

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

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## ABSTRACT

**Purpose:** This study investigated the effectiveness of the Fast ForWord Language software using two different implementations. Improvements in beginning reading skills were compared following either a 30-Minute or 50-Minute daily protocol. The software product was implemented within the curriculum in an elementary school setting. **Study Design:** The design of this study was a two-group study conducted within a single school. Nationally-normed tests were used to evaluate effectiveness. **Participants:** Study participants were 53 second-grade students attending Florence Elementary School in the Boone County School District of Florence, Kentucky. Students were assigned to one of two groups. One classroom was randomly assigned to use the 30-Minute Protocol while the other classroom was assigned to use the 50-Minute Protocol. **Materials & Implementation:** Following staff training on the Fast ForWord Language product, both groups of students started to use the product in October of the 2006 – 2007 school year. Before and after Fast ForWord participation, students' reading skills were evaluated with the Test of Phonological Awareness (TOPA). **Results:** Students using the 30-minute and 50-minute daily protocols reached similar high levels of product completion over an average of 59 and 58 days of product usage, respectively. On average, students made statistically significant improvements after Fast ForWord participation, with both protocol groups making gains on the critical early reading skill of letter-sound knowledge.

**Keywords:** Kentucky, public elementary school, suburban district, experimental study, Fast ForWord Language, Test of Phonological Awareness (TOPA).

## 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 Boone County School District was interested in evaluating the effectiveness of involving students in an optimal learning environment with a focus on early reading and cognitive skills for 30 minutes each day. They wanted to determine whether a 30-minute daily involvement was as effective at improving the early reading abilities of students as a 50-minute daily

involvement. To perform this study, two different protocols of a commercially available computer-based product (Fast ForWord Language) were used to evaluate the effectiveness of the different daily requirements at improving the early reading skills of early elementary school students.

## METHODS

### Participants

The Boone County schools serve more than 17,000 students in 20 schools. The schools are located in the fast-growing, family-oriented area of Northern Kentucky. Florence Elementary, one of Boone County's 12 elementary schools, chose to use the Fast ForWord Language product during the beginning of the 2006 – 2007 school year and took part in this study. Florence Elementary is a K-5, Title I school serving approximately 585 students.

Fifty-three second-grade students participated in this study. Half of the study participants were randomly assigned (by classroom) to the 30-Minute Fast ForWord Language Protocol and the other half used the 50-Minute Fast ForWord Language Protocol. One student had previously used Fast ForWord products, namely the Fast ForWord Language Basics and Fast ForWord to Reading Prep products. All of the other

study participants had previously not used other Fast ForWord products.

All students had their phonemic awareness skills, an early reading skill, evaluated with the Test of Phonological Awareness (TOPA) before and after students used the Fast ForWord Language product. School personnel administered the assessments and returned the assessments to Scientific Learning Corporation for scoring and 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 the Fast ForWord product.

### **Materials**

The Fast ForWord Language product is a computer-based product that combines an optimal learning environment with a focus on early reading and cognitive skills. The product includes seven exercises designed to build skills critical for reading and learning, such as auditory processing, memory, attention, and language comprehension.

*Circus Sequence:* 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:* 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:* 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.

*Phonic Match:* 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.

*Phonic Words:* 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:* 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:* 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.

### **Assessments**

School personnel evaluated all study participants with the Test of Phonological Awareness (TOPA) before and after Fast ForWord use. Tests were returned to Scientific Learning Corporation for scoring and analysis.

**Test of Phonological Awareness (TOPA):** The TOPA is a nationally-normed, group-administered measure of phonological awareness. Its two subtests are Phonological Awareness and Letter-Sounds. The Early Elementary version of the assessment is appropriate for first and second graders.

The Phonological Awareness subtest measures the child's ability to isolate individual phonemes in spoken words. In the Early Elementary version of the assessment, the child is asked to isolate initial and final phonemes.

The Letter-Sounds subtest measures the student's ability to understand the relationships between letters and phonemes in English. It requires the children to spell simple pseudowords that are given as the names of "funny animals". The words vary from two to five phonemes in length, and they are all single-syllable.

The Institute for the Development of Educational Achievement, in accordance with the Reading First legislation, determined that the

TOPA subtests are appropriate outcome assessments for accurately measuring improvement in phonemic awareness, an early reading skill, of children in early elementary school.

### Analysis

Normal Curve Equivalents (NCE's) were used for the analyses. NCE's have a mean equal to 50 and a standard deviation approximately equal to 21. Data were analyzed using a repeated measures multivariate analysis of variance (MANOVA) and 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 fall semester of the 2006 – 2007 school year, Florence Elementary chose to use the 30- and 50-Minute Fast ForWord Language Protocols. These protocols call for students to use the product for 30 or 50 minutes per day, 5 days a week for six to sixteen weeks.

Twenty-four students were assigned to the 30-Minute Fast ForWord Language group, and 29 students served as a comparison group by using the 50-Minute Fast ForWord Language Protocol. Prior to the study,

teachers reported the students to be of similar academic abilities.

The two groups of students reached comparable high completion levels on the product, with the 30-Minute Protocol group completing 73% of the content in 59 days and the 50-Minute Protocol group completing 79% of the content in 58 days. Since the 30-Minute Protocol requires more days to complete, some students in the 30-Minute group post-tested at a later date than the students in the 50-Minute group. The 30-Minute group took a longer amount of time to complete the study, but on average, due to technical issues and field trips, they only participated on the product for one more day than the 50-Minute group. Detailed usage information for the two study groups is shown in Table 1.

Figure 1 shows the average daily progress through the Fast ForWord Language exercises for the students who used the 30-Minute Protocol and Figure 2 shows progress for the 50-Minute Protocol group. 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: <b>30-Minute Group</b>	24	59	145	73%	99%	60%
Fast ForWord Language: <b>50-Minute Group</b>	29	58	117	79%	83%	65%

*Table 1. Usage data showing the number of students who used the different Fast ForWord Language protocols along with group averages for the number of days participated, the number of calendar days between start and finish, the percentage of product completed, participation level, and attendance level.*

**Learning Curves:  
30-Minute Protocol: Fast ForWord Language**

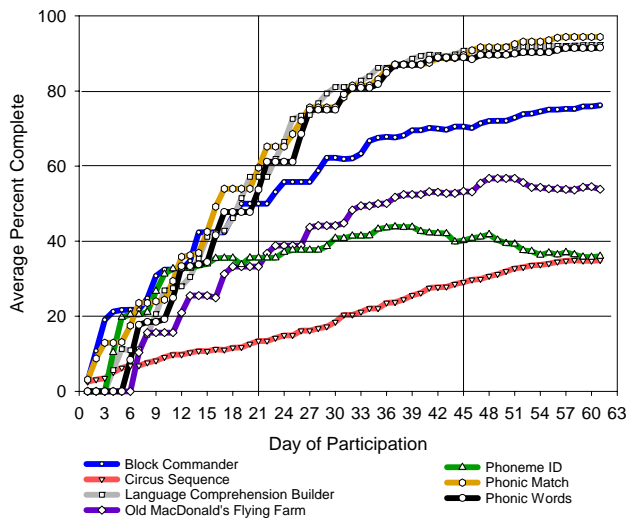


Figure 1. Average daily progress through the Fast ForWord Language exercises on the 30-Minute Protocol. Results from 24 second graders are shown.

**Learning Curves:  
50-Minute Protocol: Fast ForWord Language**

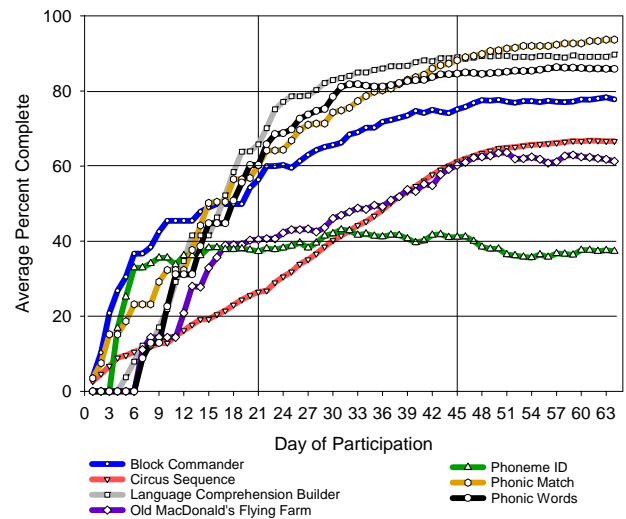


Figure 2. Average daily progress through the Fast ForWord Language exercises on the 50-Minute Protocol. Results from 29 second graders are shown.

**Assessment Results**

**Test of Phonological Awareness (TOPA):** The TOPA was used to evaluate the reading skills of the 53 students in this study, both before and after the students participated on the Fast ForWord Language product. TOPA scores were analyzed using Normal Curve Equivalents (NCE's). Eight students took pre-tests but did not have post-tests, and were therefore excluded from the following analysis.

Statistically, there was no difference between the pre-test scores of the 30-Minute Protocol group and the 50-Minute Protocol on either of the TOPA subtests ( $p=0.72$  for Phonological Awareness and  $p=0.20$  for Letter-Sounds), showing that statistically, before Fast ForWord participation, the two protocol groups performed on similar levels on those subtests. However, a multivariate analysis of variance showed that there were significant differences between the performance on the two subtests (see Table 2), with both groups of students scoring higher on the Phonological Awareness subtest than the Letter-Sounds subtest at pre-test.

Developmentally, children typically exhibit phonological awareness skills before letter-sound correspondence skills. On average, before Fast ForWord use, the study participants answered 18 out of 20 questions (90%) correctly on the Phonological Awareness subtest, while on average, they answered 8 out of 18 (44%) correctly on Letter-Sounds subtest.

Since many students scored close to the ceiling at pre-test on the Phonological Awareness subtest, additional post-hoc analyses were performed on this subtest including only the lower-performing students, based on Phonological Awareness pre-test score. For these post-hoc analyses, only students who scored at or below the group's median pre-test score (90% correct) were analyzed.

The students made significant improvements on the Letter-Sounds subtest of the TOPA, regardless of the protocol used. Looking at the results of the two protocol groups combined, on average, students moved higher into the average range (see Table 3). Overall, study participants showed a slight decrease in their phonological awareness scores. However, when looking at the students who scored lower on the Phonological Awareness subtest at pre-test, this group of students showed an increase in score (see Figure 4).

	MANOVA	
	df	F
subtest	43	21.3*
subtest x group	43	2.0
time	43	0.9
time x group	43	1.5
subtest x time	43	8.6*
subtest x time x group	43	1.5

Table 2. A MANOVA showed that students performed differently on the two subtests of the TOPA.. \*  $p < 0.05$

Protocol	n	Before		After		t-statistic
		Mean NCE	SE	Mean NCE	SE	
Letter-Sounds	45	43.4	3.0	50.7	3.1	4.9*
Phonological Awareness	45	62.4	3.5	58.3	3.6	1.2

Table 3. On average, students significantly improved in letter-sound skills after Fast ForWord use. \*  $p < 0.05$

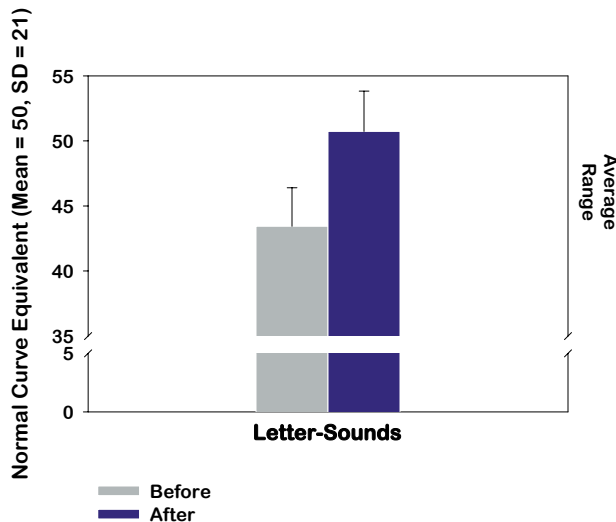


Figure 3. On average, students showed significant improvements on the Letter-Sounds subtest after Fast ForWord participation, regardless of the protocol that was used. Results of 45 students shown.

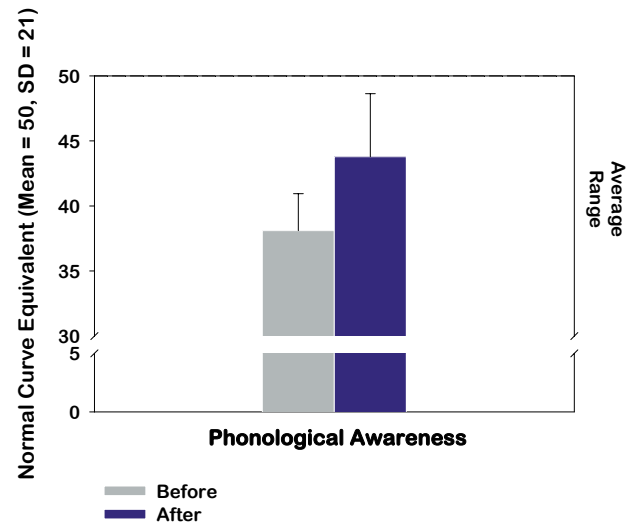


Figure 4. The lower-performing students showed gains in their phonological awareness skills after Fast ForWord participation. Results of 19 students shown.

## DISCUSSION

During the 2006 – 2007 school year, Florence Elementary School tested the effectiveness of the 30-Minute Protocol of the Fast ForWord Language product. Half of the students used the protocol that calls for 30 minutes of participation a day while the other half used the protocol that calls for 50 minutes of participation a day. Overall, students made statistically significant improvements in letter-sound skills, regardless of the protocol that was used. Also, students who had more difficulty with their phonological awareness skills at pre-test showed gains after using the Fast ForWord Language product. These findings demonstrate that, within Florence Elementary in the Boone County 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

Strong cognitive and linguistic skills provide a critical foundation for building reading and writing skills. The Fast ForWord Language product builds this foundation through development of auditory memory, attention, processing, and sequencing skills. This

study demonstrates that students in the Boone County School District who used either of two different protocols of the Fast ForWord Language product improved their early reading skills. These results suggest that using a 30-Minute or 50-Minute daily protocol of the Fast ForWord product can strengthen students' foundational skills and allow them to benefit more from the classroom curriculum.

### Notes:

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