Improved Academic Achievement by Students in the Joshua Independent School District who used Fast ForWord® Products

ABSTRACT

Purpose: This study investigated the effects of the Fast ForWord products on the academic 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 single school case study using nationally normed tests and state achievement assessments. **Participants:** Study participants were second through fourth grade students who were attending an elementary school in the Joshua Independent School District of Joshua, Texas. **Materials & Implementation:** Following staff training on the Fast ForWord products, a group of students used the products during the 2004 – 2005 school year. Student academic achievement was evaluated with the STAR Reading, the STAR Math, the Texas Primary Reading Inventory (TPRI) or the Texas Assessment of Knowledge and Skills (TAKS) assessments before and after Fast ForWord participation. **Results:** On average, students made significant improvements and were reading at grade-level after Fast ForWord use. Students had average gains of ten months in math performance and a 44% increase in reading fluency.

Keywords: Texas, elementary school, suburban district, observational study, Fast ForWord Language, Fast ForWord Language to Reading, STAR Reading, STAR Math, Texas Primary Reading Inventory (TPRI), Texas Assessment of Knowledge and Skills (TAKS).

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 Joshua 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 the reading and academic achievement of 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 for improving the academic achievement of elementary school students.

METHODS

Participants

The Joshua Independent School District is a pre-Kindergarten to twelfth grade district serving approximately 4,500 students. A. G. Elder Elementary, one of seven schools in the district, is a pre-Kindergarten to fourth grade school with a student population of over 600. A. G. Elder has a school-wide Title I program. About 85% of the students are Caucasian; 13% are Hispanic. Approximately 50% are eligible for free or reduced price lunches.

One hundred and nine 2nd through 4th grade students used the Fast ForWord products during the 2004 – 2005 school year. Approximately 73% of the participants are Caucasian and 25% are Hispanic. About 16% were English Language Learners and 13% were receiving special education services. The 109 students included in this study had STAR Reading, STAR Math or Texas Primary Reading Inventory (TPRI) assessment scores available from before and after Fast ForWord use; the Texas Assessment of Knowledge and Skills (TAKS) scores used in this study were from after Fast ForWord participation.

School personnel administered the assessments 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 school, 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 the products, both help develop certain critical skills as detailed in the following exercise descriptions.

Circus Sequence[1] and Trog Walkers[2]: 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]: Students hear a single syllable that is repeated several times, and then interrupted by a different syllable. They 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], Polar Cop[2], and Treasure in the Tomb[2]: 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] and Bug Out[2]: 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]: 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.

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

Assessments

Students were evaluated with the STAR Reading, STAR Math, or the Texas Primary Reading Inventory (TPRI) in September of 2004, before Fast ForWord use and in April of 2005, after they had participated on the products. Some students were still participating at the time of post-testing and completed the products a month later in May. Scores from the Texas Assessment of Knowledge and Skills (TAKS) were

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[1] Exercise from the Fast ForWord Language product.
[2] Exercise from the Fast ForWord Language to Reading product.

from February of 2005 for the majority of third graders. Fourth graders, and third graders who did not pass the February test, were assessed in April of 2005. Both the February and April TAKS scores were from after students had started participating on the Fast ForWord products.

STAR Reading: The STAR Reading assessment is a criterion- and norm-referenced test of reading ability. It consists of computer adaptive multiple choice questions and is appropriate for grades 1 through 12.

STAR Math: The STAR Math assessment is a criterion- and norm-referenced test of mathematical ability. It consists of computer adaptive multiple choice questions and is appropriate for grades 1 through 12.

Texas Primary Reading Inventory (TPRI): The TPRI is an individually administered assessment of reading ability designed for grades K-3. It contains a screening section to determine the reading level of a student and an inventory section to assess specific reading skills including phonemic awareness, fluency and comprehension.

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

Texas Assessment of Knowledge and Skills (TAKS): The TAKS measures a student's knowledge of the Texas Essential Knowledge and Skills (TEKS), the state-mandated curriculum for all public schools in Texas. Subject areas assessed on the TAKS include reading, writing, mathematics, science and social studies. In the reading portion of the TAKS, students read passages of text and answer multiple choice questions designed to assess their reading comprehension. The math assessment contains multiple choice questions designed to test student knowledge of mathematical skills they are expected to know in their grade-level. The writing section requires students to write a composition given a prompt and assesses revising and editing skills.

Analysis

Scores were reported in terms of instructional reading level scores for the STAR Reading and in grade equivalents for the STAR Math assessments. The Texas Primary Reading Inventory (TPRI) was reported in raw scores and in scale scores for the Texas Assessment of Knowledge and Skills (TAKS). Data were analyzed using dependent 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 level). During the 2004 – 2005 school year, the Joshua Independent School District chose to use a combination of the 50-, 75- and 100-Minute Fast ForWord Language Protocols and the 50-Minute Fast ForWord Language to Reading Protocol. These protocols call for students to use the products for 50, 75 or 100 minutes a day, five days per week, for four to twelve weeks. Most of the students used the Fast ForWord Language product followed by the Fast ForWord Language to Reading product. 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 product exercises for students who had scores available for analysis. 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
Fast ForWord Language	107	36	73	64%	72%
Fast ForWord Language to Reading	92	30	78	53%	54%

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 product completed and the participation level.
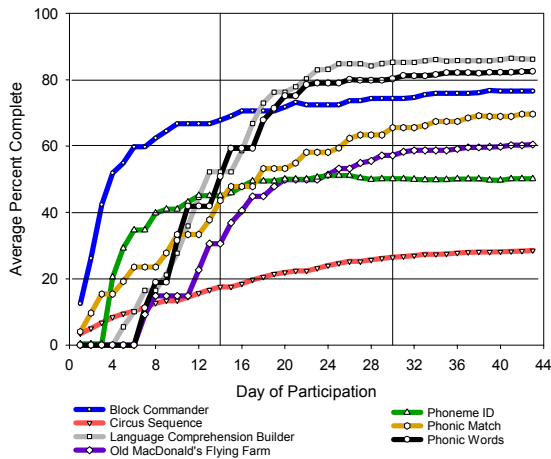
Figure 1. Average daily progress through the Fast ForWord Language product exercises. Results from 107 students are shown.
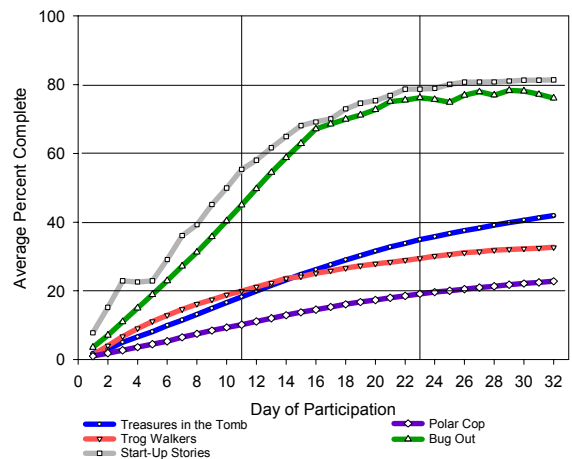

Figure 2. Average daily progress through the Fast ForWord Language to Reading product exercises. Results from 92 students are shown.

Assessment Results

STAR Reading: Scores were reported as instructional reading level (IRL) scores which indicate the reading level a student, with instructional aid, is at least 80% proficient at recognizing words and understanding material. A student with an IRL score of 7 can read seventh grade words and books with assistance with at least 80% accuracy. IRL scores range from Pre-Primer (PP), through grades 1.0 to 12.9, and to Post-High School (PHS).

Before Fast ForWord use, students had an average IRL score of 1.8. Students, on average, made significant improvements after participation on the Fast ForWord products, increasing to an IRL score of 3.1 (Figure 3, Table 2). This was an improvement of 15 months over seven months. The group of students had a grade-level of 2.9, indicating that, on average, students were reading at grade-level with at least 80% accuracy after Fast ForWord use.

STAR Math: Students with STAR Math scores available had an average grade-level of 2.8. On average, before Fast ForWord use, students were performing slightly above their grade-level at a grade equivalent of 3.1. After participation, students made significant gains in their math abilities, improving ten months in the seven months between testing times (Figure 4, Table 2).

Figure 4. Students improved an average of ten months in mathematical ability after Fast ForWord use. Results from 104 students are shown.
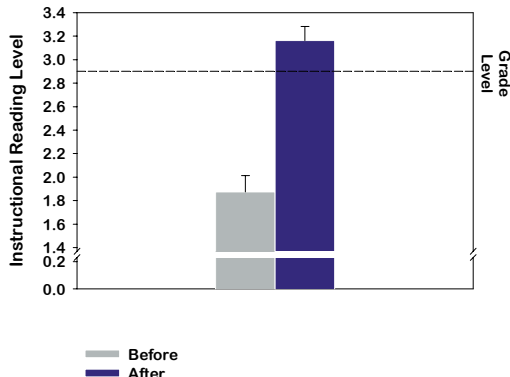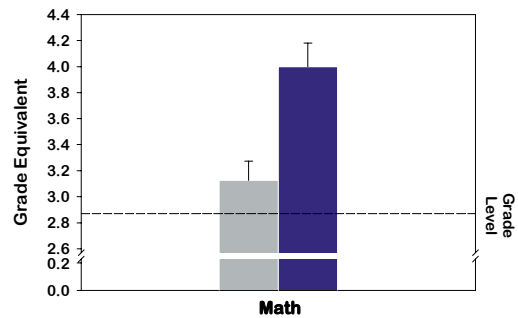

Figure 3. On average, students were reading at grade-level with at least 80% accuracy after Fast ForWord participation. Results from 106 students are shown.

Texas Primary Reading Inventory (TPRI): The TPRI subtest used in this study was Reading Fluency. Scores from seventy-seven students were available for analysis and of these, average student grade-level was 2.6. The benchmark reading rate for a fluent second grader is 90 words per minute. Students had an average reading rate of 57 words per minute before Fast ForWord participation. On average, students significantly improved their fluency after using the

Fast ForWord products, achieving a reading rate of 83 words per minute, an increase of 44% (Figure 5, Table 2).
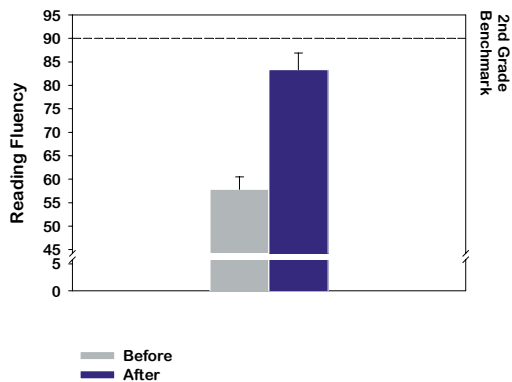

Figure 5. Students, on average, had significant improvements in reading fluency after Fast ForWord use and increased their reading rate by 44%. Results from 77 students are shown.

	n	Before		After		t-statistic
		Mean	SE	Mean	SE	
STAR Reading	106	1.87	0.13	3.16	0.11	15.2*
STAR Math	104	3.12	0.14	3.99	0.18	6.7*
TPRI	77	57.8	2.6	83.3	3.4	9.3*

*Table 2. On average, students made significant improvements in academic achievement after using the Fast ForWord products. *p<0.05.*

Texas Assessment of Knowledge and Skills (TAKS): TAKS scores were reported in terms of scale scores for the February and April 2005 tests. At the time of testing, all the students had completed the Fast ForWord Language product and most had made substantial progress through or completed the Fast ForWord Language to Reading product. Sixty-one students had TAKS Reading scores available and 75% of them met Texas performance standards. For the TAKS Math, 76% of 64 students with available scores met performance standards and for TAKS Writing, 88% of 25 students met standards. Of the 19 students with all three TAKS scores available, 13 (68%) met standards in all three areas.

DISCUSSION
One hundred and nine second through fourth graders in the Joshua Independent School District used the Fast ForWord products during the 2004 – 2005 school year. On average, students significantly improved their academic achievement after Fast ForWord participation. The group of students was reading at grade-level and had an average increase of 44% in their reading rate. Students, on average, improved

their reading and math skills by fifteen and ten months respectively. These findings demonstrate that, within A. G. Elder Elementary, 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 Joshua Independent School District made significant gains in their academic achievement, with a 44% increase in average reading rate and ten months improvements in mathematical ability. This suggests that using the Fast ForWord products strengthened the students' foundational skills and helped them benefit more from the classroom curriculum.

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