

Improved Reading Skills by Students in the Worcester County Public School District who used Fast ForWord® Products

MAPS for Learning: Educators Reports, 11(7): 1-8

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 nationally normed tests and state assessments. **Participants:** Study participants were elementary, intermediate and middle school students attending schools in the Worcester County Public School District in Newark, Maryland. **Materials & Implementation:** Before and after participation on the Fast ForWord products, students were evaluated with a variety of assessments including the Gates-MacGinitie Reading Tests (GMRT), Maryland School Assessment (MSA), Scantron Performance Series, and the Yopp-Singer Test of Phoneme Segmentation. **Results:** On average, students who used Fast ForWord products showed significant improvements on the Maryland state achievement test with the number of students who achieved a level of Proficient doubling between the 2005 and 2006 administrations. In addition, Fast ForWord participants showed significant improvements on the GMRT, Scantron and Yopp-Singer Test of Phoneme Segmentation.

Keywords: Maryland, elementary school, intermediate school, middle school, rural, observational study, special education, Fast ForWord Language, Fast ForWord Middle & High School, Fast ForWord Language to Reading, Fast ForWord to Reading 1, Fast ForWord to Reading 2, Fast ForWord to Reading 3, Fast ForWord to Reading 4, Gates-MacGinitie Reading Tests (GMRT), Maryland School Assessment (MSA), Scantron, Yopp-Singer Test of Phoneme Segmentation

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 Worcester County Public 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 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 Language to Reading, and Fast ForWord to Reading 1 through Fast ForWord to Reading 4) were used to evaluate the effectiveness of this approach at improving the reading skills of students.

METHODS

Participants

Worcester County is one of the fastest growing counties on the Eastern shore of Maryland. The Worcester County Public School District is located in Newark, Maryland and comprises 14 schools serving nearly 7,000 students in pre-Kindergarten through twelfth grade. The student population is 71 percent Caucasian and 24 percent African-American. Thirty-two percent of students are eligible for free or reduced price meals, equal to the state average of 32 percent.

This report focuses on 159 students from four schools who had their reading skills assessed before and after Fast ForWord participation. The tests that were

administered were the Gates-MacGinitie Reading Tests (GMRT), Maryland School Assessment (MSA), Scantron Performance Series, and the Yopp-Singer Test of Phoneme Segmentation. School personnel administered the assessments and reported scores for analysis.

Students targeted by the Worcester County Public School District for Fast ForWord participation included students learning English as a second language, students with autism, students with learning disabilities, and students who were at risk for academic failure. Of the 159 participants in the study, 52% were classified as having a “Specific Learning Disability”, 12% as “Other Health Impairment”, and 11% as “Speech or Language Impairment”. Approximately 43% of the students receive free or reduced price lunches.

Implementation

Educators were trained in current and established neuroscience findings on how phonemic awareness and the acoustic properties of speech impact rapid development of language and reading skills; the scientific background validating the efficacy of the products; methods for assessment of potential candidates for participation; the selection of appropriate measures for testing and evaluation; effective implementation techniques; approaches for using Progress Tracker reports to monitor student performance; and techniques for measuring the gains students have achieved after they have finished using Fast ForWord products.

Materials

The Fast ForWord products are computer-based products that combine an optimal learning environment with a focus on early reading and cognitive skills. The products used by the Worcester County Public School District (Fast ForWord Language, Fast ForWord Middle & High School, Fast ForWord Language to Reading, and Fast ForWord to Reading 1 through Fast ForWord to Reading 4) include five to seven exercises designed to build skills critical for reading and learning, such as auditory processing, memory, attention, and language comprehension. While there are differences between the products, all help develop certain critical skills as detailed in the following exercise descriptions.

*Circus Sequence*¹, *Sweeps*², and *Trog Walkers*³: Students hear a series of short, non-verbal tones. Each tone represents a different fragment of the frequency spectrum used in spoken language. Students are asked to differentiate between these tones. The exercises improve working memory, sound processing speed, and sequencing skills.

*Old MacDonald’s Flying Farm*¹ and *Streams*²: Students hear a single syllable that is repeated several times, and then interrupted by a different syllable. Students must respond when they hear a change in the syllable. This exercise improves auditory processing, develops phoneme discrimination, and increases sustained and focused attention.

*Phoneme Identification*¹, *IDs*², *Polar Cop*³, and *Treasure in the Tomb*³: Students hear a target phoneme, and then must identify the identical phoneme when it is presented later. These exercises improve auditory discrimination skills, increase sound processing speed, improve working memory, and help students identify a specific phoneme. *Polar Cop* also develops sound-letter correspondence skills. *Treasure in the Tomb* also develops grapheme recognition.

*Phonic Match*¹, *Matches*², and *Bug Out*³: Students choose a square on a grid and hear a sound or word. Each sound or word has a match somewhere within the grid. The goal is to find each square’s match and clear the grid. The *Phonic Match* exercise develops auditory word recognition and phoneme discrimination, improves working memory, and increases sound processing speed. The *Bug Out!* exercise develops skill with sound-letter correspondences as well as working memory.

*Phonic Words*¹ and *Cards*²: Students see two pictures representing words that differ only by the initial or final consonant (e.g., “face” versus “vase”, or “tack” versus “tag”). When students hear one of the words, they must click the picture that matches the word. This exercise increases sound processing speed, improves auditory recognition of phonemes and words, and helps students gain an understanding of word meaning.

*Language Comprehension Builder*¹: Students listen to a sentence that depicts action and complex relational themes. Students must match a picture representation

¹ Exercise from the Fast ForWord Language product.

² Exercise from the Fast ForWord Middle & High School product.

³ Exercise from the Fast ForWord Language to Reading product.

with the sentence they just heard. This exercise develops oral language and listening comprehension, improves understanding of syntax and morphology, and improves rate of auditory processing.

*Block Commander*¹: In Block Commander, a three-dimensional board is filled with familiar shapes that students select and manipulate. The students are asked to follow increasingly complex commands. This exercise increases listening comprehension, improves syntax, develops working memory, improves sound processing speed, and increases the ability to follow directions.

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

*Bear Bags*⁴ and *Bear Bags: More Lunch*⁵: 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*⁴ and *Magic Bird*⁵: 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*⁴ and *Fish Frenzy*⁵: 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*⁴: 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*⁴ and *Leaping Lizards*⁵: 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*⁴ and *Dog Bone*⁵: 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*⁵: 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*⁶: 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*⁶: 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*⁶: 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*⁶: Participants are presented with a variety of pictures and asked to select the sentence that

⁴ Exercise from the Fast ForWord to Reading 1 product.

⁵ Exercise from the Fast ForWord to Reading 2 product.

⁶ Exercise from the Fast ForWord to Reading 3 product.

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 Monkeys⁶ and Book Monkeys: Book Two⁷: Participants read narrative and expository passages and answer comprehension questions about each passage. The multiple-choice 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 Zone⁶ and Lulu's Laundry Line⁷: 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. In *Lulu's Laundry Line*, short passages are presented with occasional gaps where punctuation is missing. These exercises develop paragraph comprehension, complex morphology, flexible reading, and vocabulary, as well as automaticity for decoding and sentence comprehension.

Hoof Beat⁷: The participant is presented with a question and four possible answers. The participant must choose the most appropriate answer. The questions relate to semantics, phonology, morphology, orthography, and syntax. The exercise encourages flexibility during reading and automatic access to the various dimensions of vocabulary and is designed to build vocabulary by showing the participant how words function.

Jitterbug Jukebox⁷: The participant hears a word spoken aloud and letters appear on the keys of a jukebox. The participant must spell the word by clicking on the jukebox keys. Jitterbug Jukebox helps participants improve spelling and sensitivity to letter-sound correspondences. This exercise includes many of the 500 most commonly used words in written English including most word families found in 3rd and 4th grade content standards.

Goat Quotes⁷: In *Goat Quotes* four newspapers paraphrase a headline at the top of a news kiosk. The participant must select the correct paraphrase. The exercise is designed to sample the basic syntactic (i.e.,

grammatical) structures of spoken English generally mastered in the early elementary grades. The exercise develops logical thinking and working memory skills as well as careful reading.

Stinky Bill's Billboard⁷: Participants must select the word that accurately completes a sentence. In this exercise, participants improve sentence comprehension while practicing the decoding of words in realistic contexts. This exercise also helps build vocabulary and awareness of word structure.

Assessments

Students were evaluated with a variety of assessments before, during, and after participation in the Fast ForWord products.

Gates-MacGinitie Reading Tests (GMRT): The Gates-MacGinitie Reading Tests are used to assess a student's decoding, vocabulary, and passage comprehension skills. The assessment has two components, independently evaluating reading vocabulary and comprehension. The scores from the two components can be combined to give an overall reading score that can be reported in terms of a grade-equivalent score.

Maryland School Assessment (MSA): The MSA is an annual state assessment that evaluates knowledge of state content standards and measures student achievement in reading for grades K-8. It is a criterion- and norm-referenced assessment and meets the requirements of No Child Left Behind. Scores are reported as three statewide performance standards: Basic, Proficient, and Advanced.

For the Reading section of the MSA, a score of Proficient indicates a student is able to read and comprehend grade appropriate literature and informational passages.

Scantron Performance Series: The Scantron Performance Series assessment is a standards-based, norm- and criterion-referenced computer-adaptive measurement that assesses and tracks student academic growth. It adapts to a student's instructional level by changing the difficulty of questions based on previous answers. It can also measure skills associated with the various academic standards of individual states. The Reading portion of this assessment is appropriate for students in grades 2-12.

Yopp-Singer Test of Phoneme Segmentation: The Yopp-Singer Test of Phoneme Segmentation is an individually administered test designed to measure a student's ability to segment phonemes. Students who obtain high scores (segmenting all or nearly all of the items correctly) may be considered phonemically aware. Students who correctly segment some items are displaying emerging phonemic awareness. Students who are able to segment only a few items or none at all lack the levels of phonemic awareness needed for easy reading and spelling.

Analysis

All scores were analyzed using paired t-tests with a p-value of less than 0.05 as the criterion for identifying statistical significance.

⁷ Exercise from the Fast ForWord to Reading 4 product.

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). Between 2003 and 2006, the Worcester County Public School District used the 48- and 50-minute protocols for the Fast ForWord Language and Fast ForWord to Reading products. 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. Most participants started with the Fast ForWord Language or Fast ForWord Middle & High School product and used multiple products. Detailed product use information is shown in Table 1. Total values reflect the total number of days that students used products.

Figures 1 and 2 show the average daily progress through the Fast ForWord Language and Fast ForWord Middle & High School product exercises. These graphs represent the learning curve of the students as they progress through the product. Similar learning curves could be created to demonstrate progress through the other products used in this study, Fast ForWord Language to Reading and Fast ForWord to Reading 1 through Fast ForWord to Reading 4. 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 products 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	Attendance Level	Participation Level
Fast ForWord Language	86	42	100	66%	93%	69%
Fast ForWord Middle & High School	49	28	109	64%	94%	36%
Fast ForWord Language to Reading	123	37	115	58%	88%	47%
Fast ForWord to Reading 1	13	40	93	81%	77%	48%
Fast ForWord to Reading 2	21	47	123	52%	82%	46%
Fast ForWord to Reading 3	76	31	86	37%	85%	48%
Fast ForWord to Reading 4	17	25	69	25%	85%	54%
Total Fast ForWord Product Use	159	87	249			

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. Total values reflect the average total number of days that students used products. Note: Students often use multiple products.

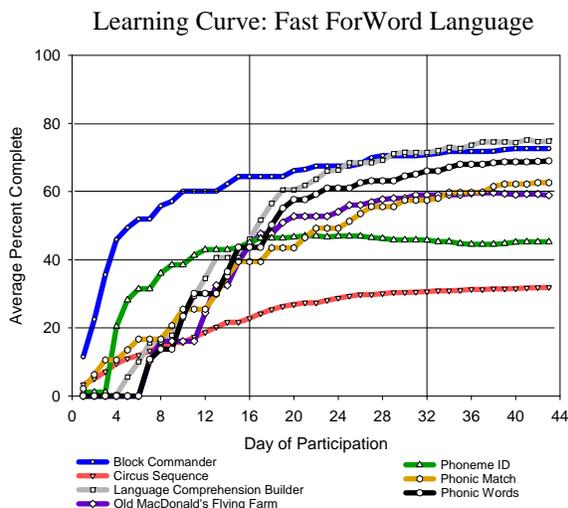


Figure 1. Average daily progress through the Fast ForWord Language product exercises. Results from 86 students are shown.

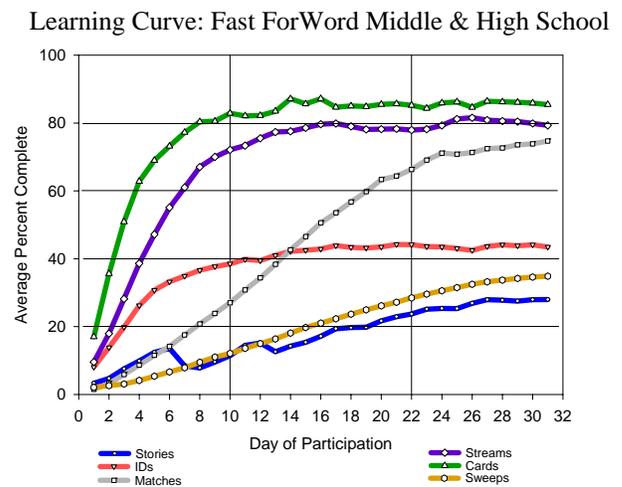


Figure 2. Average daily progress through the Fast ForWord Middle & High School product exercises. Results from 49 students are shown.

Assessment Results

Exact test dates were not available for the assessments used in this study. Where possible, approximate test dates (month and year) were used for each assessment. If a student used any Fast ForWord product between the approximate pre- and post-test dates, their scores were included in the analyses. Due to these approximations, it is possible that students had participated in or were participating in a Fast ForWord product at the time of pre-testing.

Gates-MacGinitie Reading Tests (GMRT): GMRT scores were reported in terms of grade equivalents. Students were tested twice a year, in the Fall and Spring of the school year. Between the Fall 2003 and Spring 2004 test administrations, 54 students had scores available for analysis. Most of these students

had completed the Fast ForWord Language product. On average, student reading skill improved 7 months (Figure 3). Between the Fall 2004 and Spring 2005 administrations, 123 students had scores available for analysis. At this time, many students had completed two or more Fast ForWord products. Average improvement was more than five months (Figure 4).

GMRT	n	Before		After		t-statistic
		Mean	SE	Mean	SE	
Fall 03 – Spring 04	54	2.43	0.13	3.04	0.18	5.90*
Fall 04 – Spring 05	123	3.76	0.14	4.23	0.19	4.29*

Table 2. Improvements in terms of grade equivalents for the 2003-2004 and 2004-2005 school years.

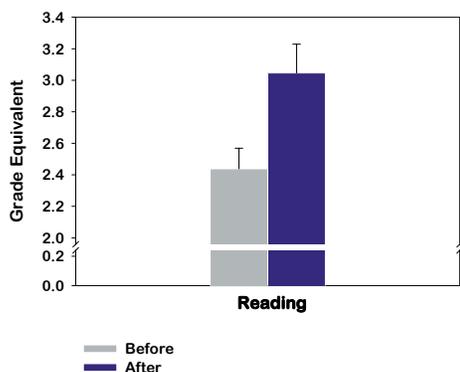


Figure 3. On average, students gained 7 months in reading ability after using Fast ForWord products during the 2003 – 2004 school year. Results from 54 students are shown.

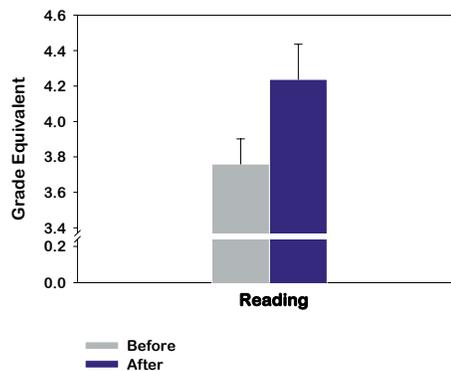


Figure 4. On average, students gained 5 months in reading ability after using Fast ForWord products during the 2004 – 2005 school year. Results from 123 students are shown.

Maryland School Assessment (MSA): MSA scores were reported in terms of scale scores. Data from the Fall of 2004, 2005, and 2006 were available for analysis. Forty-four Fast ForWord participants had scores available from the 2004 and 2005 administrations. On average, improvement from the 2004 MSA to the 2005 MSA was 7.7 points. Eighty-two participants had scores from both the 2005 MSA and 2006 MSA. Overall, these students had significant gains of 19 points (Figure 5, Table 3). Almost all of these 82 students had also used Fast ForWord products prior to the 2005 – 2006 school year. The 42 students for whom there was data available from 2004 and 2006 demonstrated average improvement of 40.6 points over the two years. Most of these students used the Fast ForWord products during both the 2004 – 2005 and the 2005 – 2006 school years.

Scantron Performance Series: Scores were reported in terms of grade equivalents and scale scores. Of the 25 students who had Scantron scores available for analysis, 13 students had grade equivalents and 12 students had scale scores. On average, students improved 4 months in grade level and had significant gains in their scale score following Fast ForWord participation (Table 4).

MSA	n	Before		After		t-statistic
		Mean	SE	Mean	SE	
2004 - 2005	44	343.3	5.08	351.0	4.47	1.55
2005 - 2006	82	355.7	3.00	375.0	3.20	5.59*
2004-2006	42	343.7	4.93	384.3	4.30	7.61*

Table 3. On average, students made significant gains on the 2006 MSA after Fast ForWord use. *p<0.05.

Scantron	n	Before		After		t-statistic
		Mean	SE	Mean	SE	
Grade equivalent	13	4.17	0.44	4.52	0.46	1.09
Scale score	12	2618	47.1	2781	52.4	3.63*

Table 4. Grade equivalents and scale scores from the Scantron Performance Series assessment for students who used Fast ForWord products. * $p < 0.05$.

Yopp-Singer Test of Phoneme Segmentation: Forty students had raw scores available for analysis. Students, on average, significantly increased in phoneme awareness after Fast ForWord participation (Table 5). Because of ceiling effects, these scores do not show the full extent of the improvement. The maximum score on the Yopp-Singer is 22. Before Fast ForWord participation, two students were at ceiling. Of the 38 students not at the ceiling, six reached it after Fast ForWord participation.

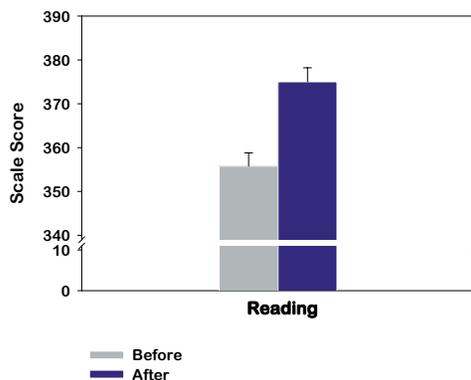


Figure 5. Students, on average, significantly improved in reading achievement following use of the Fast ForWord products. Results from 82 students are shown.

	n	Before		After		t-statistic
		Mean	SE	Mean	SE	
Yopp-Singer	40	13.8	0.81	17.3	0.74	5.69*

Table 5. On average, after Fast ForWord use, students improved significantly in phoneme awareness. * $p < 0.05$.

DISCUSSION

From 2003 through 2006, students at Worcester County Public School District used the Fast ForWord products. Overall, students made significant gains on the MSA, GMRT, Scantron, and Yopp-Singer. In terms of proficiency, of the 82 students who had 2005 and 2006 MSA scores, 68 also had proficiency levels reported. For these students, the percentage reading at a Proficient level or higher doubled from 16% to 33% following Fast ForWord participation.

These gains were particularly remarkable because the Worcester County Public School District has historically used the Fast ForWord products to target ESL students, students who have learning disabilities, and students who are academically at risk. The products have not yet been implemented in the general education population, although the District is considering future expansion. These gains demonstrate that, within the Worcester County Public School District, an optimal learning environment coupled with a focus on cognitive and early reading skills can help struggling students attain a higher level of reading achievement.

CONCLUSION

Language and reading skills are critical for all students, impacting their ability to benefit from instruction, follow directions and participate in class discussions. Strong linguistic skills also provide a critical foundation for building reading and writing skills. After using Fast ForWord products, students in the Worcester County Public School District made significant gains in their language and reading ability. This suggests that using the Fast ForWord products strengthened the students' foundational skills and helped them benefit more from the classroom curriculum.

Notes:

To cite this report: Scientific Learning Corporation. (2007). Improved Reading Skills by Students in the Worcester County Public School District who used Fast ForWord® Products, MAPS for Learning: Educator Reports, 11(7): 1-8.

REFERENCES

- Harcourt Educational Testing. (2004). *Stanford 10 Assessment*. Maryland State Department of Education www.marylandpublicschools.org/MSDE
- Lyon, G.R. (1996). Learning Disabilities. *The future of children: Special education for students with disabilities*. 6:54-76.
- MacGinitie, W. H., MacGinitie, R. K., Maria, K., Dreyer, L. G. (2000). *Gates-MacGinitie Reading Tests (GMRT) Fourth Edition*. Itasca, IL: Riverside Publishing.
- Merzenich MM, Jenkins WM, Johnston P, Schreiner CE, Miller SL, & Tallal P (1996). Temporal processing deficits of language-learning impaired children ameliorated by training. *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).
- Scantron Corporation (2003). *Scantron Performance Series*. Irvine, CA: Scantron Corporation.

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.

Yopp, H. (1995). *Reading Teacher* 49(1): 20-29.