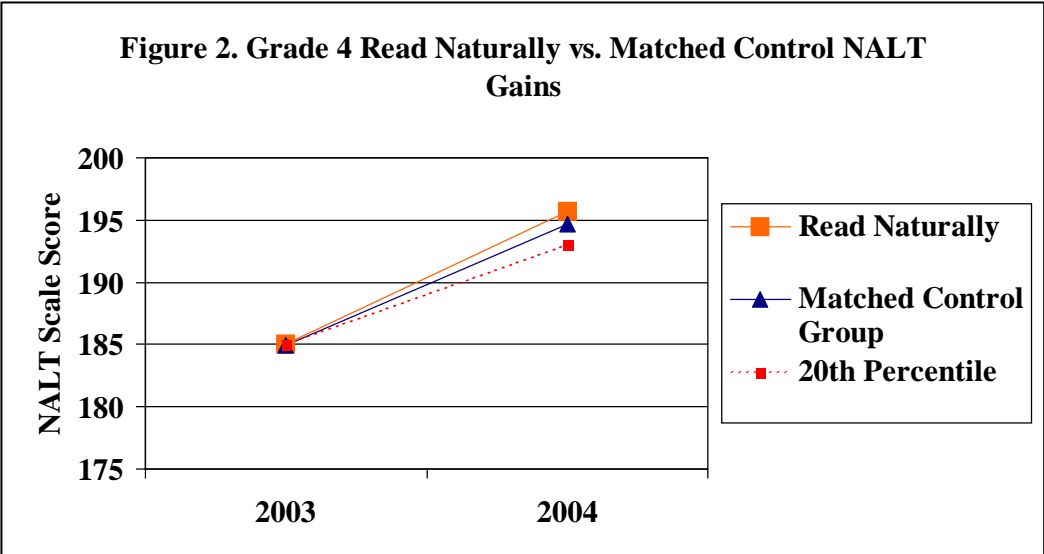
Table 4. Paired Samples t-Test Results on NALT 2004 Scale Scores for Read Naturally and Control Students

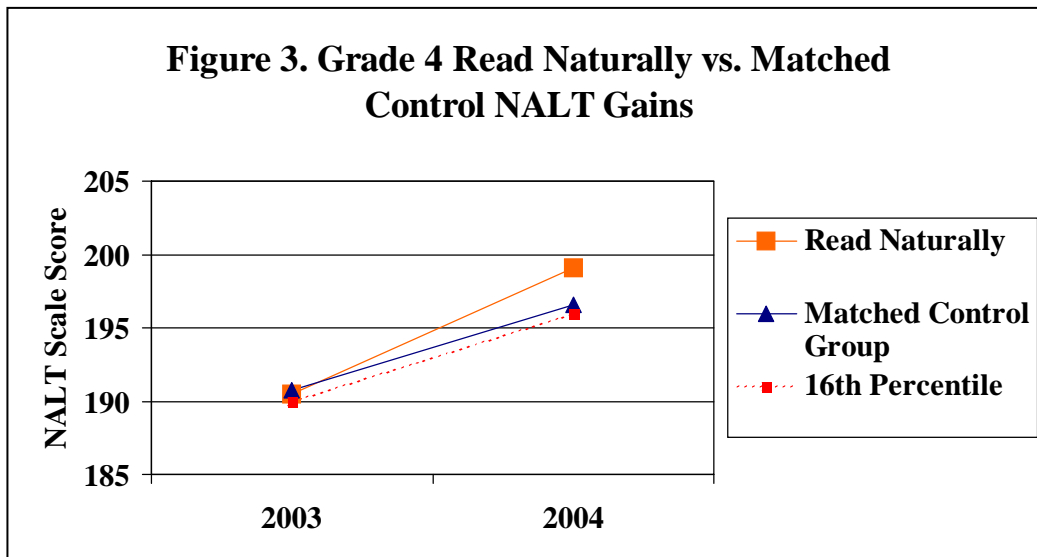
Group	Paired Differences					t	df	Sig. (2 tail)
	Mean	Std. Deviation	Std. Error Mean	95% CI Lower	95% CI Upper			
Control Group – Read Naturally	-2.50513	8.99568	1.01856	-4.53334	-.47692	-2.459	77	.016

The results in table 4 show that Read Naturally students made an average of 2.5 scale score points greater gain on the Northwest Achievement Levels Test (NALT) than students matched on pretest, poverty, ELL and Special Education services, gender, racial/ethnic category and home language.



NALT 2003 to 2004 Reading Scale Score mean gains by grade level are depicted in figures 1-3. The NALT user norm percentile equivalent to the pretest scale is shown for reference. For example, the pretest score of 178 in Grade 2 is equivalent to the NALT reading spring norm 27th percentile. The 27th percentile on NALT reading in Grade 3 is a scale score of 189.





It is clear from these graphs that the NALT gains at each grade level were both greater than the matched control group and that the percentile equivalent for the posttest improved upon the pretest in each case. It is also evident that the obtained gains for students from grades 2 to 3 and grades 4 to 5 were relatively better than from grades 3 to 4.

MCA Results

Similar analyses were performed on the 2004 Minnesota Comprehensive Assessments (MCA). All students with MCA test scores in grades 3 and 5 were entered into dependent t-test analyses.⁶ Descriptive statistics are presented in table 5 below for 44 pairs of Reading Natural vs. Matched Comparison students.

Table 5. Paired Samples Descriptive Statistics (MCA 2004 Grades 3 and 5)

Group	Mean	N	Std. Deviation	Std. Error Mean
Matched Control	1307.2727	44	157.30822	23.71511
Read Naturally	1366.3636	44	147.94862	22.30409

⁶ MCA tests were not given in Minnesota for grade 4 in the year 2004.

Table 6. Paired Samples t-Test (MCA 2004 Grades 3 and 5)

	Paired Differences					t	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% CI Lower	95% CI Upper			
Matched Control – Read Naturally	-59.09091	175.16528	26.407	-112.346	-5.835	-2.238	43	.030

Students in the Read Naturally supplemental services intervention scored significantly higher ($t_{43}=2.238$; $p=.03$) on the Minnesota Comprehensive Assessments of Reading in Grades 3 and 5 (see table 6). On average, matched control students score 59.1 scale score points lower on the MCAs than RN students.

Students in grades 3 and 5 who received RN supplemental services also had a higher rate of students meeting the state standards for *No Child Left Behind* than matched comparison students. Table 7 shows that 27.3% of the matched comparison students scored at level III or higher compared to 43.2% of the RN supplemental students who achieved level III on the 3rd and 5th grade MCAs. Table 8 provides a chi-square analysis of the percentage of students at or above 1420 on the MCA reading assessments for the matched control and RN groups. This analysis confirms that differences in MCA outcome of this magnitude would be found by chance approximately one time in 1,000 replications of the study.

Table 7. MCA Control Group vs. Read Naturally Percentages at Levels I, II, III Crosstabulation

	MCA Level	Count/Percentage	MCA Reading Levels for RN			Total
			Level I	Level II	Level III	
MCA Matched Control Group Reading Levels	Level I	Count	7	9	6	22
		% within MCA Control Group Reading Level	31.8%	40.9%	27.3%	100.0%
		% within MCA Reading Levels for Read Naturally	77.8%	56.3%	31.6%	50.0%
	Level II	Count	2	5	3	10
		% within MCA Control Group Reading Level	20.0%	50.0%	30.0%	100.0%
		% within MCA Reading Levels for Read Naturally	22.2%	31.3%	15.8%	22.7%
	Level III	Count	0	2	10	12
		% within MCA Control Group Reading Level	.0%	16.7%	83.3%	100.0%
		% within MCA Reading Levels for Read Naturally	.0%	12.5%	52.6%	27.3%
Total Count			9	16	19	44
% within MCA Control Group Reading Level			20.5%	36.4%	43.2%	100.0%

Table 8. Chi-Square Tests for 2 x 2 Students at or above 1420 on MCA

Test	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	10.842(b)	1	.001		
Fisher's Exact Test				.002	.001
Linear-by-Linear Association	10.595	1	.001		
N of Valid Cases	44				

(a) Computed only for a 2x2 table

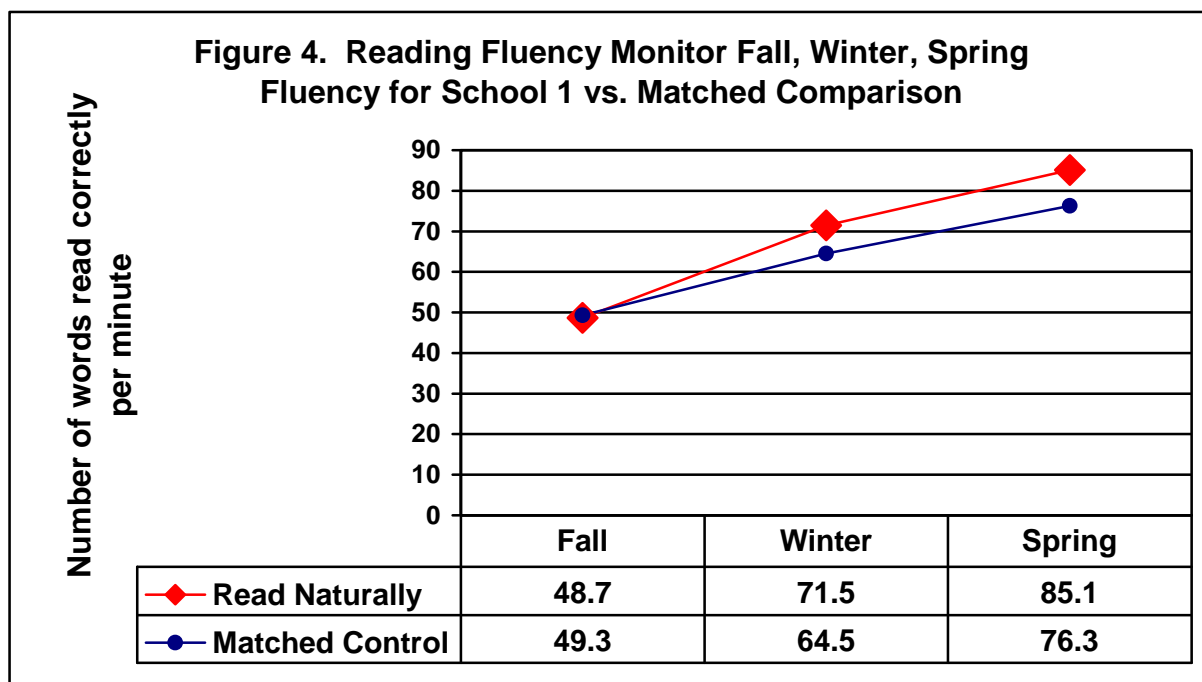
(b) 0 cells (.0%) have expected count less than 5. The minimum expected count is 5.18.

Reading Fluency Monitor (RFM) Results

Of the 4 schools participating in the evaluation, two provided supplemental Read Naturally service during the regular school day (School 1 and School 4) and the other two schools (School 2 and School 3) provided supplemental service after school. Standard Reading Fluency Monitor (RFM) passages were administered fall, winter and spring to all students receiving supplemental RN. Students from each RN school were matched with students from the Read Natural growth norm sample.

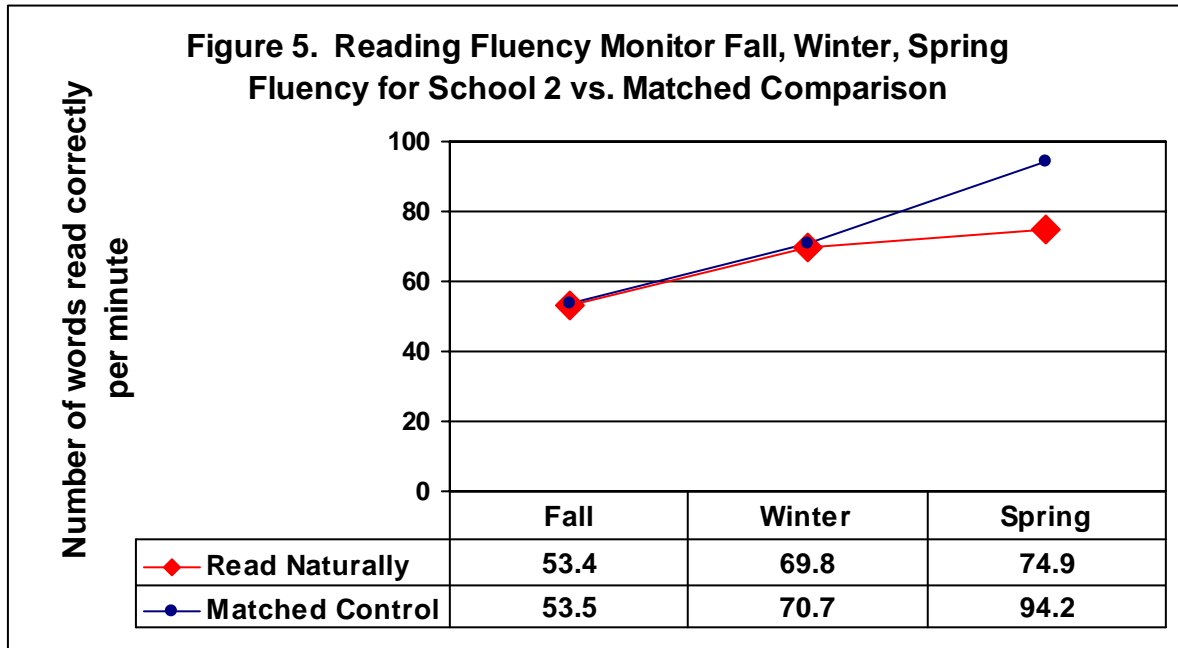
The growth norm sample included approximately 100 students per grade from Minnesota, Texas, California, Texas, Virginia, Michigan, Iowa and Pennsylvania. Since poverty status was not available for all students in the growth norms, matching was done on fall reading fluency, gender, ethnic and grade level only.

Figure 4 presents the data for 20 grade 3 students in School 1 compared to 20 matched students from RFM 3rd grade growth norms.

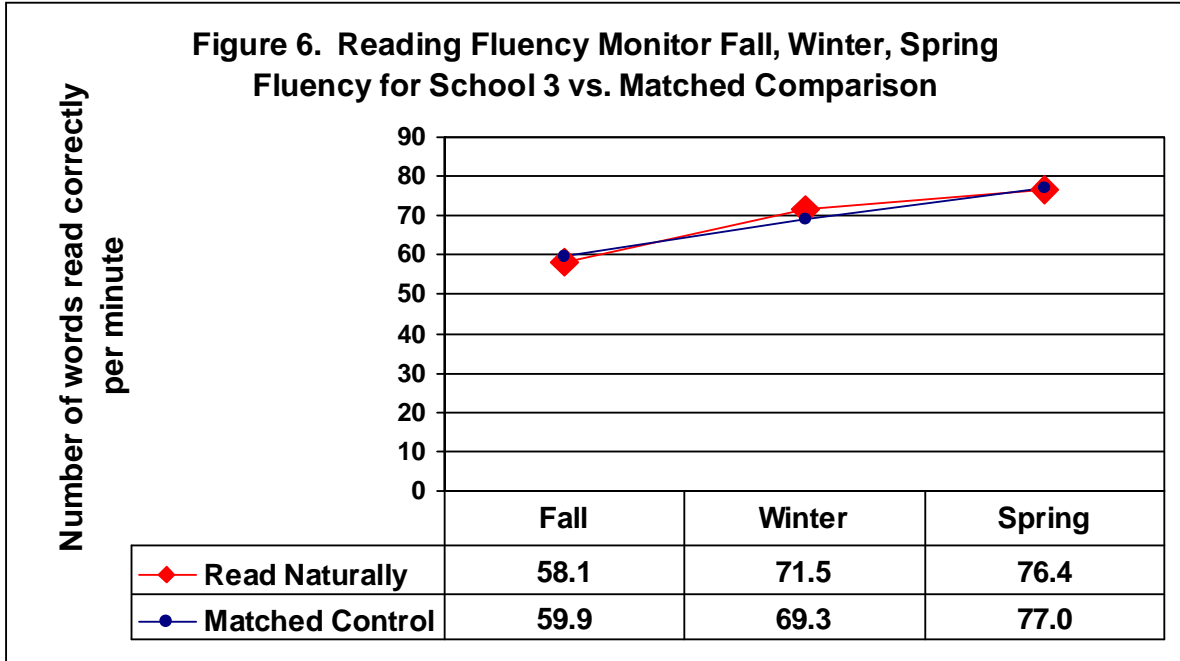


Analysis of the difference in spring oral reading rates using a dependent t-test found that the students from School 1 averaged significantly greater words read correctly at the end of the year [$t_{(19)}=2.42$; $p=.03$] than the matched comparison students. School 1 had overall attendance at supplemental reading sessions of 96% and received positive evaluations of treatment fidelity from the independent assessor hired by Read Naturally to administer the RFM and observe implementation strengths and weaknesses.

Similar analyses were performed for School 2 where 15 students were matched across grades 3,4, and 5 with the growth norm sample. Figure 5 depicts the growth for RN students and matched comparison students. Both groups made good progress from fall to winter but School 2 students showed little growth from winter to spring while the comparison group continued to make strong gains from winter to spring.

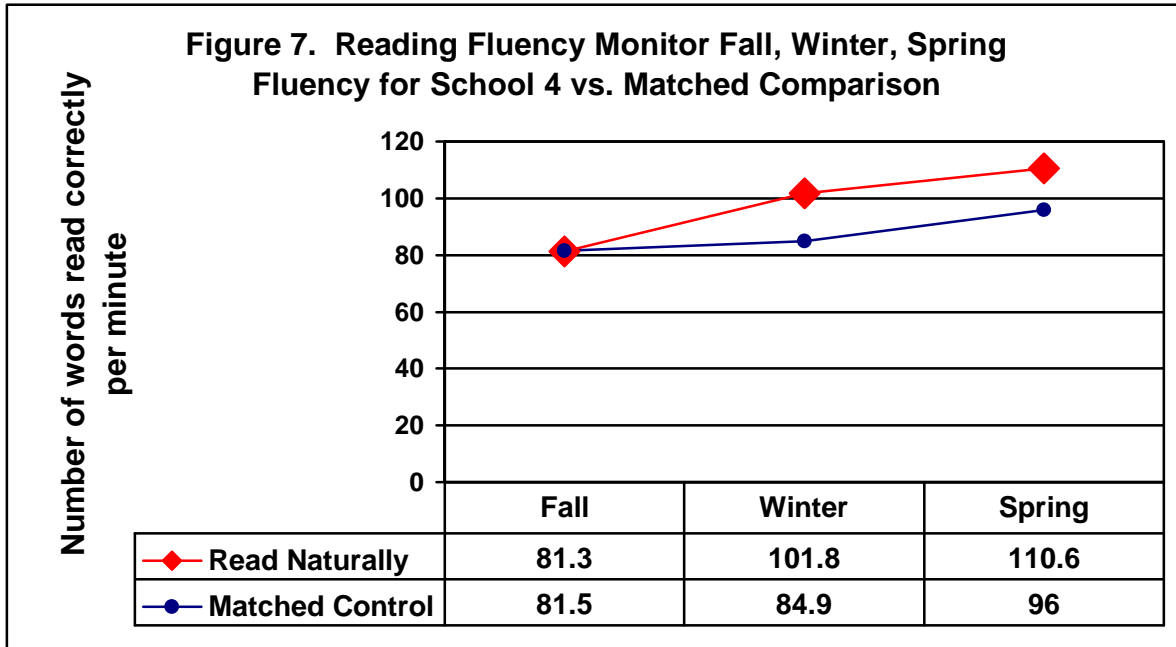


Dependent t-test analysis of the difference in spring oral reading rates found that the students from School 2 averaged fewer words read correctly at the end of the year [$t_{(14)} = -1.69$; $p = .11$] than the matched comparison students. Because of small sample size ($n=15$) this difference was not statistically significant. School 2 had decreasing attendance throughout the program.



In the fall daily attendance was 91% in the fall, 79% in the winter, and only 62% in the spring. The average attendance over the year was 79%. Overall the implementation at School 2 was rated as poor. Difficulties in organization, computer problems and lack of direct instruction by a skilled reading teacher combined with poor attendance produced a largely ineffective implementation at this site.

The reading fluency trends for School 3 were virtually identical to the matched comparison from the growth norms (see figure 6). This School also had 15 students with fall, winter and spring oral reading scores in grades 3,4, and 5. The small difference in scores in Spring was not statistically significant. Implementation at this school was uneven because of significant computer problems early in the year. Also several students were exited from the program because of behavior problems. Overall attendance was 85%.



Differences in fluency growth rates for School 4 and the matched growth norms are shown in Figure 7. Students in 4th and 5th grade in this school were matched with two schools that had a large number of Hispanic Students but perfect matches were not found for all students. A total of 28 matches with all three oral reading fluency measures. Dependent t-test analysis of the difference in spring oral reading rates found that the differences in means at the end of the year between School 4 and the matched comparison students was statistically significant [$t_{(27)} = 3.30$; $p = .003$]. The Read Naturally intervention at this school was rated highly by the independent observer. Average attendance throughout the year was 93%.

Overall the results of the RFM analysis found that growth in fluency is was equal or greater than the analysis of growth norms collected from sites that were using Read Naturally in classrooms in eight different states. Results in the two after school sites were not as strong as the results in the two programs during the school day. Implementation was also not as complete at the two after school sites

Discussion

The results of a year long supplemental intervention using Read Naturally found the students receiving the intervention improved significantly in overall reading proficiently as measured by Minnesota Comprehensive Assessments, Northwest Achievement Levels Tests, and the Reading Fluency Monitor. Matched comparison groups used in this study controlled for prior achievement and student demographic characteristics.

Northwest Achievement Levels Test (NALT) gains were significantly greater than matched comparison students for the combined group of grade 3,4, and 5. Average NALT scores also increased greater than the NALT norms for grade 3 and 5. Relatively less gain was made in grade 4 where a larger proportion of students were from the schools with a less degree of implementation fidelity. Further analysis of the relationship between Read Naturally implementation in after school versus in-school intervention will be presented in a separate technical report from this document.

Minnesota Comprehensive Assessment (MCA) Results were also very positive. MCA tests were administered in grades 3 and 5 only in 2004. Most of the student scores analyzed in these grades came from Schools 1 and 4 which had high degree of RN intervention fidelity during the regular school day. Mean differences between treatment and matched control groups of 59 scale score points were not only statistically significant but of great practical importance. The MCA overall standard deviation of the matched control group was about 150 scale score points so the overall effect size for the RN intervention group was about 1/3 of a standard deviation. In the matched control group 27% of students reached the *No Child Left Behind* proficiency (level III) on the MCA while 43% of the Read Naturally intervention group reached proficiency. Included in this group were a large number of students receiving free or reduced price lunch and/or receiving English Language Learner services.

Reading fluency increases in the two high implementation sites were clearly greater than typical annual fluency increases found in the Read Naturally norm group. Reading fluency increase in the two after school sites with lower degree of implementation were approximately equivalent to the Reading Fluency Monitor growth norms.

In this study increases in oral reading fluency are correlated with increased vocabulary and comprehension as measured by the NALT and MCA tests. Yet it is possible that other factors outside of the Read Naturally interventions caused the increase in these test scores. In this small sample study it is possible that the schools and teachers that volunteered for this study were more successful in their instruction even before the implementation of Read Naturally. In order to fully control for these possible teacher effects a larger study with random assignment of students to RN and Control interventions is needed. While this type of study is expensive and difficult to implement within the typical public school setting, it is the “gold standard” on which to attribute treatment causation.

Clearly the results of this small scale study in Minneapolis Public Schools indicates that students in the Read Naturally year long study increased reading test scores significantly more than control students matched on initial test scores and student demographic characteristics. Further research

in Minneapolis and other sites across the country should investigate the value-added contribution of Read Naturally interventions over and above typical daily instruction while controlling for teacher effects.

References

Adams, M.J. (1990). Beginning to Read. Cambridge MA: Harvard University Press.

Pinnell, G.S., Pikulski, J.J., Wixson, K.K., Campbell, J.R., Gough, P.B. & Beatty, A.S. (1995). Listening to children read aloud. Washington, DC: Office of Educational Research and Improvement, U.S. Department of Education.

Samuels, S.J., Shanahan, T., & Shaywitz, S. (2000) Chapter 3: fluency. In Langenberg, D. (Ed.) Report of the National Reading Panel: Teaching Children to Read. Washington DC: National Institute of Child Health and Human Development.

Snow, C.E., Burns, M.S., & Griffin, P. (1998). Preventing reading difficulties in young children. Washington DC: National Academy Press.

Strecker, S., Roser, N., & Martinez, M. (1998). Toward understanding oral reading fluency. In T. Shanahan & F. Rodriguez-Brown (Eds.). Forty seventh Yearbook of the National Reading Conference, (pp. 295-310). Chicago, IL: The National Reading Conference.

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