Improved Reading Achievement by Students in the Pocatello/Chubbuck School District 25 who used Fast ForWord® Products During 2004-2005

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ABSTRACT

Purpose: This study investigated the effects of the Fast ForWord products on the reading achievement of 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 elementary, middle, and high school students who were attending schools in the Pocatello/Chubbuck School District 25 in Pocatello, ID. **Materials & Implementation:** Following staff training on the Fast ForWord products, a group of students used the products during the 2004-2005 school year. Before and after Fast ForWord participation, student reading performance was evaluated with the Idaho Standards Achievement Test (ISAT). **Results:** On average, students had significant improvements in reading achievement, moving from the 23rd percentile to the 30th—a gain of more than one-fourth of a standard deviation. Forty percent of study participants met Idaho reading performance standards following Fast ForWord use, up from 5% before. Overall, 52% of the participants improved at least one proficiency level after Fast ForWord use.

Keywords: Idaho, elementary school, middle school, high school, urban district, observational study, Fast ForWord Language, Fast ForWord Middle & High School, Fast ForWord Language to Reading, Fast ForWord to Reading 4, Idaho Standards Achievement Test (ISAT).

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). Studies that the Pocatello/Chubbuck School District 25 has carried out on effectiveness of an optimal learning environment support these early studies. The district has previously taken part in two studies of optimal learning environments. In the first study, students used Fast ForWord products during the summer of 2003 and were tested immediately before and after participation on the Woodcock-McGrew-Werder Mini-Battery of Achievement (MBA). On average, the students improved two-thirds of a standard deviation, moving from the 12th percentile to the 30th percentile.

In the second study, students used the Fast ForWord products during the 2003-2004 school year, and were evaluated before and after participation on the Idaho Standards Achievement Test (ISAT). Improvements in scaled scores, after participation, were compared to typical improvements seen nationwide. On average, the students who used Fast ForWord products had improvements that were 80% greater than those seen nationwide.

The Pocatello/Chubbuck School District 25 was interested in continuing to monitor the effectiveness of an optimal learning environment with a focus on early reading and cognitive skills. In this study, the group of students involved was increased to include those in elementary school. The district used commercially available computer-based products (Fast ForWord Language, Fast ForWord Middle & High School, Fast ForWord Language to Reading, and Fast ForWord to Reading 4) to evaluate the effectiveness of this approach at improving the reading achievement of students.

METHODS

Participants

The Pocatello/Chubbuck School District 25 is a grade K through 12 urban district with 23 schools serving nearly 12,000 students in southeastern Idaho. Eleven percent of students receive special education services

and 5% are classified as gifted and talented. Approximately 16% are minority students and 46% have free or reduced price lunches.

During the 2004-2005 school year, five schools in the Pocatello/Chubbuck School District 25 chose to use the Fast ForWord products and take part in the study reported here. Before and after Fast ForWord participation, student reading achievement was evaluated with the Idaho Standards Achievement Test (ISAT). School personnel administered the assessments and reported scores for analysis. Study participants were 142 second through tenth grade students (average grade level of 7.9). Approximately 28% of participants were receiving special education services.

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 Pocatello/Chubbuck School District 25, Fast ForWord Language, Fast ForWord Middle & High School, Fast ForWord Language to Reading and Fast ForWord to Reading 4, 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 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], Sweeps[2], and Trog Walkers[3]: 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] and Streams[2]: 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[1], IDs[2], Polar Cop[3], and Treasure in the Tomb[3]: 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], Matches[2], and Bug Out[3]: 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] and Cards[2]: 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

[1] Exercise from the Fast ForWord Language product.
[2] Exercise from the Fast ForWord Middle & High School product.
[3] Exercise from the Fast ForWord Language to Reading product.

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.

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

Hoof Beat[4]*:* The participant is presented with a question and four possible answers. The participant must choose the most appropriate answer. The questions relate to semantics, phonology, morphology, orthography, and syntax. The exercise encourages flexibility during reading and automatic access to the various dimensions of vocabulary and is designed to build vocabulary by showing the participant how words function.

Jitterbug Jukebox[4]*:* The participant hears a word spoken aloud and letters appear on the keys of a jukebox. The participant must spell the word by clicking on the jukebox keys. Jitterbug Jukebox helps participants improve spelling and sensitivity to letter-sound correspondences. This exercise includes many of the 500 most commonly used words in written English including most word families found in 3rd and 4th grade content standards.

Goat Quotes[4]*:* In Goat Quotes four newspapers paraphrase a headline at the top of a news kiosk. The participant must select the correct paraphrase. The exercise is designed to sample the basic syntactic (i.e., grammatical) structures of spoken English generally mastered in the early elementary grades. The exercise develops logical thinking and working memory skills as well careful reading.

Book Monkeys: Book Two[4]*:* Participant reads a passage, chart, or schedule and then answers questions related to the material. This exercise develops a participants' ability to read for literal meaning, cause-and-effect relationships, and inferential comprehension. It also develops a participant's working memory as well as vocabulary skills, which are crucial for flexible, fluent reading.

Stinky Bill's Billboard[4]*:* Participants must select the word that accurately completes a sentence. In this exercise, participants improve sentence comprehension while practicing the decoding of words in realistic contexts. This exercise also helps build vocabulary and awareness of word structure.

Lulu's Laundry Line[4]*:* Short passages are presented with occasional gaps where punctuation is missing. The participant must read the words and understand the passage in order to determine the correct punctuation. The exercise develops punctuation skills as well as automaticity for decoding and sentence comprehension.

Assessments

Students in the Pocatello/Chubbuck School District 25 had their reading skills evaluated with the Idaho Standards Achievement Test (ISAT) in the fall and spring of the 2004-2005 school year.

Idaho Standards Achievement Test (ISAT): The ISAT is a computerized, standards-based state assessment produced by the Northwest Evaluation Association (NWEA). It contains multiple choice questions and is appropriate for grades 2 through 10. The test has reading, language arts, and math sections and is offered in the fall and spring of each academic year. Scores are reported in terms of a scaled score or percentiles.

Once a student completes the test, their score is translated into a proficiency category. These are Advanced (score exceeds standards), Proficient (score meets standards), Basic (score is below standards), and Below Basic (score is critically below standards). A score of Proficient or higher is needed to indicate mastery of a subject.

Analysis

Scores were reported in terms of scale scores (ISAT Rasch Units) and percentiles. Data were analyzed 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). During the 2004-2005 school year, the Pocatello/Chubbuck School District 25 chose to use a variety of protocols. These protocols called for students to use the products for 48, 50, 90 or 100 minutes a day, five days per week, for four to twelve

[4] Exercise from the Fast ForWord to Reading 4 product.

weeks. Most of the 142 students started with the Fast ForWord Middle & High School or Fast ForWord Language to Reading product. Other products may have been used in previous years. 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 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	Attendance Level
Fast ForWord Language	13	45	124	71%	90%	61%
Fast ForWord Middle & High School	78	29	74	78%	80%	54%
Fast ForWord Language to Reading	73	30	95	59%	78%	43%
Fast ForWord to Reading 4	15	32	66	71%	74%	68%

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.

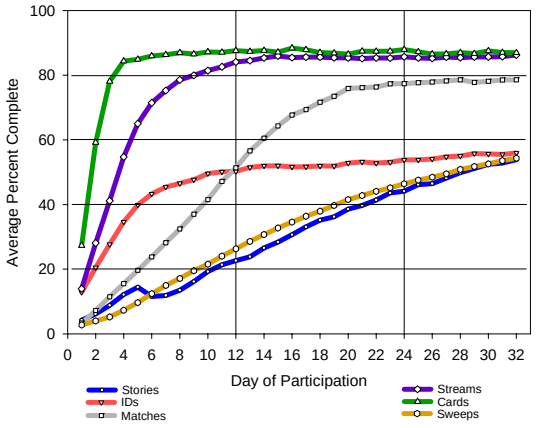

Figure 1. Average daily progress through the Fast ForWord Middle & High School product exercises. Results from 78 students are shown.

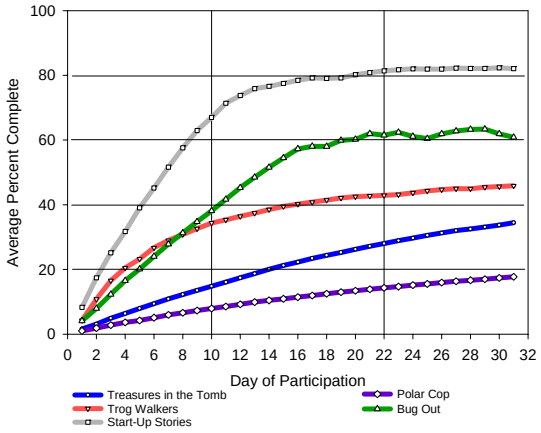

Figure 2. Average daily progress through the Fast ForWord Language to Reading product exercises. Results from 73 students are shown.

Assessment Results

The ISAT scoring system uses Rasch Units (RIT), which represent a unit of knowledge on a numeric scale ranging from approximately 150 to 300. Scores are calculated with a formula using the RIT value of the question and the number of correct answers. The RIT score is then translated into a proficiency level (below basic, basic, proficient, advanced). School personnel reported RIT scores as well as percentiles for analysis.

ISAT percentiles were converted to normal curve equivalents (NCEs) for the analyses. NCEs, which allow for comparisons across grades, are normally distributed and therefore are the most appropriate units for statistical analysis. Since percentiles rate students relative to their peers, a consistent percentile indicates a student is developing at a rate similar to other students of a similar age and ability. Increases in percentile rank (or NCE score) indicate that the students' learning rate has increased.

Idaho Standards Achievement Test (ISAT): ISAT scores from before and after Fast ForWord use were reported for 142 students. Before Fast ForWord participation, the average NCE score was 32.1, a score in the low average range. Following product use, students, overall, significantly improved their reading achievement and gained more than one-fourth of a standard deviation, corresponding to an improvement from the 23rd to the 30th percentile (Figure 3, Table 2). In terms of proficiency levels, only 5% of participants had Proficient reading skills at the time of pre-testing. At post-test, the number of students at Proficient or above increased to 40% after participating in Fast ForWord. Overall, 52% of the participants improved at least one proficiency level after Fast ForWord use.

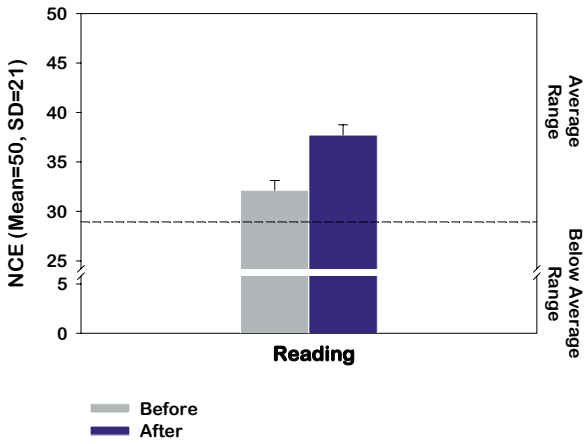

Figure 3. Students, on average, made significant gains in reading achievement after using Fast ForWord products. Results from 142 students are shown.

	n	Before		After		t-statistic
		Mean	SE	Mean	SE	
ISAT	142	32.1	0.98	37.7	1.05	5.79*

Table 2. On average, after Fast ForWord participation, students significantly improved their reading achievement and gained a quarter of a standard deviation in reading score.

	n	Proficiency Levels			
		Below Basic	Basic	Proficient	Advanced
Before	142	59.2	35.9	4.9	0
After	142	30.3	29.6	37.3	2.8

Table 3. Following Fast ForWord participation, 40% of study participants were meeting Idaho reading standards. Results are shown in percentages.

DISCUSSION

During the 2004-2005 school year, students in the Pocatello/Chubbuck School District 25 used the Fast ForWord products and had their reading performance evaluated with the Idaho Standards Achievement Test (ISAT). On average, students made significant gains in reading achievement after Fast ForWord product use, improving their score by over one-fourth of a standard deviation and reaching the 30th percentile in reading ability. These findings demonstrate that, within the Pocatello/Chubbuck School District 25, an optimal learning environment coupled with a focus on cognitive and early reading skills continues to help students attain higher levels 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 Pocatello/Chubbuck School District 25 made significant gains in their reading achievement with the number of students meeting Idaho performance standards reaching 40%, eight times the number of students who were meeting proficiency before Fast ForWord use. 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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