

## **Improved Reading Achievement by Students in the Cleveland Heights – University Heights City School District who used Fast ForWord® Products: 2009 - 2010**

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### **ABSTRACT**

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

**Results:** Overall, third graders significantly improved their scores on the reading portion of the Ohio Achievement Assessment after using Fast ForWord products, with 78% of the students improving one or more performance levels, and none decreasing. The difference between the results of the third-grade participants and a comparison group of third graders who had not used Fast ForWord products was statistically significant, with the participants improving their scaled scores 89% more than the comparison group. The increase in Ohio Achievement Assessment scaled scores for fourth-grade participants was 41% greater than for the rest of the fourth graders. The scores of the fifth graders decreased, with the participants' scores dropping only half of the average drop that was seen in the fifth graders who did not use the products.

**Study Design & Participants:** The design of this study was a multiple-school, observational study using high stakes and nationally-normed assessments. Study participants were elementary school students in the Cleveland Heights-University Heights City School District of University Heights, Ohio.

**Materials & Implementation:** Following staff training on the Fast ForWord products, the students used the Fast ForWord products during the 2009-2010 school year and had their reading achievement evaluated before and after Fast ForWord participation with the Ohio Achievement Assessment (OAA) and/or Reading Progress Indicator.

**Keywords:** Ohio, elementary school, urban district, observational study, Fast ForWord Language Basics, Fast ForWord Language, Fast ForWord Language to Reading, Fast ForWord Reading Prep, Fast ForWord Reading Level 1, Fast ForWord Reading Level 2, Fast ForWord Reading Level 3, Fast ForWord Reading Level 4, Ohio Achievement Assessment (OAA) 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 reading achievement of a wide range of students.

The Cleveland Heights-University Heights City 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 achievement of their students. In this study, commercially-available, computer-based products (Fast ForWord Language Basics, Fast ForWord Language, Fast ForWord Language to Reading, Fast ForWord Reading Prep, Fast ForWord Reading Level 1, Fast ForWord Reading Level 2, Fast ForWord Reading Level 3, and Fast ForWord Reading Level 4) were used to evaluate the effectiveness of this approach for improving the reading achievement of elementary school students<sup>1</sup>.

## METHODS

### Participants

The Cleveland Heights-University Heights City School District is an inner-ring suburb to the east of Cleveland. It serves Cleveland Heights and University Heights as well as a portion of South Euclid. The northeastern Ohio district serves approximately 6,000 students in seven elementary, three middle, and one high school. Approximately 77% of the students in the district are African American, and 17% are Caucasian. Fifty-six percent of the students are eligible for free or reduced-price lunches and 19% receive services for special education.

During the 2009-2010 school year, students at all seven elementary schools used the Fast ForWord products; the target population was third, fourth, and fifth graders who had not tested at the proficient level or above on the reading portion of the most recent Ohio Achievement Assessment (fall, 2009 for third graders; spring, 2009 for fourth and fifth graders.) The students typically used Fast ForWord products during lunch periods and recess so as not to disrupt their regular classroom instruction although some students did use the products during their English Language Arts, science, or social studies instruction.

The school's reading curriculum included a variety of programs. Students participating in regular classroom instruction used Macmillan / McGraw-

Hill's McGraw-Hill Reading 2005, leveled libraries, and novels; for the students receiving Title I support these were supplemented by Scholastic's Read 180, Achieve3000's KidBiz3000, and Macmillan / McGraw-Hill's Treasures. Students receiving special education services who did not take part in regular classroom reading instruction used WILSON Language Training's WILSON Reading System and Stevenson Learning Skills' Stevenson Reading.

This study first analyzes the impact of the products on students from all seven elementary schools, and then focuses on the students at Roxboro and Noble Elementary Schools – two elementary schools that had had widespread use of the products for several years, and had strong implementations. Before and after Fast ForWord participation, students were assessed with the Ohio Achievement Assessment (OAA) and/or Reading Progress Indicator (RPI). School personnel administered the assessment and reported scores for analysis.

### 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 Progress Tracker reports to monitor student performance; and techniques for measuring the gains students have achieved after they have finished using Fast ForWord products.

### 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 below in Table 1. More detailed descriptions of the exercises and learning modes within each product can be found online at <http://www.scientificlearning.com>.

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<sup>1</sup> Products used by fewer than five students are not included.

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 Basics	•									
Fast ForWord Language	•	•	•	•		•			•	
Fast ForWord Language to Reading	•		•	•	•	•	•		•	
Fast ForWord Reading Prep				•		•	•			
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 achievement was assessed with the Ohio Achievement Assessment (OAA) and/or Reading Progress Indicator (RPI).

**Ohio Achievement Assessment (OAA):** The OAA are criterion-referenced and compare student academic performance to Ohio's selected curriculum in five areas: reading, math, citizenship, science, and writing. Assessment items include multiple-choice, short answer, and extended response style questions. Administered to students in 3<sup>rd</sup> through 8<sup>th</sup> grades, the 3<sup>rd</sup> graders are assessed twice (once in early October and again in late April) while the older students are only assessed once (in late April).

Scores on the OAA are reported in terms of scaled scores. The Ohio State Board of Education has established performance standards (cut scores) based on these scores. These standards divide test scores into performance levels ranging from Limited to Advanced. The established proficiency standard (performance level of Proficient) for the Ohio Achievement Assessment at all grades is a scaled score of 400.

**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 scaled scores and achievement level for the Ohio Achievement

Assessment and normal curve equivalents, scaled scores, grade equivalent scores, and percentile scores for Reading Progress Indicator. Both scaled scores and achievement levels were used to analyze the OAA scores; scaled scores and normal curve equivalents were used to analyze Reading Progress Indicator scores. Data were analyzed using an analysis of variance (ANOVA) or paired t-tests. All analyses used a p-value of less than 0.05 as the criterion for identifying statistical significance.

## 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 the 2009 - 2010 school years, the Cleveland Heights-University Heights City School District chose to use the 30-Minute protocols with products in the Fast ForWord Language Series, and the 30- or 40-Minute Protocols with products in the Fast ForWord Reading series. These protocols call for students to use the products for 30 or 40 minutes a day, five days per week for nine to sixteen weeks. Detailed product use is shown in Table 2.

2009 – 2010 Product Use						
	Number of Students	Days Participated	Number of Calendar Days	Percent Complete	Participation Level	Attendance Level
Fast ForWord Language Basics	74	9	21	92	93	73
Fast ForWord Language	77	41	111	53	91	69
Fast ForWord Language to Reading	10	37	90	49	91	68
Fast ForWord Reading Prep	43	27	76	61	95	73
Fast ForWord Reading Level 1	57	29	56	75	95	77
Fast ForWord Reading Level 2	343	37	72	78	96	77
Fast ForWord Reading Level 3	301	31	61	50	96	79
Fast ForWord Reading Level 4	44	22	39	55	94	83
Total	527	56.6	118.2	--	95.1	76.6

Table 2. Usage data showing the number of students who used the Fast ForWord products during the 2009–2010 school year, 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

**Ohio Achievement Assessment (OAA):** OAA scores were available from fall and spring of the 2008-2009 school year, and fall and spring of the 2009-2010 school year. The fall/spring scores allow the calculation of the impact of Fast ForWord products on 3<sup>rd</sup> graders, while the spring/spring scores allow the calculation of the impact of Fast ForWord products on 4<sup>th</sup> and 5<sup>th</sup> graders.

One hundred seventy-one Fast ForWord participants were 3<sup>rd</sup> graders and had OAA scores from the fall and spring of the 2009-2010 school year. On average, these students made statistically significant improvements in their OAA scores, improving from an average score of 373 in the fall, to an average score of 405 in the spring. An analysis of the students' reading achievement level showed that most of the students were initially at the Limited or Basic level, and that 78% of the third graders who participated moved up one or more achievement levels.

There were 74 students in the district who were 3<sup>rd</sup> graders during the 2008-2009 school year, but did not use Fast ForWord products until the 2009-2010 school year. These students made a good comparison group because they had similar reading challenges as demonstrated by their later use. In the fall of their 3<sup>rd</sup> grade year, these 74 students had an average OAA Reading score of 379. In the spring, their OAA scores were significantly higher with an average score of 396; 50% of the students had improved one or more achievement levels. An analysis of variance (ANOVA) was performed comparing the scores of the 3<sup>rd</sup> graders during the 2009-2010 school year who used Fast ForWord to the improvements of the 3<sup>rd</sup> graders during the

2008-2009 school year who did not use Fast ForWord until later. The ANOVA showed a statistically significant Time x Group interaction ( $F = 26.4$ ;  $df = 243$ ;  $p < 0.001$ ) with the students who used the products improving 32 points compared to the 17 points of the students who did not use the products (Table 3; Figure 1).

Third Graders					
		Fall		Spring	
	n	Mean	SE	Mean	SE
Fast ForWord	171	373.5	1.4	405.1	1.6
No Fast ForWord	74	379.1	2.4	395.8	2.1

Table 3. Fall and spring OAA scores for third graders who used Fast ForWord during third grade (Fast ForWord) and who did not use Fast ForWord until fourth grade (No Fast ForWord).

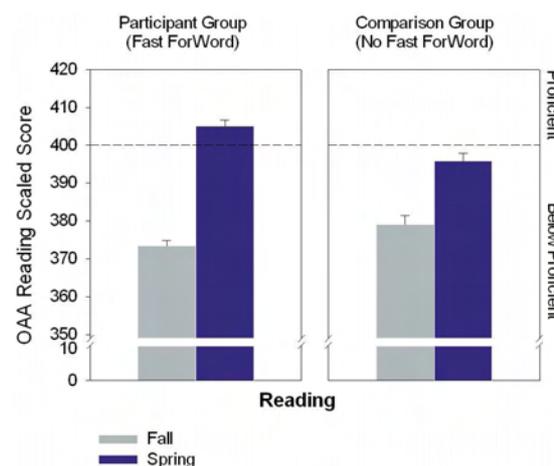


Figure 1. Third graders were evaluated on the reading portion of the Ohio Achievement Assessment in the Fall and Spring. Students who used Fast ForWord products ( $n = 171$ ) made significantly greater gains than students who waited until their 4<sup>th</sup> grade year to use the products ( $n=74$ ).

Two hundred forty-three fourth and fifth graders used the Fast ForWord products during the 2009-2010 school year and had OAA scores available from the springs of 2009 and 2010 (110 fourth graders; 133 fifth graders.) On average, the fourth graders improved their scaled scores by a statistically significant amount while the fifth graders had a statistically significant drop in their OAA scores.

Scores were not available for any other time spans, so the scores of the participants were compared to the scores of the non-participants. On average, the fourth grade participants improved more than the fourth grade non-participants, and the fifth grade participants dropped by fewer points than the fifth grade non-participants (Table 4; Figure 2).

Fourth and Fifth Graders						
		2009			2010	
		n	Mean	SE	Mean	SE
4 <sup>th</sup> Grade	Fast ForWord	110	396.7	1.9	405.0	1.9
	No Fast ForWord	161	412.3	2.1	418.2	1.9
5 <sup>th</sup> Grade	Fast ForWord	133	399.0	1.6	387.8	2.1
	No Fast ForWord	229	437.8	2.2	416.5	2.2

Table 4. Average OAA scores and the standard errors from spring, 2009 and spring, 2010 for students who used Fast ForWord and students who did not use Fast ForWord.

Independent t-tests were performed and showed that there was a statistically significant difference between the change scores of the third and fifth grade participants and non-participants (Table 5).

	Fast ForWord		No Fast ForWord		df	t-statistic
	Change	SE	Change	SE		
3 <sup>rd</sup> Grade	31.6	1.6	16.8	2.2	243	5.14*
4 <sup>th</sup> Grade	8.3	1.5	5.9	1.9	269	1.01
5 <sup>th</sup> Grade	-11.2	1.9	-21.3	1.3	360	4.34*

Table 5. The change in OAA scores for students in 3<sup>rd</sup>, 4<sup>th</sup>, and 5<sup>th</sup> grade. Note: the 3<sup>rd</sup>-grade students all had reading challenges and were selected by teachers to use Fast ForWord (either as 3<sup>rd</sup> graders or the following year as 4<sup>th</sup> graders). The two groups were compared using independent t-tests. There were statistically significant differences between the change scores of the 3<sup>rd</sup> and 5<sup>th</sup> graders. \* < 0.05.

The Cleveland Heights – University Heights City School District was particularly interested in the impact of the products on students at Roxboro and Noble Elementary Schools – the two schools that had the most experience using the Fast ForWord products. Tables 6 and 7 show the 2009 and 2010 OAA scores for 3<sup>rd</sup>, 4<sup>th</sup>, and 5<sup>th</sup> graders at those two schools. A comparison between Table 5, 6, and 7 shows that the third- and fourth-grade participants at Roxoboro and Noble improved more than

participants across the district did, and the scores of fifth-grade participants dropped less.

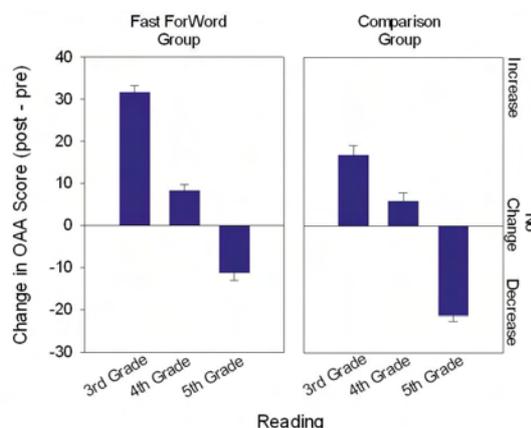


Figure 2. OAA Reading score changes were evaluated for students in 3<sup>rd</sup> through 5<sup>th</sup> graders. Students who used Fast ForWord products improved more, or decreased less, than students who did not. The differences between the participants and non-participants reached significance for the 3<sup>rd</sup> and 5<sup>th</sup> graders.

Third Graders						
		Fall		Spring		
		n	Mean	SE	Mean	n
Noble		38	367.1	3.5	407.7	3.7
Roxboro		15	375.7	4.8	402.3	6.3

Table 6. OAA scores from fall and spring for third graders at Noble and Roxboro Elementary Schools.

Fourth and Fifth Graders						
		2009			2010	
		N	Mean	SE	Mean	SE
4 <sup>th</sup> Grade	Noble	29	403.1	4.2	416.2	4.1
	Roxboro	23	401.1	3.9	409.0	3.7
5 <sup>th</sup> Grade	Noble	38	404.6	3.4	400.2	3.6
	Roxboro	11	403.4	5.8	384.8	9.2

Table 7. OAA scores from spring, 2009 and spring, 2010 for fourth and fifth graders at Noble and Roxboro Elementary Schools.

An analysis of achievement level showed that the Fast ForWord participants were more likely to increase their achievement level than students who did not use Fast ForWord products. The third graders provide the best example since the students in the participant group and the students in the comparison group were all struggling students selected to use Fast ForWord products (the students in the comparison group were “future participants”.) Table 8 shows the fall, 2009

reading achievement level (rows) and the spring, 2010 level (columns) for students who were in third grade during the 2009-10 school year and who used the Fast ForWord products that year. Table 9 shows the fall, 2008 and spring, 2009 achievement levels for students who were in third grade during the 2008-9 school year and did not use the Fast ForWord products until the following school year.

Going across the top row of Table 8, the reading achievement of 114 students was at the Limited level in the fall of 2009. In the spring, 28 students remained at Limited, 32 moved up to Basic, 30 moved to Proficient, 17 moved to Accelerated, and 7 moved to Advanced. The boxes on the diagonal (in grey) show the students who were at the same level in the fall and spring. Students above and to the right improved one or more levels while students below and to the left decreased one or more levels. The results are also shown in Figure 3.

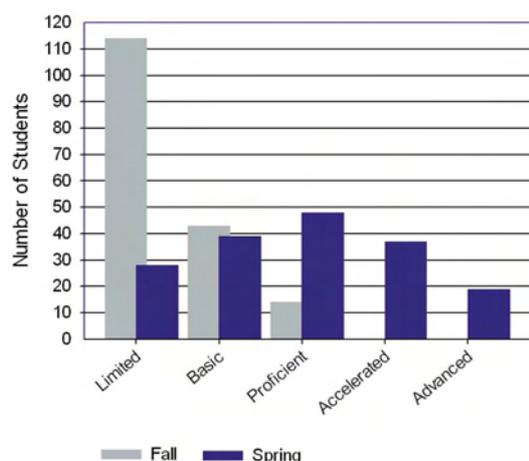


Figure 3. The performance level of 3<sup>rd</sup> graders in the fall and spring. The students used Fast ForWord products between the two administrations of the reading portion of the OAA.

Third Grade Experimental Group								
		Spring, 2010					Fall, 2009	Spring, 2009
		Limited	Basic	Proficient	Accelerated	Advanced	Total	Total
Fall, 2009	Limited	28	32	30	17	7	114	28
	Basic	0	7	15	13	8	43	39
	Proficient	0	0	3	7	4	14	48
	Accelerated	0	0	0	0	0	0	37
	Advanced	0	0	0	0	0	0	19

Table 8. The number of third graders who increased/decreased their achievement level after using Fast ForWord products. The grey boxes on the diagonal indicate students who remained at the same level from the Fall, 2009, to the Spring, 2010.

Third Grade Comparison Group								
		Spring, 2009					Fall, 2009	Spring, 2009
		Limited	Basic	Proficient	Accelerated	Advanced	Total	Total
Fall, 2008	Limited	17	14	10	3	1	45	22
	Basic	5	5	2	5	0	17	20
	Proficient	0	1	4	1	0	6	18
	Accelerated	0	0	2	3	1	6	12
	Advanced	0	0	0	0	0	0	2

Table 9. The number of third graders who increased/decreased their achievement level between the Fall, 2008, and the Spring, 2009. These students did not use Fast ForWord products between the Fall and Spring, but were struggling students who used the products the following year.

Across the third graders, 78% of the Fast ForWord participants increased one or more levels and none went down a level. In the comparison group, 50% of the students increased while 11% of the students decreased. Table 10 summarizes the number of students at each grade who increased or decreased their achievement level. At each grade, the percentage of students in the experimental group that increased was greater than the percentage that increased in the comparison group, and the percentage in the experimental group that decreased was smaller.

Grade	Comparison		Experimental	
	Decreased	Increased	Decreased	Increased
Third	11%	50%	0%	78%
Fourth	50%	22%	32%	38%
Fifth	59%	3%	58%	17%

Table 10. The percentage of third, fourth, and fifth graders who increased/decreased their reading achievement level. At all three grades, a higher percentage of participants increased their achievement level, and a lower percentage decreased their achievement level.

**Reading Progress Indicator (RPI):** In addition to the OAA, RPI was used to evaluate the impact of the Fast ForWord products on students in the Cleveland Heights-University Heights City School District who used the Fast ForWord products during the 2008 – 2009 or 2009-2010 school year. RPI was administered before using Fast ForWord products, and then again after finishing each product. Three hundred seven students in first through fifth grade had valid pre- and post-participation scores and are included in the RPI evaluation. Of the students, 253 (82%) showed improvement. Their average grade level was 3.5 nearly a year higher than their skill-level of 2.7. Following three months of Fast ForWord participation, the students' skills had improved to the 3.4 level, an improvement of seven months. This corresponds to improving from the 22<sup>nd</sup> percentile to the 40<sup>th</sup> percentile.

Eighteen students had multiple post-tests. Of these students, 17 (94%) showed improvement between the first administration and the last one. Their average initial grade level was 3.4, nearly a year higher than their initial skill level of 2.7. On average, the students completed their first product in 6 ½ months, improving to a skill level of 3.5. The next assessment was taken four months later, and the students had an average skill level of 4.7 for an average improvement of 2 years in the 10 ½ months between the first and last assessment.

## DISCUSSION

On average, during the 2009 – 2010 school year, Fast ForWord participants in the Cleveland Heights – University Heights City School District significantly improved their reading achievement and skills. Students were evaluated on the OAA and/or RPI. Most of the students were struggling: in the Limited or Basic range on the OAA, and in the Struggling range on RPI.

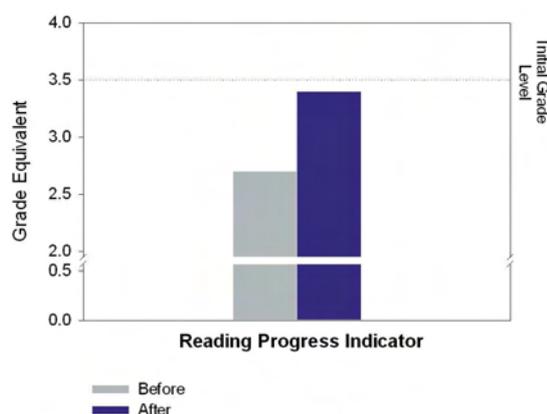


Figure 4. Students in 1<sup>st</sup> through 5<sup>th</sup> grade were evaluated with Reading Progress Indicator. The average initial grade level of the 307 students was midway through third grade (3.5).

Variations in student performance from test to test are typical and somewhat predictable. For example, students frequently have a difficult time with the fifth-grade administration of the OAA. What is particularly notable about the results of this study is the size of the improvement relative to comparison groups. On average, the third grade participants started lower, and finished higher, than the students in the comparison group; although the fifth grade participants' scores dropped, they did not drop as much as the students who did not use the products. In both cases, there was a statistically significant difference between the change in OAA scores with the students who used Fast ForWord products performing better.

On RPI, students improved seven months in an average of three months. These students were midway through third grade but had reading skills equivalent to the level of a midyear second grader. They had not been able to keep up with their peers. Despite their history of reading struggles, the students outperformed expectations, gaining skills rapidly. These skills are critical for the students' future success in reading and learning.

These findings demonstrate that, within the Cleveland Heights – University Heights City School District, an optimal learning environment coupled with a focus on cognitive and early reading skills can help students attain a higher level of reading achievement.

## 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 Cleveland Heights – University Heights City School District made significant gains in their reading 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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