

Improved Language and Reading Skills by Students in the Boone County School District who used Fast ForWord® Products

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ABSTRACT

Purpose: This study investigated the effects of the Fast ForWord products on the language and reading skills of students in the Boone County School District who used the products within the curriculum in a school setting. **Study Design:** The design of this study was a multiple school case study using research-based assessments. Dependent t-tests were used to evaluate changes in student performance. **Participants:** Study participants were 67 elementary and middle school students from the Boone County School District in Florence, Kentucky who were struggling readers and had EdVision (now Scantron Performance Series) assessment scores from Fall 2002 and Fall 2003. **Materials & Implementation:** Following staff training on the Fast ForWord products, a group of Boone County students used the products in the Fall of 2002. Before and after Fast ForWord participation, student performance was evaluated with the Scantron Performance Series assessment. **Results:** On average, students made significant improvements on their language and reading skills after using the Fast ForWord products. In eleven months, the elementary school students improved their reading achievement by an average of two years, and in one year, the middle school students improved their reading achievement by an average of 16 months.

Keywords: Kentucky, elementary school, middle school, suburban district, observational study, Fast ForWord Language, Fast ForWord Middle & High School, Fast ForWord Language to Reading, Fast ForWord to Reading 3, Scantron Performance Series.

INTRODUCTION

Early laboratory tests of a prototype of a computer-based product 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 Boone County School District was interested in evaluating the effectiveness of this optimal learning environment with a focus on early reading and cognitive skills as a way of improving the benefit that struggling students received from the District's reading curriculum and instruction. In this study, commercially available computer-based products (Fast ForWord Language, Fast ForWord Middle & High School, Fast ForWord Language to Reading, and Fast ForWord to Reading 3) were used to evaluate the effectiveness of this approach for improving the language skills and academic achievement of students.

METHODS

Participants

Sixty-seven students from two schools participated in this study. With over 15,000 students in 18 schools, Boone County, in Florence, Kentucky, is the third largest school district in Kentucky. Two schools in the Boone County School District used the Fast ForWord products. The schools were an elementary

school, New Haven Elementary, and a middle school, Conner Middle.

New Haven Elementary had 39 students from the second to fourth grades participate in the study. Conner Middle had 28 students in grades five and six participate in the study. At both schools, the students selected for the study were academically at-risk and, on average, performed substantially below the level of their peers. School personnel at each school administered the assessments and reported scores for analysis.

Implementation

The Boone County School District first implemented the Fast ForWord products at an elementary school and at a middle school that provide target assisted Title I services. This report focuses on those schools.

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 monitoring student performance; and techniques for measuring the gains students have achieved after they have finished using the products.

Materials

The Boone County School District funds the Fast ForWord products through a creative variety of funding methods: a Title I grant, part of a 21st Century Community Learning Center grant, business partnerships, and parent-teacher organizations. The district currently provides 50% of the necessary funding from its General Fund. Since schools have a great deal of autonomy in the district, teachers and staff have implemented the Fast ForWord products in a variety of settings (in a computer lab, in a classroom computer center, or at a computer in the back of the class) and periods (during school, after school, and in summer programs).

New Haven Elementary students participated on the Fast ForWord Language, the Fast ForWord Language to Reading and the Fast ForWord to Reading 3 products. Students at Conner Middle used the Fast ForWord Language, the Fast ForWord Middle & High School and the Fast ForWord Language to Reading products. The products include 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*¹, *Sweeps*², and *Trog Walkers*³: 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*¹ and *Streams*²: 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*¹, *IDs*², *Polar Cop*³, and *Treasure in the Tomb*³: 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*¹, *Matches*², and *Bug Out*³: 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*¹ and *Cards*²: 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*¹: 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*¹: 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.

*Stories*² and *Start-Up Stories*³: Students follow increasingly complex commands, match pictures to sentences, and answer multiple-choice questions about stories that are presented aurally.

*Scrap Cat*⁴: 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.

¹ Exercise from the Fast ForWord Language product.

² Exercise from the Fast ForWord Middle & High School product.

³ Exercise from the Fast ForWord Language to Reading product.

⁴ Exercise from the Fast ForWord to Reading 3 product.

*Canine Crew*⁴: 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*⁴: 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*⁴: 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*⁴: 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 among four alternatives. This task develops paragraph comprehension, inferential and cause-and-effect reasoning, working memory, flexible reading, and vocabulary.

*Hog Hat Zone*⁴: 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

Students at New Haven Elementary and Conner Middle had their language and reading skills evaluated with the Scantron Performance Series assessment before and after participation on the Fast ForWord products. School personnel administered the assessments and reported the scores in terms of grade-equivalents. While the students in most grades were assessed annually, the assessments for some of the youngest students were just seven months apart. On

average, there were 11 months between the two tests for the elementary school students, and 12 months between the two tests for the middle school students.

Scantron Performance Series: The Scantron Performance Series assessment is a standards and research based adaptive measurement that assesses and tracks student academic growth. It adapts to a student's instructional level by changing the difficulty of questions based on previous answers. It can also measure different academic assessments of individual state standards.

Analysis

Student achievement was reported in terms of grade-equivalents which indicate the average grade at which typically developing children achieve a similar performance. All statistical analyses were done using these scores. Data was analyzed for each school using dependent t-tests. Since most students had a year between pre and post assessment scores and student language abilities were expected to improve during this year even without benefit of the Fast ForWord products, one year was added to the students' pre-participation grade-equivalent scores to account for expected improvements between the two assessments. 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 content completed, days of use, and adherence to the chosen protocol (participation level). The Fast ForWord Language protocol used by the school called for students to use the product 100 minutes per day, for 5 days a week for four to eight weeks. The Fast ForWord Middle & High School, Fast ForWord Language to Reading, and Fast ForWord to Reading 3 protocols called for students to participate for 90 minutes per day, 5 days a week for four to eight weeks.

Students at both schools used the Fast ForWord products during the 2002 to 2003 school year. Except for the New Haven second grade class, assessments were given before participation in the Fall, 2002, and then again after Fast ForWord participation in the Fall, 2003 – 12 months later. The New Haven second grade class had pre-participation assessments in January 2003 and post participation assessments seven months later in August of 2003, as they entered third grade.

Figures 1 to 3 show the average daily progress through the Fast ForWord products exercises for New Haven Elementary students. Figures 4 to 6 show the average daily progress for students at Conner Middle School. 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 products fewer than the number of days shown, percent complete is maintained at the level achieved

on their final day of product use. Detailed usage information by school is shown in Table 1.

Daily Progress in Fast ForWord Language for New Haven Elementary School Students¹

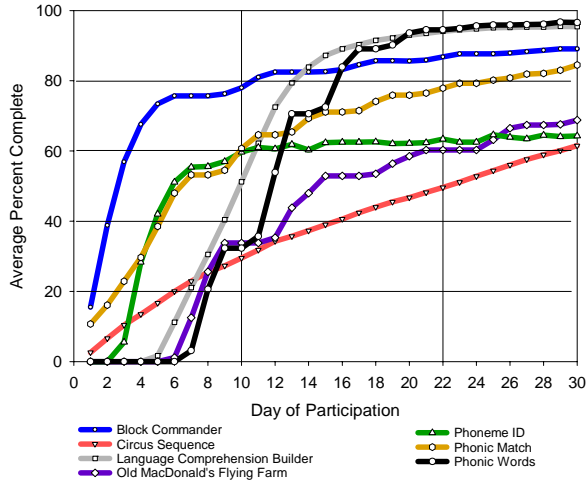


Figure 1. Average daily progress of New Haven students using the Fast ForWord Language product. Results from 95 students are shown.

Daily Progress in Fast ForWord Language to Reading for New Haven Elementary School Students¹

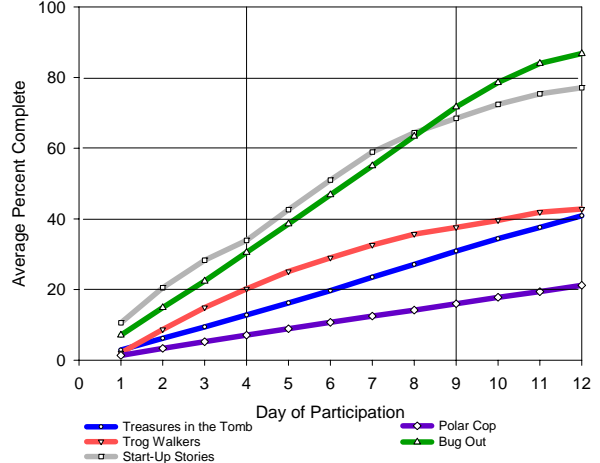


Figure 2. Average daily progress of New Haven students through the Fast ForWord Language to Reading product exercises. Results from 74 students are shown.

Daily Progress in Fast ForWord to Reading 3 for New Haven Elementary School Students¹

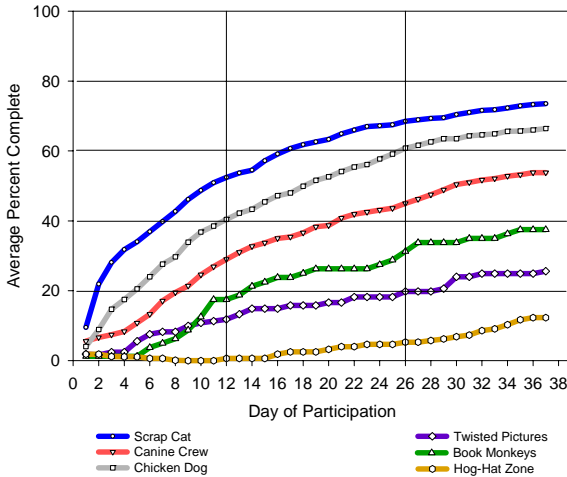


Figure 3. Average daily progress through the Fast ForWord to Reading 3 product exercises for New Haven students. Results for 40 students are shown.

Daily Progress in Fast ForWord Language for Conner Middle School Students¹

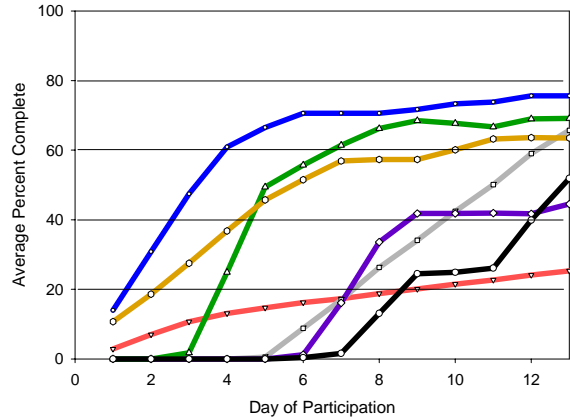


Figure 4. Average daily progress of Conner Middle School students through the Fast ForWord Language product exercises. Results for 55 students are shown.

School	FFWD Product	Number of Students	Average Days Participated	Average Number of Calendar Days	Average Percent Complete	Participation Level
New Haven	Fast ForWord Language	95	39	85	88%	71%
	Fast ForWord Language to Reading	74	74	168	88%	65%
	Fast ForWord to Reading 3	40	62	137	62%	N/A
Conner Middle	Fast ForWord Language	55	14	25	60%	64%
	Fast ForWord Middle & High School	172	40	96	64%	25%
	Fast ForWord Language to Reading	141	13	30	19%	16%

Table 1. Usage information by school 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, percentage of product completed and participation level.

Daily Progress in Fast ForWord Middle & High School for Conner Middle School Students¹

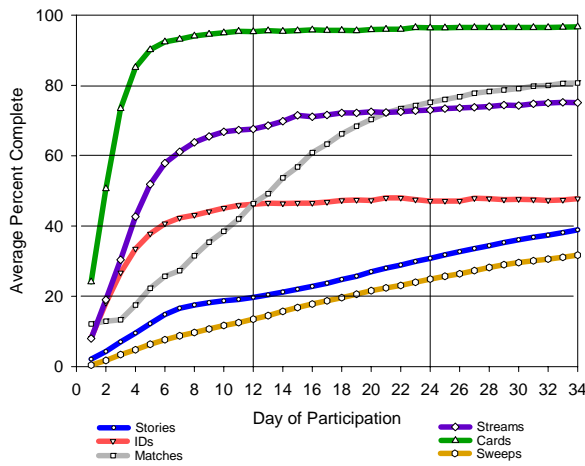


Figure 5. Average daily progress of Conner Middle students through the Fast ForWord Middle & High School product exercises. Results for 172 students are shown.

Daily Progress in Fast ForWord Language to Reading for Conner Middle School Students¹

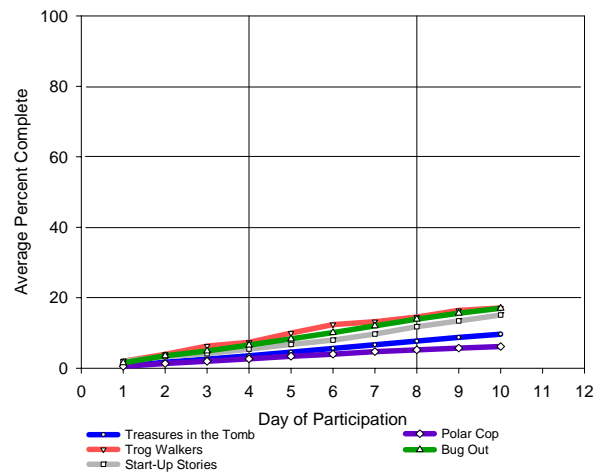


Figure 6. Average daily progress of Conner Middle School students through the Fast ForWord Language to Reading product exercises. Results for 141 students are shown.

Assessment Results

Since students had a year between their initial and final assessments, and student language abilities were expected to improve during that year even without benefit of the Fast ForWord products, prior to the analyses, one year was added to the students' initial grade-equivalent scores to account for the expected improvements. On average, students from both schools made significant improvements beyond the added year's expected gains.

New Haven Elementary

Scantron Performance Series: Before and after participation on the Fast ForWord products, 39 students at New Haven were assessed with the Scantron Performance Series. On average, the students performed below their grade-level (average grade-equivalent score of 2.8 for students at an average grade level of 3.15). Eleven months later, after using the Fast ForWord products, the students, on average, had made significant improvements on their reading and language skills, surpassing the level expected for their new grade and achieving a performance-level of 4.8 versus an average grade-level of 4.2 (Figure 7 and Table 2.)

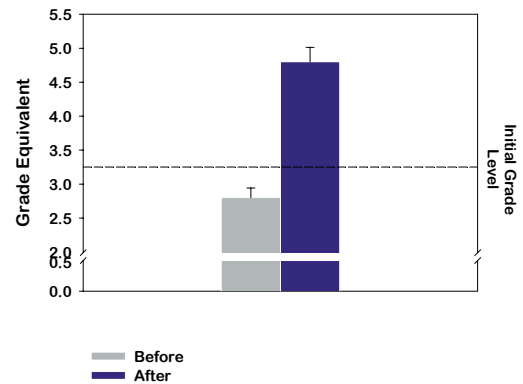


Figure 7. Scores on the Scantron Performance Series show that, on average, 39 students made significant improvements in their language and reading skills after participation on the Fast ForWord products.

Conner Middle School

Students at Conner Middle had their performance evaluated before and after Fast ForWord participation. On average, the 28 students were performing at a level lower than their actual grade level (performance-level of 4.7 vs grade-level 5.4). After participation on the Fast ForWord products, students made improvements achieving levels significantly greater than expected (original level plus one year) and performed at a level closer to their actual grade (performance-level of 6.1 versus their new average grade-level of 6.4. Figure 8 and Table 2.)

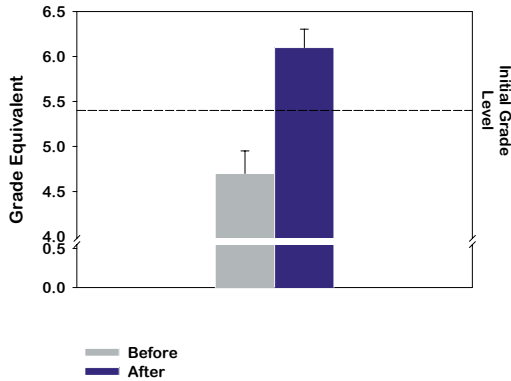


Figure 8. Scores on the Scantron Performance Series show that, on average, 28 Conner Middle School students made significant improvements in their language and reading skills after using the Fast ForWord products.

Grade Equivalent		# of Students	Mean	SE	t-statistic
New Haven	Initial	39	2.8	0.1	
	Initial + 1 year	39	3.8	0.1	
	Final	39	4.8	0.2	5.34*
Conner Middle	Initial	28	4.7	0.2	
	Initial + 1 year	28	5.7	0.2	
	Final	28	6.1	0.2	2.70*

Table 2. Students made significant gains in their language and reading abilities after participation in the Fast ForWord products, even after adding one year's expected benefit to their pre-participation scores. The t-statistic is for a comparison of "Initial + 1 year" with "Final". * $p < 0.05$

DISCUSSION

When their school board and superintendent mandated significant improvements in reading for all students, Boone County officials researched their options. They decided to tackle the problem at its roots: their students' cognitive capacity. Research has repeatedly shown that enhancing cognitive capacity- Memory, Attention, Processing, and Sequencing (or Learning MAPs)- significantly increases the effectiveness of classroom instruction. After several principals sent information on Fast ForWord products to the District Administration, administrators attended a presentation at a national school administrators conference and decided to try the products.

From 2002 to 2003, students in two schools in the Boone County School District used the Fast ForWord products. Students from both schools made significant improvements in their language and reading abilities after participation on the Fast ForWord products. On average, at the time of the post-test, students in the corresponding grades at New Haven Elementary were performing at the 5.5 grade level, and students at Conner Middle were performing at the 6.9 level. While students who used the Fast ForWord products

had not caught up with their peers, they had made great strides, with the students at New Haven, on average, surpassing their grade level.

Improvements were also observed at home.

According to surveys distributed by the Boone County School District, 87% of parents felt their child had an improved reading foundation, 75% felt their child had new self-confidence, and 62.5% felt their child had improved fluency and higher self-esteem. One parent pointed out, "The biggest benefit of the program (beyond the rapid improvement in reading scores) is that my son has a much stronger interest in reading."

Since the initial study, Administrators have noticed that not only the low-achieving or at-risk students benefit from the Fast ForWord products. Other elementary schools have added their at-risk students to the Fast ForWord program and implementations have quickly grown to cover all elementary students in the county, the middle schools and one high school.

CONCLUSION

Language skills are critical for all students, impacting their ability to benefit from instruction, follow instructions, and participate in class discussions. Strong linguistic skills also provide a critical foundation for building reading and writing skills. Scores from before and after participation on the Fast ForWord products show that, on average, after using the products, students in the Boone County School District demonstrated substantial increases in their language and reading abilities. This suggests that using Fast ForWord products strengthened the students' foundational skills and helped them benefit more from the classroom curriculum.

Notes:

1. Thirty-nine of the 209 New Haven students and 28 of the 368 Conner Middle students participated in the study. (Due to the nature of the data provided by the Boone County School District, it was not possible to disaggregate the usage data of study participants from that of the larger group of Fast ForWord products users.)

2. To cite this report: Scientific Learning Corporation. (2004). Improved Language and Reading Skills by Students in the Boone County School District who used Fast ForWord Products, MAPS for Learning: Educator Reports, Vol. 8, No. 17: pp. 1-7.

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