Improved Longitudinal Achievement in English Language Arts, Math, Science, and Social Studies by Students in St. Mary Parish who used Scientific Learning Products

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ABSTRACT

Purpose: This study investigated the longitudinal English Language Arts, Math, Science, and Social Studies achievement of elementary and middle school students, focusing on the years corresponding to widespread implementation of the Fast ForWord products which started during the 2006-2007 school year at the elementary schools, and during the 2008-2009 school year at the middle schools.

Results: From 2006 to 2011, 4th grade English Language Arts proficiency levels rose from 55% to 81%, Math proficiency levels rose from 59% to 80%, Science proficiency levels rose from 53% to 69%, and Social Studies Proficiency levels rose from 59% to 69%. From 2008 to 2011, 8th grade English Language Arts proficiency levels rose from 58% to 64%, Math proficiency levels dropped from 59% to 58%, Science proficiency levels rose from 54% to 59%, and Social Studies Proficiency levels rose from 54% to 62%. Finally, the grade promotion rate for 4th graders improved from 65% to 87% between 2006 and 2011 while the number of students needing Special Education services (not including students identified as Gifted and Talented) decreased by 17%.

Study Design & Participants: The design of this study was a district-wide observational study using high stakes tests of English Language Arts, Math, Science, and Social Studies achievement. Study participants were elementary and middle school students in the St. Mary Parish Public School System in St. Mary Parish, Louisiana.

Materials & Implementation: Following staff training on the Fast ForWord products, students in eight elementary schools started using the Fast ForWord products during the 2006-2007 school year. The rest of the elementary schools and the middle schools implemented the products two years later, during the 2008-2009 school year. The Scientific Learning Reading Assistant product was first implemented during the 2009-2010 school year. Each spring, students in 4th grade and 8th grade had their English Language Arts, Math, Science, and Social studies achievement evaluated with the Louisiana Educational Assessment Program (LEAP).

Keywords: Louisiana, elementary school, middle school, rural district, observational study, longitudinal study, Title I, Louisiana Educational Assessment Program (LEAP).

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).

Further research has demonstrated that the use of an optimal learning environment with a focus on reading and cognitive skills not only benefits the auditory processing and language skills of school children who have specific language impairments, but can benefit the reading achievement of a wide range of students.

The St. Mary Parish Public School System was interested in evaluating the effectiveness of an optimal learning environment with a focus on early reading and cognitive skills as a way to improve the English language arts, math, science, and social studies achievement of its students. In this study, the Fast ForWord family of products (a family of commercially-available, computer-based interventions) was used by the district's elementary and middle schools.

METHODS

Participants

At the beginning of the 2006-2007 school year, the St. Mary Parish Public School System started school-wide use of the Fast ForWord products at seven elementary schools that were in Academic Assistance (a designation for schools that fail to improve sufficiently). Students at an eighth struggling elementary school started using the products later that year. During the 2008-2009 school year, the remaining elementary schools and the middle schools began using the Fast ForWord products as well. The elementary schools initially focused on students in 3rd through 5th grades before expanding to the lower grades; the middle schools used school-wide implementations. In addition, during the 2009-2010 school year, the Scientific Learning Reading Assistant product was implemented.

This study focuses on the longitudinal trends of LEAP achievement levels of the St. Mary Parish district as a whole, beginning in 2003 (three years before Fast ForWord implementation) and extending through 2011. This study also examines the performance of key demographic subgroups during that period.

Each spring, 4th and 8th grade students are evaluated with the LEAP tests; students in 3rd, 5th, 6th, and 7th grades are evaluated with the iLEAP. School personnel administer the assessments and results are made available on the state Department of Education website and/or to the districts.

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 importance of guided oral reading practice for building reading fluency; 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 the online reporting tool, Scientific Learning® Progress Tracker, to monitor student performance; and techniques for measuring the gains students have achieved after Fast ForWord and Reading Assistant Expanded Edition participation.

Materials

The Fast ForWord products are computer-based products that combine an optimal learning environment with a focus on early reading and cognitive skills. Each product includes several exercises designed to build cognitive skills critical for all learning, such as attention and memory. These exercises simultaneously develop academic skills critical for reading, such as English language conventions, phonemic awareness, vocabulary, and comprehension.

Scientific Learning Reading Assistant is a computer-based tutor for guided oral reading. Combining advanced speech recognition technology with research-based interventions, Reading Assistant helps elementary and secondary students strengthen their reading fluency, vocabulary and comprehension.

Some of the primary skills developed by these products are outlined below in Table 1. More detailed descriptions of the exercises and learning modes within each product can be found online at http://www.scientificlearning.com/exercises.

Assessments

In the spring of 2003 through 2011, the English language arts, math, science, and social studies achievement of students in 4th and 8th grade was assessed with the Louisiana Educational Assessment Program (LEAP).

Louisiana Educational Assessment Program (LEAP):
The LEAP is part of Louisiana's criterion referenced state testing program. The LEAP is administered to students in grades 4 and 8 and measures how well a student has mastered the state content standards. Students receive a scaled score and one of five achievement ratings ranging from Unsatisfactory to Advanced.

Analysis

Scores from the LEAP were reported in terms of the percent at each achievement level. Analyses were conducted on the percentages using the statistical test of two proportions and all statistical analyses used a p-value of less than 0.05 as the criterion for identifying statistical significance.

Primary Skills / Product Name	Listening Accuracy & Auditory Sequencing	Auditory Word Recognition	English Language Conventions	Following Directions	Listening Comprehension	Phonological Skills / Phonemic Awareness	Phonics / Word Analysis	Fluency	Vocabulary	Reading Comprehension
Fast ForWord Language Basics	●									
Fast ForWord Language (v1 and v2)	●	●	●	●		●			●	
Fast ForWord Literacy	●	●	●	●	●	●			●	
Fast ForWord Literacy Advanced	●		●	●	●	●	●		●	
Fast ForWord Language to Reading (v1 and v2)	●		●	●	●	●	●		●	
Fast ForWord Reading Level 1					●	●	●	●	●	●
Fast ForWord Reading Level 2					●	●	●	●	●	●
Fast ForWord Reading Level 3						●	●	●	●	●
Fast ForWord Reading Level 4						●	●	●	●	●
Fast ForWord Reading Level 5						●	●	●	●	●
Reading Assistant								●	●	●

Table 1: The Fast ForWord products work on numerous cognitive and early reading skills. The primary skills focused on by each product are noted in the table.

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 and attendance levels). From the beginning of Fast ForWord implementation in St. Mary Parish through 2011, students used the 30-, 40-, and 50-minute protocols. These protocols call for students to use the product for 30, 40, or 50 minutes a day, five days per week for eight to sixteen weeks. Detailed product use is shown in Table 2 (for Reading Assistant) and Table 3 (for Fast ForWord). Overall, more than 47% of the students completed two or more products.

Reading Assistant Use			
Product	**n**	**Days Participated**	**Number of Calendar Days**
Reading Assistant	4735	47	386

Table 2. Product use data for Reading Assistant. First use on the Reading Assistant product was during the 2009-2010 school year.

Fast ForWord Use						
Product	**n**	**Days Participated**	**Number of Calendar Days**	**Percent Complete**	**Attendance Level**	**Participation Level**
Fast ForWord Language Basics	757	11	24	97%	78%	96%
Fast ForWord Language	1691	36	82	75%	82%	97%
Fast ForWord Language v2	3976	43	95	89%	82%	97%
Fast ForWord Literacy	2816	34	138	87%	77%	94%
Fast ForWord Language to Reading	1095	44	129	72%	81%	98%
Fast ForWord Language to Reading v2	2942	54	139	80%	79%	97%
Fast ForWord Literacy Advanced	2199	46	167	77%	77%	92%
Fast ForWord Reading 1	3290	23	72	93%	79%	97%
Fast ForWord Reading 2	4384	33	108	91%	80%	96%
Fast ForWord Reading 3	4439	51	177	81%	78%	96%
Fast ForWord Reading 4	2763	48	164	78%	78%	96%
Fast ForWord Reading 5	1371	61	185	41%	75%	95%
Total	8624	151	469	--	78%	95%

Table 3. Product use data for Fast ForWord participants who started a product from fall 2006 through fall 2011. Data shown: total number of participants, average number of days participated, average calendar days between start and finish, average percentage of content completed, average participation and attendance levels. Note that many students (47%) completed two or more products.

Assessment Results

Analysis of District-Wide LEAP Performance

Students at eight struggling elementary schools started using the Fast ForWord products during the 2006-2007 school year. Since that year, fourth graders in the St. Mary Parish Public School System have shown dramatic improvements in their LEAP achievement. Since the implementation of Fast ForWord products in St. Mary Parish middle schools during the 2008-2009 school year, eighth graders have shown improvements in their LEAP achievement as well.

In 2008, for the first time in a decade, the district exceeded the state average for the percentage of fourth graders performing at or above the Basic level on the initial LEAP ELA test. During the 2008-2009 and 2009-2010 school years, Fast ForWord was extended to the rest of the district, including eighth graders, and the schools began using Reading Assistant.

Table 4 shows the annual percentages of St. Mary Parish fourth and eighth grade students who scored at grade-level proficiency on their initial LEAP tests for English Language Arts, Math, Science, and Social Studies.

Grade	**Subject**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**Net Change***
4th	ELA	53%	54%	60%	55%	64%	73%	73%	78%	81%	+ 26%†
	Math	54%	54%	62%	59%	59%	71%	69%	79%	80%	+ 21%†
	Science	45%	56%	59%	53%	59%	66%	67%	69%	69%	+ 16%†
	Social Studies	55%	58%	55%	59%	66%	63%	63%	72%	69%	+ 10% †
8th	ELA	52%	44%	47%	54%	59%	58%	67%	63%	64%	+ 6%†
	Math	53%	58%	60%	56%	61%	59%	60%	61%	58%	- 1%
	Science	46%	45%	51%	47%	58%	54%	60%	57%	59%	+ 5%
	Social Studies	45%	48%	48%	52%	57%	54%	62%	58%	62%	+ 8%†

*Table 4. Changes in percentage of St. Mary Parish students initially testing at grade-level proficiency on the LEAP assessment. Data are from all tested St. Mary Parish students. Periods of Fast ForWord/Reading Assistant implementation are shaded green. *: Net Change is measured from the year before Fast ForWord participation to 2011, i.e. 2006-2011 for 4th graders, and 2008-2011 for 8th graders. †: Using the statistical test of two proportions, the longitudinal changes between the year prior to use and 2011 are statistically significant ($p<0.05$).*

Analysis of District-Wide 4th Grade LEAP Performance

In the five years of elementary school Fast ForWord implementation, the percentage of fourth graders in the district performing at or above Basic on the initial LEAP ELA test increased from 55% to 81%. Figure 1 shows the longitudinal trends for St. Mary Parish initial 4th grade testers (blue) and the statewide average (red).

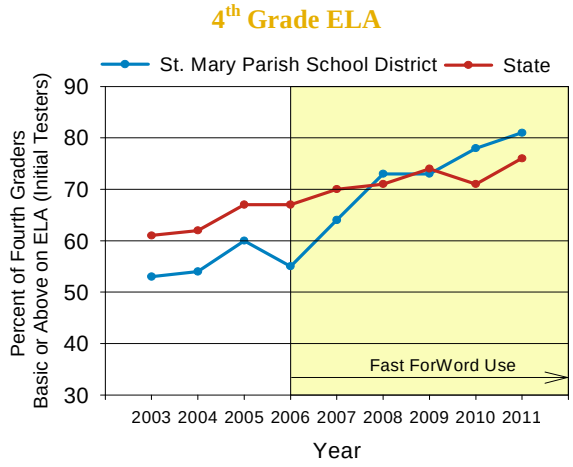

Figure 1. Longitudinal LEAP English Language Arts trends for St. Mary Parish 4th grade initial testers (blue) and the statewide average for 4th grade initial testers (red).

Similarly, the percentage of fourth graders in the district performing at or above Basic on the initial LEAP Math test increased from 59% to 80%. Figure 2 shows the longitudinal trends for St. Mary Parish initial 4th grade testers (blue) and the statewide average (red).

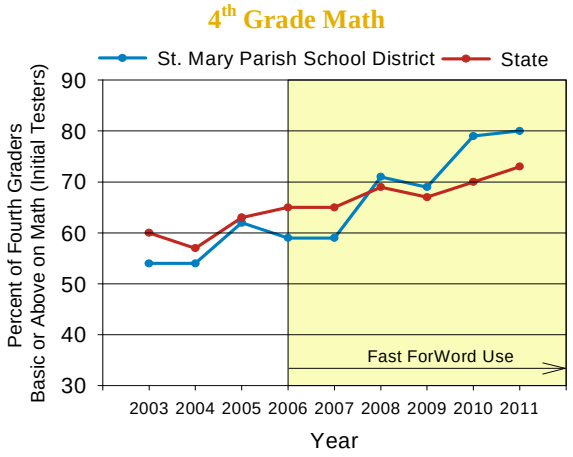

Figure 2. Longitudinal LEAP Math trends for St. Mary Parish 4th grade initial testers (blue) and the statewide average for 4th grade initial testers (red).

The percentage of fourth graders in the district performing at or above Basic on the initial LEAP Science test increased from 53% to 69%. Figure 3 shows the longitudinal trends for St. Mary Parish initial 4th grade testers (blue) and the statewide average (red).

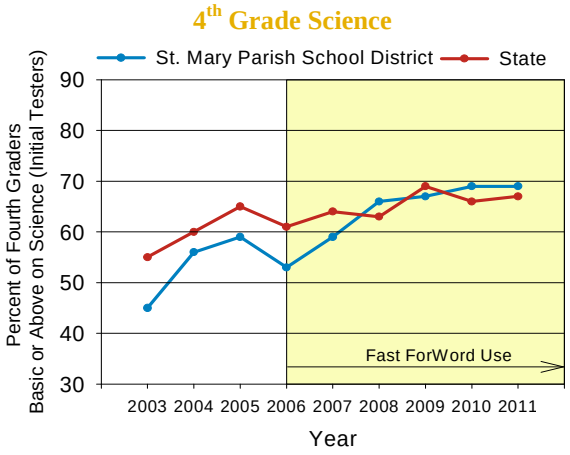

Figure 3. Longitudinal LEAP Science trends for St. Mary Parish 4th grade initial testers (blue) and the statewide average for 4th grade initial testers (red).

The percentage of fourth graders in the district performing at or above Basic on the initial LEAP Social Studies test increased from 59% to 69%. Figure 4 shows the longitudinal trends for St. Mary Parish initial 4th grade testers (blue) and the statewide average (red).

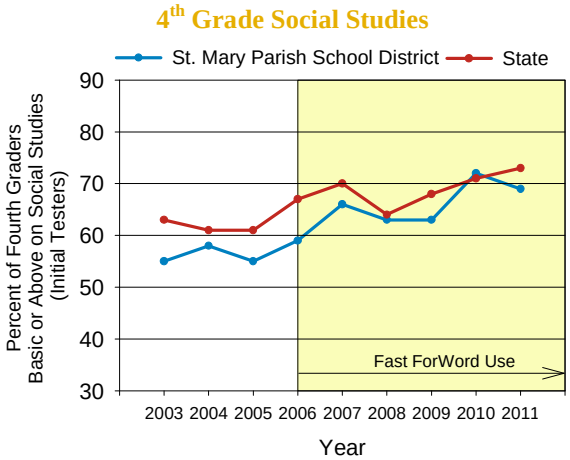

Figure 4. Longitudinal LEAP Social Studies trends for St. Mary Parish 4th grade initial testers (blue) and the statewide average for 4th grade initial testers (red).

These district-wide results show that St. Mary Parish 4th grade students experienced dramatic improvements in their achievement across LEAP subject areas between 2006 and 2011, the five-year period corresponding to Fast ForWord implementation.

Analysis of District-Wide 8th Grade LEAP Performance

In three years of middle school Fast ForWord implementation, the percentage of eighth graders in the district performing at or above Basic on the initial LEAP ELA test increased from 58% to 64%. Figure 5 shows the longitudinal trends for St. Mary Parish initial 8th grade testers (blue) and the statewide average (red).

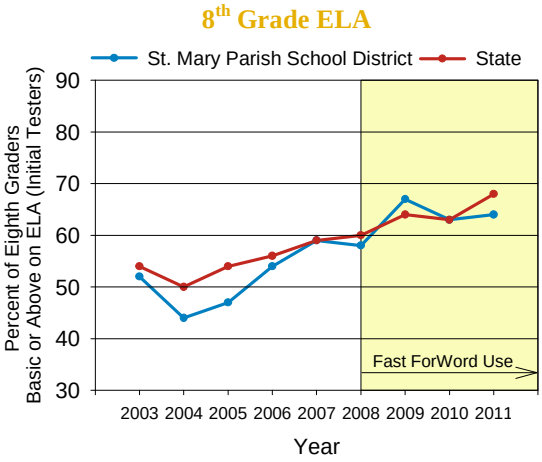

Figure 5. Longitudinal LEAP English Language Arts trends for St. Mary Parish 8th grade initial testers (blue) and the statewide average for 8th grade initial testers (red).

The percentage of eighth graders performing at or above Basic on the initial LEAP Math test decreased slightly from 59% to 58% (statewide, the percentage decreased from 60% to 53%). Figure 6 shows the longitudinal trends for St. Mary Parish initial 8th grade testers (blue) and the statewide average (red).

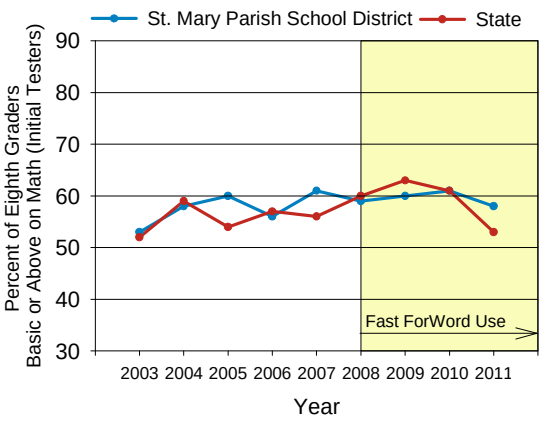

Figure 6. Longitudinal LEAP Math trends for St. Mary Parish 8th grade initial testers (blue) and the statewide average for 8th grade initial testers (red).

The percentage of eighth graders performing at or above Basic on the initial LEAP Science test increased from 54% to 59%. Figure 7 shows the longitudinal trends for St. Mary Parish initial 8th grade testers (blue) and the statewide average (red).

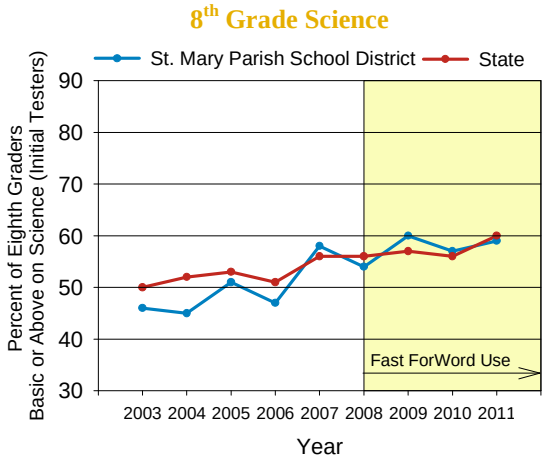

Figure 7. Longitudinal LEAP Science trends for St. Mary Parish 8th grade initial testers (blue) and the statewide average for 8th grade initial testers (red).

The percentage of eighth graders in the district performing at or above Basic on the initial LEAP Social Studies test increased from 54% to 62%. Figure 8 shows the longitudinal trends for St. Mary Parish initial 8th grade testers (blue) and the statewide average (red).

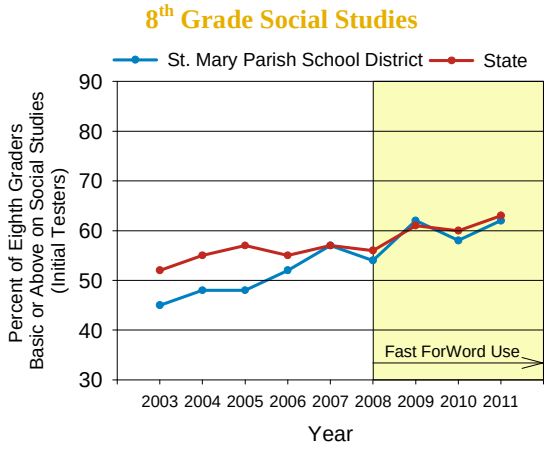

Figure 8. Longitudinal LEAP Social Studies trends for St. Mary Parish 8th grade initial testers (blue) and the statewide average for 8th grade initial testers (red).

These district-wide results show that St. Mary Parish 8th grade students experienced improvements in their achievement across LEAP subject areas between 2008 and 2011, the three-year period corresponding to Fast ForWord implementation.

Analysis of Achievement Gap for Demographic Subgroups

St. Mary Parish has nearly equal numbers of Black and White students. Since the elementary and middle schools started using the Fast ForWord products, the achievement gap between the Black students and their White peers has diminished on both the English Language Arts and Math LEAP tests. These achievement gap reductions are shown in Figures 9 and 10. The elementary schools show a comparison between 2006 and 2011 while the middle school comparison is from 2008 to 2011.

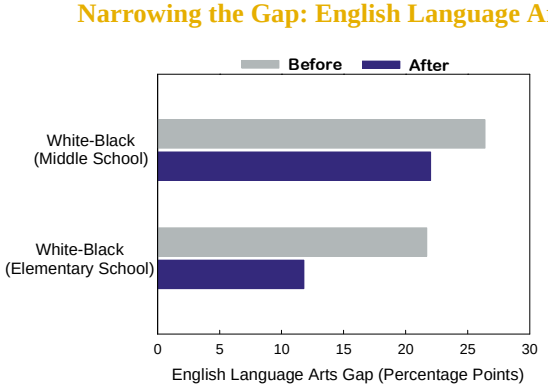

Figure 9. Achievement gap reductions for St. Mary Parish students on the LEAP ELA test between the year before initial Fast ForWord implementation (2006 at the elementary schools, 2008 at the middle schools) and 2011.

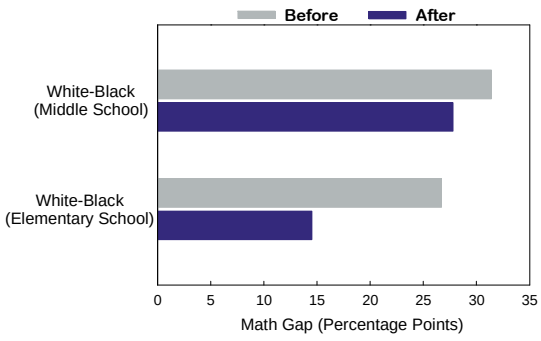

Figure 10. Achievement gap reductions for St. Mary Parish students on the LEAP Math test between the year before initial Fast ForWord implementation (2006 at the elementary schools, 2008 at the middle schools) and 2011.

The reduction in gap size for English Language Arts for the St. Mary Parish middle schools is nearly 5%. The reductions at St. Mary elementary schools for both English Language Arts and Math are dramatic; both gaps were nearly cut in half between 2006 and 2011. This indicates that St. Mary Parish has had success in closing the achievement gap between their Black and White students at both the elementary and middle school levels.

Analysis of 4th Grade Promotion Rates

In addition to the achievement gains demonstrated by the analyses above, St. Mary Parish collected longitudinal data about the percentage of 4th grade students who met the promotional standards each year after the spring administration of the LEAP. Figure 11 shows the trend in 4th grade promotion rates from 2006-2011, during which time the rate improved from 65% to 87%.

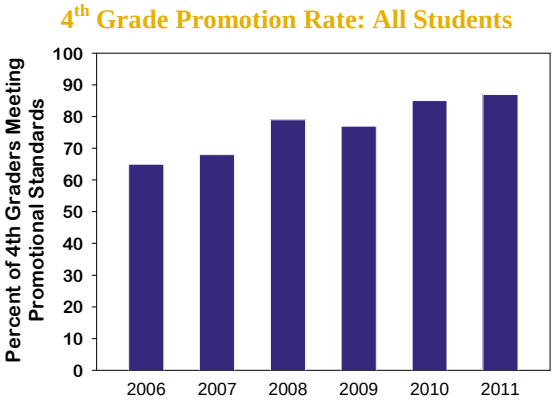

Figure 11. Percentage of St. Mary 4th graders meeting promotional standards from 2006-2011.

In general, the percentage of students meeting the promotional standards steadily increased for both the General Education population and the Special Education population. Figure 12 shows the trend in 4th grade General Education promotion rates from 2006 to 2011. Between 2006 and 2011, the General Education 4th grade promotion rate improved from 67% to 90%.

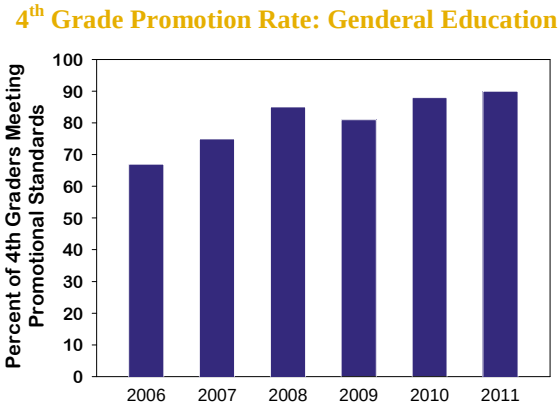

Figure 12. Percentage of St. Mary general education 4th graders meeting promotional standards from 2006-2010.

Figure 13 shows the trend in 4th grade Special Education promotion rates from 2006 to 2010. Between 2006 and 2010, the Special Education 4th grade promotion rate improved from 33% to 66%.

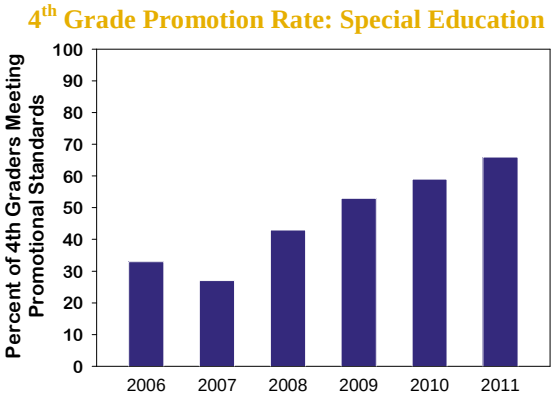

Figure 13. Percentage of St. Mary 4th graders receiving Special Education services who met promotional standards from 2006-2010.

By moving students from the General Education population into the Special Education population, it would be possible to increase the percentage of proficient students in each, without making any changes in the promotion rate of individual students. Between 2006 and 2011, the St. Mary Parish Public School System did just the opposite; not only did they increase the promotion rate of both the General Education and the Special Education students, but the number of students requiring Special Education services decreased by 17% (not including students receiving services for Gifted and Talented) (Figure 14).

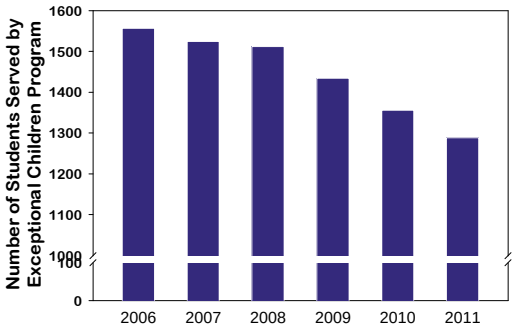

Figure 14. The number of students served by the Exceptional Children Program, not including those who are Gifted and Talented, has decreased by 17% since 2006.

DISCUSSION

Over the past nine years (2003 to 2011), the St. Mary Parish Public School System has increased the overall proficiency of their elementary and middle school students on the LEAP English Language Arts, Math, Science, and Social Studies tests. In addition, since starting the use of the Fast ForWord products, St. Mary Parish has reduced the achievement gap between their Black and White students. In 2011, far fewer students are struggling below grade level and more 4th grade students are meeting promotional standards than before.

The students' improvements have impacted the district performance with the District Performance Score (DPS) increasing from 80.0 in 2006 to 96.7 in 2011. This improvement of 16.7 points is nearly double the increase in the State Baseline School Performance Score which has improved 8.8 points during that same time (Figure 15).

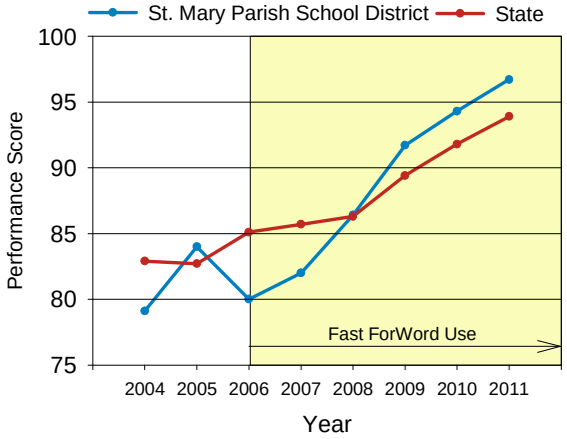

Figure 15. Since initial implementation of the Fast ForWord products during the 2006-2007 school year, the increase of the St. Mary Parish School Systems' District Performance Score (DPS) has nearly doubled the increase of the state's baseline School Performance Score (SPS).

These findings demonstrate that, within the St. Mary Parish Public School System, an optimal learning environment coupled with a focus on cognitive and early reading skills can help students attain a higher level of English Language Arts, Math, Science, and Social Studies achievement.

CONCLUSION

Cognitive and language skills are critical for all students, impacting their ability to benefit from instruction, follow directions and participate in class discussions. Strong cognitive skills also provide a critical foundation for building language, reading, and math skills. After Fast ForWord use, students in the St. Mary Parish Public School System made significant gains in their English language arts and math achievement. These results replicate other studies and suggest that using the Fast ForWord

products strengthened the students' foundational skills and better positioned them to benefit from the classroom curriculum.

Notes:

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