

# Improved Ohio Reading Proficiency Test Scores by Students in the Springfield City School District who used Fast ForWord® Products

MAPS for Learning: Educator Reports, 8(8): 1-6

## ABSTRACT

**Purpose:** This study investigated the effects of Fast ForWord products on the reading skills and academic achievement of at-risk students who used the products within the curriculum in a school setting in four elementary schools. **Study Design:** The design of the study was a multiple-school experimental study using state achievement tests. A repeated measure analysis of variance (ANOVA) was used to evaluate changes in student performance and determine whether students who used Fast ForWord products outperformed those who did not. **Participants:** Study participants were fourth grade students attending Title I designated schools in the Springfield City School District in Springfield, Ohio who had Ohio Proficiency Test scores from Fall, 2002 and Spring, 2003 and had not previously used Fast ForWord products. Forty-one of the students used Fast ForWord products, and a comparison group was formed by pseudo-randomly selecting 50 students with test scores who had had no exposure to Fast ForWord products. **Materials & Implementation:** Following staff training on the Fast ForWord products, a group of Springfield students, on average, used one of the Fast ForWord products for 36 days over nearly 3 months. Before and after Fast ForWord participation, student performance was evaluated by examining progress on the Ohio Proficiency Test (OPT). **Results:** On average, the students who used Fast ForWord products scored 14.5 points higher on the Spring assessment than on the Fall. This improvement was significantly greater than that of a comparable-sized group of students who did not use Fast ForWord products, and over 30% higher than for all the non-participants for whom test scores were available.

**Keywords:** Ohio, elementary schools, urban district, experimental study, at-risk students, Title I, Fast ForWord Language, Fast ForWord Language to Reading, Fast ForWord to Reading 3, Ohio Proficiency Test (OPT).

## INTRODUCTION

Early laboratory tests of a prototype of a computer-based product (Fast ForWord Language) combined an optimal learning environment with a focus on early reading and cognitive skills. The results were dramatic improvements in the auditory processing and language skills of elementary school children who had specific language impairments (Merzenich et al, 1996; Tallal et al., 1996) or were at-risk for academic failure (Miller et al., 1999). The Springfield 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 of increasing the benefit that struggling students received from their reading curriculum and instruction. In this study, commercially available computer-based products (Fast ForWord Language, Fast ForWord Language to Reading, and Fast ForWord to Reading 3) were used to evaluate the effectiveness of this approach for improving the reading skills and academic achievement of fourth grade students in school settings who were at, or below, the 49th percentile in their reading achievement.

## METHODS

### Participants

During the 2002 – 2003 school year, five schools in the Springfield City School District of Springfield, OH,

used Fast ForWord products. The schools included four elementary schools and one middle school.

The Springfield City School District includes 22 schools and over 9,000 students. Mobility rate is about 33% and 32% of the enrolled students are minority students. Sixteen percent of the students are receiving Special Education services, and 0.2% of the students have limited English proficiency. Approximately 57% of students are economically disadvantaged (receiving free or reduced lunch).

The students in this study were all in the 4<sup>th</sup> grade and attended elementary schools designated as Title I. The schools participated in this study to evaluate the effectiveness of Fast ForWord products on improving early reading skills and academic achievement of students who did not pass the October, 2002 Ohio Reading Proficiency Test. Student selection was not uniformly controlled and each elementary school established its own method of student identification and assignment. The district was particularly interested in students who had used Fast ForWord products for 20 or more days and this study analyzes 41 students who had used the products at least 20 days during the 2002 – 2003 school year, and had Ohio Proficiency Test (OPT)

scores available from before or shortly after start of participation, and again from after participation.<sup>1</sup>

The comparison group was made from 50 fourth grade students pseudo-randomly selected from the 356 fourth graders in the district who had an Ohio Reading Proficiency Test score from October and from March, and who did not use any Fast ForWord products prior to, or during the study, and for whom two scores were available.

### Implementation

At each participating school, 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.

Schools used different implementation models, with some schools having students use the products in the back of the classroom, while other schools sent students down the hall to a computer lab that varied in size from seven to 24 students. Computer labs typically had a single monitor. Schools also experimented with an after-school program but found that the after-school implementation resulted in low attendance and poor participation levels.<sup>1</sup>

### Materials

Fast ForWord Language, Fast ForWord Language to Reading, and Fast ForWord to Reading 3, computer-based products that combine an optimal learning environment with a focus on early reading and cognitive skills, were used. Each of the products includes five 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.

*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.

*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

<sup>1</sup> Sixty students in the fourth grade used the Fast ForWord products between the Fall and Spring administrations of the OPT, and have scores reported from both administrations. Thirteen of those students used the products for fewer than 20 days, and six students were removed at the request of the district for non-compliance with the protocol (they attended class infrequently and/or did not participate during the entire class period).

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

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

<sup>4</sup> Exercise from the Fast ForWord to Reading 3 product.

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.

*Scrap Cat*<sup>4</sup>: In Scrap Cat, a series of words is visually presented and participants are asked to sort each word into the correct semantic, phonological, syntactic, or morphological category. For this exercise only, the participant can click a button to hear any word and see it defined. This exercise trains decoding, vocabulary, and word recognition skills.

*Canine Crew*<sup>4</sup>: In Canine Crew multiple words are presented together in a grid and participants are asked to find pairs that match on the basis of the current criterion. This criterion shifts from words that rhyme, to synonyms, to antonyms, to homophones, as the participant progresses. This exercise trains vocabulary, decoding, and automatic word recognition.

*Chicken Dog*<sup>4</sup>: Participants hear a word and see it partially spelled. They must complete the word by filling in the missing letter or letter group. Five options are always provided, including options that represent common visual and phonological errors. This exercise trains basic spelling patterns, letter-sound correspondences, and decoding.

*Twisted Pictures*<sup>4</sup>: Participants are presented with a variety of pictures and asked to select the sentence that most accurately describes each picture from among four alternatives. The descriptive sentences incorporate a wide range of syntactic structures. As the participant progresses, the sentences get longer and more difficult vocabulary is included. This exercise builds sentence comprehension by developing syntax, working memory, logical reasoning, and vocabulary.

*Book Monkeys*<sup>4</sup>: Participants read narrative and expository passages and answer comprehension questions about each passage. The multiple-choice questions demand that the participant use memory for literal detail, generation of inferences, or grasp of causal relationships to select the best answer from among four alternatives. This task develops paragraph comprehension, inferential and cause-and-effect reasoning, working memory, flexible reading, and vocabulary.

*Hog Hat Zone*<sup>4</sup>: In Hog Hat Zone, short passages from classic children's literature are presented, with occasional

gaps in the text where words are missing. Participants are asked to fill in each gap with the correct word from among four alternatives. The missing words are morphologically important items such as pronouns, auxiliary verbs, and words with suffixes and prefixes. This task develops paragraph comprehension, complex morphology, flexible reading, and vocabulary.

### Assessments

The reading score from the Ohio Proficiency Test (OPT), a mandatory state test for fourth graders, was used to evaluate students. Personnel at the participating schools administered the assessments and reported the scores for analysis. The assessments were administered before, or shortly after the students started Fast ForWord participation, and again afterwards, according to a pre-determined schedule aligning with other schools in the state and district.

**Ohio Proficiency Test (OPT):** The OPT is a statewide assessment that is administered to students in 4<sup>th</sup>, 6<sup>th</sup>, and 9<sup>th</sup> grades. The tests are criterion-referenced, and compare the performance of the students to Ohio's selected curriculum in five areas: reading, math, citizenship, science, and writing. Test items include multiple choice, short answer, and extended response style questions. The established proficiency standard for Reading for 4<sup>th</sup> grade students is 217. If students in the fourth grade do not demonstrate proficiency during the October assessment, they retake the test in March. The OPT can also be retaken at the end of summer school – after fourth grade.

### Analysis

Data was analyzed using a repeated measures analysis of variance (ANOVA) to contrast performance improvements on the OPT between students who used Fast ForWord products and a comparison group of students who had not used any of the products prior to, or between, the two test points. The comparison group of students was made by pseudo-randomly selecting 50 students from the entire group of 356 students who had two scores and no exposure to the products. Scale scores were used for the analysis and all analyses used a p-value of 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 days of use, content completed, and adherence to the chosen protocol (participation level). The Fast ForWord Language protocol used by the Springfield City School District called for students to use the product for 100 minutes a day, five days a week, for four to eight weeks. The Fast ForWord Language to Reading and Fast ForWord to Reading 3 protocols were 90 minutes a day, five days a week, for four to eight weeks.

The forty-one students included in this analysis used the products for at least 20 days during the 2002 – 2003 school

year, were in the fourth grade, and had OPT scores from the Fall and the Spring. Two used the Fast ForWord Language product, one used the Fast ForWord Language to Reading product, and 38 used the Fast ForWord to Reading 3 product. On average, each of the 41 students used the Fast ForWord products for a total of 36 days over a calendar period of 86 days. During participation, students completed an average of 49% of the exercise material. Detailed usage data for each product with more than five participants is shown in Table 1.

Figure 1 shows the average daily progress through the Fast ForWord to Reading 3 exercises for the students for whom OPT scores were available. Due to the small number of students using the Fast ForWord Language and Fast ForWord Language to Reading products, progress history is not shown for those products. The final day shown on each chart 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.

**Fast ForWord Product Use by Students who Took the Ohio Proficiency Test**

Springfield City School District	Number of Students	Average Days Participated	Average Number of Calendar Days	Average Overall Percent Complete
Fast ForWord Language	2	na	na	na
Fast ForWord Language to Reading	1	na	na	na
Fast ForWord to Reading 3	38	37	90	48%
<b>Overall</b>	<b>41</b>	<b>36</b>	<b>87</b>	<b>49%</b>

Table 1. Usage data showing the number of students who used the Fast ForWord products. Also shown are group averages for the number of days of product use, calendar days between start and finish, and percentage of content covered, and participation level (percentage of 100 minutes per day, five days per week, that the students actually used the Fast ForWord Language product, or 90 minutes per day, five days per week, that students actually used the Fast ForWord Language to Reading product.) Results for groups with fewer than five participants are not shown.

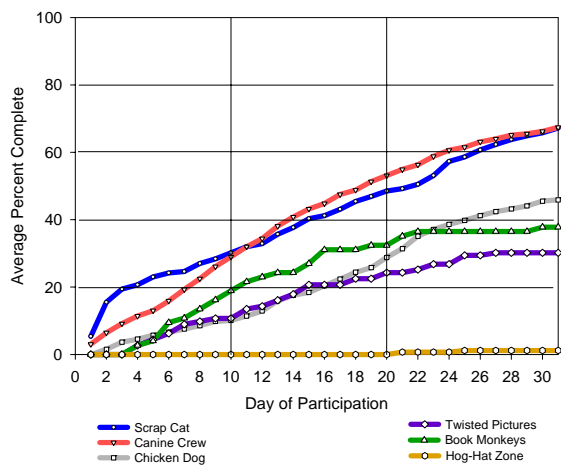


Figure 1. Average daily progress of students using the Fast ForWord to Reading 3 product.

**Assessment Results**  
**Ohio Proficiency Test:**

On the fourth-grade OPT in reading, a score of 217 is considered proficient. Students are assessed in the Fall of fourth grade. If they do not demonstrate proficiency, they are retested in the Spring. Additional tests may be administered.

In order to perform the analysis, scores from two assessments (Fall and Spring) needed to be available. Of the 501 students with Fall and Spring scores available, 356 had never used Fast ForWord products, and did not do so during the study, and 41 used Fast ForWord products during the study for at least 20 days. A comparison group of 50 students who did not use Fast ForWord products was created by using SPSS to randomly pull 50 students from the 356 who had two test scores, and had never used the products. A repeated-measure ANOVA comparing these two groups indicated that the students who used Fast ForWord products between the two test administrations made significantly greater gains than those who did not (Table 2 and Figure 2). A comparison of students who used Fast ForWord products to all students who did not shows that, on average, Fast ForWord participants improved over 30% more than non-participants (14.5 points vs 10.8).

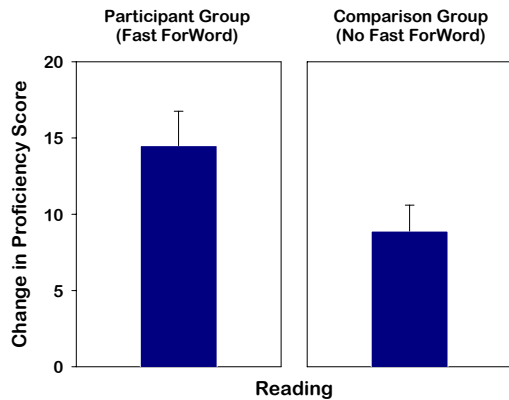


Figure 2. Change scores between the Fall and Spring administration of the Ohio Proficiency Test scores of 41 students who used Fast ForWord products are shown on the left, while the change scores for a comparison group of 50 students who did not use the products are shown on the right. Improvement by the students who used the products was significantly greater than the improvement of those who did not.

## DISCUSSION

Between Fall and Spring of the 2002 – 2003 school year, students in the Springfield City School District who used Fast ForWord products achieved significantly greater improvements on their OPT scores than students who did not use Fast ForWord products. The improvement of the

students who used the products was over 30% greater than the scores of the students in the comparison group.

Since not all Fast ForWord participants were able to be matched to student scores, it is possible that there were some participants in the comparison group who were incorrectly identified as non-participants, causing an underestimation of the impact of the Fast ForWord products. However, it is believed that the effect would be small.

There are many different methods of incorporating the Fast ForWord products into the instructional day. It was determined early on that an after-school program was not appropriate due to low attendance and participation level. However, based upon the stellar results of the students who used the products during the instructional day, the District expanded the products into all elementary and middle schools during the 2003 – 2004 school year, with a focus on the 4<sup>th</sup> and 6<sup>th</sup> grade students who would be taking the Ohio Proficiency Test. In addition, the District made the products available to an alternative school and students in a special education program at one of the high schools. Continued monitoring of the students, and their product use, will be important in generalizing the effectiveness of the products to different populations, and determining the best methods of implementing the products within the instructional day.

Ohio Proficiency Test	n	Before		After		MANOVA F		
		Mean	SE	Mean	SE	df	Time	Time x Group
Overall						89	71.5*	4.0*
Fast ForWord Participants	41	196.9	2.0	211.4	2.6			
Comparison Group	50	196.1	2.0	205.1	2.4			
All Non-participants	356	193.9	0.87	204.7	1.0			

Table 2. Forty-one fourth grade students who used Fast ForWord products made significantly greater improvements on their OPT scores than a pseudo-randomly selected group of non-participants. Overall, participants improved over 30% more than non-participants. \*p < 0.05.

## CONCLUSION

Springfield City School District fourth-grade Ohio Reading Proficiency Test scores from before and after students used Fast ForWord products demonstrated, on average, 30% greater improvement in reading achievement than scores for students who did not use Fast ForWord products. The results also demonstrate that the use of Fast ForWord products improves academic achievement in low performing students and further the findings of early studies (Miller et al., 1999). The students who used Fast ForWord products have strengthened their foundational reading skills and are now better positioned to partake in the classroom curriculum.

Given such dramatic and positive results, the intent is to expand on the delivery model so that the optimal learning environment and focus on early reading and cognitive skills can be made accessible to more students – both in the fourth grade, and in other grades.

### Notes:

1. To cite this report: Scientific Learning Corporation. (2004). Improved Ohio Reading Proficiency Test Scores by Students in the Springfield City School District who used Fast ForWord Products, MAPS for Learning: Educator Reports, Vol. 8, No. 8: pp. 1-6.

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