

Improved Reading Achievement by Students in Pocatello/Chubbuck School District 25 who used Fast ForWord® Products Longitudinal Results

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ABSTRACT

Purpose: Two studies investigated the longitudinal effects of the Fast ForWord products on the reading skills of students who used the products within the curriculum in a school setting. **Study Design:** These studies were multiple school observational studies using state assessments. **Participants:** Study participants were seventh through twelfth grade students who were attending schools in the Pocatello/Chubbuck School District 25 of Pocatello, Idaho.

Materials & Implementation: Following staff training on the products, students used Fast ForWord products during the summer before the 2003-2004 school year (study 1) or during the 2003-2004 school year (study 2). Student performance was evaluated with the Idaho Standards Achievement Test (ISAT) before, after and up to 18 months following Fast ForWord participation. **Results:** On average, after using the Fast ForWord products, students had significant gains in reading achievement and rate of learning. Study 1 (Summer School, 2003): the group of students improved from the 13th percentile before Fast ForWord use to the 22nd percentile immediately after, and the 39th percentile 18 months later. Study 2 (2003 – 2004 School Year): the group of students improved from only 19% achieving a Basic reading level or above, to 61%. A year later, the level was similar (59%).

Keywords: Idaho, middle school, high school, urban district, observational study, longitudinal study, 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).

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 current studies are on the same two groups of students but are longitudinal, evaluating the effects of the Fast ForWord products over time. Both groups of students are followed through the 2004 – 2005 school

year: more than 18 months after initial participation for the summer participants, and 12 months after participation for the 2003 – 2004 school year participants.

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% were eligible for free or reduced price lunches.

Three schools, Hawthorne Middle School, Highland Senior High School, and New Horizon High School, used Fast ForWord products during the summer of 2003 or during the 2003-2004 school year and had Idaho Standards Achievement Test (ISAT) scores reported for analysis. Study participants were 7th-12th grade students who had ISAT scores from before, after and up to 18 months after Fast ForWord participation. School personnel administered the assessments and reported scores for analysis.

For this report, students were separated into two groups depending on when they used Fast ForWord products. The first group (Summer School, 2003) included 20 students who participated during the summer before the 2003-2004 school year; the second group (2004 – 2005 School Year) included 80 students with product use from the 2003-2004 school year. Four percent of all study participants were English Language Learners and 43% 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 Middle & High School, Fast ForWord Language to Reading, and Fast ForWord to Reading products are computer-based products that

combine an optimal learning environment with a focus on early reading and cognitive skills. The products include five to six 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; Fast ForWord Middle & High School and Fast ForWord Language to Reading are detailed in the following exercise descriptions.

Sweeps¹ and Trog Walkers²: 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.

Streams¹: Students hear a single syllable that is repeated several times, and then interrupted by a different syllable. Students must respond when they hear the change in the syllable. This exercise improves auditory processing, develops phoneme discrimination, and increases sustained and focused attention.

IDs¹, Polar Cop², and Treasure in the Tomb²: Students hear a target syllable or word, and then must identify the identical syllable or word when it is presented later. These exercises improve auditory discrimination skills, increase sound processing speed, improve working memory, and help students identify a specific sound. *Polar Cop* also develops sound-letter correspondence skills. *Treasure in the Tomb* also develops grapheme recognition.

Matches¹ and Bug Out²: 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 *Matches* 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.

Cards¹: 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

¹ Exercise from the Fast ForWord Middle & High School product.

² Exercise from the Fast ForWord Language to Reading product.

sound processing speed, improves auditory recognition of phonemes and words, and helps students gain an understanding of word meaning.

Stories¹ and Start-Up Stories²: Students follow increasingly complex commands, match pictures to sentences, and answer multiple-choice questions about stories that are presented aurally.

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 each 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.

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

Percentiles and scale scores (ISAT Rasch Units) from three school years, 2002-2003, 2003-2004, and 2004-2005, were available for analysis. The test was administered in the Fall and Spring of each year. ISAT scores were 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

Summer School Group

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 time the Pocatello/Chubbuck School District 25 used Fast ForWord products, the district chose to use a variety of protocols. These protocols called for students to use the products for 48, 50, or 90 minutes a day, five days per week for four to twelve weeks. During the summer of 2003, the students used the Fast ForWord Middle & High School product with the 90-Minute Protocol; a few also used the Fast ForWord Language to Reading product with the 90-Minute Protocol during the summer. Following summer participation, the school district switched to a version of the Fast ForWord products that was not connected to the internet. Consequently, specific product use information from the 2003 – 2004 or 2004 – 2005 school years was not available. Detailed product use data from summer 2003 participation is shown in Table 1.

Figure 1 shows the average daily progress through the Fast ForWord Middle & High School product exercises during the summer, 2003, 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.

| Summer School, 2003 | Number of Students | Days Participated | Number of Calendar Days | Percent Complete | Participation Level |
|-----------------------------------|--------------------|-------------------|-------------------------|------------------|---------------------|
| Fast ForWord Middle & High School | 20 | 21 | 34 | 87% | 78% |

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.

Assessment Results

Summer School, 2003:

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 constant score indicates the student is developing at a typical rate. Increases in percentile rank (or NCE score) indicate that the students' learning rate has increased.

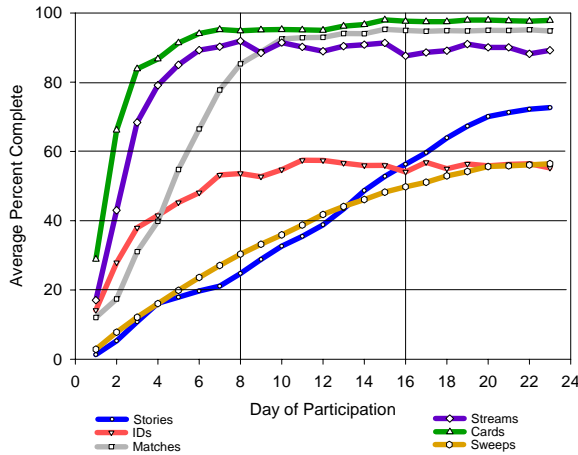


Figure 1. Average daily progress through the Fast ForWord Middle & High School product exercises. Results from 20 students are shown.

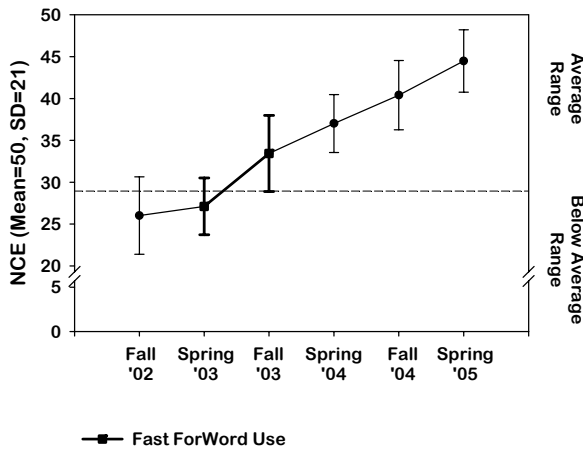


Figure 2. On average, students continued to make gains on the ISAT after using Fast ForWord products during the summer of 2003. Results from 12 students are shown.

ISAT scores were reported from the fall and spring of the 2002-2005 school years for a total of six test scores. Of the 20 students who had ISAT scores and product use, 9 had scores from all six test administrations. Two students who were missing one or more ISAT scores had their missing data replaced by linear interpolation; a total of three scores were replaced by linear interpolation. An additional student was missing only the score from Spring, 2005—it was replaced with his score from Fall, 2004. A total of 12 students were included in the MANOVA which showed that students had a significant difference in the

| Summer School, 2003 | n | Mean | SE |
|--------------------------|----|------|------|
| Fall '02 | 12 | 26.0 | 4.62 |
| Spring '03 (before FFWD) | 12 | 27.1 | 3.39 |
| Fall '03 (after FFWD) | 12 | 33.4 | 4.55 |
| Spring '04 | 12 | 37.0 | 3.46 |
| Fall '04 | 12 | 40.4 | 4.13 |
| Spring '05 | 12 | 44.5 | 3.73 |

Table 3. NCE scores of each ISAT test administered from Fall 2002 to Spring 2005.

| Summer School, 2003 | NCE | | Percentile | |
|-----------------------|------|------|------------|------|
| | Mean | SE | Mean | SE |
| Before FFWD | 26.8 | 2.77 | 17.8 | 3.29 |
| After FFWD | 38.8 | 2.03 | 33.1 | 2.97 |
| Final (at Spring '05) | 44.9 | 3.77 | 42.6 | 5.61 |

Table 4. The average NCE and percentile for student scores before Fast ForWord, after Fast ForWord and at the end of the study in Spring 2005. Students used products during the summer of 2003.

| Summer School, 2003 | n | Proficiency Levels | | | |
|--------------------------|----|--------------------|-------|------------|----------|
| | | Below Basic | Basic | Proficient | Advanced |
| Fall '02 | 12 | 83.3 | 0 | 16.7 | 0 |
| Spring '03 (before FFWD) | 12 | 50 | 33.3 | 16.7 | 0 |
| Fall '03 (after FFWD) | 11 | 63.6 | 27.3 | 9.1 | 0 |
| Spring '04 | 10 | 40.0 | 40.0 | 20.0 | 0 |
| Fall '04 | 11 | 45.5 | 27.3 | 27.3 | 0 |
| Spring '05 | 11 | 9.1 | 27.3 | 54.5 | 9.1 |

Table 5. The percentages of students who used Fast ForWord products during the summer of 2003 at each proficiency level during the six test administrations.

time between pre- and post-Fast ForWord test administrations ($F=19.46, p<0.001$). Figure 2 and Table 3 show the mean NCE score at each test administration; table 4 shows the average NCE and percentile of all scores before Fast ForWord use (Fall '02 and Spring '03), after Fast ForWord use (Fall '03-Spring '05) and the final score in Spring '05. Table 5 shows the percentages of students at each ISAT proficiency level.

2003 – 2004 School Year Group

Participation Level

During the 2003-2004 school year, the Pocatello/Chubbuck School District 25 chose to use the non-internet versions of the Fast ForWord Middle & High School and Fast ForWord Language to Reading products. The non-Internet version of Fast ForWord does not collect detailed product use information so detailed product use information is not available for students who used Fast ForWord during the 2003-2004 school year.

Assessment Results

2003-2004 School Year: A MANOVA was performed with scores from 58 students who used Fast ForWord products and had ISAT scores from all six test administrations (2 students had 3 missing data points replaced using linear interpolation). Results from the MANOVA showed that students improved significantly by time ($F=5.281, p<0.001$) and reached the average range of reading achievement following Fast ForWord use (Figure 3, Table 6). Table 7 shows the average NCE and percentile of all scores before Fast ForWord use (Fall '02-Fall '03), after Fast ForWord use (Spring '04-Spring '05) and the final score in Spring '05.

Table 8 shows the percentage of students at each ISAT proficiency level. Before Fast ForWord participation, the number of students at Basic or above ranged from 33% to 20% (average of 28%). After Fast ForWord participation, the number of students at Basic or above ranged from 35% to 62% (average of 52%).

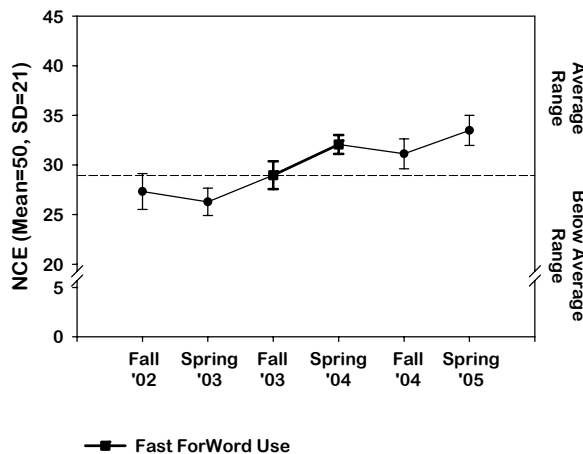


Figure 3. On average, student reading achievement reached and remained in the average range after Fast ForWord participation. The students used the Fast ForWord products during the 2003-2004 school year. Results from 58 students are shown.

| 2003-2004 School Year | n | Mean | SE |
|----------------------------|----|------|------|
| Fall '02 | 58 | 27.3 | 1.81 |
| Spring '03 | 58 | 26.3 | 1.38 |
| Fall '03 (before FFWD) | 58 | 29.0 | 1.40 |
| Spring '04 (after FFWD) | 58 | 32.1 | 0.94 |
| Fall '04 | 58 | 31.1 | 1.51 |
| Spring '05 | 58 | 33.5 | 1.51 |

Table 6. NCE scores of each ISAT test administered from Fall 2002 to Spring 2005 for students who used products during the 2003-2004 school year.

| 2003-2004 School Year | NCE | | Percentile | |
|-----------------------|------|------|------------|------|
| | Mean | SE | Mean | SE |
| Before FFWD | 27.5 | 0.89 | 17.6 | 0.99 |
| After FFWD | 32.2 | 0.78 | 22.3 | 0.98 |
| Final (at Spring '05) | 33.5 | 1.51 | 24.3 | 2.01 |

Table 7. The average NCE and percentile for student scores before Fast ForWord, after Fast ForWord and at the end of the study in Spring 2005. Students used products during the 2003-2004 school year.

| 2003-2004 School Year | n | Proficiency Levels | | | |
|----------------------------|----|--------------------|-------|------------|----------|
| | | Below Basic | Basic | Proficient | Advanced |
| Fall '02 | 58 | 67.2 | 27.6 | 5.2 | 0 |
| Spring '03 | 57 | 68.4 | 28.1 | 1.7 | 1.7 |
| Fall '03 (before FFWD) | 57 | 80.7 | 14.0 | 5.3 | 0 |
| Spring '04 (after FFWD) | 57 | 38.6 | 54.4 | 7.0 | 0 |
| Fall '04 | 58 | 65.5 | 25.9 | 8.6 | 0 |
| Spring '05 | 58 | 41.4 | 32.8 | 22.4 | 3.4 |

Table 8. Percentages of students at ISAT proficiency levels for students who used products during the 2003-2004 school year.

DISCUSSION

During the summer before the 2003-2004 school year and during the 2003-2004 school year, students in the Pocatello/Chubbuck School District 25 used Fast ForWord products. Student reading achievement was evaluated using the Idaho state assessment. Scores from three school years were available. Scores from before, after and up to 18 months after Fast ForWord product use show that students made significant improvements and continued to show gains in reading achievement well after initial Fast ForWord participation.

In the first study, comprising students who used the Fast ForWord products during the summer, 2003, the group of students was initially at the 13th percentile. On average, the group reached the 22nd percentile in the fall, immediately after using the products. Their acquisition rate of reading skills continued to increase during the following two school years such that the average reading scores were in the 39th percentile in the Spring of 2005.

In the second study, during the 2003 – 2004 school year, the percentage of students at Basic or above increased from 19% immediately before Fast ForWord participation to 61% immediately following Fast ForWord use. It was close to this level (59%) a year later.

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 can help students attain a higher level of reading achievement, and accelerate their rate of learning.

CONCLUSION

Strong cognitive and language skills are critical for all students, impacting their ability to benefit from instruction and participate in class discussions. Strong linguistic skills also provide a critical foundation for building reading and writing skills. Scores from before and after Fast ForWord participation show that, on average, students made significant increases in their reading achievement, with a higher percentage of students moving closer to or meeting Idaho performance standards. Scores also show that these students' stronger skills and rate of learning were maintained or even continued to improve six, twelve, and eighteen months after initial Fast ForWord

participation. 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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