

# Improved Reading Skills by Students in the Perrysburg Exempted Village Schools who used Fast ForWord<sup>®</sup> Products

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## ABSTRACT

**Purpose:** This study investigated the effects of the Fast ForWord products on the reading skills of elementary school students who used the products within the curriculum in a school setting. **Study Design:** The design of this study was a multi school two group study using nationally normed assessments. **Participants:** Study participants were second graders attending schools in the Perrysburg Exempted Village Schools of Perrysburg, Ohio. Participants were in one of two groups, a Fast ForWord group that used the products and a control group that did not use products and served as a comparison. **Materials & Implementation:** Following staff training on the Fast ForWord products, the students used the products during the 2006-2007 school year and had their reading abilities evaluated with the Dynamic Indicators of Basic Early Literacy Skills (DIBELS) and Reading Edge before and after Fast ForWord participation. **Results:** Both the Fast ForWord group and the comparison group significantly improved in oral reading fluency, on average, with the Fast ForWord group making higher gains than the comparison group of their peers. On average, after Fast ForWord participation, student reading skills also improved significantly as measured by Reading Edge.

**Keywords:** Ohio, elementary school, suburban district, experimental study, Fast ForWord Language Basics, Fast ForWord Language, Fast ForWord Language to Reading, Fast ForWord to Reading 1, Fast ForWord to Reading 2, Dynamic Indicators of Basic Early Literacy Skills (DIBELS), Reading Edge.

## 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). The Perrysburg Exempted Village Schools were 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 language achievement of their students

in a school setting. In this study, commercially available computer-based products (Fast ForWord Language Basics, Fast ForWord Language, Fast ForWord Language to Reading, Fast ForWord to Reading 1, and Fast ForWord to Reading 2) were used to evaluate the effectiveness of this approach for improving the reading achievement of elementary school students.

## METHODS

### Participants

Located in northern Ohio, the city of Perrysburg is 10 miles south of Toledo. The Perrysburg Exempted Village Schools is consistently recognized as one of the highest achieving districts in the state of Ohio. The district has six schools and a student enrollment of approximately 4,500 in pre-Kindergarten through twelfth grade.

Four elementary schools in the district chose to participate in the study reported here. Two schools used the Fast ForWord products during the fall of the 2006-2007 school year and two schools served as the

comparison group. All study participants were in the second grade. Students were assessed with the Dynamic Indicators of Basic Early Literacy Skills (DIBELS) and Reading Edge before and after the Fast ForWord group used the products. 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. The products used by the Perrysburg Exempted Village Schools, Fast ForWord Language Basics, Fast ForWord Language, Fast ForWord Language to Reading, Fast ForWord to Reading 1, and Fast ForWord to Reading 2, include three to seven exercises designed to build skills critical for reading and learning, such as auditory processing, memory, attention, and language comprehension. While there are variations across products related to the specific skills targeted and the approaches taken, there are several critical skills developed in all of the products, as detailed in the following exercise descriptions.

*Inside the Tummy*<sup>1</sup>: Participants click and drag colored shapes into matching shape outlines in pre-defined patterns. This task helps participants improve fine motor skills, hand-eye coordination, and computer mousing skills.

*Flying Saucer*<sup>1</sup>: Participants identify sounds presented in a sequence, then click on graphic icons associated with those sounds to reproduce the sequence. This task builds auditory discrimination ability, auditory working memory, and sequencing skills.

*Drag Racer*<sup>1</sup>: Participants point and click on a (sometimes moving) graphic, then hold the mouse

button down to hear a stream of identical sounds. Participants release the mouse button when there is a sound change. This task is designed to improve auditory discrimination and sustained auditory attention. It also develops mousing skills, and the ability to withhold a response until an auditory cue is presented.

*Circus Sequence*<sup>2</sup> and *Trog Walkers*<sup>3</sup>: Students hear a series of short, non-verbal tones. Each tone represents a different fragment of the frequency spectrum used in spoken language. Students are asked to differentiate between these tones. The exercises improve working memory, sound processing speed, and sequencing skills.

*Old MacDonald's Flying Farm*<sup>2</sup>: Students hear a single syllable that is repeated several times, and then interrupted by a different syllable. Students must respond when they hear a change in the syllable. This exercise improves auditory processing, develops phoneme discrimination, and increases sustained and focused attention.

*Phoneme Identification*<sup>2</sup>, *Polar Cop*<sup>3</sup>, and *Treasure in the Tomb*<sup>3</sup>: Students hear a target phoneme, and then must identify the identical phoneme when it is presented later. These exercises improve auditory discrimination skills, increase sound processing speed, improve working memory, and help students identify a specific phoneme. *Polar Cop* also develops sound-letter correspondence skills. *Treasure in the Tomb* also develops grapheme recognition.

*Phonic Match*<sup>2</sup> and *Bug Out*<sup>3</sup>: Students choose a square on a grid and hear a sound or word. Each sound or word has a match somewhere within the grid. The goal is to find each square's match and clear the grid. The *Phonic Match* exercise develops auditory word recognition and phoneme discrimination, improves working memory, and increases sound processing speed. The *Bug Out!* exercise develops skill with sound-letter correspondences as well as working memory.

*Phonic Words*<sup>2</sup>: Students see two pictures representing words that differ only by the initial or final consonant (e.g., "face" versus "vase", or "tack" versus "tag"). When students hear one of the words, they must click the picture that matches the word. This exercise increases sound processing speed, improves auditory recognition of phonemes and words, and helps students gain an understanding of word meaning.

<sup>2</sup> Exercise from the Fast ForWord Language product.

<sup>3</sup> Exercise from the Fast ForWord Language to Reading product.

<sup>1</sup> Exercise from the Fast ForWord Basics product.

*Language Comprehension Builder*<sup>2</sup>: Students listen to a sentence that depicts action and complex relational themes. Students must match a picture representation with the sentence they just heard. This exercise develops oral language and listening comprehension, improves understanding of syntax and morphology, and improves rate of auditory processing.

*Block Commander*<sup>2</sup>: In Block Commander, a three-dimensional board is filled with familiar shapes that students select and manipulate. The students are asked to follow increasingly complex commands. This exercise increases listening comprehension, improves syntax, develops working memory, improves sound processing speed, and increases the ability to follow directions.

*Start-Up Stories*<sup>3</sup>: Students follow increasingly complex commands, match pictures to sentences, and answer multiple-choice questions about stories that are presented aurally.

*Bear Bags*<sup>4</sup> and *Bear Bags: More Lunch*<sup>5</sup>: In these exercises, the participant is asked to help Mama Bear sort words (on pieces of toast) into phoneme-based categories (in lunch bags). They develop phonemic awareness and decoding of single-syllable words. Bear Bags also develops understanding of alphabetic principles (phonics) and Bear Bags: More Lunch also develops grapheme/phoneme associations.

*Magic Rabbit*<sup>4</sup> and *Magic Bird*<sup>5</sup>: These exercises combine spelling and word-building practice with spelling patterns and word families commonly studied in 1st grade for *Magic Rabbit* and in 2<sup>nd</sup> grade for *Magic Bird*. The task is designed to emphasize the relationships between words by showing how one word can be turned into another by simply changing a single letter in any position. Using a click and drag interface, the participant must either select the missing letter to complete a partially spelled word or rearrange scrambled letter tiles to spell a word. These exercises develop spelling and sensitivity to letter-sound correspondences.

*Flying Fish*<sup>4</sup> and *Fish Frenzy*<sup>5</sup>: In these exercises, a fishing pelican pronounces a word. Then a series of spoken and/or written words (on fish) fly across the pond and the participant clicks on the word when it matches the pronounced word. These exercises develop decoding skills, identification of sight words, and auditory memory.

*Quail Mail*<sup>4</sup>: In Quail Mail, a squirrel mail carrier pulls words out of a mailbag and the participant sorts them into different categories by clicking on the appropriate mailbox. This exercise encourages flexibility during reading and automatic access to the various dimensions of vocabulary.

*Bedtime Beasties*<sup>4</sup> and *Leaping Lizards*<sup>5</sup>: These exercises use the “cloze task,” in which a written and aurally presented sentence has a word missing. The participant must select the correct word to complete the sentence from four choices. Vocabulary skills and sentence comprehension are developed in these exercises.

*Buzz Fly*<sup>4</sup> and *Dog Bone*<sup>5</sup>: In these exercises, the participant listens to a passage and answers comprehension questions relating to each passage. The questions are aurally presented and written, and the response choices are presented as pictures. Responses are presented as words or short phrases in *Dog Bone*. These exercises develop listening comprehension and working memory skills as measured by performance on multiple choice questions.

*Ant Antics*<sup>5</sup>: The participant will be presented with a picture and then asked to pick one of the four alternatives that best describes an aspect of that picture. This exercise improves vocabulary skills and sentence comprehension.

### Assessments

Before and after Fast ForWord participation, student language skills were assessed with the Dynamic Indicators of Basic Early Literacy Skills (DIBELS).

#### Dynamic Indicators of Basic Early Literacy Skills (DIBELS):

The DIBELS are standardized, individually administered measures of early literacy development designed to monitor the development of pre-reading and early reading skills. Skills assessed range from phonemic awareness to phonics to fluency. The appropriate skills for measuring with the DIBELS vary with the grade of the students. For students in the second grade and beyond, the appropriate measure is Oral Reading Fluency, which is a standardized test of accuracy and fluency.

The Institute for the Development of Educational Achievement, in accordance with the Reading First legislation, recognizes the DIBELS as an appropriate assessment for measuring improvement in the reading skills of children in early elementary school

**Reading Edge:** Reading Edge is a software program for evaluating phonological/early reading skills, including phonological processing, phonological awareness, phonemic decoding, and letter-sound identification. The Reading Edge composite score reflects a student’s overall performance on the various phonological and reading tests in Reading Edge taking into account the relative importance of each test in predicting reading ability.

<sup>4</sup> Exercise from the Fast ForWord to Reading 1 product.

<sup>5</sup> Exercise from the Fast ForWord to Reading 2 product.

Second graders scoring above 50 are performing at the expected level for their grade. Second graders scoring at 30 or below are at risk for reading failure. Second graders scoring between 31 and 50 are borderline.

**Analysis**

Scores were reported in terms of raw scores. Data were analyzed using paired t-tests that 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 2006-2007 school year, the Perrysburg Exempted Village Schools chose to use the 30-, 48- and 50-

Minute protocols. These protocols called for students to use the product for 30, 48, or 50 minutes a day, five days per week for six to sixteen weeks. Detailed product use is shown in Table 1.

Figure 1 shows the average daily progress through the Fast ForWord Language product exercises. This graph represents the learning curve of the students as they progress through the product. The other products used in this study, Fast ForWord Language Basics, Fast ForWord Language to Reading, Fast ForWord to Reading 1, and Fast ForWord to Reading 2, have similar learning curves. The final day shown is determined by the maximum number of days that at least two-thirds of the students participated. For students who used the product fewer than the number of days shown, percent complete is maintained at the level achieved on their final day of product use.

	Number of Students	Days Participated	Number of Calendar Days	Percent Complete	Participation Level	Attendance Level
Fast ForWord Language Basics	39	6	11	96%	95%	87%
Fast ForWord Language	127	27	47	78%	99%	82%
Fast ForWord Language to Reading	120	28	65	66%	99%	71%
Fast ForWord to Reading 1	19	8	22	62%	99%	71%
Total	128	57	117	-	-	-

Table 1. Usage data showing the number of students who used the Fast ForWord products, 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.

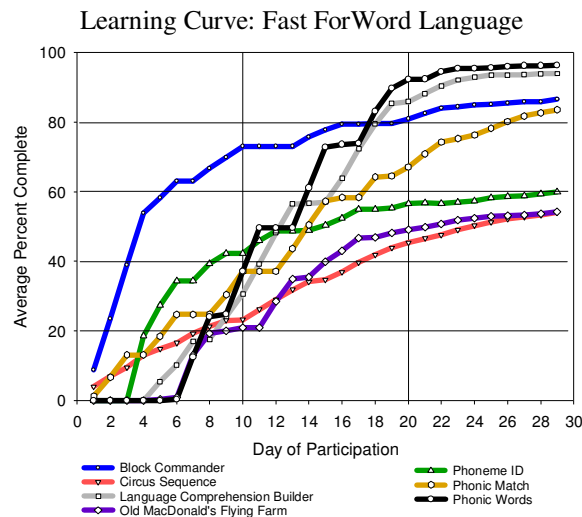


Figure 1. Average daily progress through the Fast ForWord Language product exercises. Results from 127 students are shown.

**Assessment Results**

Dynamic Indicators of Basic Early Literacy Skills (DIBELS):

Data were reported in terms of raw scores for 308 students (127 Fast ForWord students and 181 comparison students). On average, students in both groups significantly improved in oral reading fluency at post-test, with the Fast ForWord group making greater gains than the comparison group (Table 2, Figure 2).

Group	n	Before		After		t-statistic
		Mean	SE	Mean	SE	
Fast ForWord	127	63.0	2.9	103.1	3.1	31.0*
Comparison	181	59.6	2.6	93.5	2.8	17.6*

Table 2. Students who used Fast ForWord products improved more in measures of reading fluency than students who did not use products, on average. \*p<0.05.

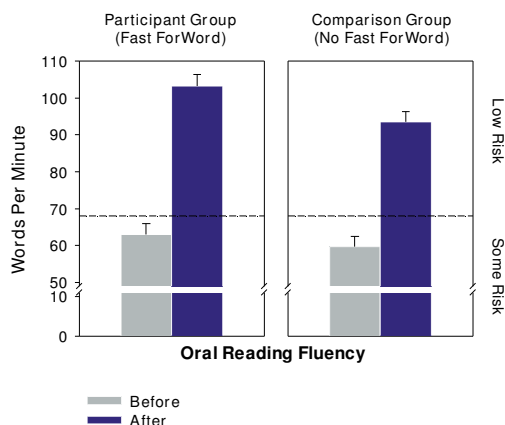


Figure 2. On average, the Fast ForWord group outperformed the comparison group in reading skills. Results from 308 students are shown.

There was a particular interest in the performance of struggling students and high performing students. Struggling students were identified as those scoring below the benchmark for 2<sup>nd</sup> graders on the Fall ORF

– a score of less than 44. High performing students were identified as those with a Fall ORF score above the benchmark for the Fall of 3<sup>rd</sup> grade – a score greater than or equal to 77.

The second grade Winter benchmark goal is an ORF score greater than or equal to 68.

**Struggling students:** Data from 45 Fast ForWord participants and 64 comparison students were available. Although both groups had significant gains, the Fast ForWord group improved more in reading skills than the comparison group and, on average, moved into the “low risk” range (Table 3).

**High performing students:** Students scoring in the low risk range of reading skills, on average, also made significant gains at post-test. Average improvement for the Fast ForWord group was 41 points compared to a 32 point gain by the comparison group (Table 3).

	Group	n	Before		After		t-statistic
			Mean	SE	Mean	SE	
Struggling students	Fast ForWord	45	32.1	1.3	70.9	3.0	19.8*
	Comparison	64	26.9	1.2	56.9	2.9	14.1*
High performing students	Fast ForWord	38	104.8	3.4	146.0	3.3	14.9*
	Comparison	45	105.9	5.4	138.2	3.5	5.1*

Table 3. Struggling students and high performing students significantly improved in reading skills, with the Fast ForWord group making greater gains in both cases. \* $p < 0.05$ .

**Reading Edge:** Raw scores from the Reading Edge assessment were available for 111 Fast ForWord participants. The comparison group of students was not assessed. Following Fast ForWord product use, students, on average, had significant gains of 16 points in reading skills (Table 4, Figure 3).

	n	Before		After		t-statistic
		Mean	SE	Mean	SE	
Reading Edge	111	73.5	2.4	89.5	1.2	7.3*

Table 4. Following Fast ForWord product use, student reading ability improved significantly. \* $p < 0.05$ .

Reading Edge	n	Before		After		t-statistic
		Mean	SE	Mean	SE	
Struggling students	25	32.3	1.8	78.2	4.2	9.8*

Table 5. Struggling students also showed significant improvement in reading ability after Fast ForWord participation. \* $p < 0.05$ .

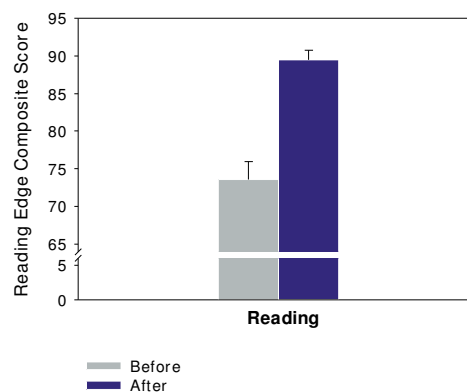


Figure 3. After Fast ForWord participation, students improved 16 points in reading skills as measured by Reading Edge, on average. Results from 111 students are shown.

A separate analysis was performed for students identified as struggling (a Reading Edge score of less than 50). These students, on average, showed significant gains of 45 points in reading ability and moved out of the at risk range (Table 5).

## DISCUSSION

During the 2006-2007 school year, Fast ForWord participants in the Perrysburg Exempted Village Schools significantly improved in reading skills and outperformed a comparison group of students who did not use the Fast ForWord products. The Fast ForWord group had average gains of 40 points on the Oral Reading Fluency measure of the DIBELS compared to a 33 point gain by the comparison group. Fast ForWord participants also had higher gains than the comparison group when evaluating students identified as struggling or students identified as high performing. In addition, students, on average, significantly improved in reading ability as measured by the Reading Edge assessment. These findings demonstrate that, within the Perrysburg Exempted Village Schools, 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 Perrysburg Exempted Village Schools made significant gains in their reading ability. This suggests 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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