Improved Reading Achievement by Students in the Clarke County School District who used Fast ForWord® Products: 2006 - 2008

MAPS for Learning: Educator Reports, 13(1): 1-10

ABSTRACT

Purpose: This study investigated the effects of Fast ForWord products on the reading skills of students who used the products within the curriculum in a school setting.

Results: During the 2006-2007 school year, students in the Clarke County School District who used Fast ForWord products made greater gains in reading achievement than students in the comparison group; these results were replicated during the 2007-2008 school year. These results applied to all subgroups evaluated: Limited English Proficiency, Special Education and Economically Disadvantaged. Following Fast ForWord participation in 2006-2007, 40% of students who were not proficient in 2006 crossed the proficiency threshold in 2007, compared to 27% of the students in the comparison group. These results were replicated by students who first used Fast ForWord products during the 2007-2008 school year: 42% of the participants crossed the proficiency threshold in 2008, compared to 29% of the students in the comparison group.

Study Design: The design of this study was a multiple school quasi-experimental study using high stakes tests.

Participants: Study participants were 2,257 elementary and middle school students attending schools in the Clarke County School District in Athens, Georgia. Students were broken down into three cohorts based on when they started using Fast ForWord products: during the 2006-2007 school year, during the 2007-2008 school year or after the 2008 administration of the Georgia state assessment.

Materials & Implementation: Before and after participation on Fast ForWord products, students were evaluated with the Criterion-Referenced Competency Tests (CRCT).

Keywords: Georgia, elementary school, middle school, urban, at-risk, quasi-experimental study, longitudinal study, Fast ForWord Language Basics, Fast ForWord Language, Fast ForWord Middle & High School, Fast ForWord Literacy, Fast ForWord Literacy Advanced, Fast ForWord Reading Prep, Fast ForWord Reading Level 1, Fast ForWord Reading Level 2 Fast ForWord Reading Level 3, Criterion-Referenced Competency Tests (CRCT),.

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 Clarke County 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 skills of students in a school setting. In this study, commercially available computer-based products (Fast

ForWord Language Basics, Fast ForWord Language, Fast ForWord Language to Reading, Fast ForWord Middle & High School, Fast ForWord Literacy, Fast ForWord Literacy Advanced, Fast ForWord Reading Prep, Fast ForWord Reading Level 1, Fast ForWord Reading Level 2, and Fast ForWord Reading Level 3) were used to evaluate the effectiveness of this approach at improving the reading ability of elementary and middle school students.

METHODS
Participants
The Clarke County School District is located in the college town of Athens in northeastern Georgia. Athens has grown up around the University of Georgia and has a current population of approximately 175,000 people.

Serving nearly 12,000 students at 22 schools, Clarke County School District's mission is to prepare its students to be productive members of society by providing a challenging and meaningful education. Approximately 55% of the students in the district are African-American, 22% are Caucasian and 17% are Hispanic.

Two thousand two hundred fifty-seven students in kindergarten through eighth grade from eight schools took part in this study and had their reading achievement assessed before and after Fast ForWord participation. Students were broken down into three cohorts based on when they started using Fast ForWord products: during the 2006-2007 school year, during the 2007-2008 school year or after the 2008 administration of the Georgia state assessment.

The assessment used was Georgia's high stakes reading assessment: the Criterion-Referenced Competency Tests (CRCT). All students had scores available from the 2006, 2007, and 2008 administrations of the CRCT. School personnel administered the assessments and reported scores for analysis.

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
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 in this study (Fast ForWord Language Basics, Fast ForWord Language, Fast ForWord Language to Reading, Fast ForWord Middle & High School, Fast ForWord Literacy, Fast ForWord Literacy Advanced, Fast ForWord Reading Prep, Fast ForWord Reading Level 1, Fast ForWord Reading Level 2, and Fast ForWord Reading Level 3) 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 the products, all help develop certain critical skills as detailed in the following exercise descriptions.

Inside the Tummy[1, 2]*:* Participants click and drag colored shapes into matching shape outlines in pre-defined patterns. This task helps participants improve fine motor skills, hand-eye coordination, and computer mousing skills.

Hungry Tummy[2]*:* Participants follow spoken directions to feed shapes of different colors and sizes to "Hungry Tummy" the bear. This task develops knowledge of basic colors (red, blue, green, yellow, and white), shapes (square, circle, and triangle) and relative size (big and small). Participants also develop their working memory, verbal decoding skills, and mousing skills as they practice following spoken instructions.

Flying Saucer[1]*:* Participants identify sounds presented in a sequence, then click on graphic icons associated with those sounds to reproduce the sequence. This task builds auditory discrimination ability, auditory working memory, and sequencing skills.

Drag Racer[1]*:* Participants point and click on a (sometimes moving) graphic, then hold the mouse button down to hear a stream of identical sounds. Participants release the mouse button when there is a sound change. This task is designed to improve auditory discrimination and sustained auditory attention. It also develops mousing skills, and the

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[1] Exercise from the Fast ForWord Basics product.
[2] Exercise from the Fast ForWord to Reading Prep product.

ability to withhold a response until an auditory cue is presented.

Packing Pig Goes to Work[2]: The name of a letter is presented aurally, and then that letter, along with up to four other letters, is displayed on the screen. The participant must click on the letter that was aurally presented. This task develops letter-name knowledge, auditory working memory, and visual-spatial memory abilities.

Packing Pig Has Lunch[2]: Participants match upper and lower case letter tiles in progressively larger grids. At the easiest levels, the tiles are face-up, with the letters visible throughout the trial. At the hardest levels the tiles are face-down, and letters are only briefly visible when clicked, so that it becomes a memory challenge. This task develops letter-name knowledge, association of upper and lower case letters, auditory working memory, and visual-spatial memory abilities.

Ghost Coaster[2]: The participant works to associate a set of consonant phonemes (speech sounds) with the letters that represent them. Each phoneme/letter pair is presented in several trials, along with examples of words that start with the phoneme. This task builds letter-sound association skills and understanding of the alphabetic principle in written English.

Houndini[2]: Participants listen to sets of words, and must select the odd-one-out based on either beginning sounds or ending sounds. This task improves phonological processing skills including phoneme analysis and phonological working memory.

Circus Sequence[3] , Sweeps[4], Trog Walkers[5], Space Racer[6], and Sky Rider[7]: 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[3], Streams[4] and Galaxy Goal[6]: 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[3], IDs[4], Polar Cop[5], Treasure in the Tomb[5], Spin Master[6], Meteor Ball[7], and Lunar Leap[7]: 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[3], Matches[4], Bug Out[5], Lunar Tunes[6], and Laser Match[7]: 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[3], Cards[4], and Star Pics[6]: 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[3]: 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[3]: 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[4], Start-Up Stories[5],Stellar Stories[6], and Galaxy Theater[7]: Students follow increasingly complex

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[3] Exercise from the Fast ForWord Language product.
[4] Exercise from the Fast ForWord Middle & High School product.
[5] Exercise from the Fast ForWord Language to Reading product.
[6] Exercise from the Fast ForWord Literacy product.
[7] Exercise from the Fast ForWord Literacy Advanced product.

commands, match pictures to sentences, and answer multiple-choice questions about stories that are presented aurally.

Bear Bags[8] and Bear Bags: More Lunch[9]: In these exercises, the participant is asked to help Mama Bear sort words (on pieces of toast) into phoneme-based categories (in lunch bags). They develop phonemic awareness and decoding of single- syllable words. *Bear Bags* also develops understanding of alphabetic principles (phonics) and *Bear Bags: More Lunch* also develops grapheme/phoneme associations.

Magic Rabbit[8] and Magic Bird[9]: These exercises combine spelling and word-building practice with spelling patterns and word families commonly studied in 1st grade for *Magic Rabbit* and in 2nd grade for *Magic Bird*. The task is designed to emphasize the relationships between words by showing how one word can be turned into another by simply changing a single letter in any position. Using a click and drag interface, the participant must either select the missing letter to complete a partially spelled word or rearrange scrambled letter tiles to spell a word. These exercises develop spelling and sensitivity to letter-sound correspondences.

Flying Fish[8] and Fish Frenzy[9]: In these exercises, a fishing pelican pronounces a word. Then a series of spoken and/or written words (on fish) fly across the pond and the participant clicks on the word when it matches the pronounced word. These exercises develop decoding skills, identification of sight words, and auditory memory.

Quail Mail[8]: In Quail Mail, a squirrel mail carrier pulls words out of a mailbag and the participant sorts them into different categories by clicking on the appropriate mailbox. This exercise encourages flexibility during reading and automatic access to the various dimensions of vocabulary.

Bedtime Beasties[8] and Leaping Lizards[9]: These exercises use the "cloze task," in which a written and aurally presented sentence has a word missing. The participant must select the correct word to complete the sentence from four choices. Vocabulary skills and sentence comprehension are developed in these exercises.

Buzz Fly[8] and Dog Bone[9]: In these exercises, the participant listens to a passage and answers comprehension questions relating to each passage. The questions are aurally presented and written, and the response choices are presented as pictures. Responses are presented as words or short phrases in *Dog Bone*. These exercises develop listening comprehension and working memory skills as measured by performance on multiple choice questions.

Ant Antics[9]: The participant will be presented with a picture and then asked to pick one of the four alternatives that best describes an aspect of that picture. This exercise improves vocabulary skills and sentence comprehension.

Scrap Cat[10]: In Scrap Cat, a series of words is visually presented and participants are asked to sort each word into the correct semantic, phonological, syntactic, or morphological category. For this exercise only, the participant can click a button to hear any word and see it defined. This exercise develops decoding, vocabulary, and word recognition skills.

Canine Crew[10]: In Canine Crew multiple words are presented together in a grid and participants are asked to find pairs that match on the basis of the current criterion. This criterion shifts from words that rhyme, to synonyms, to antonyms, to homophones, as the participant progresses. This exercise develops vocabulary, decoding, and automatic word recognition.

Chicken Dog[10]: Participants hear a word and see it partially spelled. They must complete the word by filling in the missing letter or letter group. Five options are always provided, including options that represent common visual and phonological errors. This exercise develops basic spelling patterns, letter-sound correspondences, and decoding.

Twisted Pictures[10]: Participants are presented with a variety of pictures and asked to select the sentence that most accurately describes each picture from among four alternatives. The descriptive sentences incorporate a wide range of syntactic structures. As the participant progresses, the sentences get longer and more difficult vocabulary is included. This exercise builds sentence comprehension by developing syntax, working memory, logical reasoning, and vocabulary.

Book Monkeys[10]: Participants read narrative and expository passages and answer comprehension questions about each passage. The multiple-choice

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[8] Exercise from the Fast ForWord Reading Level 1 product.
[9] Exercise from the Fast ForWord Reading Level 2 product.

[10] Exercise from the Fast ForWord Reading Level 3 product.

questions demand that the participant use memory for literal detail, generation of inferences, or grasp of among four alternatives. This task develops paragraph comprehension, inferential and cause-and-effect reasoning, working memory, flexible reading, and vocabulary.

Hog Hat Zone[10]: In Hog Hat Zone, short passages from classic children's literature are presented, with occasional gaps in the text where words are missing. Participants are asked to fill in each gap with the correct word from among four alternatives. The missing words are morphologically important items such as pronouns, auxiliary verbs, and words with suffixes and prefixes. This task develops paragraph comprehension, complex morphology, flexible reading, and vocabulary.

Assessments:
In the spring of 2006, 2007 and 2008, students' reading achievement levels were evaluated with the reading portion of the Criterion-Referenced Competency Tests (CRCT). School personnel administered the assessment and reported the scores for analysis.

Criterion-Referenced Competency Tests (CRCT): The CRCT is designed to measure how well students acquire the skills and knowledge described in the Georgia Performance Standards (GPS). The CRCT is given every spring to all students to grades 1-8. Students are tested in Reading, English Language Arts and Mathematics.

Analysis:
Criterion-Referenced Competency Test (CRCT) scores were reported in terms of scaled scores. The scaled scores were analyzed using paired t-tests. 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 the 2007-2008 school years, the Clarke County School District used the 30-, 40-, 48-, 50- and 90-Minute protocols for Fast ForWord products. These protocols call for students to use the products for 30, 40, 48, 50 or 90 minutes a day, five days per week for four to sixteen weeks. Detailed product use is shown in Tables 1 and 2 for students in Wave 1 (students who started Fast ForWord during the 2006-2007 school year) and Wave 2 (students who started Fast ForWord during the 2007-2008 school year), respectively. Products used by fewer than 5% of the students are not included. Note: Many students used multiple products.

Product Use: 2006 – 2007 School Year						
	Number of Students	**Days Participated**	**Number of Calendar Days**	**Percent Complete**	**Attendance Level**	**Participation Level**
Language Series						
Fast ForWord Language	338	27	50	80%	90%	100%
Fast ForWord Language to Reading	306	30	111	62%	83%	100%
Fast ForWord Middle & High School	232	30	56	82%	85%	97%
Fast ForWord Literacy	38	43	104	83%	75%	97%
Fast ForWord Literacy Advanced	199	25	47	68%	85%	96%
Reading Series						
Fast ForWord Reading Level 1	237	15	48	76%	82%	97%
Fast ForWord Reading Level 2	147	15	43	50%	83%	95%
Fast ForWord Reading Level 3	44	19	57	44%	79%	90%
Total Fast ForWord Product Use	571	68	178			

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. Aggregate data is not shown for products used by fewer than five percent of the students. This table includes students who started using the products during the 2006-2007 school year. Note: Students often use multiple products.

Product Use: 2007 – 2008 School Year						
	Number of Students	Days Participated	Number of Calendar Days	Percent Complete	Attendance Level	Participation Level
Language Series						
Fast ForWord Language Basics	147	15	42	86%	73%	96%
Fast ForWord Language	240	43	104	63%	86%	99%
Fast ForWord Language to Reading	78	32	81	54%	90%	99%
Fast ForWord Middle & High School	38	10	19	51%	89%	98%
Fast ForWord Literacy	218	30	75	83%	77%	95%
Fast ForWord Literacy Advanced	138	29	82	66%	74%	93%
Reading Series						
Fast ForWord Reading Prep	207	39	110	78%	79%	98%
Fast ForWord Reading Level 1	279	29	71	70%	77%	96%
Fast ForWord Reading Level 2	130	18	45	56%	82%	92%
Fast ForWord Reading Level 3	62	23	57	61%	94%	83%
Total Fast ForWord Product Use	758	62	180			

Table 2. 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. Aggregate data is not shown for products used by fewer than five percent of the students. Total values reflect the average total number of days that students used products. This table includes students who started during the products during the 2007-2008 school year. Note: Students often use multiple products.

Assessment Results

Criterion Referenced Competency Tests (CRCT):
Scores were available from the 2006, 2007 and 2008 administrations of the CRCT. For the purpose of these analyses, students were divided into three cohorts:

- Wave 1: 571 students who started using Fast ForWord products during the 2006-2007 school year.
- Wave 2: 758 students who started using Fast ForWord products during the 2007-2008 school year.
- Wave 3: 928 students who did not start using Fast ForWord products until after the 2008 administration of the CRCT.

2006–2007 School Year: Results from students who began using Fast ForWord products during the 2006-2007 school year (Wave 1) were compared to results from students who did not use the products until the 2007 – 2008 school year (Wave 2). Since Wave 2 students were candidates for Fast ForWord products but did not use the products until after the 2007 administration of the CRCT, they were an appropriate comparison group.

Initially, at the time of the 2006 CRCT, Wave 1 students performed significantly below the group of students in the comparison group. After using Fast ForWord products, students in Wave 1 made significant improvements in their scaled scores on the 2007 administration of the CRCT Reading test; there was no significant change in the performance of the students in the comparison group (Table 3). Figure 1 compares the gains made by the Wave 1 and Wave 2 students during the 2006-2007 school year.
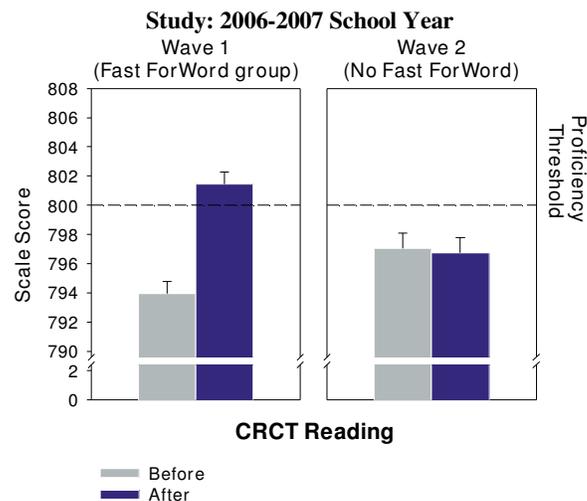

Figure 1. CRCT Reading scaled scores for Fast ForWord participants during the 2006-2007 school year (Wave 1) vs. students who did not use Fast ForWord products in 2006-2007. Students are considered proficient if they score better than 800 scaled score points. Results are shown for 514 Wave 1 students and 346 Wave 2 students.

	n	2006		2007		t-statistic
		Mean	SE	Mean	SE	
Wave 1 (Fast ForWord)	514	793.9	.845	801.5	0.81	9.70*
Wave 2 (Comparison)	346	797.1	1.02	796.7	1.05	-0.36

Table 3. CRCT Reading scaled scores for Fast ForWord participants during the 2006-2007 school year (Wave 1) vs. students who did not use Fast ForWord products in 2006-2007(Wave2). Results are significant if the p-value is less than 0.05 (*).

2007–2008 School Year: In 2007-2008, Clarke County replicated their 2006-2007 results. The new Fast ForWord participants (Wave 2) made significant gains, replicating the gains that had been made by the Wave 1 students in their first year of Fast ForWord participation. A comparison group was formed from the Wave 3 students who did not begin using Fast ForWord products until after the 2008 administration of the CRCT. The Wave 2 participants started with a lower average scaled score on the 2007 CRCT. Following Fast ForWord participation, the Wave 2 participants significantly improved their performance on the 2008 CRCT, achieving greater gains than those of the comparison group (Table 4). Figure 2 compares the gains made by the Wave 2 2007-2008 Fast ForWord participants and the Wave 3 non-participants.

Longitudinal Results: Three years of results from all three Waves show that during periods before students used Fast ForWord products, there were no significant changes in the groups' CRCT Reading Scores (Figure 3, dashed lines). However, during and after periods of Fast ForWord participation (Figure 3, solid lines), students achieved significant improvements in their CRCT Reading scores.

	n	2007		2008		t-statistic
		Mean	SE	Mean	SE	
Wave 2 (Fast ForWord)	426	797.9	0.90	804.6	0.87	6.883*
Wave 3 (Comparison)	805	799.0	0.75	799.8	0.62	1.731

Table 4. CRCT Reading scaled scores for Fast ForWord participants who starting using products during the 2007-2008 school year (Wave 2) vs. students who did not use Fast ForWord products in 2007-2008 (Wave3). Results are significant if the p-value is less than 0.05 (*).
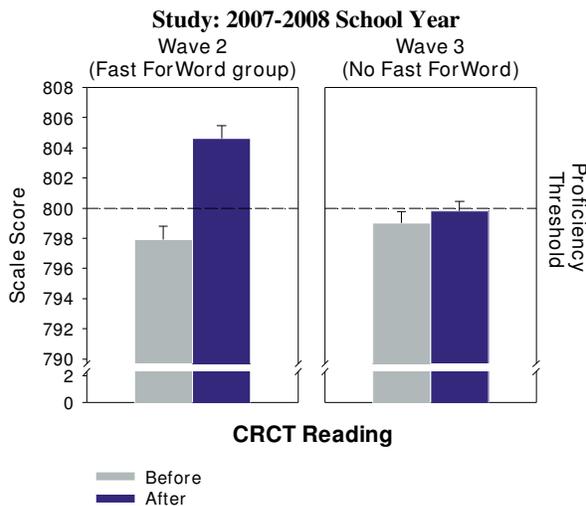

Figure 2. CRCT Reading scaled scores for 426 Fast ForWord participants who starting using products during the 2007-2008 school year (Wave 2) vs. 805 students who did not use Fast ForWord products in 2007-2008 (Wave 3). Students are considered proficient if they score better than 800 scaled score points.
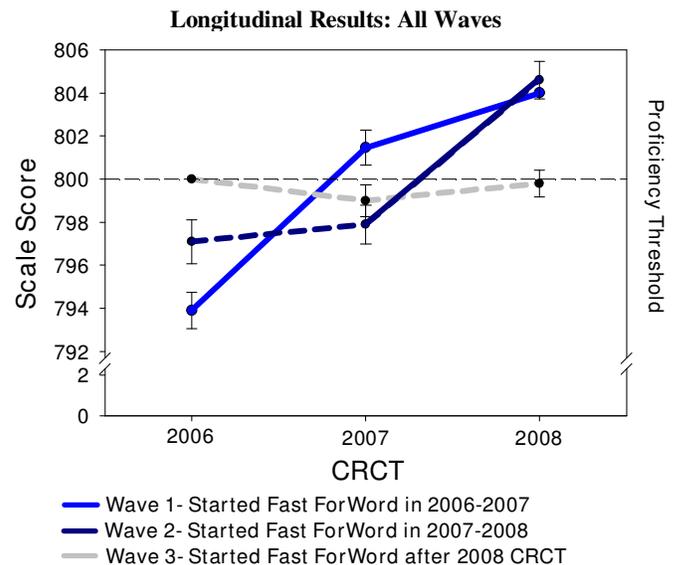

Figure 3. Scaled scores from the 2006, 2007 and 2008 administrations of the CRCT for all three cohorts. Lines are dashed when cohorts did not use Fast ForWord products and solid during or after participation.

CRCT Proficiency Level Results: Students in Georgia are considered proficient in reading when they pass the proficiency threshold of 800 scaled score points.

2006- 2007 Participants: In 2006, 58% of the Wave 1 Fast ForWord participants (332 of 571) were not proficient. Following Fast ForWord participation, 40% of the non-proficient students became proficient (133 of 332). Of the 199 students who did not reach proficiency in 2007, 129 had scores from 2008 with 47 (36%) reaching proficiency. For comparison, there were 569 students who did not use Fast ForWord products during the 2006-2007 school year and who were not proficient in 2006 (Wave 2 and Wave 3). Of them, only 27% (154 of 569) percent became proficient in 2007. Of the 415 students who did not reach proficiency in 2007, 392 had scores from 2008 and did not use the Fast ForWord products during the 2007-2008 school year. Of them, 63 (16%) reached proficiency in 2008 (Table 5).

Thus, following Fast ForWord participation during the 2006-2007 school year, 40% of the Fast ForWord participants who were not proficient in 2006 became proficient in 2007, and 54% reached proficiency by 2008; for the comparison group, 27% of non-participants reached proficiency in 2007, for a total of 38% reaching proficiency by 2008.

Wave I Participants			
	First Reached Proficiency in 2007	First Reached Proficiency in 2008	Percent of original group with verified proficiency in 2007 or 2008
Fast ForWord	40%	36%	54%
Comparison	27%	16%	38%

Table 5. In 2006, there were 332 non-proficient students who used Fast ForWord products during the 2006 – 2007 school year, and 569 non-proficient students who did not. 40% of participants first reached proficiency in 2007. Of the students who did not, but had 2008 scores available (70 were missing scores), 36% reached proficiency in 2008. 21% of the participants were not proficient in 2007, but did not have scores available for 2008. Therefore, the total of the original participants with verified proficiency in 2007 or 2008 was 54%.

2007-2008 Participants: Proficiency level changes were also available for the Wave 2 students who used Fast ForWord products during the 2007-2008 school year. In 2007, 25% (226 of 758) of the Wave 2 students had not met proficiency standards on the CRCT. Following Fast ForWord participation, 42% (94 of 226) of these students became proficient – similar to the percentage of students who first became proficient after using Fast ForWord products during the 2006-2007 school year.

For comparison, the results from Wave 3 students were evaluated. There were 467 students who were not proficient at the time of the 2007 CRCT and did

not use Fast ForWord products before the 2008 administration of the CRCT (Wave 3). Only 29% (135 of 467) percent became proficient compared to the 42% in the group the Wave 2 group that used the products (Table 6).

Wave 2 Participants	
	First Reached Proficiency in 2008
Fast ForWord	42%
Comparison	29%

Table 6. In 2007, there were 226 non-proficient students who first used Fast ForWord products during the 2007 – 2008 school year, and 467 non-proficient students who did not. 42% of participants first reached proficiency in 2008 while only 29% of the students in the comparison group did.

The results from the 2007-2008 study indicate that the proficiency level improvements made by Wave 1 students in 2006-2007 were replicated by the Wave 2 students in 2007-2008. These results consistently demonstrate that the students who did not use the products had lower percentages of students reaching proficiency (27% in 2006-2007 and 29% in 2007-2008) (Figure 4).
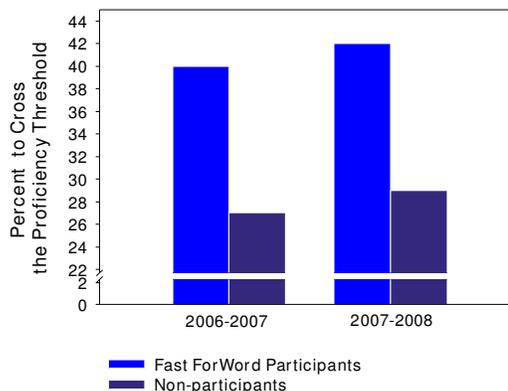

Figure 4. Of those students who were not proficient at pre-test, the percent of students to cross the proficiency threshold at post-test is shown. Results are presented for first-year participants vs. non-participants during the 2006-2007 and 2007-2008 school years.

CRCT Reading Analysis by Subgroup: Across the Limited English Proficiency, Special Education, and Economically Disadvantaged subgroups, t-tests were used to compare the average changes in scaled score made by groups of students who used Fast ForWord products and groups of students who had not. For each of the three subgroups, students in their first year of Fast ForWord participation made statistically significant improvements while there were not significant changes in the scores of the students in the comparison group. In addition, the students who used Fast ForWord products made significantly greater gains on the CRCT Reading test than the students in the comparison group (Table 5 and Figure 5)

Demographic Group	Group	n	Before		After		
			Mean	SE	Mean	SE	t-statistic
Limited English Proficiency	Fast ForWord	91	796.9	1.90	809.0	1.95	+ 4.45*
	Comparison	110	793.8	1.58	794.0	1.56	+ 0.11
Special Education	Fast ForWord	192	790.5	1.39	795.9	1.26	+ 2.83*
	Comparison	341	790.7	1.06	790.6	0.98	− 0.04
Economically Disadvantaged	Fast ForWord	885	795.8	0.64	803.2	.640	+ 7.96*
	Comparison	1050	797.3	0.62	797.0	0.56	− 0.33

Table 5. CRCT Scaled scores for first-year Fast ForWord participants vs students who did not use Fast ForWord before the administration of the CRCT. * p < 0.05.
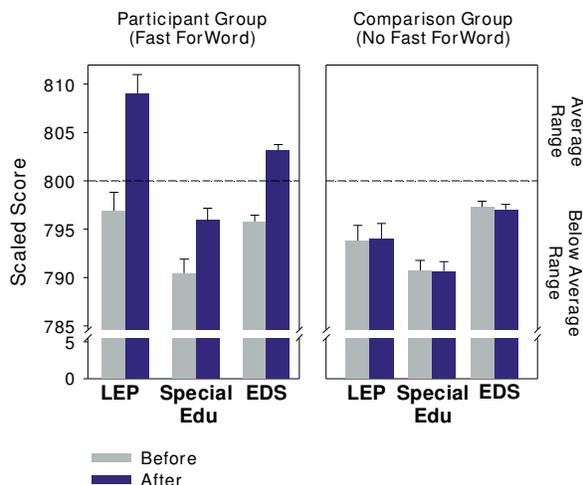

Figure 5. First-year Fast ForWord participants outgained comparison students on the CRCT Reading test across the Limited English Proficiency, Special Education, and Economically Disadvantaged subgroups.

DISCUSSION

Overall, students in the Clarke County School District made significant gains in their reading achievement following Fast ForWord participation.

The group of students who originally used Fast ForWord products during the 2006-2007 school year made statistically significant improvements in 2007 on the Reading component of the Criterion-Referenced Competency Tests (CRCT). The group built on this initial improvement, making further gains in 2008. In contrast, the there was not a significant change in the comparison group's score between 2006 and 2007.

The students in the 2006-2007 comparison group then proceeded to use Fast ForWord products during the 2007-2008 school year at which time they made statistically significant gains. Similar to the 2006-2007 analysis, the 2007-2008 first-year participants were compared to a group of students who did not use Fast ForWord products until after the 2008 administration of CRCT. Again, the Fast ForWord participants outgained the comparison group.

These significant improvements on the CRCT Reading test were not only apparent when evaluating the entire group of Fast ForWord participants, but were also demonstrated for a variety of subgroups including students with Limited English Proficiency, students receiving services for Special Education, and Economically Disadvantaged students.

Following Fast ForWord participation in 2006-2007, 40% of students who were not proficient in 2006 crossed the proficiency threshold in 2007. When a new group of students started using the products during the 2007-2008 school year, 42% of the students who were not proficient in 2007 crossed the proficiency threshold. These results are very positive compared to the students in the comparison groups that had 27% reach proficiency in 2007 and 29% reach proficiency in 2008.

These findings show that Fast ForWord products have a significant, replicable impact on the reading proficiency of students in Clarke County and that an optimal learning environment coupled with a focus on cognitive and early reading skills can help students in Clarke County attain a higher level of language and reading achievement.

CONCLUSION

Language and reading skills are critical for all students, impacting the students' 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. During the 2006 – 2007 school year, students in the Clarke County School District who used Fast ForWord products made greater gains in reading achievement than students in the comparison group. These results were replicated during the 2007 – 2008 school year. In addition, these results apply to students in the Limited English Proficiency, Special Education and Economically Disadvantaged

subgroups. These results support other studies demonstrating that using Fast ForWord products strengthens the students' foundational skills and helps them benefit more from the classroom curriculum.

Notes:
To cite this report: Scientific Learning Corporation. (2009). Improved Reading Achievement by Students in the Clarke County School District who used Fast ForWord® Products: 2006 - 2008, MAPS for Learning; Educator Reports, 13(1)1-10.

REFERENCES

 (2007) Georgia Department of Education – Testing: Criterion-Referenced Competency Tests. Retrieved October 22, 2008. http://www.doe.k12.ga.us/ci_testing.aspx?PageReq=CI_TESTING_CRCT.

Lyon, G.R. (1996). Learning Disabilities. *The future of children: Special education for students with disabilities.* 6:54-76.

Merzenich MM, Jenkins WM, Johnston P, Schreiner CE, Miller SL, & Tallal P (1996). Temporal processing deficits of 888*Science*, 271, 77-80.

Miller, S.L., Merzenich, M.M., Tallal, P., DeVivo, K., Linn, N., Pycha, A., Peterson, B.E., Jenkins, W.M., (1999). Fast ForWord Training in Children with Low Reading Performance, (Table 4).*Nederlandse Vereniging voor Lopopedie en Foniatrie: 1999 Jaarcongres Auditieve Vaardigheden en Spraak-taal.* (Proceedings of the 1999 Dutch National Speech-Language Association Meeting).

Tallal P, Miller SL, Bedi G, Byma G, Wang X, Nagarajan SS, Schreiner C, Jenkins WM, Merzenich MM (1996). Language comprehension in language-learning impaired children improved with acoustically modified speech. *Science* 271:81-84.