

Improved Reading Skills and Academic Achievement by Students in the Grand Forks Public Schools who used Fast ForWord® Products

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ABSTRACT

Purpose: This study investigated the effects of the Fast ForWord products on the reading skills and academic achievement of elementary and middle school students who used the products within the curriculum in a school setting.

Results: On average, after Fast ForWord participation, students made statistically significant improvements in their reading skills and academic achievement. Students in third through sixth grades improved more than typical based on normative data of students in similar grades and at similar achievement levels. Data from a comparison group of fifth graders showed that for the Reading, Language and Math tests of the Measures of Academic Progress, there was a statistically significant difference between the improvement of the students who used the products, and those who did not, with the Fast ForWord participants improving more. The difference in growth of the experimental and comparison groups on the NDSA Reading tests trended towards significance.

Study Design & Participants: The design of this study was primarily a multi-school case study using nationally-normed and high stakes assessments. There was a comparison group available for the fifth graders, providing an opportunity for a quasi-experimental component of the study. Study participants were elementary and middle school students in the Grand Forks Public School District of Grand Forks, North Dakota.

Materials & Implementation: Following staff training on the Fast ForWord products, the students used the Fast ForWord products during the 2009-2010 and 2010-11 school years and had their reading skills and achievement evaluated before and after Fast ForWord participation with the Measures of Academic Progress (MAP), North Dakota State Assessment (NDSA) and/or Reading Progress Indicator (RPI).

Keywords: North Dakota, elementary school, middle school, urban district, quasi-experimental study, Title I, Native American, Fast ForWord Language Series, Fast ForWord Literacy Series, Reading Readiness, Fast ForWord Reading Level 1 - 4, Measures of Academic Progress (MAP), North Dakota State Assessment (NDSA) and/or Reading Progress Indicator (RPI).

INTRODUCTION

Numerous research studies have shown that cognitive and oral language skills are under-developed in struggling readers, limiting their academic progress (Lyon, 1996). University-based research studies reported the development of a computer software product that focused on learning and cognitive skills, and provided an optimal learning environment for building the memory, attention, processing and sequencing

skills critical for reading success (Merzenich et al., 1996; Tallal et al., 1996). This prototype of the Fast ForWord Language software showed that an optimal learning environment and focus on early reading and cognitive skills resulted in dramatic improvements in the auditory processing and language skills of school children who had specific language impairments (Merzenich et al, 1996; Tallal et al., 1996) or were experiencing academic reading failure (Miller et al., 1999).

Further research has demonstrated that the use of an optimal learning environment with a focus on reading and cognitive skills not only benefits the auditory processing and language skills of school children who have specific language impairments, but can benefit the academic achievement of a wide range of students.

The Grand Forks Public School District was interested in evaluating the effectiveness of an optimal learning environment with a focus on early reading and cognitive skills as a way to improve the reading skills and achievement of its students. In this study, commercially available computer-based products (Fast ForWord Language Series, Fast ForWord Literacy Series, Reading Readiness and Fast ForWord Reading Levels 1 - 4) were used to evaluate the effectiveness of this approach for improving the reading skills and academic achievement of elementary and middle school students.

METHODS

Participants

The Grand Forks Public School District serves nearly 7,000 students. Approximately 84% of the students in the district are Caucasian, 7% are Native American, and 4% are African American; 35% of the students are eligible for free or reduced-price lunches, 4% are English language learners, and 15% receive services for special education.

During the 2009-2010 school year, two schools, Lake Agassiz Elementary School and Valley Middle School, chose to use the Fast ForWord products and participate in the study reported here. Lake Agassiz, which is kindergarten through 5th grade, used a school-wide implementation while Valley Middle, which serves students in 6th through 8th grades, focused on struggling students.

Both schools have school-wide Title I programs and sizeable Native American populations (23% at the elementary school and 17% at the middle school). Demographic and classification information was available for 294 participants – those in 3rd – 7th grade with MAP and/or NDSA scores available. All 294 students were identified as Title I students, 28% were receiving services for special education, 26% were Native American, 61% were Caucasian, and fewer than

5% were a different race or ethnicity, or English language learners.

Starting with a small group of students at Lake Agassiz during the summer, 2009, and then expanding to both schools during the 2009-10 school year, students in the district used the Fast ForWord products. Before and after Fast ForWord participation, students were assessed with a variety of tests including the Measures of Academic Progress (MAP), North Dakota State Assessment (NDSA) and/or Reading Progress Indicator (RPI). School personnel administered the assessment and reported scores for analysis. Across the two schools, between 2009 and 2011, 462 students used the Fast ForWord products and had pre- and post-participation scores from one or more assessments. Those students ranged from kindergarten through seventh grade.

Implementation

Educators were trained in current and established neuroscience findings on how phonemic awareness and the acoustic properties of speech impact rapid development of language and reading skills; the scientific background validating the efficacy of the products; methods for assessment of potential candidates for participation; the selection of appropriate measures for testing and evaluation; effective implementation techniques; approaches for using the online reporting tool, Scientific Learning® Progress Tracker, to monitor student performance; and techniques for measuring the gains students have achieved after Fast ForWord participation.

Materials

The Fast ForWord products are computer-based products that combine an optimal learning environment with a focus on early reading and cognitive skills. Each product includes several exercises designed to build cognitive skills critical for all learning, such as attention and memory. These exercises simultaneously develop academic skills critical for reading, such as English language conventions, phonemic awareness, vocabulary, and comprehension.

Some of the primary skills developed by these products are outlined in Table 1. More detailed descriptions of the exercises and learning modes within each product can be found online at <http://www.scientificlearning.com/exercises>.

Primary Skills Product Name	Listening Accuracy & Auditory Sequencing	Auditory Word Recognition	English Language Conventions	Following Directions	Listening Comprehension	Phonological Skills / Phonemic Awareness	Phonics / Word Analysis	Fluency	Vocabulary	Reading Comprehension
Fast ForWord Language v2	•	•	•	•		•			•	
Fast ForWord Language to Reading v2	•		•	•	•	•	•		•	
Fast ForWord Literacy	•	•	•	•	•	•			•	
Fast ForWord Literacy Advanced	•		•	•	•	•	•		•	
Fast ForWord Reading Readiness				•		•	•			
Fast ForWord Reading Level 1					•	•	•	•	•	•
Fast ForWord Reading Level 2					•	•	•	•	•	•
Fast ForWord Reading Level 3						•	•	•	•	•
Fast ForWord Reading Level 4						•	•	•	•	•

Table 1: The Fast ForWord products work on numerous cognitive and early reading skills. The primary skills focused on by each product are noted in the table.

Assessments

Before and after Fast ForWord participation, student reading skills and academic achievement were assessed with a variety of tests including the Measures of Academic Progress (MAP), North Dakota State Assessment (NDSA) and/or Reading Progress Indicator (RPI).

Measures of Academic Progress (MAP): Developed by the Northwest Evaluation Association, the MAP are state-aligned computerized adaptive tests that accurately reflect the instructional level of each student and measure growth over time. The MAP is appropriate for students in grades 2 through 10. The Grand Forks Public School District uses the MAP to assess students in 3rd through 8th grades.

North Dakota State Assessments (NDSA): The NDSA are designed to measure a student's knowledge of Reading, Language Arts, and Mathematics in Grades 3 through 8 and Grade 11. The test items are drawn from CTB/McGraw-Hill's item pool and the assessment provides scale scores. The assessments are administered each fall starting at the end of October, and going through mid-November.

Reading Progress Indicator (RPI): Reading Progress Indicator is a computerized assessment designed to rapidly measure the impact of the Fast ForWord products. It assesses a student's early reading skills including phonemic awareness, decoding, vocabulary, and comprehension.

Analysis

Scores were reported in terms of RIT scores for the MAP, scale scores for the NDSA, and normal curve equivalents and scaled scores for Reading Progress Indicator.

Average MAP scores from before and after Fast ForWord participation are presented. In addition, the year over year changes in MAP scores were compared to the typical changes for students at the same grade and reading level, as reported by the Northwest Evaluation Association, the publisher of the MAP.

In a quasi-experimental study, inferential statistics were used to compare changes in MAP scores for students who used Fast ForWord products to the score changes of students in a comparison group. Multiple schools feed into Valley Middle School. Students at one school, Lake Agassiz Elementary, used the Fast ForWord products during the 5th grade – before the students moved to Valley Middle School. Students at the other elementary schools did not use the Fast ForWord products and served as a comparison group. Elementary school scores were available for both

groups of students. A multivariate analysis of variance (MANOVA) was performed to evaluate differences between the MAP scores of the students in the two groups.

For the NDSA, average change scores from 2009 to 2010 were calculated for each grade. Paired t-tests were used to determine whether the changes were statistically significant. Again, scores were available for a comparison group of students who were 5th graders during the 2009-10 school year and an inferential analysis was performed using the 2008 NDSA scores (prior to participation) and the 2010 NDSA scores (after participation).

Finally, RPI results from before and after participation were compared and t-tests were performed to determine whether the students at the elementary and middle school made statistically significant improvements in their early reading skills. The improvements were also compared to expected

improvements based upon the time between assessments.

RESULTS

Participation Level

Research conducted by Scientific Learning shows a relationship between product use and the benefits of the product. Product use is composed of content completed, days of use, and adherence to the chosen protocol (participation and attendance levels). During this study, Lake Agassiz Elementary School chose to use the 30-Minute protocols while Valley Middle School used the 40-Minute protocols. These protocols call for students to use the product for 30 or 40 minutes a day, five days per week for nine to sixteen weeks. Detailed product use for students who started during the summer of 2009 or during the 2009-10 school year is shown in Table 2. Through the end of 2010-11 school year, students at the elementary school had completed an average of 2.4 products while middle school students had completed 1.3 products.

Students Who Started During 2009-2010						
Lake Agassiz Elementary School						
	Number of Students	Days Participated	Calendar Days	Percent Complete	Participation Level	Attendance Level
Fast ForWord Language	173	43	94	89%	95%	80%
Fast ForWord Language to Reading	145	57	139	83%	98%	84%
Fast ForWord Reading Readiness	9	47	118	81%	98%	75%
Fast ForWord Reading Level 1	5	27	81	64%	100%	79%
Fast ForWord Reading Level 2	107	33	88	94%	99%	80%
Fast ForWord Reading Level 3	75	40	138	77%	98%	77%
Fast ForWord Reading Level 4	7	30	56	97%	100%	76%
Total Fast ForWord Use	175	132	332	--	97%	81%
Valley Middle School						
Fast ForWord Literacy	126	22	43	88%	99%	82%
Fast ForWord Literacy Advanced	85	27	85	63%	99%	80%
Fast ForWord Reading Level 3	41	20	48	75%	99%	85%
Fast ForWord Reading Level 4	12	19	56	60%	98	82
Total Fast ForWord Use	126	49	121	--	99%	81%

Table 2. Usage data showing the number of students who used the Fast ForWord products during the 2009 – 2010 school year (including students who started during the summer of 2009), along with group averages for the number of days participated, the number of calendar days between start and finish, the percentage of product completed, the participation level, and the attendance level. Total values reflect the average total number of days that students used products. Note: Students often use multiple products.

Assessment Results

Measures of Academic Progress (MAP): The MAP is administered to students in 3rd through 7th grades. Scores of 3rd graders were evaluated between the fall and the spring assessment (fall, 2009 to spring, 2010); at all other grades, scores were evaluated from spring to spring (spring, 2009 to spring, 2010).

Students in 3rd through 7th grade made statistically significant improvements in their Reading and Language Arts scores. Students in 3rd through 6th grades also made statistically significant improvements in their Math scores (Figure 1 for 3rd graders; Figure 2 for students in 4th – 7th grades).

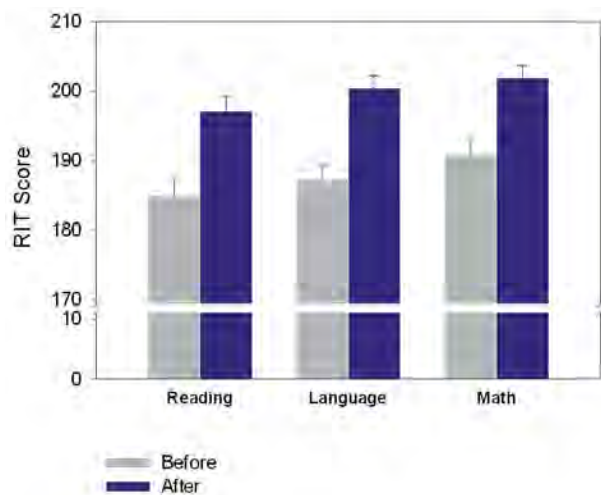


Figure 1. MAP scores from fall, 2009 and spring, 2010 for third graders who used the Fast ForWord products. Results include data from 48 students.

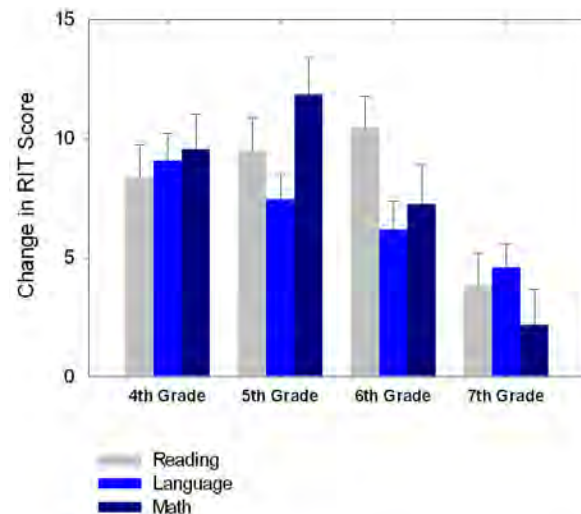


Figure 2. MAP scores from spring, 2009 and spring, 2010 for students in the 4th – 7th grades who used the Fast ForWord products. Results include data from at least 30 students in each grade.

The Northwest Evaluation Association provides normative scores showing typical improvements for certain assessment intervals for students in various grades and at various levels. A comparison was made between typical improvements for 3rd graders, fall to spring, and for typical improvements for 4th through 7th graders for spring to spring. The students who had used the Fast ForWord products tended to improve

more than typical (Table 3). Since there was a large group of Native American students, and an interest in their performance, Table 4 separates out the results of the Native Americans. The group varies from 8 to 12 students per grade so caution should be used in generalizing the results but again, in Reading and Language Arts, the growth of the participants exceeded typical growth at most grades.

All 2009-10 Participants										
		Reading Growth			Language Growth			Math Growth		
	n	Mean	SE	Typical	Mean	SE	Typical	Mean	SE	Typical
3 rd Grade	54	12.1	1.5	10.0	13.1	1.1	9.7	11.1	10.6	10.6
4 th Grade	33	8.3	1.4	7.6	9.1	1.1	7.3	9.6	1.5	9.5
5 th Grade	32	9.5	1.4	5.6	7.5	1.1	4.8	11.8	1.6	8.3
6 th Grade	38	10.4	1.3	5.0	6.2	1.2	4	7.3	1.6	6.5
7 th Grade	51	3.8	1.4	5.4	4.6	1.0	4.1	2.2	1.5	6.5

Table 3. Growth in MAP scores, divided by grade and subject. For third grade, the growth is fall to spring. For other grades it is spring to spring. Also shown is the typical growth based on data gathered by the publisher. The typical growth is for a student of a comparable grade and achievement level to the group averages.

Native American Participants										
		Reading Growth			Language Growth			Math Growth		
	n	Mean	SE	Typical	Mean	SE	Typical	Mean	SE	Typical
3 rd Grade	10	14.7	4.2	11.6	11.3	2.5	9.9	9.8	2.2	11.0
4 th Grade	11	7.5	3.1	7.5	8.5	2.0	7.4	6.3	3.1	10.0
5 th Grade	8	9.1	2.3	6.2	8.9	1.1	5.5	12.1	4.1	8.2
6 th Grade	12	10.0	2.4	5.2	8.0	1.9	4.4	2.7	2.2	6.5
7 th Grade	10	5.9	4.2	6.7	2.5	2.4	4.3	-9.9	5.4	6.6

Table 4. Due to the sizeable Native American population, growth in MAP scores was disaggregated for Native Americans, divided by grade and subject. For third grade, the growth is fall to spring. For other grades it is spring to spring. Also shown is the typical growth based on data gathered by the publisher. The typical growth is for a student of a comparable grade and achievement level as the group averages.

In addition to the MAP scores provided for Lake Agassiz fifth graders, scores were also provided for fifth graders from compatible schools. Although the students started fifth grade at similar levels, the students at Lake Agassiz, who all used the Fast ForWord products, made greater gains during their final year of elementary school, allowing them to start middle school at a higher level. An analysis of variance indicated that the students made statistically significant improvements between the 2009 and 2010 administrations of the MAP (there was a main effect of time), that there was a statistically significant difference between the tests (there was a main effect of test), and that there was a statistically significant difference between the year-over-year growth of the two groups (there was a time by group interaction) (Table 5; Figure 3).

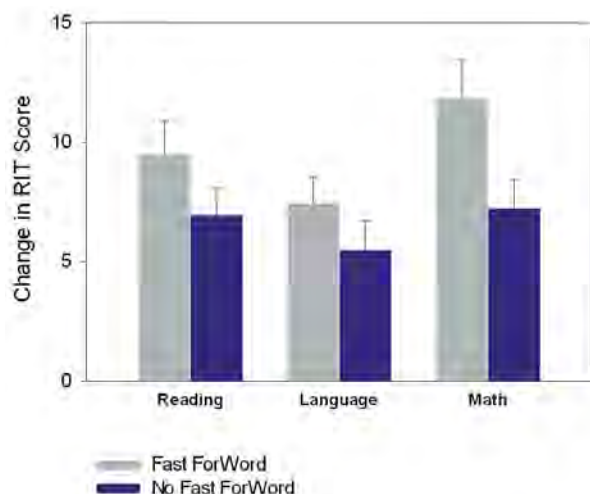


Figure 3. Spring over spring change in MAP scores for two groups of fifth graders: one group used the Fast ForWord products during the fifth grade year, the other group did not use the products until the following year.

	df	F-Statistic
Time	75	170.4*
Test	74	66.1*
Group	1	0.03
Time x Group	75	6.0*
Time x Test x Group	74	0.7

Table 5. An ANOVA was performed to compare the spring, 2009 MAP scores to the spring, 2010 MAP scores for two groups of fifth graders. One used the products during the fifth grade; the other group was from other schools and did not use the products until the following year.

North Dakota State Assessment (NDSA): Two hundred thirty Fast ForWord participants in third

through seventh grades had NDSA Reading scale scores available from fall, 2009, the year they started using the Fast ForWord products. Since the NDSA is administered in mid-fall (the end of October through mid-November), some students had used the products for a few weeks prior to their pre-test, and 13 students had used the products during the summer. The 230 students also had scores available from the following year, fall, 2010. Students in 3rd, 5th, and 6th grades made statistically significant improvements in their scores (Figure 4).

Similar to the MAP scores, there were NDSA Reading scores available for a comparison group of 5th graders. Both groups of students had similar reading achievement in the fall, 2008. One group started using the Fast ForWord products in late September, 2009, approximately six weeks prior to the administration of the NDSA (two students started during the summer of 2009). The students in the other group did not use the Fast ForWord products until the following school year (September, 2010). Figure 5 shows that the students who used the Fast ForWord products during the 2009-10 school year improved an average of 15.3 points, 65% more than the students in the comparison group who improved an average of 9.3 points. An ANOVA was performed comparing 2008 scores (prior to any use) to scores from 2010. The results showed that there was a trend towards significance ($F(70) = 2.85$; $p < 0.10$).

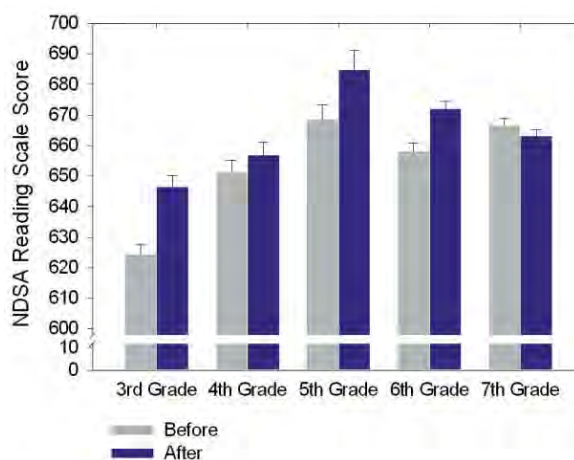


Figure 4. NDSA Reading scale scores showing the growth in achievement the year the students used the Fast ForWord products. The NDSA is administered each fall. Results represent data from 31 (5th grade) to 59 (7th grade) students. Growth for students in 3rd, 5th, and 6th grades was statistically significant ($p < 0.05$).

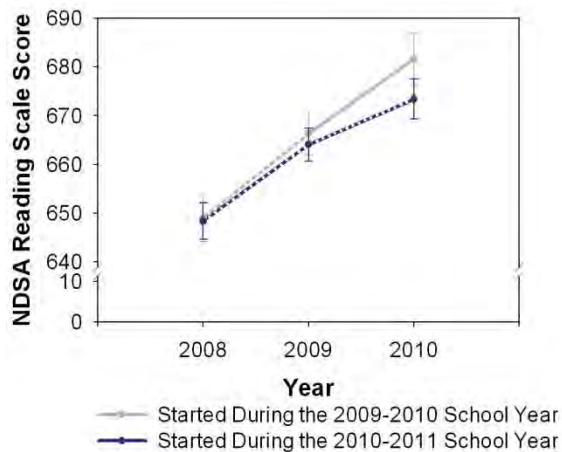


Figure 5. NDSA Reading scores from two groups of fifth graders. One group started using the Fast ForWord products in September, 2009 (two students started during the prior summer). The other group did not use the products until fall, 2010. The NDSA is administered each year between the end of October and mid-November.

Reading Progress Indicator (RPI): In addition to the MAP and NDSA, RPI was used to evaluate the impact of the Fast ForWord products on students in the Grand Forks Public School District who started using the Fast ForWord products during the summer of 2009 or the 2009-10 school year. RPI was administered before and after each Fast ForWord product. Two hundred fifty-seven students (151 at Lake Agassiz Elementary; 106 at Valley Middle) had valid pre- and post-participation scores and are included in the RPI evaluation. At the elementary school, there was an average of 12 months between the first test and last test. At the middle school, there was an average of 6 months. At the elementary school, the students had an initial grade-level of late 3rd grade (3.8) but their skills were at the level of mid-third grade (3.5). Twelve months later, the students had improved by nearly two years, with reading skills at the mid-fifth grade level (5.4). At the middle school, the students had an initial grade-level of mid-sixth grade (6.5) and their reading skills were at the early 6th grade level (6.1). Six months later, the students had improved more than one year with reading skills now at the early 7th grade level (7.3) (Figure 6).

DISCUSSION

On average, during the 2009 – 2010 school year, Fast ForWord participants in the Grand Forks Public School District significantly improved their reading skills and academic achievement. Students were evaluated on a variety of assessments including the MAP, NDSA, and RPI. On average, the students were a bit below benchmark levels. On the MAP, students made statistically significant improvements at all

grades, and in most subjects. In most grades, the improvements exceeded the expected improvements based on normative data that was collected by the Northwest Evaluation Association, the assessments publisher. In a quasi-experimental analysis, the improvements of the 5th graders who used the Fast ForWord products were compared to a group of comparable students who did not use the products until later. The growth of the Fast ForWord participants was greater than that of the comparison group by a statistically significant amount.

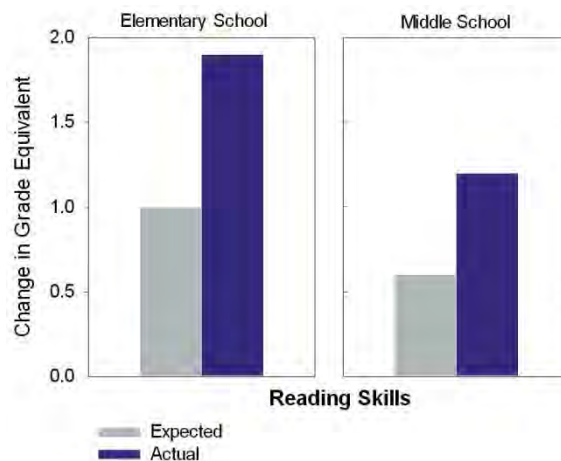


Figure 6. Expected improvements in reading skills are based on the time between the first and last administration of RPI. Results are divided between where students were when they first used the Fast ForWord products.

A similar analysis of NDSA scores showed similar results. Students made statistically significant improvements at most grade levels. In a comparison of the improvement of Fast ForWord participants to that of students in a comparison group, the students who used the Fast ForWord products made greater gains than those who did not, with the differences trending towards statistical significance.

CONCLUSION

Language and reading skills are critical for all students, impacting their ability to benefit from instruction, follow directions and participate in class discussions. Strong linguistic skills also provide a critical foundation for building reading and writing skills. After Fast ForWord use, students in the Grand Forks Public School District made statistically significant gains in their reading skills and achievement. These results replicate other studies and suggest that using the Fast ForWord products strengthened the students' foundational skills and better positioned them to benefit from the classroom curriculum.

Notes:

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