

Students in the Edgewood Independent School District Show Gains on the TPRI and Tejas LEE after using Fast ForWord® Products

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ABSTRACT

Purpose: This study investigated the effects of Fast ForWord products on the reading skills of elementary school students who used the products within the curriculum in a school setting. **Study Design:** This was a multiple-school case study using data from two criterion-referenced measures of reading development published by the Texas Educational Agency. **Participants:** Study participants were students in grades K-2 who were attending one of six elementary schools in the Edgewood Independent School District, in San Antonio, Texas. **Materials & Implementation:** All study participants used one or two Fast ForWord products in the winter and spring of 2006. Before and after participation on the Fast ForWord products, study participants were evaluated with the Texas Primary Reading Inventory (TPRI) or El Inventario de Lectura en Español de Tejas (Tejas LEE). **Results:** After the Fast ForWord software products were added to their curriculum, study students demonstrated significant gains on these reading measures, with average comprehension improving from 68 to 83 percent correct, average reading fluency improving from 46 to 59 words read per minute, and 30% of the students improving their reading accuracy from the Listening or Frustration level to either the Instructional or Independent level.

Keywords: Texas, elementary school, urban, observational study, Hispanic students, Fast ForWord Language, ForWord Language to Reading, Texas Primary Reading Inventory (TPRI), El Inventario de Lectura en Español de Tejas (Tejas LEE).

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 Edgewood Independent 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 for improving reading skills of early elementary-school students in a school setting. In this study, commercially available computer-based products (Fast ForWord Language, and Fast ForWord Language to Reading) were used to evaluate the effectiveness of this approach at

improving the reading skills of students at six elementary schools within the district.

METHODS

Participants

The Edgewood Independent School District is located within the city of San Antonio, in Bexar County, Texas. Since its earliest days in 1905, the district has grown to 22 schools, including 13 elementary schools, 4 middle schools, 4 high schools, 2 alternative schools, and a secondary academy. These schools serve a student population that is predominantly Mexican-American, and comprises more than 22,000 students.

Within the Edgewood ISD, five schools participated in this study: Alonso S. Perales Elementary School, Cenizo Park Elementary School, L. B. Johnson Elementary School, Loma Park Elementary School, and Roosevelt Elementary School.

During the 2005-2006 school year, more than 450 students from Edgewood ISD schools used one or more of the Fast ForWord products. This report focuses on 114 students who, before Fast ForWord participation and then again after at least 5 days of participation, were assessed with the Texas Primary Reading Inventory (TPRI) or El Inventario de Lectura en Español de Tejas (Tejas LEE). Most of these participants were in grades 1 or 2, with the exceptions of three Kindergartners and one 3rd grader. All

participants ranged from 5 to 9 years of age, with an average age of 7.6. All participants were Hispanic, with a gender ratio of 47 female to 67 male students. School personnel administered the assessments and reported scores for analysis.

Implementation

Educators at the participating Edgewood ISD schools 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 in this study (Fast ForWord Language, and Fast ForWord Language to Reading) 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 differences between these products, both help develop certain critical skills as detailed in the following exercise descriptions.

Circus Sequence¹ and Trog Walkers²: 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 Farm¹: 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 Identification¹, Polar Cop², and Treasure in the Tomb²: 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 Match¹ and Bug Out²: 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 Words¹: 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 Builder¹: 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 Commander¹: 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 Stories²: Students follow increasingly complex commands, match pictures to sentences, and answer multiple-choice questions about stories that are presented aurally.

¹ Exercise from the Fast ForWord Language product.

² Exercise from the Fast ForWord Language to Reading product.

Assessments

Before and after Fast ForWord participation, students were evaluated with the Texas Primary Reading Inventory (TPRI) or El Inventario de Lectura en Español de Tejas (Tejas LEE). Pre-test scores came from the beginning-of-year and middle-of-year administrations, while post-test scores came from the middle-of-year and end-of-year administrations, with an average interval of approximately seven months between tests.

TPRI scores were reported for 106 students, and Tejas LEE scores were reported for 8 students. Scores from the two tests were combined for all analyses. Due to the small number of students with Tejas LEE scores, it was not possible to do further analyses comparing the results from the TPRI to the Tejas LEE.

Texas Primary Reading Inventory (TPRI): The TPRI is a criterion-referenced assessment tool designed to provide a comprehensive picture of reading development for students in grades K-3, permitting teachers to provide differentiated instruction and monitor student progress.

Depending on grade level, the skills covered may include phonological awareness, reading accuracy, reading fluency, listening comprehension and/or reading comprehension.

El Inventario de Lectura en Español de Tejas (Tejas LEE):

The Tejas LEE is specifically designed to measure the reading development of students receiving primary instruction in Spanish, and all test content was developed in Spanish.

Tejas LEE is structurally similar to the TPRI, and provides the same kinds of information.

Analysis

Performance on each subtest was reported using different criteria and scales. In addition, each subtest has a different sample size, because not all subtests were reported for all students. For these reasons, separate analyses were conducted on each subtest.

Reading accuracy was reported in terms of a categorical level reflecting the percentage of words read correctly in a specified passage. A Chi-Square

test was performed to compare the number of students at each of the three levels of reading accuracy, Frustration, Instructional, and Independent, before and after Fast ForWord participation. For the purposes of this analysis, students whose accuracy level was designated as “listening” were grouped with students at the Frustration level.

Reading fluency was reported in terms of words read per minute in oral reading. Reading/listening comprehension was reported in terms of the percent of comprehension questions answered correctly. Paired t-tests were performed on the results from each of these subtests. All statistical 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 level and attendance level).

All study participants used the 50-minute protocol for Fast ForWord Language, and many proceeded to use the 50-minute protocol for Fast ForWord Language to Reading. These protocols call for students to use the products for 50 minutes per day, 5 days per week for 8 to 12 weeks. Detailed product use is shown in Table 1.

Figures 1 and 2 show the average daily progress through the Fast ForWord Language and Fast ForWord Language to Reading exercises for all students who participated in this study. The final day shown on the daily progress graphs 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.

Product	Number of Students	Days Participated	Calendar Days	Percent Complete	Participation Level	Attendance Level
Fast ForWord Language	114	41	125	56%	86%	46%
Fast ForWord Language to Reading	69	16	49	29%	84%	48%

Table 1. Usage data showing the number of students who used each Fast ForWord product along with group averages for the number of days participated, the number of calendar days between start and finish, the percentage of the product completed, the participation level, and the attendance level. Note: all students started with the Fast ForWord Language product. Many went on to use the Fast ForWord Language to Reading product.

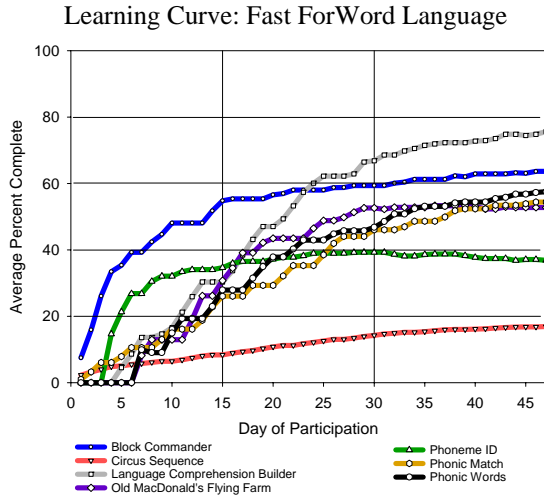


Figure 1. Average daily progress through the Fast ForWord Language exercises. Results from 114 students are shown.

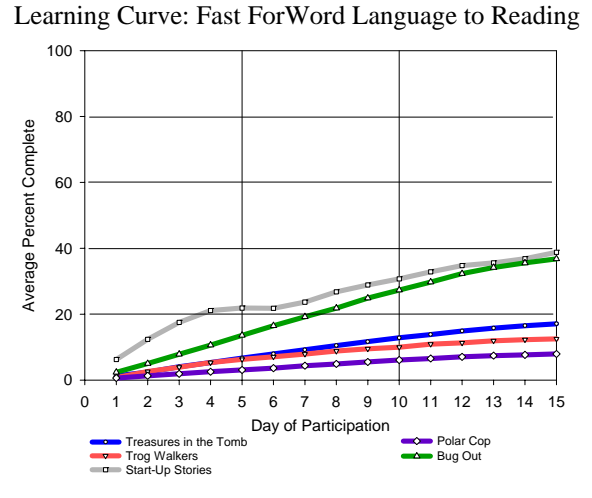


Figure 2. Average daily progress through the Fast ForWord Language to Reading exercises. Results from 69 students are shown.

Assessment Results

Reading accuracy level was reported for 109 students. Before Fast ForWord participation, 57% of these students were scoring at the Instructional level or the Independent level for reading accuracy. After Fast

ForWord participation, significantly more students attained higher levels of reading accuracy, with 87% scoring at the Instructional level or the Independent level (Table 2 and Figure 3).

TPRI/Tejas LEE: Accuracy Level	Number of Students		Chi-Square
	Before	After	
Frustration/Listening (90% words read correctly or less)	47	14	40.985* (df=2)
Instructional (91% to 97% words read correctly)	32	51	
Independent (98% words read correctly or more)	30	44	

Table 2. Of the 109 Edgewood ISD students for whom reading accuracy levels were reported, a significant number gained one or more accuracy levels after using Fast ForWord products. * $p < 0.05$.

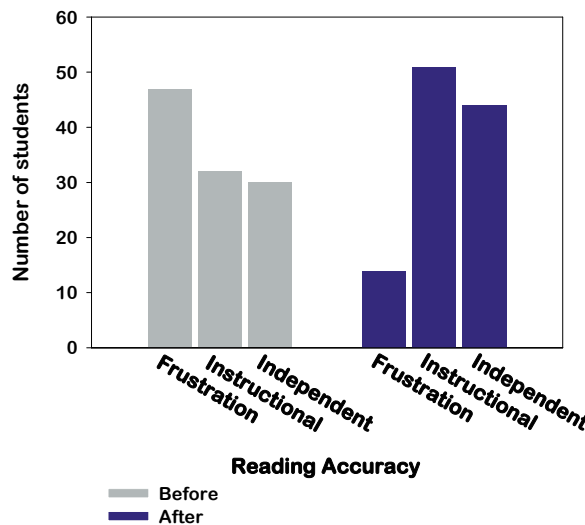


Figure 3. After using Fast ForWord products, a significant number of students moved from the Frustration/Listening level to the Instructional or Independent levels of reading accuracy. Reading accuracy levels for 109 students are shown.

Reading fluency level was reported for 36 students. Before Fast ForWord participation these students were reading aloud at an average rate of 46 words per minute. After Fast ForWord participation, their reading fluency improved significantly, with an average reading rate of 59 words per minute (Table 3 and Figure 4).

Reading/listening comprehension was reported for 53 students. Before Fast ForWord participation, these students correctly answered comprehension questions 68% of the time, on average. After Fast ForWord participation, their comprehension scores improved significantly to an average of 83% correct (Table 4 and Figure 5).

TPRI/Tejas LEE: Fluency	n	Before		After		t-statistic
		Mean	SE	Mean	SE	
Fluency: Words per minute	36	46.3	2.7	58.5	3.6	3.622*

Table 3. On average, the 36 Edgewood ISD students for whom fluency scores were reported demonstrated significant improvements in reading fluency after Fast ForWord participation. * $p < 0.05$.

TPRI/Tejas LEE: Comprehension	n	Before		After		t-statistic
		Mean	SE	Mean	SE	
Comprehension: Percent correct	53	67.6%	3.2%	82.5%	2.3%	4.563*

Table 4. On average, the 53 Edgewood ISD students for whom comprehension scores were reported demonstrated significant improvements in listening/reading comprehension after Fast ForWord participation. * $p < 0.05$.

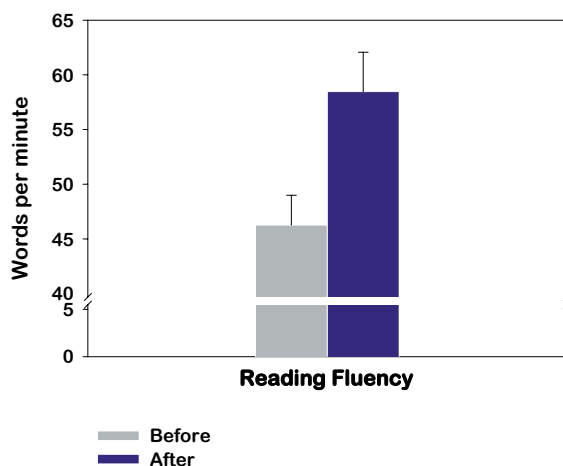


Figure 4. On average, students showed significant gains in reading fluency after using Fast ForWord products. Fluency scores for 36 students are shown.

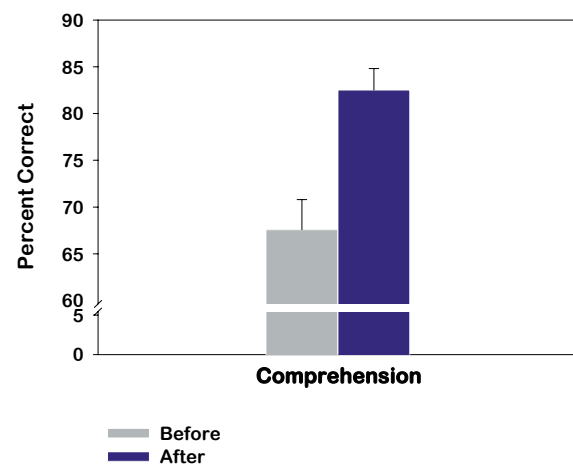


Figure 5. On average, students showed significant gains in reading/listening comprehension after using Fast ForWord products. Comprehension scores for 53 students are shown.

DISCUSSION

Developing skills in reading accuracy, reading fluency, and comprehension are central goals of early reading instruction. Five elementary schools in the Edgewood Independent School District used either the Texas Primary Reading Inventory (TPRI) or El Inventario de Lectura en Español de Tejas (Tejas LEE) to measure these skills before and after students used Fast ForWord products. They found that, on average, students made significant gains in all three skill areas.

It should be noted that on each administration of the TPRI or the Tejas LEE the teacher must select reading

passages suitable to the student's current skill level (as determined by performance on a word list placement tool). This ensures that students who are improving in their reading skills will be tested with increasingly difficult test material on subsequent tests, which in turn means that their gains are less likely to be revealed by pre-test to post-test comparisons. More than half the students in this study were post-tested with material that was more difficult than the material with which they were pre-tested (61 students had more difficult material, 50 students had the same material, and 3 students had less difficult material). Therefore, it is likely that the changes reported here underestimate the students' true gains.

After using Fast ForWord products, 30% of the students for whom reading accuracy level was reported moved from the Listening or Frustration level to either the Instructional or Independent level. Likewise, students increased their reading rate by 28%, and increased their correct responses to reading or listening comprehension questions by 15%.

These findings demonstrate that, within the Edgewood Independent 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 are critical for all students, impacting their ability to benefit from instruction, follow directions, and participate in class discussions, as well as providing a foundation for strong reading skills. After using Fast ForWord products, students demonstrated significant gains on measures of the critical early reading skills of reading accuracy, reading fluency, and comprehension. This indicates that using the Fast ForWord products strengthened the students' foundational skills and helped them benefit more from the classroom curriculum.

Notes:

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