

Improved Academic Skills of Low-Performing Students in the Pacifica School District who used Fast ForWord® Products

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ABSTRACT

Purpose: This study investigated the effects of Fast ForWord software on the academic achievement of students who were low-performing and who used the product within the curriculum in a school setting. **Study Design:** The design of the study was a single-school case study using nationally-normed tests. Dependent t-tests and frequency distributions were used to evaluate changes in student test performance. **Participants:** Study participants were 23 students at Oddstad Elementary School in the Pacifica School District of Pacifica, California whose language scores were at, or below, the 50th percentile. **Materials & Implementation:** Following staff training on the Fast ForWord products, Oddstad Elementary School students used the Fast ForWord Language product for an average of 23 days over an average period of 46 calendar days, with some of these students later using the Fast ForWord Language to Reading product for an average of 20 days over an average period of 43 calendar days. Before and after Fast ForWord Language participation, student performance was evaluated by examining progress on various subtests of the Stanford Achievement Test Series, Ninth Edition (SAT-9). Dependent t-tests and frequency distributions were used to compare how the study participants performed before and after using the Fast ForWord products. **Results:** On average, the students who used the Fast ForWord products made significant improvements in language, reading, spelling and mathematics skills as measured by the SAT-9. The improvements in the different skill areas were similar. In addition, between the two assessment times, the students showed a clear shift in their performance levels towards the higher performance bands of the Academic Performance Index (API).

Keywords: California, elementary school, suburban district, observational study, Fast ForWord Language, Fast ForWord Language to Reading, Stanford Achievement Test Series, Ninth Edition (SAT-9).

INTRODUCTION

Early laboratory tests of a prototype of a computer-based product combined an optimal learning environment with a focus on early reading and cognitive skills. The tests resulted in dramatic improvements in the auditory processing and language skills of elementary school children who had specific language impairments (Merzenich et al, 1996; Tallal et al., 1996) or were at-risk for academic failure (Miller et al., 1999). The Pacifica School District was interested in evaluating the effectiveness of this approach in improving the academic performance of their low-performing students. They turned to the commercially available, computer-based Fast ForWord products and evaluated their effectiveness in improving the academic skills of these students.

METHODS

Participants

The Pacifica School District is located in San Mateo County of Pacifica, California. The district has six elementary schools and one middle school, serving over 3,000 students. During the 2000 – 2001 and 2001 – 2002 school years, 79 students

from Oddstad Elementary School in the Pacifica School District were selected by teachers and school administrators to use the Fast ForWord products.

Twenty-three of these participants were low-performing students who pre-tested at, or below, the 50th percentile on the Language subtest of the Stanford Achievement Test Series, Ninth Edition. These students participated in a study involving an analysis of percentiles from the language, reading, spelling, and mathematics subtests of the SAT-9 that was administered before and after the students used the Fast ForWord products. The 23 students in the study group were of varied ages, ranging from second to fifth grade. All 23 study participants used the Fast ForWord Language product while 11 of the 23 followed their Fast ForWord Language use with the Fast ForWord Language to Reading product.

Implementation

Educators at Oddstad Elementary School were trained in current and established findings on the neuroscience of 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 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 product.

Materials

Fast ForWord Language and Fast ForWord Language to Reading, computer-based products that combine an optimal learning environment with a focus on early reading and cognitive skills, were used. Each of the products includes 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 variations across products related to the specific skills targeted and the approaches taken, there are several critical skills developed in all of the products, 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, 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, *IDs*², *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 in the study had their academic skills evaluated before and after they used the Fast ForWord products. School personnel administered the Stanford Achievement Test Series, Ninth Edition (SAT-9) and reported the scores for analysis. Scores were reported in terms of percentiles.

Stanford Achievement Test – Ninth Edition (SAT-9): The SAT-9 comprises four subtests, Language, Reading, Spelling, and Math. These multiple choice tests are designed to evaluate the academic achievement of students.

The SAT-9 contributes to a school's Academic Performance Index (API), which measures the academic improvement of a school from year to year. Performance bands of the API indicate the percentage of students that fall into each of the quintiles. The API is increased as students shift from the lower quintiles into the upper quintiles. The greatest increase in API occurs as students increase from the 1st to the 2nd quintile.

¹ Exercise from the Fast ForWord Language product.

² Exercise from the Fast ForWord Language to Reading product.

Analysis

Percentiles for all study students were compared using a multivariate analysis of variance (MANOVA) with two within-subjects factors (time x subtest), to determine whether scores were affected by Fast ForWord product use, or were differentially affected across the Language, Reading, Mathematics, or Spelling subtests. To account for students with missing values at post-test, a conservative approach was taken; missing values were replaced with the average percentile calculated from the percentiles available across all tests and at both time points. The analysis used a p-value of 0.05 as the criterion for identifying statistical significance. To show how the API was affected at Oddstad Elementary School, frequency distributions of the scores into quintiles were also used.

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). The Fast ForWord Language protocol used at Oddstad Elementary School called for students to use the product for 100 minutes a day, five days a week, for four to eight weeks. The Fast ForWord Language to Reading protocol used

called for students to use the product for 90 minutes a day, five days a week, for four to eight weeks.

Either during the 2000 – 2001 or the 2001 – 2002 school year, 25 Oddstad Elementary students who used the Fast ForWord software scored at, or below, the 50th percentile on the SAT-9 Language subtest at pre-test and used the Fast ForWord Language product for 15 or more days. Of those students, 23 had pre- and post-tests. Scores from those 23 students are the ones that are analyzed. Of these 23 students with pre- and post-tests, 11 used the Fast ForWord Language to Reading product.

On average, the students used the Fast ForWord Language product for 23 days over a period of 46 calendar days, completing 75% of the product content, and achieving a participation level of 70% (Table 1). Of those students, 11 used the Fast ForWord Language to Reading software for an average of 20 days over a period of 43 calendar days, completing 66% of the product content, and achieving a participation level of 70%. On average, students spent a total of 32 days on one or both of the products. The average daily progress through the Fast ForWord Language exercises for the first 20 days and the average daily progress through the Fast ForWord Language to Reading exercises for the first 16 days are charted in Figures 1 and 2, respectively. (For students who used the products fewer than the days shown, percent complete is maintained at the level achieved on their final day of product use.)

Product	Number of Students	Average Days of Product Use	Average Number of Calendar Days	Average Overall Percent Complete	Average Participation Level
Language	23	23	46	75%	70%
Language to Reading	11	20	43	66%	70%

Table 1. Usage data showing the number of study students who used the Fast ForWord Language and Language to Reading products. Also shown are the group averages for the number of days they used the products, the calendar days between start and finish, the percentage of content they covered, and their participation level (the percentage of 90 or 100 minutes per day, five days per week, that the students actually used the Fast ForWord Language or Language to Reading product).

Daily Progress through Fast ForWord Language by Oddstad Students

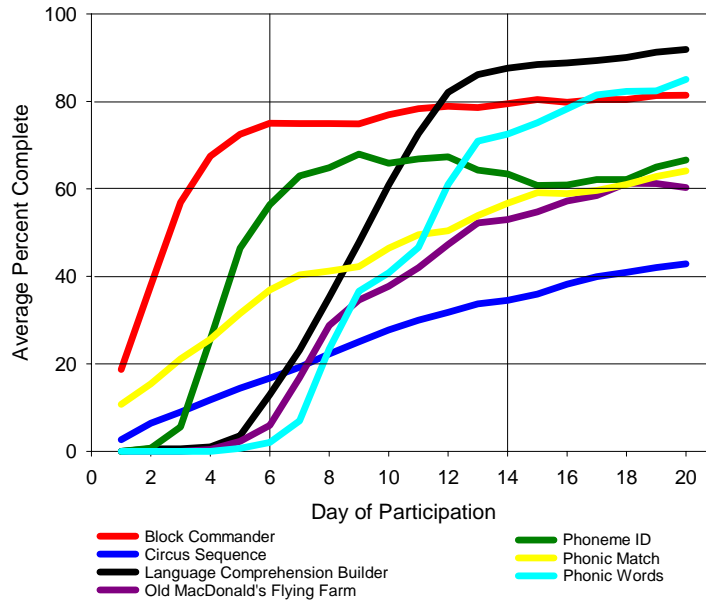


Figure 1. Average daily progress over the first 20 days of use for Oddstad Elementary School students in the study.

Daily Progress through Fast ForWord Language to Reading by Oddstad Students

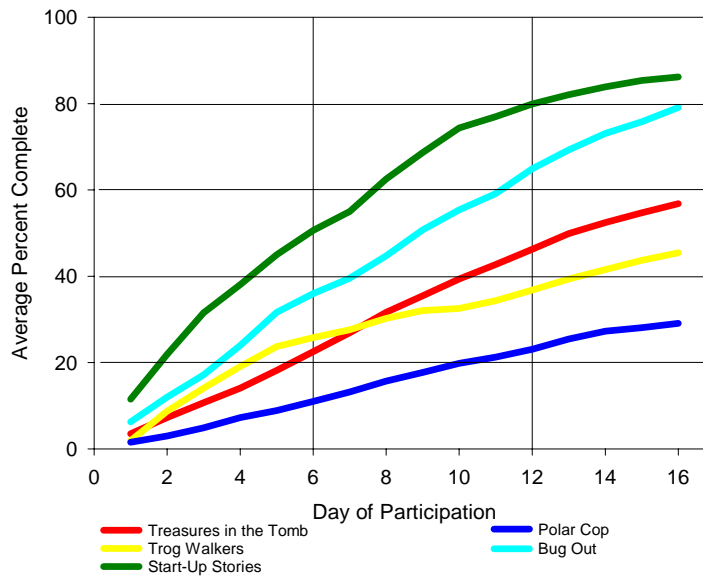


Figure 2. Average daily progress over the first 16 days of use for Oddstad Elementary School students in the study.

Assessment Results

Stanford Achievement Test Series, Ninth Edition:
Percentiles on the Language, Reading, Spelling, and Mathematics subtests of the SAT-9 were

reported for students in the study before and after they used the Fast ForWord software. Three students were missing one or more scores. Missing values were replaced using a very

conservative approach; the replacement value was the average percentile achieved across all students, and all tests, before, and after, participation – a value of 31.3. Of the 184 data points (23 students x 4 tests x 2 test points), 4 were replaced – a replacement rate of 2%.

Before participation, all study participants were in the bottom three quintiles ($\leq 59^{\text{th}}$ National Percentile Rank) on their SAT-9 Language percentiles, with 21 of the 23 (91%) in the bottom two quintiles ($\leq 39^{\text{th}}$ National Percentile Rank). After Fast ForWord participation, on average, across the four subtests, there was a significant improvement in the students' percentile ranks. There was not a significant difference between performance on the different subtests, and there was not significant interaction between subtest and time (Table 2). Table 3 shows the mean performance of the study participants on the various subtests before and after their Fast ForWord participation. Figure 3 shows the mean

increase in percentile in each academic area analyzed for students in the study.

A frequency distribution of student performance shows that after participation, there was a clear shift in academic performance, with some students moving into the fourth or fifth quintiles in language, reading, spelling, or mathematics. Figures 4 through 7 show the breakdown of the participants' quintiles in language, reading, spelling, and mathematics skills, respectively. Most students were performing in the low quintiles in these skill areas before Fast ForWord participation, as seen in the graphs. After using the products, the breakdown of student performance became more scattered, with some students moving into the fourth or fifth quintiles. For example, before participation only 8% of students were in or above the fourth quintile in spelling. After Fast ForWord participation, this percentage increased to 30% of the students.

SAT-9	df	MANOVA F
Time	22	5.66*
Subtest	20	2.55
Time x Subtest	20	0.60

Table 2. A MANOVA showed that the students in this study performed differently before and after Fast ForWord participation. This table uses missing-value replacement data. * $p < 0.05$. Missing values were replaced using a very conservative approach; the replacement value was the average of the percentiles at both time points, across all tests and all students.

SAT-9 subtests	n	Before		After	
		Mean	SE	Mean	SE
Language	22	24.7	2.9	32.2	3.7
Reading	20	24.8	2.3	30.9	4.1
Spelling	23	31.0	4.4	40.7	4.7
Mathematics	23	33.0	4.5	35.8	3.9

Table 3. Overall, students who used the Fast ForWord products made gains in academic skills as measured by the SAT-9. Results from a specific subtest are not included in this table if the student did not have results available from both before, and after, participation.

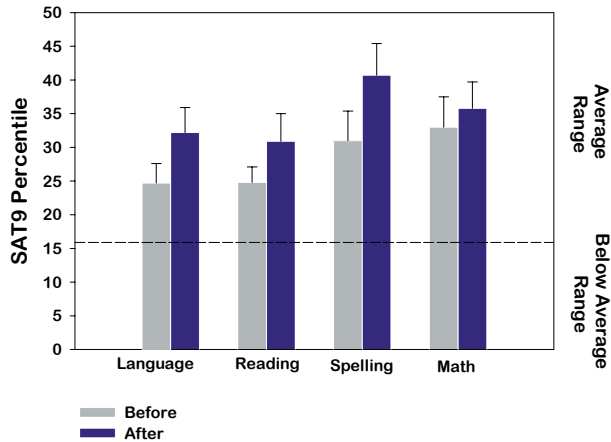


Figure 3. In this elementary school case study, the skills of 23 students were evaluated. On average, after using the Fast ForWord products, the students made significant improvements in academic skills, moving closer to the national median.

DISCUSSION

All of the study's students from Pacifica School District were low-performing students. Before participation, all of them were evaluated as having language skills at, or below the national median with 91% of the students at, or below, the second quintile. After participation, this percentage decreased to 64% with the remaining students performing in the third or fourth quintiles. Across the four subtests, there was significant improvement. There was not a significant difference in the improvements on each subtest. These findings demonstrate that, within the Pacifica School District, an optimal learning environment, coupled with a focus on cognitive and early reading skills, can help low-performing students attain a higher level of academic achievement.

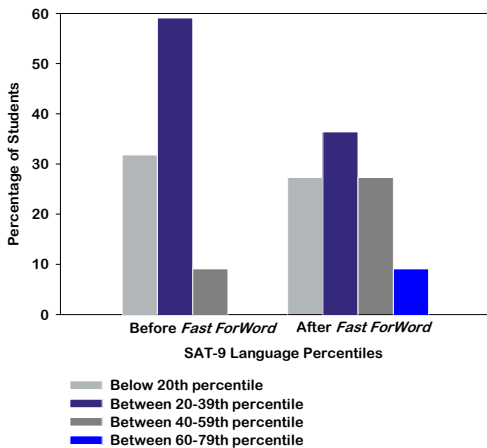


Figure 4. The frequency distribution shows a clear shift toward the higher quintiles on the Language subtest after Fast ForWord participation.

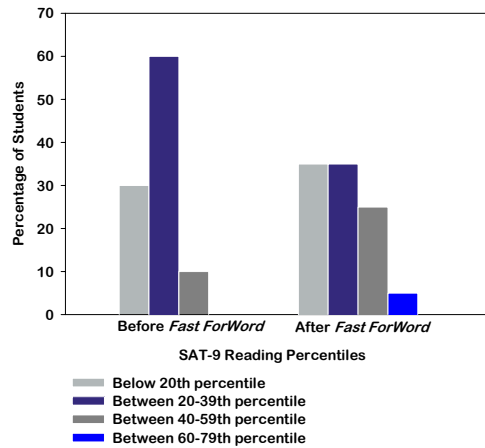


Figure 5. The frequency distribution shows a clear shift toward the higher quintiles on the Reading subtest after Fast ForWord participation.

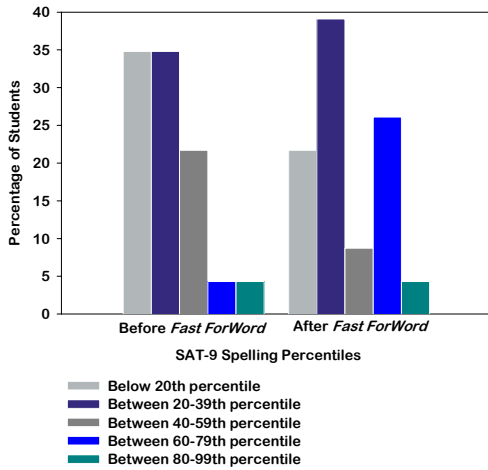


Figure 6. The frequency distribution shows a clear shift toward the higher quintiles on the Spelling subtests after Fast ForWord participation.

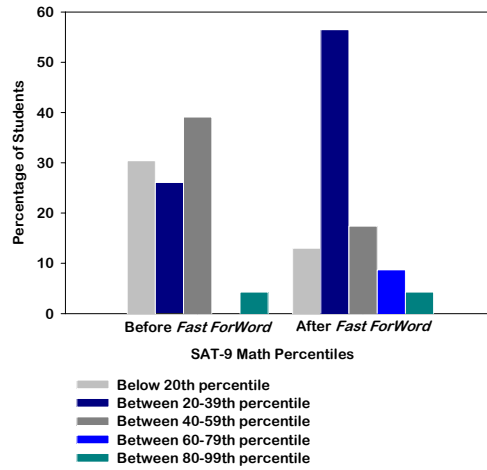


Figure 7. The frequency distribution shows a clear shift toward the higher quintiles on the Math subtest after Fast ForWord participation.

CONCLUSION

Staff from the Pacifica School District decided to approach the problem of their low-performing students from its cognitive roots. They wanted to help these students build their foundational early reading and cognitive skills in order to improve their reading ability. After an average of nearly seven weeks of using the Fast ForWord products, the students built their academic and cognitive skills, better positioning them to partake in the classroom curriculum.

Notes:

- To cite this report: Scientific Learning Corporation. (2004). Improved Academic Skills of Low-Performing Students in the Pacifica School District who used Fast ForWord Products, MAPS for Learning: Educator Reports, Vol. 8, No. 1: pp. 1-7.

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