

# Improved Reading Skills by High School Students in the Amarillo Independent 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 reading skills of high school students who used the products within the curriculum in a school setting. **Study Design:** This was a single-school case study using data from annual statewide testing, in addition to a nationally normed test. **Participants:** Study participants were high school students who were attending Palo Duro High School in the Amarillo Independent School District, in Amarillo, Texas. **Materials & Implementation:** All study participants used one or more 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 reading portion of Texas Assessment of Knowledge and Skills (TAKS; 8<sup>th</sup> grade version - spring 2005, 9<sup>th</sup> grade version - spring 2006), and/or the Gates-MacGinitie Reading Tests. **Results:** After the Fast ForWord software products were added to their curriculum, study students made significant gains on both reading measures. Palo Duro High School received Gold Performance Acknowledgement in 2005 for having a high Texas Growth Index (TGI) in reading, relative to comparable schools. Students who used Fast ForWord products during the 2005-2006 school year showed 73% greater gains, achieving a TGI of 0.19. They significantly outperformed their expected gains on the TAKS, and the number of students meeting the state reading standard increased dramatically.

**Keywords:** Texas, high school, urban, observational study, Fast ForWord Middle & High School, Fast ForWord Language, ForWord Language to Reading, Texas Assessment of Knowledge and Skills (TAKS), Gates-MacGinitie Reading Tests.

### 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 Amarillo 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 secondary students in a school setting. In this study, commercially available computer-based products (Fast ForWord Middle & High School, 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 Palo Duro High School.

### METHODS

#### Participants

The Amarillo Independent School District is located in the Texas Panhandle and spans Potter and Randall counties. The district opened its first school in 1889. Since then, the district has grown to encompass 36 elementary schools, 10 middle schools, 4 high schools, an alternative school, and a specialty high school. These schools serve a student population of over 29,000.

Palo Duro High School is located in the Amarillo Independent School District. This comprehensive high school serves an ethnically diverse student body of more than 1800 students in grades 9 through 12. Over 70% of Palo Duro students are eligible for free or reduced-price lunches. More than 40% of Palo Duro students are Hispanic.

During the 2005-2006 school year, 372 students from Palo Duro High School used one or more Fast ForWord products. This report focuses on 142 students (including 122 ninth-graders) who, before and after at least 5 days of Fast ForWord participation, were assessed with the reading portion of Texas Assessment of Knowledge and Skills (TAKS) and/or

the Gates-MacGinitie Reading Tests. School personnel administered the assessments and reported scores for analysis.

### Implementation

Educators at Palo Duro High School 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 Middle & High 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 these products, all help develop certain critical skills as detailed in the following exercise descriptions.

*Circus Sequence<sup>1</sup>, Sweeps<sup>2</sup>, and Trog Walkers<sup>3</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. The exercises improve working memory, sound processing speed, and sequencing skills.

*Old MacDonald's Flying Farm<sup>1</sup> and Streams<sup>2</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>, IDs<sup>2</sup>, Polar Cop<sup>3</sup>, and Treasure in the Tomb<sup>3</sup>*: 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<sup>1</sup>, Matches<sup>2</sup>, and Bug Out<sup>3</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. 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<sup>1</sup> and Cards<sup>2</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.

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

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

<sup>2</sup> Exercise from the Fast ForWord Middle & High School product.

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

## Assessments

Before and after Fast ForWord participation, students were evaluated with the reading portion of Texas Assessment of Knowledge and Skills (TAKS), and/or the Gates-MacGinitie Reading Tests. Pre-test and post-test TAKS scores were reported for 101 of the 122 ninth-graders in the study. Pre-test scores came from the spring 2005 administration of the 8<sup>th</sup> grade TAKS, and post-test scores from the spring 2006 administration of the 9<sup>th</sup> grade TAKS. Pre-test and post-test GMRT scores were reported for 108 ninth-graders and 20 students from other (unspecified) grades.

**Texas Assessment of Knowledge and Skills (TAKS):** The Texas Assessment of Knowledge and Skills is administered annually throughout Texas. The TAKS is closely aligned with state curricular standards (Texas Essential Knowledge and Skills). The reading portion of the TAKS, which is administered to students in grades 3-9, measures a student's ability to comprehend and critically analyze culturally diverse written texts.

Scale scores from the TAKS at one grade level cannot be directly compared to those of another grade level. However, it is possible to derive expected student scale scores, and compare these to actual performance in subsequent years. Similarly, the Texas Growth Index (TGI) can be derived to estimate student growth over subsequent years. The TGI is used by the state accountability system to evaluate improvements at the school and district level.

**Gates-MacGinitie Reading Tests (GMRT):** The Gates-MacGinitie Reading Tests are used to assess a student's decoding, vocabulary, and passage comprehension skills. The assessment has two components, independently evaluating reading vocabulary and comprehension.

In the Vocabulary subtest, the student must sound out and recognize words corresponding to a picture. This subtest measures a student's word decoding ability as well as vocabulary.

In the Comprehension subtest, the student must read passages of progressively increasing difficulty. This subtest measures a student's understanding of complex written material.

## Analysis

Scores on the TAKS were reported in terms of scale scores. Scores on the GMRT were reported in terms of

grade equivalents. Because different types of scores were reported for the two tests, their data were analyzed separately, using paired 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 and attendance level).

Most study participants used the 90-minute protocol for Fast ForWord Middle & High School, the 75-minute protocol for Fast ForWord Language, and/or the 90-minute protocol for Fast ForWord Language to Reading. These protocols call for students to use the products for either 75 minutes per day, 5 days per week for 6 to 10 weeks or 90 minutes per day, 5 days per week for 8 to 12 weeks. Students began Fast ForWord participation between January and March of 2006 and completed participation by May, 2006 (with the exception of four students who resumed Fast ForWord use in the fall of 2006). Detailed product use is shown in Table 1.

Figures 1 and 2 show the average daily progress through the Fast ForWord Middle & High School and Fast ForWord Language exercises for students who participated in this study (daily progress is not shown for Fast ForWord Language to Reading because most students used this product for fewer than 5 days). 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	Number of Calendar Days	Percent Complete	Participation Level	Attendance Level
Fast ForWord Middle & High School	123	17	56	73	72	42
Fast ForWord Language	18	21	92	56	80	37
Fast ForWord Language to Reading	26	4	11	28	75	62

*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, the participation level, and the attendance level. Please note that the median number of calendar days for Fast ForWord Language users was 52 (the average is much higher than the median in this instance because some of these students resumed product use in the fall of 2006).*

Learning Curve: Fast ForWord Middle & High School

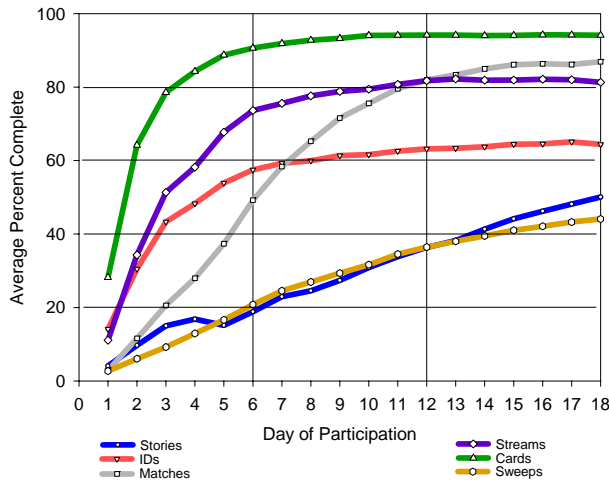


Figure 1. Average daily progress through the Fast ForWord Middle & High School exercises. Results from 123 students are shown.

Learning Curve: Fast ForWord Language

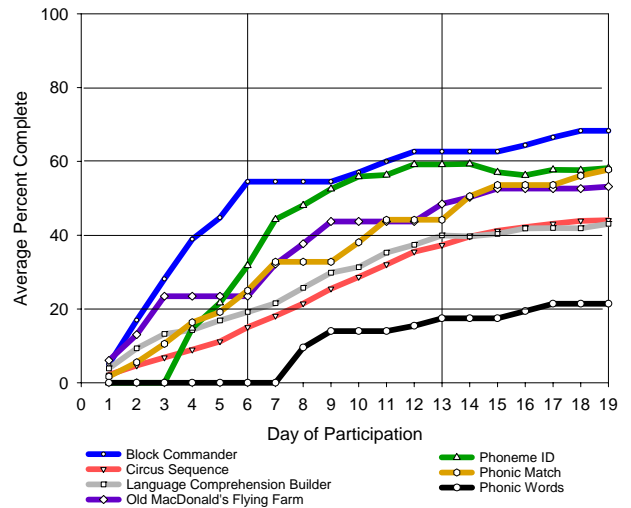


Figure 2. Average daily progress through the Fast ForWord Language exercises. Results from 18 students are shown.

**Assessment Results**

Texas Assessment of Knowledge and Skills (TAKS):

Following the procedure for calculating the Texas Growth Index (TGI), an expected student scale score for 9<sup>th</sup> grade TAKS Reading was derived from each student's 8<sup>th</sup> grade TAKS Reading scale score. A

paired t-test was performed, comparing students' expected scale scores with their actual 9<sup>th</sup> grade TAKS Reading scale score. This analysis showed that students performed significantly better on the reading portion of the TAKS after using Fast ForWord products.

	n	Expected		Actual		t-statistic
		Mean	SE	Mean	SE	
TAKS (9 <sup>th</sup> grade, Reading)	101	2168	12.7	2187	12.3	2.188*

Table 3. On average, students at Palo Duro High School demonstrated significantly better than expected annual growth in reading skills on the reading portion of the TAKS after Fast ForWord participation. \*p<0.05.

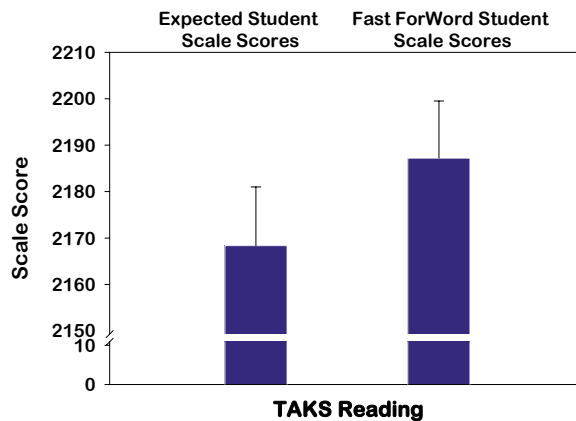


Figure 3. Students who used one or more Fast ForWord products showed significantly better gains in reading knowledge and skills than would be expected for students exposed to the standard curriculum alone. Expected and actual 9<sup>th</sup> grade TAKS Reading scale scores for 101 students are shown.

Gates-MacGinitie Reading Tests (GMRT): A paired t-test was performed to analyze changes in the grade equivalent score of the GMRT. Before Fast ForWord use, students were, on average, several years below

grade level in reading (all study participants were in grade nine or higher). After Fast ForWord use, students demonstrated significant gains in reading level.

	n	Before		After		t-statistic
		Mean	SE	Mean	SE	
Total GRMT: Grade Equivalent	128	6.8	0.22	7.3	0.23	2.660*

Table 3. On average, students at Palo Duro High School demonstrated significantly improved reading skills after Fast ForWord participation. \* $p < 0.05$ .

## DISCUSSION

Reading test data were collected from 142 students at Palo Duro High School. The data were collected before and after the students used one or more Fast ForWord product. On average students made significant gains, improving their performance by six months in grade level on the Gates-MacGinitie Reading Tests (GMRT), and outperforming their expected student scale scores on the Texas Assessment of Knowledge and Skills (TAKS) by 19 points.

Of the students for whom pre-test and post-test TAKS scores were reported, 26% fell below the cutoff for “met standard” (a scale score of 2100) in eighth grade, before using Fast ForWord products. Based on their expected student scale scores, all of these students were expected to continue falling below the cutoff in ninth grade. However, after using ForWord products, the actual percentage of students falling below the “met standard” cutoff was reduced by 38%, to 16% of the student group.

Growth on the TAKS can also be analyzed in terms of the Texas Growth Indicator (TGI). In 2005, the average TGI score for students at Palo Duro High School was 0.11. In a comparison of comparable schools, Palo Duro High School placed in the top quartile for student improvement. The students who used Fast ForWord products in this study achieved an average TGI score of 0.19 – higher than the school-wide average.

These findings demonstrate that, within the Amarillo 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 vocabulary, comprehension, and critical analysis of culturally diverse written texts. On average, students who used Fast ForWord products outperformed expectations on the TAKS, and achieved higher TGI scores than other Palo Duro High School students. 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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