

Improved Reading Achievement by Students in the Waterford Public Schools who used Fast ForWord® Products: 2006 - 2008

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ABSTRACT

Purpose: This study investigated the 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:** The design of this study was a multiple school study using high stakes and/or reading skills tests. High stakes test scores were available for three years allowing an investigation of longitudinal effects. **Participants:** Study participants were 153 students attending elementary and middle schools in the Waterford Public Schools, in Waterford, Connecticut during the 2006-2007 or 2007 - 2008 school year. **Materials & Implementation:** Before and after participation on the Fast ForWord products, students were evaluated with the Degrees of Reading Power and/or Reading Progress Indicator (RPI). **Results:** On average, after Fast ForWord participation, students showed significant improvement in Reading achievement as measured by the Degrees of Reading Power. This improvement was not evident prior to participation. Results were maintained for at least one year after participation. According to RPI, students who benefitted made an average improvement of 1 year after 41 days of Fast ForWord participation, corresponding to movement from the 23rd to the 45th percentile.

Keywords: Connecticut, elementary school, middle school, suburban, longitudinal, observational study, Fast ForWord Language, Fast ForWord Middle & High School, Fast ForWord Literacy, Fast ForWord Literacy Advanced, Connecticut Mastery Test (CMT), Degrees of Reading Power (DRP), Reading Progress Indicator (RPI).

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 Waterford Public Schools were 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 students in a school setting. In this study, commercially available computer-based products (Fast

ForWord Language, Fast ForWord Middle & High School, Fast ForWord Literacy, and Fast ForWord Literacy Advanced) were used to evaluate the effectiveness of this approach at improving the reading skills of students

METHODS

Participants

A town of approximately 20,000 residents, Waterford, Connecticut, is located in southeast Connecticut two hours from Boston and New York City. Founded in the 1700's, it is surrounded by water on three sides and is an easy commute to Hartford and New Haven.

The Waterford Public Schools serve nearly 3,000 students at seven schools. Approximately 85% of the students in the district are Caucasian, with the remainder evenly split between Asian, Hispanic, and Black.

This study used two measures to evaluate the impact of the Fast ForWord products: the state assessment, and an assessment of reading skills. The state assessment was used to evaluate the impact on ninety-seven middle school students: half started using the products between the 2006 and 2007 administrations

of the state assessment while the others started between the 2007 and 2008 administration. The students had scores available from the Connecticut Mastery Test (CMT) immediately prior and following Fast ForWord participation.

Reading Progress Indicator was used to measure the impact on 95 students: forty-one of the middle school students (of which 39 were also evaluated on the CMT) and an additional 54 elementary school students. School personnel administered the assessments and reported CMT scores for analysis.

Of the middle school students who participated on the ForWord products and had CMT scores available, 73% were White, 12% Hispanic, and 6% Black. Twelve percent of the students were eligible for free or reduced-price lunches and 6% were English language learners. During the 2006-2007 school year 91% of the Fast ForWord participants were receiving special education services, while only 20% of the 2007-2008 Fast ForWord 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 at least 10% of these students in this study (Fast ForWord Language, Fast ForWord Middle & High School, Fast ForWord Literacy, and Fast ForWord Literacy Advanced) 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 the products, all help develop certain critical skills as detailed in the following exercise descriptions.

*Circus Sequence*¹, *Sweeps*², *Space Racer*³ and *Sky Rider*⁴: 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 *Streams*² and *Galaxy Goal*³: 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, *Spin Master*³, *Meteor Ball*⁴, and *Lunar Leap*⁴: 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.

*Phonic Match*¹, *Matches*², *Lunar Tunes*³, and *Laser Match*⁴: 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 *Cards*², and *Star Pics*³: 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 Literacy product.

⁴ Exercise from the Fast ForWord Literacy Advanced 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, *Stellar Stories*³, and *Galaxy Theater*⁴: Students follow increasingly complex commands, match pictures to sentences, and answer multiple-choice questions about stories that are presented aurally.

Assessments

Every spring the students' reading skills were evaluated with the Degrees of Reading Power (DRP) as part of the Connecticut Mastery Test (CMT). School personnel administered the assessments.

Connecticut Mastery Test (CMT): The Connecticut Mastery Test, or CMT, is a standardized test administered to students in Connecticut in grades 3 through 8 every spring.

The CMT incorporates the **Degrees of Reading Power (DRP)** by TASA Literacy (now Questar Assessments Inc.), to provide a norm-referenced component of reading comprehension.

Reading Progress Indicator (RPI) was also administered to many students who participated during the 2007 – 2008 school year. It was administered

before and after completion of each Fast ForWord product.

Reading Progress Indicator: Reading Progress Indicator is a computerized assessment designed to rapidly measure the impact of the Fast ForWord products. It assesses a student's early reading skills including phonemic awareness, decoding, vocabulary, and comprehension.

Analysis

Unit Scores from the Degrees of Reading Power were reported for the norm-referenced portion of the test.

The DRP Unit Scores from 2006, 2007, and 2008 were analyzed using paired t-tests. Reading Progress Indicator (RPI) scores were reported in terms of national percentiles and grade equivalents. A p-value of less than 0.05 was 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 2006-2007 and 2007-2008 school years, the Waterford Public Schools used the 48- and 50-Minute protocols. These protocols call for students to use the products for 48 or 50 minutes a day, five days per week for eight to twelve weeks. Detailed product use for students with DRP Unit Scores is shown in Table 1. Detailed product use for students with valid RPI scores is shown in Table 2. Products used by fewer than 10% of the students are not included.

Product Use for Students with Scores from the Connecticut Mastery Test						
	Number of Students	Days Participated	Number of Calendar Days	Percent Complete	Participation Level	Attendance Level
Fast ForWord Middle & High School	46	31	62	81.2%	84.4%	79.0%
Fast ForWord Literacy	51	23	45	92.5%	98.4%	76.0%
Fast ForWord to Literacy Advanced	97	26	51	62.8%	84.1%	80.4%
Total Fast ForWord Product Use	97	53	105			

Table 1. Usage data for students with DRP data. This table shows 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. Products used by fewer than 10% of the students are not included. Total values reflect the average total number of days that students used products. Note: Students often use multiple products.

Product Use for Students with Scores from Reading Progress Indicator						
	Number of Students	Days Participated	Number of Calendar Days	Percent Complete	Participation Level	Attendance Level
Fast ForWord Language	54	42	44	73%	93%	80%
Fast ForWord Literacy	15	34	65	62%	97%	81%
Fast ForWord to Literacy Advanced	41	23	44	73%	93%	80%
Total Fast ForWord Product Use	95	39	54			

Table 2: Usage data for students with RPI data. This table shows 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. Note: Students often use multiple products.

Assessment Results

Connecticut Mastery Test (CMT): The CMT is administered each year in early March. To allow students time to complete product content, only students who started using the products prior to January 1st are included in the CMT analysis.

Results from the DRP were analyzed using a paired t-test to compare DRP Unit Scores from before participation to Scores from after participation. There were 46 Fast ForWord participants with DRP Scores

available from both 2006 and 2007. Overall, the students achieved significant improvements in their DRP Unit Scores with scores increasing from 48.4 to 52.9 after Fast ForWord participation (Table 3).

Results were similar for the 52 students who first participated during the 2007 – 2008 school year; this second group made significant improvements after using the Fast ForWord products with average scores improving from 49.8 to 53.7 (Table 3).

DRP Unit Scores	n	Before		After		t-statistic
		Mean	SE	Mean	SE	
2006 - 2007	46	48.4	1.2	52.9	1.3	4.28
2007 - 2008	52	49.8	0.92	53.7	0.97	4.6*

Table 3. Students who used Fast ForWord products achieved significant improvement in their Reading scores as reflected by their Scale Score. * $p < 0.05$.

Most students had scores available for all three years: 2006 – 2008. This allowed the evaluation of longitudinal effects as well as an inspection of typical improvements for students appropriate for Fast ForWord participation in the year prior to participation.

Thirty-one students first used the products during the 2006 – 2007 school year and had scores available from 2006 – 2008. These students achieved significant improvements between 2006 and 2007, moving from an initial score of 47.4 to 50.2 following Fast ForWord product use. They maintained their higher scores in 2008 with a DRP Unit Score of 51.5 (Figure 1).

Forty-six students first used the Fast ForWord products during the 2007- 2008 school year, but had scores available from 2006 – 2008. Scores in 2007 were steady with those from 2006, moving only from an initial score of 48.0 to 49.5. However, after using

the Fast ForWord products, students significantly improved their performance for a final DRP Unit Score of 53.8 (Figure 2).

Reading Progress Indicator (RPI): RPI was also used to evaluate the impact of the Fast ForWord products on Waterford Public Schools students who used the Fast ForWord products during the 2007 – 2008 school year. Ninety-five students in the district are included in the RPI evaluation; most of the students (54) were in elementary school. The 95 students used the Fast ForWord products during the 2007 – 2008 school year and had valid RPI scores from before and after product use. Of the students, 59 (62%) showed improvement with their average improvement being 1 year after 41 days of participation. This corresponds to improving from the 23rd percentile to the 45th (Figure 3). Most of the students (54.6%) were initially in the Struggling category (below the 30th percentile). After Fast ForWord participation, the number of students below the 30th percentile dropped by 25%, from 51 students to 38.

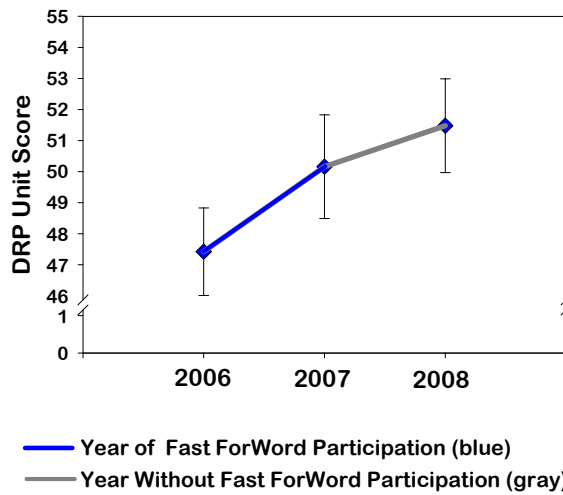


Figure 1: On average, students who used Fast ForWord products made improvements on their reading achievement as measured by the DRP. Thirty-one students who used the Fast ForWord products between the 2006 and 2007 assessments made significant improvements on the 2007 assessment, and maintained those improvements in 2008.

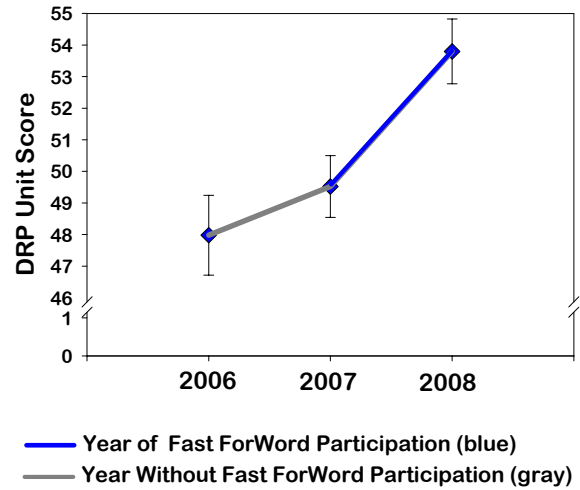


Figure 2: On average, students who used Fast ForWord products made improvements on their reading achievement as measured by the DRP. Forty-six students who did not use the products until after the 2007 assessment did not make significant improvements between 2006 and 2007, but did make significant improvements between 2007 and 2008. participation but did not use it as evidenced by the lack of significant improvement between 2006 and 2007 for students who did not use the products.

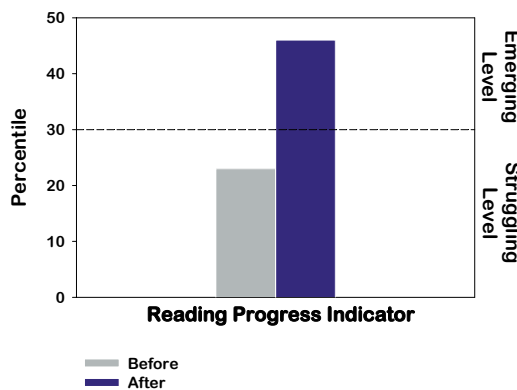


Figure 3: On average, students who used Fast ForWord products made improvements on Reading Progress Indicator. For students who showed improvement, the average improvement was 1 year.

DISCUSSION

Students in Waterford Public Schools made significant gains in their academic achievement following Fast ForWord participation. These improvements are apparent in the analysis of the DRP scores as well as the students' RPI scores.

Across all students in the district with 2006 and 2007 DRP scores who participated on the Fast ForWord products, students on average showed significant improvement in Reading achievement. These improvements were not evident in students who were appropriate for Fast ForWord

Improved reading skills were also observed using the Reading Progress Indicator (RPI). Students improved, on average, 1 year after 41 days of Fast ForWord participation, corresponding to movement from the 23rd percentile to the 45th percentile.

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. The current study reflects significant improvements in academic achievement across a variety of demographic groups. This study supports other studies demonstrating that using the Fast ForWord products strengthens students' foundational skills allowing them to benefit more from the classroom curriculum.

Notes:

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