

# Improved Academic Achievement by Students in the Redlands Unified School District who used Fast ForWord® Products

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### ABSTRACT

**Purpose:** This study investigated the longitudinal effects of the Fast ForWord products on the academic achievement of elementary school students 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 state assessments. **Participants:** Study participants were second through fifth grade students who were attending elementary schools in the Redlands Unified School District of Redlands, California. **Materials & Implementation:** Following staff training on the Fast ForWord products, a group of students used the products during the 2002-2004 school years. Student academic ability was evaluated with the California Standards Tests (CSTs) of the Standardized Testing and Reporting (STAR) program before and after Fast ForWord participation. **Results:** On average, students who used Fast ForWord products made significant improvements in their academic achievement and had greater gains than their peers. After Fast ForWord participation, the number of students performing at a level of Basic or higher on the CSTs had reached 48%, more than double the level before participation.

**Keywords:** California, public elementary school, suburban district, observational study, longitudinal results, Fast ForWord Language, Fast ForWord to Reading 3, Standardized Testing and Reporting (STAR) program: California Standards Tests (CSTs).

### 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 Redlands Unified 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 to improve 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 to Reading 3) were used to evaluate the effectiveness of this approach for improving the academic achievement of elementary school students.

### METHODS

#### Participants

The area of Redlands, California, was once part of the Spanish Mission lands. The city was formed in the 1880's, following a surge in economic growth provided by the arrival of railroads connecting Southern California to the north.

The Redlands Unified School District is a 20 school district with a student population of more than 20,500. Forty percent of the students are Caucasian and 35% are Hispanic. Approximately 10% of the students are English Language Learners and 10% have Individual Education Plans (IEPs). Four elementary schools in the district chose to use the Fast ForWord products during the 2002-2003 and 2003-2004 school years.

Ninety-three students participated in the study reported here. Students were in third through fifth grade (average grade=3.7) at the beginning of the study in 2002. Student academic achievement was evaluated with the California Standards Tests (CSTs) portion of the Standardized Testing and Reporting (STAR) program before and 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 Redlands Unified School District, Fast ForWord Language and Fast ForWord to Reading 3, include six 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 both of the products, as detailed in the following exercise descriptions.

*Circus Sequence*<sup>1</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. This exercise improves working memory, sound processing speed, and sequencing skills.

*Old MacDonald's Flying Farm*<sup>1</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>1</sup>: First, students listen as one animal character utters a phoneme, and then two new animals utter similar phonemes. The students identify which of the latter two sounds was identical to the first phoneme. This exercise improves auditory discrimination skills, increases sound processing speed, improves working memory, and helps students identify specific phonemes.

*Phonic Match*<sup>1</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. This exercise develops auditory word recognition and phoneme discrimination, improves working memory, and increases sound processing speed.

*Phonic Words*<sup>1</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>1</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>1</sup>: 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.

*Scrap Cat*<sup>2</sup>: Students are asked to sort a series of visually-presented words into the correct semantic, phonological, syntactic, or morphological categories. For this exercise only, students can click a button to hear any word and see it defined. This exercise develops decoding, vocabulary, and word recognition skills.

*Chicken Dog*<sup>2</sup>: Students hear a spoken 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, with foils representing common visual and phonological errors. This exercise develops basic spelling patterns, letter-sound correspondences, and decoding.

*Canine Crew*<sup>2</sup>: Students are asked to match pairs of words within a grid. Grid size increases as the student develops mastery, and the matching criterion shifts from rhyming words to synonyms, antonyms, and, finally, homophones. This exercise develops

<sup>1</sup> Exercise from the Fast ForWord Language product.

<sup>2</sup> Exercise from the Fast ForWord to Reading 3 product.

vocabulary, decoding, and automatic word recognition.

*Twisted Pictures*<sup>2</sup>: Students are presented with a series of pictures and visually-presented sentences. They are asked to select the most accurate description of each picture from the four accompanying sentences. The descriptive sentences incorporate a wide range of syntactic structures. As the student 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>2</sup>: Students read narrative and expository passages and answer comprehension questions about each passage. The multiple-choice questions demand that the student uses memory for specific details, to generate inferences, or to grasp causal relationships. The student selects the best answer from among four alternatives. This task develops paragraph comprehension, cause-and-effect reasoning, working memory, flexible reading, and vocabulary.

*Hog Hat Zone*<sup>2</sup>: In Hog Hat Zone, short passages from classic children's literature are presented, with occasional gaps in the text where words are missing. Students are asked to fill in each gap with the correct word from among four alternatives. The missing words are grammatically 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 California Standards Tests (CSTs) of the Standardized Testing and Reporting (STAR) program was administered in 2002 before Fast ForWord participation and in the following three years after students had completed products. Results from the CSTs were available for the 2001-2005 school years.

**California Standards Tests (CSTs):** The CSTs are part of California's Standardized Testing and Reporting (STAR) program of student testing and accountability. Tests of English-language

arts, mathematics, science, and history are administered annually to students in grades 2-11. The CSTs assess student knowledge of state academic content standards. Scores can be reported as performance levels or as scale scores. There are four performance levels: Advanced, Proficient, Basic, Below Basic, and Far Below Basic. Scale scores range from 150 to 600. The minimum scale score for proficiency is 350.

### Analysis

Scores were reported in terms of scale scores and analyzed using a repeated measures multivariate analysis of variance (MANOVA). 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). Participation level is not available for the version of Fast ForWord to Reading 3 that was used in this study.

During the 2002-2003 school year, the Redlands Unified School District chose to use the 100-Minute Fast ForWord Language Protocol. In the following 2003-2004 school year, some students continued product use with the 90-Minute Fast ForWord to Reading 3 Protocol. These protocols called for students to use the products for 90 or 100 minutes a day, five days per week, for four to six weeks. All 93 study participants used the Fast ForWord Language product and completed use by Spring of 2003. 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 to Reading 3 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 products 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	93	29	47	82%	83%
Fast ForWord to Reading 3	23	24	54	46%	-

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.

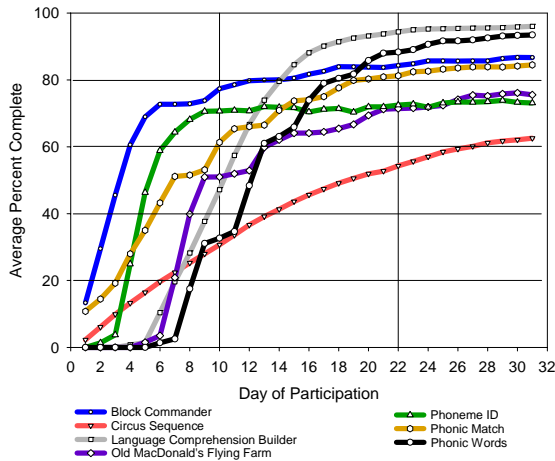


Figure 1. Average daily progress through the Fast ForWord Language product exercises. Results from 93 students are shown.

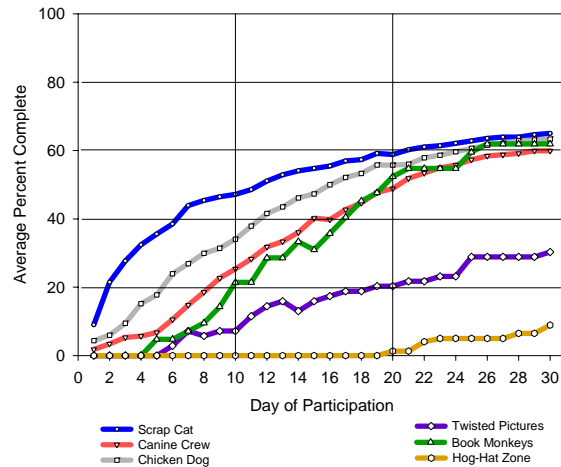


Figure 2. Average daily progress through the Fast ForWord to Reading 3 product exercises. Results from 23 students are shown.

**Assessment Results**

All study participants used the Fast ForWord Language product during the 2002-2003 school year with some using the Fast ForWord to Reading 3 product during the 2003-2004 school year. At the time of the 2004 CSTs administration, students had completed the Fast ForWord products.

California Standards Tests (CSTs): Ninety-two students had both English-language arts and Mathematics scores from the 2002-2005 school years available for analysis. One student was missing a score and therefore was not included in the following analyses. A MANOVA found a significant difference by time and by test and no significant differences between the gains made in English-language arts and Mathematics (Table 2). This indicates students overall made significant improvements in both English-language arts and Mathematics after Fast ForWord participation.

n	MANOVA F		
	Time	Test	Time x Test
92	5.39*	11.03*	0.80

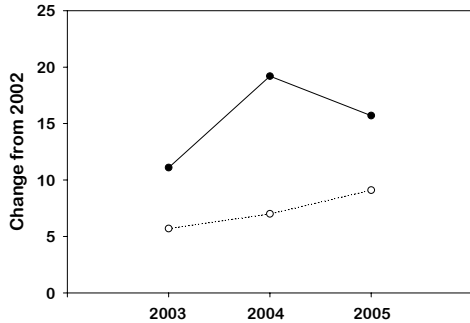
Table 2. Students, on average, made significant gains in academic achievement following Fast ForWord use. \*p<0.05.

Table 3 shows the average scale scores for the Redlands Unified School District and the Fast

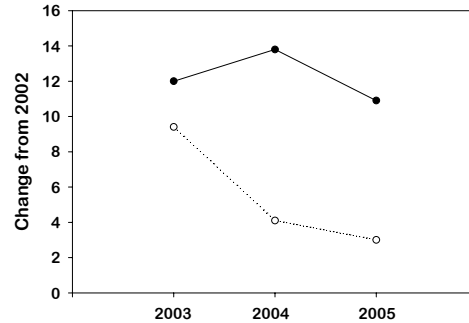
ForWord participants in this study for the 2002-2005 school years. The District numbers were calculated using the average scale scores by grade as reported by the Redlands Unified School District and weighting them by the number of study participants in each grade.

Figures 3 and 4 show the gains Fast ForWord users made compared to average gains made district-wide by students in comparable grades. While the Fast ForWord participants' peers had higher average scale scores in both English-language arts and Mathematics, the Fast ForWord users, overall, made greater gains between the 2002 to 2003 and 2003 to 2004 CSTs administrations.

Scores for the CSTs can be reported in terms of performance levels: are Advanced, Proficient, Basic, Below Basic, and Far Below Basic. In 2002, before Fast ForWord participation, approximately 23% of the students were at a performance level of Basic or above in English-language arts. After completing the Fast ForWord Language product in 2003, this number rose to 37% and by 2004 when students had also completed the Fast ForWord to Reading 3 product, the percentage of students performing at the Basic level or higher was 48% (Table 3).



English-language Arts



Mathematics

● Fast ForWord District

● Fast ForWord District

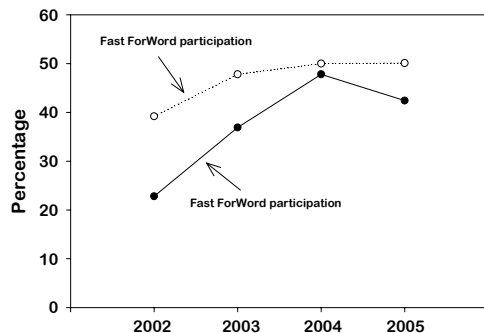
Figures 3 and 4. Students who used Fast ForWord products, on average, significantly improved in measures of academic achievement and had greater gains than students who did not use products. Results from 92 students are shown.

Year	n	English-language Arts			Mathematics		
		FFWD		District	FFWD		District
		Mean	SE	Mean	Mean	SE	Mean
2002	92	279.6	3.67	334.6	293.2	5.72	343.0
2003	92	290.7	3.48	340.3	305.2	6.42	352.4
2004	92	298.8	3.86	341.6	307.0	6.43	347.1
2005	92	295.3	3.54	343.7	304.1	5.85	346.0

Table 3. Average scale scores for the Fast ForWord participants compared to their district peers. On average, the Fast ForWord students made greater gains year to year.

Test	Year	Performance Level				
		Far Below Basic	Below Basic	Basic	Proficient	Advanced
English-language arts	2002	35.9	41.3	18.5	4.3	0
	2003	26.1	37.0	30.4	6.5	0
	2004	22.8	29.3	40.2	6.5	1.1
	2005	22.8	34.8	37.0	4.3	1.1
Mathematics	2002	14.1	46.7	20.7	15.2	3.3
	2003	17.4	34.8	25.0	17.4	5.4
	2004	16.3	33.7	26.1	19.6	4.3
	2005	16.3	33.7	34.8	12.0	3.3

Table 4. The percentages of study participants at each performance level during the 2002-2005 school years.



Students at Basic or Above

● English-language Arts  
○ District

Figure 5. The percentages of students at a performance level of Basic or above during the 2001-2005 school years.

## DISCUSSION

The students in this study were in second through fourth grade at the time of their initial assessment. Only 23% had English-language arts skills that were Basic or above. The following school year (2002-2003) all students used the Fast ForWord Language product and 37% reached Basic or above. The following year, the number performing at Basic or above continued to climb. When the students were approaching or in middle school (5<sup>th</sup>-7<sup>th</sup> grade), 42% had achieved Basic or above. Over the same interval, for students in corresponding grades, the district also achieved an increase in the number of students performing at Basic or above: from 76% in 2002 to 79% in 2005. This corresponds to a decrease of 12% in the number of students performing Below Basic or Far Below Basic. When the Fast ForWord products were used to enhance the foundational skills of the

students, providing a stronger basis for the curriculum, the percentage of students moving out of the Below and Far Below Basic levels was substantially higher—25%. These findings demonstrate that, within the Redlands Unified 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

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. This study shows that, among students in the Redlands Unified School District who used Fast ForWord in addition to the district curriculum, twice as many students achieved and maintained levels of Basic or above. This suggests 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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