

Improved Cognitive and Early Reading Skills by Students in Stamford City School District who used Fast ForWord® Products

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ABSTRACT

Purpose: This study investigated the effects of the Fast ForWord Language product on the cognitive and early reading skills of students who used the products within the curriculum of a school setting. **Study Design:** The design of this study was a multiple school case study using nationally normed tests. **Participants:** Study participants were 70 students attending schools in the Stamford City School District of Fairfield County, Connecticut. **Materials & Implementation:** Following staff training on the Fast ForWord Language product, students started participation with individual start dates staggered. On average, students used the products for 25 days over a period of 48 calendar days. Before and after participation, students had their language abilities evaluated with the Comprehensive Test of Phonological Processing (CTOPP) and the Developmental Reading Assessment (DRA). **Results:** On average, students made significant improvements in their cognitive and early reading skills after participation on the Fast ForWord Language product, gaining one-half standard deviation in phonological awareness and phonological memory.

Keywords: Connecticut, public elementary schools, urban district, observational study, Fast ForWord Language, special education, Comprehensive Test of Phonological Processing (CTOPP), Developmental Reading Assessment (DRA).

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 Stamford City 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 the reading achievement of low-performing students in a school setting. In this study, a commercially available computer-based product (Fast ForWord Language) was used to evaluate the effectiveness of this approach at improving the reading achievement of students.

METHODS

Participants

From 2003 – 2004, 70 students with an average grade level of 4.3 in the Stamford City School District used

the Fast ForWord Language product. The majority of the participants were identified special education students who were referred by the Planning and Placement team in each building. Students were chosen from ten schools in the district that participated in this study.

The Stamford City School District is an urban community located in Fairfield County, CT. The district has 21 schools serving over 15,000 students in grades PK to 12. Approximately 44% of students are white, 26% black and 25% Hispanic. About 34% of K – 12 students come from non-English language homes and 32% are eligible for free or reduce price meals. 11% of the students receive special education services.

Students had their language skills evaluated with the Comprehensive Test of Phonological Processing (CTOPP) before and after participation on the Fast ForWord Language product. Some students were also evaluated with the Developmental Reading Assessment (DRA). Seventy students had pre- and post-participation scores available for analysis.

Implementation

Educators at Stamford City School District 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. Individual teams at each school were given additional training.

A referral protocol was developed and shared with the Planning and Placement team in each building. The protocol requested data specific to hearing and vision screening, teacher input, and standardized test scores. The latter included Developmental Reading Assessment and other state mandated test scores as well as individual tests including, but not limited to, the Clinical Evaluation of Language Fundamentals, the Comprehensive Test of Phonological Processing and the Woodcock Johnson Achievement Tests.

Student data were reviewed and students were selected. Letters were sent home to parents outlining the program requirements and seeking permission. Parents were invited to learn more about the program via phone calls and information packets. Once permission was given, pre-participation testing began.

Materials

The Fast ForWord Language product, is a computer-based product that combines an optimal learning environment with a focus on early reading and cognitive skills. The product includes seven exercises designed to build skills critical for reading and learning, such as auditory processing, memory, attention, and language comprehension.

Circus Sequence: 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: Students use the computer mouse to catch and hold a flying animal. The animal repeats a single syllable several times, and students must release the animal when they hear a change in the syllable. This exercise improves auditory processing, develops phoneme discrimination, and increases sustained and focused attention.

Phoneme Identification: 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: 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 improves rate of auditory processing.

Phonic Words: Students see two pictures representing two similar words that differ only by initial or final consonant ("tack" versus "tag"). When students hear the word representing one of the pictures, 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: 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: In Block Commander, a three-dimensional board game is filled with familiar shapes that students select and manipulate. The students are asked to follow increasingly complex commands. This exercise increases listening comprehension and the ability to follow directions, improves syntax, develops working memory, and improves sound processing speed.

Assessments

Students were evaluated with the Comprehensive Test of Phonological Processing (CTOPP) before and after participation on the Fast ForWord Language product. Some students were also evaluated with the Developmental Reading Assessment (DRA). School personnel administered the assessment and reported the scores for analysis.

Comprehensive Test of Phonological Processing (CTOPP): The CTOPP measures a student's awareness of, and access to, the phonological structure of oral language as well as phonological memory, ability to rapidly execute a sequence of operations, and ability to blend and segment words and non-words.

The Institute for the Development of Educational Achievement recognizes the CTOPP as an appropriate assessment for measuring improvements in the phonological awareness skills of children in early elementary school. Phonological awareness is an essential component of language and early reading skills.

Developmental Reading Assessment (DRA): The DRA is a criterion-referenced test designed to evaluate a student's oral

reading accuracy, fluency, and reading comprehension. It is appropriate for grades K– 3.

Analysis

Scores were reported in terms of standard scores for the CTOPP and data were analyzed using dependent t-tests and a MANOVA calculation. Scores for the DRA were reported in terms of Level. All analyses used a p-value of 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). The Fast ForWord Language protocol chosen by the district calls for students to use the product for 100 minutes a day, 5 days a week, for four to eight weeks.

Seventy students from the Stamford City School District used the Fast ForWord Language product. The start dates for the students were staggered throughout the 2003 – 2004 year, with each student using the product for an average of 25 days over a calendar period of 48 days, completing 71% of the product and achieving a participation level of 63%. Detailed usage data is shown in Table 1.

Figure 1 shows the average daily progress through the Fast ForWord Language exercises for the students for whom CTOPP scores were available. 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
Fast ForWord Language	70	25	48	71%	63%

Table 1. Usage data showing the number of students who used the Fast ForWord Language product along with group averages for the number of days of product use, calendar days between start and finish, percentage of content covered and participation level.

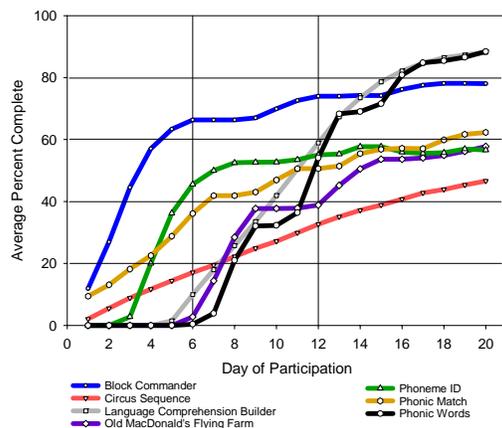


Figure 1. Average daily progress of students through the Fast ForWord Language exercises. Results from 70 students are shown.

Assessment Results

Comprehensive Test of Phonological Processing (CTOPP):

Student CTOPP scores were reported in terms of standard scores. A repeated measures multivariate analysis of variance (MANOVA) found significant differences for test and for time. There was also a significant interaction of test by time (Table 2). T-tests were calculated for the subtests and significant improvements were found for all three (Table 3).

Overall, before participation on the Fast ForWord Language product, students were performing in the below or low average range. After Fast ForWord participation, on average, students had moved into the average range for all three CTOPP subtests used (Figure 2).

	df	MANOVA f
Test	68	11.8*
Time	69	70.3*
Test x Time	68	8.9*

Table 2. Significant differences were found for test, time and test by time for students who used the Fast ForWord Language product. *p<0.05.

	n	Before		After		t-statistic
		Mean	SE	Mean	SE	
Phonological Awareness	70	81.2	1.44	88.1	1.3	6.24*
Phonological Memory	70	87.1	1.48	95.9	1.65	6.15*
Rapid Naming	70	87.7	1.67	89.9	1.8	2.18*

Table 3. Students who used the Fast ForWord Language product made significant improvements in their cognitive and early reading skills after participation. *p<0.05.

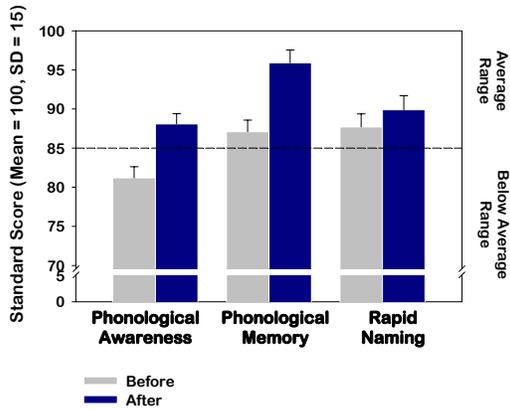


Figure 2. Standard scores from before and after participation on the Fast ForWord Language product show that students who used the product made significant improvements on the CTOPP.

Developmental Reading Assessment (DRA): Before Fast ForWord Language participation, students, on average, were at a DRA reading level below that appropriate for their grade (they were at a DRA level of 12.4, and at a grade level of 2.8). After using the Fast ForWord Language product, students made significant gains in their reading skills and moved closer to their desired DRA reading level (Figure 3 and Table 4).

	n	Before		After		t-statistic
		Mean	SE	Mean	SE	
DRA	14	12.4	2.11	17.9	2.5	3.10*

Table 4. Overall, after Fast ForWord Language participation, students made significant improvements in their reading skills. * $p < 0.05$.

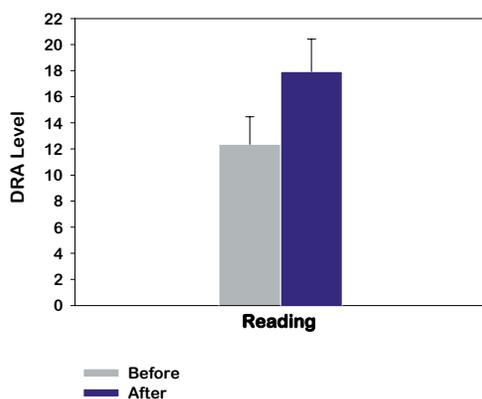


Figure 3. Students who used the Fast ForWord Language product made significant gains in their reading abilities after participation.

DISCUSSION

From 2003 – 2004, students in the Stamford City School District used the Fast ForWord Language product. On average, students who were receiving

special education services made significant improvements in their cognitive and early reading skills after using the Fast ForWord product.

Before using the products, students were, on average, in the below or low average range on the CTOPP composites. On average, after Fast ForWord Language participation, students made significant improvements and moved into the average range. Students, on average, were also below their reading level on the DRA before Fast ForWord Language participation. After using the product, students showed significant gains and moved closer to their required DRA reading level.

CONCLUSION

Cognitive and early reading skills are critical for all students, impacting their ability to benefit from instruction, follow instructions, and participate in class discussions. Strong cognitive 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 cognitive and early reading abilities. This suggests that using the Fast ForWord Language product strengthened the students' foundational skills and helped them benefit more from the classroom curriculum.

Notes:

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