The Effectiveness of the Fast ForWord Computer Program

On Improving the Literacy Skills of Struggling Readers

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Introduction

The ability to read is an essential skill needed by all students to be successful. It is the foundation on which all subjects build upon. If a student is unable to read, they will likely struggle in other subjects such as math, language, science and social studies. Teachers are continually working to identify and implement reading interventions that will provide struggling readers with the differentiated instruction and remediation needed to be successful. There are many different intervention programs available to help remediate and improve students reading skills. One program my school recently adopted is the Fast ForWord program. This is a computer based program designed to help students learn and practice reading skills. I have decided to learn more about this program and evaluate how effective the program is in helping students to improve his or her reading skills and overall performance in the classroom.

Orientation to Topic

The Scientific Learning Corporation (1998) designed and developed the Fast ForWord program to help students develop and strengthen focus, memory, processing rate, and sequencing by completing a series of computer-based game like exercises. The program provides not only engaging activities for students but individualized instruction based on the students' needs. I first heard of the Fast ForWord program when a local hospital and two elementary schools in my county began implementing the program to help struggling readers. Teachers and parents who have witnessed the program described it as being engaging and effective. In August 2013, my school, Sunset Elementary, started implementing Fast ForWord as an intervention for struggling readers in third, fourth, and fifth grades. Students were chosen to participate in Fast ForWord using data collected from the Dynamic Indicators of Basic Early Literacy Skills (DIBELS)

assessment given at the beginning of the school year. Ten students from third grade were chosen to participate in the Fast ForWord intervention program. The intervention is provided four days a week in the computer lab for thirty minutes. Fast ForWord instruction is provided in addition to the regular reading instruction provided by the classroom teacher.

Learning to read can be a difficult task. To ensure students learn to read, teachers need to provide a well-balanced reading program on a daily basis. A well balanced reading program consists of daily instruction in phonemic awareness, phonics, fluency, vocabulary, and comprehension. The learning needs to be meaningful and engaging. In order to address state standards and become lifelong learners, students need to be exposed to a wide range of text. Students also need individualized instruction based on their needs. Some students may need remediation in phonic skills while some students may need acceleration using texts above grade level.

The Fast ForWord program is one of the many computer based programs designed to address the needs of students who need remediation in the area of reading. The student receives individualized reading instruction based on his or her needs and at the pace needed for individual success. The lessons are also engaging and fun for the students to complete.

Purpose Statement

The purpose of the study is to determine whether or not the computer-based reading program, Fast ForWord, is effective for helping struggling readers. Over the years, there have been many studies conducted on this program with conflicting results. Due to such a large price tag and time commitment, it is important to evaluate the effectiveness of the Fast ForWord

program. Is the time and money a wise investment for school systems, or would their time and

money more efficiently produce greater gains with a different intervention program?

Research Questions

Questions to help guide the research study:

1. How can computer based interventions, such as Fast ForWord, enhance a student's

   abilities to read?

2. How effective is the Fast ForWord computer based intervention program in improving

   literacy skills of struggling readers?

Importance of the Study

Technology is a hot topic in education. Technology is incorporated into state standards

and the ability to use different forms of technology is a life skill students will need to be lifelong

learners. Technology can provide teachers with a variety of tools to remediate, practice, or

accelerate curriculum taught in the classroom. Fast ForWord is just one of the many computer

based intervention programs on the market. Many may ask what makes Fast ForWord a better

choice over other programs.

Fast ForWord was designed and developed based on research that supports brain

neuroplasticity. As stated on the Scientific Learning Website, "By exercising processing skills

through intensive, adaptive activity, actual physical changes occur in the brain. And those

physical changes result in enduring gains in language and reading skills." The frequent and

intense training of the program is believed to *rewire* the brain. According to Begley (2000), Fast

ForWord helps to rewire the brain so that it is able to recognize lightning-fast phonemes. The

program helps students learn to distinguish between similar short sounds to help them link

written words with sounds and later with learning to read. Many students in third grade lack

phonemic awareness and phonic skills in order to decode and read words on a page. Fast

ForWord, and its ability to rewire the brain, shows a lot of potential in helping students gain the

foundational skills needed to read grade level text.

Definition of Terms

As stated on the Scientific Learning website, "Fast ForWord is defined as an online

reading intervention program that builds memory, processing rate, sequencing skills, and

attention for reading success in a skillful way".

Begley (2000) defines neuroplasticity as the way the brain is created by what is put in it

and that it is continually reorganizing itself and is able to change throughout a lifetime.

Literature Review

This section will provide information and past research on the Fast ForWord program and the effects the program has had, if any, on struggling readers. This chapter is organized into two leading research questions and themes that have developed from those questions.

How Fast ForWord enhances reading skills

According to the Scientific Learning Corporation (1998), "Fast ForWord is a computer-based intervention program for children 4 – 14 in age. It is designed to help students develop and strengthen focus, memory, processing rate, and sequencing by completing a series of computer-based game like exercises." Agocs et al. (2006) shared, "The main focus of the Fast ForWord program was built on two assumptions. First, children with language impairments are impaired by the inability to perceive rapid successive information from a speech signal and to store the speech sounds. Second, is that the intense training provided through the program can improve students' attention, discrimination, sequencing, and memory, which will result in improved processing skills."

As these skills increase, the student will improve critical language and reading skills such as phonological awareness, phonemic awareness, fluency, vocabulary, comprehension, decoding, working memory, syntax, grammar, and other skills required to read and strengthen reading skills. Fast ForWord was developed on the research and finding of the brain's neuroplasticity. As stated on the Scientific Learning Website (1998), "By exercising processing skills through intensive, adaptive activity, actual physical changes occur in the brain. And those physical changes result in enduring gains in language and reading skills." The program uses acoustically modified speech signals that make rapid consonant transitions longer which increase the

amplitude of some transitions. As the student progresses through computer exercises, the speech presented as input to the student is decreased until it is presented at the same rate and volume as normal speech.

Neuroplasticity

Research shows that the brain, once thought of as a rigid structure after the age of three, is now known to be malleable or *plastic*. Neuroplasticity means that the brain is created by what is put in it and that it is continually reorganizing itself and is able to change throughout a lifetime. "A key element of Fast ForWord is the assumption that multiple trails can change the brain's neuroplasticity and in return improve the learning and retention of language skills" Merzenich, Tallal, Person, Miller, & Jenkins, 1999).

"Many children with language difficulties process rapid and incoming sensory information slowly and are unable to discriminate among brief and weak acoustic cues needed to learn the phonemes of language" (Loeb, Gillam, Hoffman, Brandel, Marquis, 2009). According to Benasich, Thomas, Choudhury, and Leppanen (2002*),* "This impairment may also interfere with a student's ability to understand and use language, read, perform on grade level, and successfully participate in activities in and outside of a school setting." "The Fast ForWord program is designed to break down the components of language by altering the way the brain processes the rapidly successive features of speech sounds" (Loeb et al, 2009). Begley (2000) stated, "The Fast ForWord program was designed to rewire the brain so it is able to break down and recognize lightning-fast phonemes". Tallal (1980), "One of the developers for the Fast ForWord program, shares that the program assists students in learning of both language and reading because they sharpen phonological processing skills such as speech perception and

phonemic awareness." These skills help teach students to use phonological strategies when trying to decode unknown words.

Merzenich et al. (1996) conducted a study on eleven language-learning impaired children. In this study, it was proved that neuroplasticity-based training could significantly improve basic auditory processing speed by engaging children with language-based learning impairments in adaptive training using computer-based activities designed to improve their temporal processing skills. Participating in this study made 1 -2 years gains in language comprehension and speech discrimination skills.

In a study conducted by Rogowsky, Papamichalis, Heim, and Tallal (2013), twenty-five college students who demonstrate poor writing skills participated in training where the Fast ForWord Literacy and Fast ForWord Reading series (levels 3-5) were used to evaluate the effectiveness of computer-based cognitive and linguistic training. Students participated in the training for 11 weeks. At the end of the 11 weeks, the students were tested to see if any gains were made since taking the pretest 11 weeks earlier. Results showed that the training group made statistically greater improvements than the comparison group. This study shows that neuroplasticity-based programs such as Fast ForWord could be implemented to help increase college students with below average writing skills. It is intriguing to know if the Fast ForWord program could show the same positive results with elementary students with below grade level reading skills.

Effects of Fast ForWord for Students with Disabilities

Over the years, the Fast ForWord program has been studied by many different researchers in variety of settings using different methodologies. The studies show positive and negative results.

Cohen et al. (2005) conducted a study with seventy-seven students ranging in ages 6-10 from Scotland in a randomized controlled trial (RCT) of Fast ForWord. All the students who participated in the study had severe mixed receptive-expressive specific language impairments. The children were assigned to three different groups: 1) FFW intervention as a home-based therapy for 6 weeks. 2) Commercially available computer-based activities designed to promote language as a control for computer games exposure. 3) No additional study intervention. In the end, each group made significant gains in language scores, but there was no additional effect for either computer intervention. As a result, the findings from this RCT did not support the efficacy of Fast ForWord as an intervention for children with severe mixed receptive–expressive SLI. Additional studies need to be conducted to further study the FFW-L and its impact on phonemic awareness and reading.

The following study was designed by Loeb, Gillam, Hoffman, Brandel, Marquis (2009) to evaluate intervention programs that could improve reading for students who may have dual diagnosis of poor reading skills and language impairments. This study was a quasi-experimental design. 103 Students (6 to 8 years old) were assigned to one of four conditions: 1) Fast ForWord-Language (FFW-L), 2) computer-assisted language intervention (CALI) 3), individualized language intervention (ILI), 4) attention control (AC). The intervention was for 6 weeks, totaling 30 sessions. Measures for phonemic awareness and reading outcomes were taken at three

different points: before treatment, immediately following treatment, and 6 months after

treatment. Results showed that students in the FFW-L, CALI, and ILI made great gains in

blending sounds compared to the AC group. There were not any significant changes when

retested six months later. None of the intervention made any significant changes in reading skills.

It is important to note that since the authors began the research for this study, the Scientific

Learning Corporation has published additional software to be used with the FFW-L program to

assist with reading development. The authors suggested that future studies may be needed to

accurately evaluate the Fast ForWord program.

Pokorni et al. (2004) found similar results in a study of sixty students with severe mixed

language impairments and reading disabilities. Students were randomly assigned to three

different programs: Fast ForWord, Earobics, and the Lindamood Phoneme Sequencing Program

(LiPS). No gains in the students' reading skills were shown in either of the groups.

Fast ForWord effects on At-Risk Students

Borman, Benson, and Overman (2009) designed and implemented a study to focus more

on the effectiveness of the Fast ForWord Language computer-based program beyond a

laboratory experiment with only children with specific language-based impairments. This quasi-

experimental design study aimed to study if the Fast ForWord program was successful with

second and seventh grade students in eight Baltimore City Schools. As stated by Borman,

Benson, and Overman (2009), "The results from this experimental study suggest that an

implementation of Fast ForWord with a sample of educationally at-risk students from urban

school setting of Baltimore did not produce short-term achievement advantages on district-

administered standardized tests that are used for accountability purposes." Further studies are

suggested to determine which specific cognitive, language, or reading skills included within the series of training had the most impact on writing.

In contrast to other studies, Troia and Whitney (n.d.) reported positive effects from students who participated in Fast ForWord. Students in treatment groups were matched with students in a no-contact control group and were assessed in: oral language competency, phonological processing abilities, basic reading skills, and classroom behavior. Students were assessed immediately following intervention that was 4 – 8 weeks long. When comparing the treatment group and the controlled group, the treatment group made significant gains in oral language, syllable and sound blending, and behavior.

Positive effects were also found in a study focused on language comprehension, literacy, the uniqueness of Fast ForWord, treatment settings, and mechanisms underlying improvement. "The children we studied were somewhat better off after FFW intervention or, at least in two cases, after intervention with another computerized intervention program presented on the same intensive schedule as FFW. The outcome is reasonably consistent with the results of the FFW field trial (Tallal, 2000), regardless of the explanation for the effect" (Gillam, Loeb, & Friel-Patti, 2001). The results showed improvements in language abilities as a result of FFW training.

A third study to support the efficiency of Fast ForWord is a correlation study of twenty-nine students with and without auditory disorders in Singapore. The results showed students who used the Fast ForWord language program made significant improvements in auditory processing, phonemic awareness, phonological decoding, sight word reading, and attention (MAPS, 2006).

Statement and Rationale for Hypotheses

The results from past research studies contradict each other. Some studies show great gains in students' reading skills while others show very little to none. My hypothesis is that the students will show gains in basic phonemic awareness skills and fluency. The research study that I have designed will use quantitative and qualitative data to evaluate the Fast ForWord program to find out if it is effective in improving students' reading skills.

Methodology

Overview of Research Design

The purpose of conducting this study was to evaluate the effectiveness of the Fast ForWord computer program on struggling readers. The study included a mixed methods approach by including quantitative and qualitative data from ten third grade students and his or her classroom teacher. The study took place from January 2014 until April 2014. Data collection included the use of DIBELS Next assessment data from the beginning of the year and end of the year. Observations and interview notes from students and classroom teachers were also used. Throughout the course of the study, students participating in the Fast ForWord program were observed for a total of three hours. Teachers and students were interviewed at the end of the study. Data from the beginning of the year DIBELS assessment was used to compare the participants' growth to ten struggling readers in third grade who did not participate in the Fast ForWord program.

Participants

Ten third grade students ranging eight to ten years of age participated in the Fast ForWord program. These students were identified as struggling readers at the beginning of the year using DIBELS Next data that was collected in August. The participants are both male and

female and are many different ethnicities. None of these students have been identified as special

education students but many are currently being monitored through the Response to Intervention

(RTI) program. All ten of these students will participate in the research study.

Data Sources and Collection

A mixed methodology embedded design was used to evaluate the Fast ForWord program.

DIBELS Next was used as the main form of quantitative data. Observations and interview notes

were used to collect qualitative data to support the DIBELS Next data. This information helped

provide an explanation or follow up to the DIBELS Next results when evaluating if the Fast

ForWord program is or is not effective in improving the literacy of elementary students.

DIBELS Next is an oral reading fluency test on a grade level passage. The oral reading

fluency section is a timed test calculating the percentage of words read correctly in one minute.

A baseline is established for each child at the beginning of the year (BOY) which is in August.

Additional benchmark assessments are given at the middle of the year (MOY) which is in

December, and at the end of the year (EOY) in April. For the purpose of this study, DIBELS

Next data from the BOY was compared to the participants' EOY DIBELS Next data to calculate

the amount of growth that occurred throughout the academic year. The participants' growth was

compared to other struggling readers with similar BOY scores who did not participate in the Fast

ForWord program. In April, the students and teachers were interviewed using the interview

questions (located in the Appendices) to gather information to use along with the DIBELS Next

data to evaluate the effects, if any, the Fast ForWord program has on struggling readers.
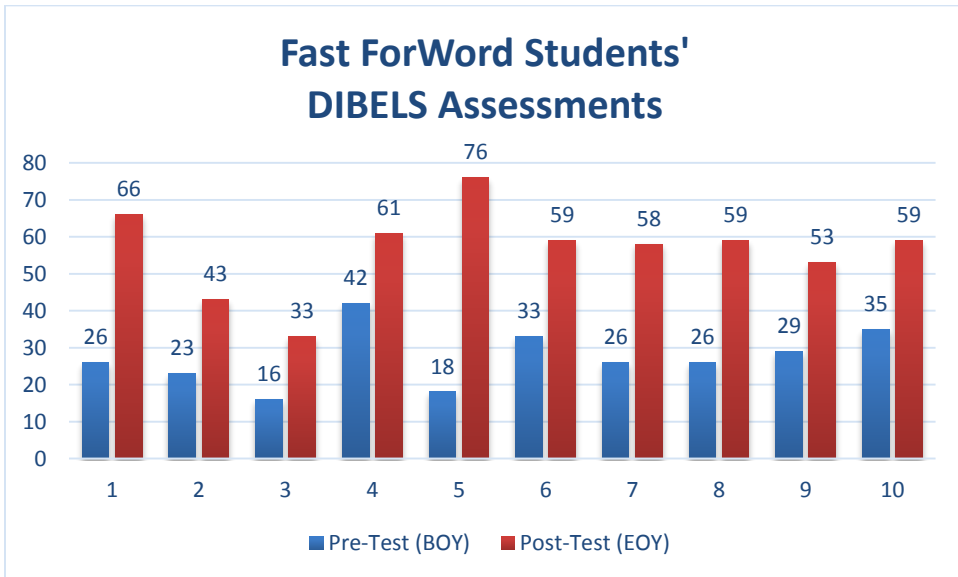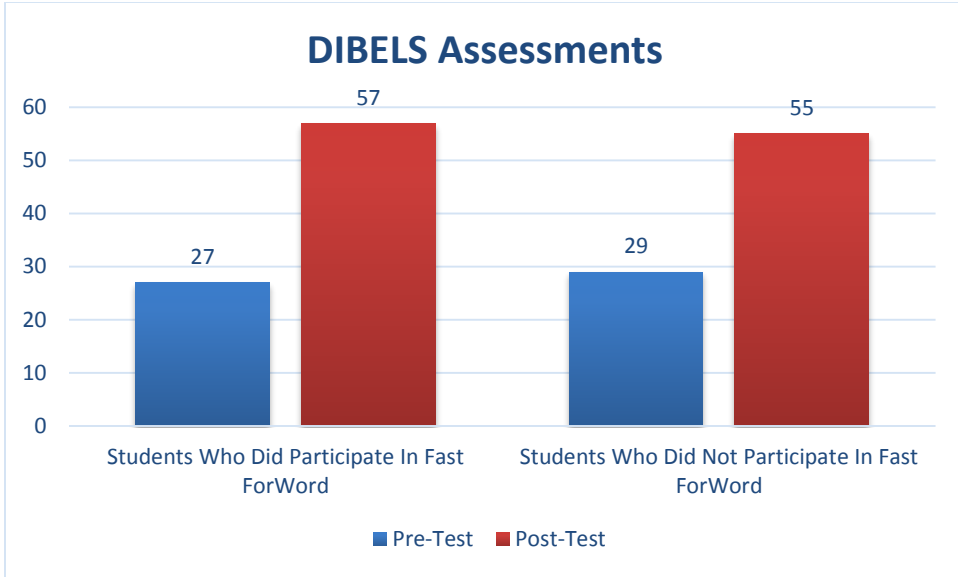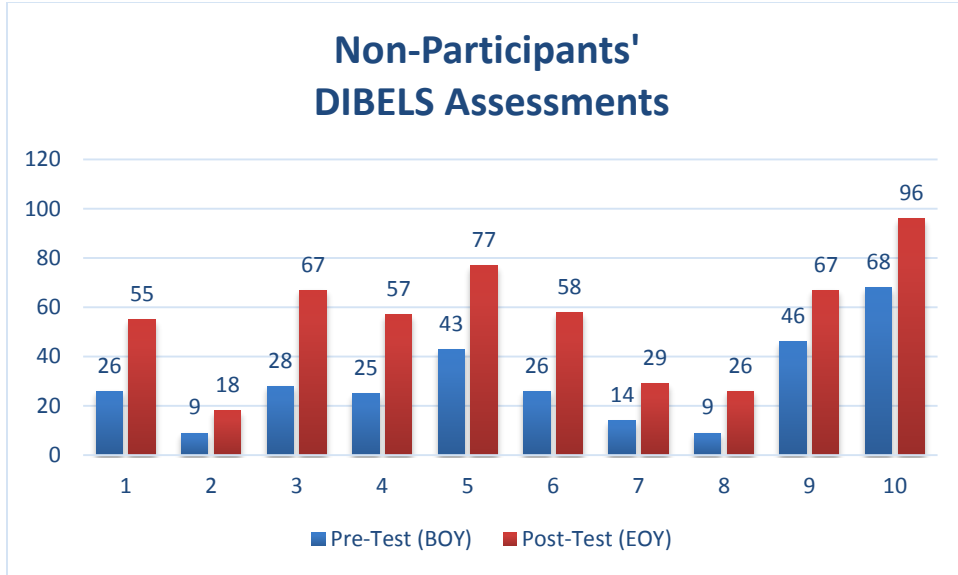
Reliability/Validity or Credibility

For this study, only a small number of third grade students at Sunset Elementary School were studied. There are limitations to this study due to the small number of participants from one grade or one elementary school.

Analysis

For the purpose of this research project, the beginning of the year (BOY) and end of the year (EOY) DIBELS Next data for the ten students who participated in the Fast ForWord program and ten non-participants with similar BOY scores were analyzed. Each participant's scores were placed on a chart to plot the progress from the BOY to the EOY. An average percentage of growth was determined.

The group mean for students who participated in the Fast ForWord program increased 29 points from the BOY to the EOY. The growth of the Fast ForWord participants was compared to the group mean of students not participating in the Fast ForWord program which showed an increase of only 26 points from the BOY to the EOY.

DIBELS Assessments

Students Who Did Participate In Fast ForWord: Pre-Test 27, Post-Test 57

Students Who Did Not Participate In Fast ForWord: Pre-Test 29, Post-Test 55

Legend: Pre-Test, Post-Test

Fast ForWord Students' DIBELS Assessments

Student	Pre-Test (BOY)	Post-Test (EOY)
1	26	66
2	23	43
3	16	33
4	42	61
5	18	76
6	33	59
7	26	58
8	26	59
9	29	53
10	35	59

Legend: Pre-Test (BOY), Post-Test (EOY)

Non-Participants' DIBELS Assessments

After finding the change in group mean for both groups, an independent samples t-Test was used to determine if the difference between the two were significant. The growth in students who participated in Fast ForWord from the BOY pre-test to EOY post-test was 29 points and the non-participants' growth from the BOY to EOY was 26 points. The difference in means was not significant at the *p>*.05 level (*t=*.64, *df =*18).

Table 1. Change in Group Mean from the BOY and EOY DIBELS NEXT

Column1	Column2	Column3
t-Test: Two-Sample Assuming Equal Variances		
Change		
	Participants	*Non-Participants*
Mean	28.7	25.6
Variance	141.5666667	92.48888889
Observations	10	10
Pooled Variance	117.0277778	
Hypothesized Mean Difference	0	
df	18	
t Stat	0.640770068	
P(T<=t) one-tail	0.264873091	
t Critical one-tail	1.734063607	
P(T<=t) two-tail	0.529746181	
t Critical two-tail	2.10092204	

To further support the findings, the mean of both groups' pre-test and post-test were used to determine if there was a significant difference using an independent samples t-Test. The mean of the Fast ForWord participants' pre-test was 27 points. The mean of the non-participants' pre-test was 29 points. The difference in means was not significant at the *p>*.05 (*t*= -.32, *df*=18).

Table 2: Pre-test of Fast ForWord participants and Non-Participants

Column1	Column2	Column3
t-Test: Two-Sample Assuming Equal Variances		
Pre-Test		
	Participants	*Non-Participants*
Mean	27.4	29.4
Variance	60.93333333	340.4888889
Observations	10	10
Pooled Variance	200.7111111	
Hypothesized Mean Difference	0	
Df	18	
t Stat	-0.315667078	
P(T<=t) one-tail	0.377942956	
t Critical one-tail	1.734063607	
P(T<=t) two-tail	0.755885911	
t Critical two-tail	2.10092204	

For the post-test, the mean for the Fast ForWord participants was 57 points. The mean for the non-participants was 55 points. The difference in means was not significant at the *p>*.05 (*t*=.20, *df*=18).

Table 3: Post-test of Fast ForWord participants and Non-Participants

Column1	Column2	Column3
t-Test: Two-Sample Assuming Equal Variances		
Post-Test		
	Participants	*Non-participants*
Mean	56.7	55
Variance	139.7888889	594.6666667
Observations	10	10
Pooled Variance	367.2277778	
Hypothesized Mean Difference	0	
Df	18	
t Stat	0.198365509	
P(T<=t) one-tail	0.422491145	
t Critical one-tail	1.734063607	
P(T<=t) two-tail	0.84498229	
t Critical two-tail	2.10092204	

All qualitative data was collected, coded and analyzed to see if there were any improvements in the students' overall reading ability and to determine if the Fast ForWord program was effective in helping struggling readers. One-on-one interviews with the ten Fast ForWord participants and their teachers along with three hours of observation notes were used for this data. Observation and interview notes were highlighted and sorted to match the research questions by color coding these with a highlighter. The notes were correlated to the quantitative results.

When putting both pieces of data together for a final analysis, the quantitative and qualitative data results demonstrated a positive effect on the reading abilities of struggling readers but the difference was not significant. Students who participated showed an increase from the BOY to the EOY on their DIBELS Next assessment. The mean of the participants' pre-

test scores was lower than the non-participants' pre-test scores by two points, but at the EOY, the mean of the Fast ForWord participants' DIBELS scores was two points higher than the non-participants' EOY scores. Qualitative data collected reflected positive changes in the Fast ForWord participants' reading ability inside the classroom. Participating teachers shared in their interview that they could clearly see increases in the students' oral reading fluency and willingness to read aloud in class. Of the five teachers interviewed, all of them agreed that the Fast ForWord program was effective in helping students improve their reading skills. Many teachers explained that the students enjoyed the game-like format of the program and were eager to attend each morning. This was also a common response when interviewing students on their favorite feature of the program. Eighty percent of the students said the program was fun. Many explained that it was like playing a video game. One student stated, "It makes learning to read fun and it is usually boring!"

Results from past research studies have been contradictory of each other. Some studies show great gains in students' reading skills while others have shown very little to none. My hypothesis at the beginning of this project was that students would show gains in basic reading skills and fluency. After analyzing the quantitative and qualitative data that was collected over the four month period, my hypothesis was not supported. It is not evident that the Fast ForWord program had a positive effect on improving literacy skills and fluency of struggling readers but the effect was not significant. The computer based program provides game-like features which makes learning to read fun and engaging to enhance a student's oral reading fluency and ability to read but in this study it is not proven that the program makes an overall significant increase in students' overall literacy skills compared to students who do not participate in the program.

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Appendix

Interview Protocol

Interviews will be conducted one-on-one. Responses will be recorded using paper and pencil.

Interview questions for students:

1. Do you like the Fast ForWord program? Why or Why not?
2. What features of the program do you like the most?
3. When you are reading with the Fast ForWord program, are you able to pay attention all the time?

Interview questions for teachers:

1. What changes have you seen in the student's reading ability or skills in the classroom setting?
2. Why do you believe the Fast ForWord program has been effective or non-effective in helping the students improve his or her reading skills?