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AN OBSERVATIONAL STUDY OF THE FAST FORWARD PROGRAM AND  
ATTENTION SKILLS OF STUDENTS WITH LEARNING AND  
BEHAVIORAL DIFFICULTIES

by  
Eileen A. Mosby

A Thesis

Submitted in partial fulfillment of the requirements of the  
Masters of Arts Degree  
of  
The Graduate School  
at  
Rowan University  
April 29, 2009

Approved by \_\_\_\_\_  
Advisor

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## ABSTRACT

Eileen A. Mosby  
AN OBSERVATIONAL STUDY OF THE FAST FORWORD PROGRAM AND  
ATTENTION SKILLS OF STUDENTS WITH LEARNING AND  
BEHAVIORAL DIFFICULTIES

2008/09

Dr. Jay Kuder  
Master of Arts in Special Education

This study investigated the effectiveness of the Fast ForWord program (FFW) on attention for students with learning and behavior problems, compared to two other reading programs (Achieve 3000 computerized reading program and a traditional reading program). Improvements in attention skills were observed and compared following a 30-minute, 5 day-a-week schedule. The three programs were implemented within the curriculum in a middle school setting for a 40 day period. The design was a single group study conducted within a single school in the Gloucester County Special Services District. The study participants were 12 seventh through ninth-grade students attending Bankbridge Regional School in Sewell, New Jersey, during 2008-2009. An attention rubric was used to determine off-task behaviors, as well as, on-task behaviors, during all three programs and then compared at the end of a 40 day period. On average, students made significant improvements in attention skills, while on the FFW program, compared to the traditional reading program. The FFW program had only a slight improvement, on attention skills, compared to the Achieve 3000 computerized, reading program.

## ACKNOWLEDGEMENTS

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# Chapter 1

## I. Introduction

Attention deficits and hyperactivity are characteristics often observed in students with learning and behavior disorders. In fact, in one study, 25 to 68 percent of students with attention deficit disorder were also identified as learning disabled (McKinney, Montague, and Hocutt, 1993). A pattern of inattention is frequently displayed from students with attention deficits, while students with hyperactivity exhibit impulsive behaviors. In the classroom, inattention is manifested in a failure to pay attention to details, careless mistakes, messy work, and difficulty in persisting with a task until completion (American Psychiatric Association, 1994). Students with learning disorders display significantly more attention problems, but not conduct or anxiety, than average achievers (LaGreca and Stone, 1990).

The term attention refers to a wide range of behaviors, including tending to details or the amount of time attending to tasks. Capacity to focus awareness on selected incoming stimuli is called selective attention. The importance of selective attention can be demonstrated in relation to the reading process. Students sometimes go through mechanical motions while reading a passage, not really comprehending what was just read. Instead the students mind has drifted to thoughts about friends, music, or video games. An efficient reader must selectively attend to the relevant stimuli. Attention can only be devoted to a few cognitive processes at a time. These processes require less attention the more proficient you become at a process. Automatic processes are well

practiced and require little attention, whereas, deliberate processes require considerable attention. These same principles have been applied to the reading process (LaBerge and Samuels, 1987; Swanson, 1996). Students with learning and behavior problems must commit their attention to identifying words in isolation rather than comprehending what was just read. Readers at an automatic level have more word recognition, therefore, more attention capacity for comprehension.

There are many types of programs available to enhance reading, but few, if any, address the need to help readers' better focus their attention on the reading task. One program that may have the potential to address this need is the Fast ForWord program.

The Fast ForWord program is based on the science of how the brain learns and retains information to develop the brain's processing efficiency, essential for academic learning and reading success. This computer based program specializes in reading intervention designed for K-12 education institutions and clinical specialists worldwide whose students are reading below grade level. The Fast ForWord program develops brain processing efficiency through intensive, adaptive exercises. The program also develops and strengthens memory, attention, processing rate, and sequencing. The strengthening of these skills results in a wide range of improved critical language and reading skills such as phonological awareness, phonemic awareness, fluency, vocabulary, comprehension, decoding, working memory, syntax, grammar, and other skills necessary to learn how to read or to become a better reader. The Fast ForWord reading intervention supports existing curriculum and aligns to the state mandates. (Scientific Learning Corporation, 1997-2008)

In the classroom environment, the Fast ForWord program helps the students stay interested due to the graphics, sounds, and animation. During the time allotted for the program the students are quiet and focused on the task. The Fast ForWord program holds the students attention and seems to have a calming effect on them, from the unstructured lunch period prior to the program. This is why the Fast ForWord program is essential in the development of the basic characteristics of reading comprehension in students with various learning and behavior disabilities. Since reading is a demanding activity, the Fast ForWord program applies the discoveries of neuroscience to accelerate important reading skills and conduct positive changes in a students learning capacity.

## II. Statement of the Problem

Attention during reading can be very challenging for students with learning and behavior problems. Many students seem to have difficulty working for extended periods of time on a task and have difficulty attending to relevant information in a message. These students may have trouble focusing on the teacher's directions or are easily distracted by other stimuli. Students with attention difficulties often display significant problems in one or more academic areas, such as spelling, writing, oral language skills, and reading comprehension. A systematic and well-structured program is needed to motivate, entice, and monitor the effectiveness of students with learning and behavior problems. The purpose of this research study is to investigate whether the Fast ForWord program will improve attention, for students with learning and behavior problems, during reading. In addition, this research will examine whether students using the Fast ForWord

program will improve their attention skills compared to other reading programs, one being a computer based reading program and the other a traditional reading program using novels.

Research question:

1. Can the Fast ForWord program improve attention skills, during reading, compared to the Achieve 3000 computerized reading program , and a traditional reading program, for students with learning and behavior problems?

Hypothesis:

This research study will: (a) support that the Fast ForWord program will improve attention skills, during reading, for students with learning and behavior problems. (b) support that the Fast ForWord program will improve attention skills, for students with learning and behavior problems, compared to the Achieve 3000 computerized, reading program. (c) support that the Fast ForWord program will improve attention skills, for students with learning and behavior problems, compared to a traditional reading program.

### Importance of the Problem:

Reading is an essential skill. Attention is needed for successful reading. Many students with learning disabilities have attention problems that impede on the essential skill of reading. In the classroom, an approach is needed that can enhance attention and reading.

We all know that attention is a very desirable skill, but how many possess it? Why it is important? It is a requirement for every student who desires to succeed. In order to achieve success students must focus their mind, along with settling its restlessness and tendency to constantly shift from one stimulus to the next. Attention is vital in any action which requires comprehension skills. It has to be developed. Its development and training starts from a very early age. Teachers focus on having children decode the words in a story before they can analyze the story itself. Attention in reading is crucial as the student must have sufficient mental energy to read lengthy passages, able to extract the most important details, and self-monitor when reading. These actions reinforce the statement as to why attention during reading is so vital in today's classroom. The importance of the problem is whether a computer based program can improve the attention (defined as mental focus or concentration) and reading of students with learning and behavior disabilities.

### III. Summary:

In summary, this study will determine whether, students with reading disorders, using the Fast ForWord program will improve in the areas of attention during reading for students with learning and behavior problems. Case Studies on the Fast ForWord program show that there are four key cognitive skill sets that, when developed together, improve learning and reading. These skill sets are memory, attention, processing rate and sequencing. In order to measure the attention during reading, twelve students were selected to participate in a computerized language and reading program. The Fast ForWord program will be implemented to the students and scores recorded. Many behaviors prior to and following the use of the Fast ForWord program will be observed and checked. If the Fast Forward can be shown to improve both attention and reading, the program can be an effective tool for special education students, who are struggling with attention during reading.

## Chapter II

### Literature Review

Many children who have trouble reading actually have one or more learning disability that makes it difficult for them to benefit from traditional classroom teaching methods (Krueger, 2003). Students with reading disorders perform reading tasks well below the level one would expect on the basis of their general intelligence, educational opportunities, and physical health (Davidson, 2003). There are many factors that may cause reading disorders, including reading accuracy, speed, and comprehension (Scientific Learning, 2003).

### Attention and Reading

In addition to the factors cited above, attention problems may play a role in the development of reading difficulties. Early screening for attention problems may help identify the children most at risk of developing reading problems. Sometimes attention problems are difficult to detect, because some children with attention problems don't always behave disruptively. Some children who are quietly inattentive may not be identified by teachers as having a problem, therefore, they do not get the additional help needed to master certain reading skills. This includes children with attention deficit hyperactivity disorder, predominately inattentive (ADHD-1), which goes undiagnosed until they are further along in school and their work has already suffered. ADHD-I is different from the other subtypes of ADHD in that it is characterized primarily by inattention, easy distractibility, disorganization, procrastination, forgetfulness, and



lethargy, but with less or none of the symptoms of hyperactivity or impulsiveness typical of the other ADHD subtypes (Neihart, 2007).

Several studies have documented a link between attention problems and reading achievement. For example, (Stevens, Fanning, Cocha, Sanders, & Neville (2007) examined whether six weeks of training, with a computerized intervention designed to improve language skills, would also change neural mechanisms of selective auditory attention previously shown to be deficient in children with specific language impairment (SLI). The computerized training included twenty children, eight children diagnosed with SLI and twelve children with typically language development. No special training for thirteen additional children (control group), with typically developing language, were tested and re-tested. Before and after training children completed standardized language assessments and an event-related brain potential (ERP) measure of selective auditory attention. Children received training for one-hundred minutes per day. Those who received the training showed increases in receptive language. In addition, children receiving training showed larger increases in the effects of attention on neural processing following training relative to the control group. The enhanced effect of attention on neural processing represented a large effect size and was specific to changes in signal enhancement of attended stimuli. Recent electrophysiological studies indicate that speech segmentation is associated with early neural modulation similar to the effects of selective attention on auditory processing (Sanders and Neville, 2003). If Fast ForWord activities are training auditory attention, and this attention training aides with language improvement, then designing activities that target attention explicitly might be beneficial

to students with SLI. These findings indicate that the neural mechanisms of selective auditory attention, previously shown to be deficient in children with SLI, can be helped through training and can accompany improvements on standardized measures of language.

There is also evidence that programs designed to improve attention can also improve reading. In 2002, a study, (Burns, Hecker, Elkind, Katz, 2002) investigated how assistive reading software affected the reading performance of a group of 20 post-secondary students who had a primary diagnosis of attention disorder. These students used assistive reading software to read assignments for an English class and in testing sessions. Comparisons were made between normal, unassisted reading, and reading assisted by the soft-ware. This software provided a synchronized visual and auditory presentation of text, and incorporated study skills tools for highlighting and note taking. Attention measures, reading speed, comprehension scores, and attitude questionnaire responses were obtained during these sessions. The students reported having many of the reading difficulties that are characteristic of students with attention disorders such as missing or skipping parts of words, whole words, phrases, sentences; sentences not making sense; not remembering what was read; and relying on context to infer meaning. Consistent evidence that attention improved when the students used the assistive reading software was achieved. The median number- of distractions per hour was cut in half in an observed extended reading session. This result was statistically significant and was supported by limited data from independent reading by 10 students that showed a 65% reduction in distractions per hour (not significant and possibly not representative of the

whole student group). The main results were that the assistive software allowed the students to attend better to their reading, to read with less stress and fatigue, reduce their distractibility, and to read for longer periods of time. The decrease in distractions was proportional to the number of distractions per hour in unassisted reading. Eighty percent of the students reported that reading was less stressful and 75% that it was less tiring. They also estimated in responses to two questionnaires administered at different times that the duration of sustained reading significantly increased by more than 60% with the assistive reading software.

The software did not have a significant effect on comprehension of the entire group of students, but it did benefit those who had very low comprehension test scores. The improvements in reading speed for sustained reading should have led to improvements in timed comprehension scores. However, only 40% of the students improved either their timed or untimed comprehension test scores when using the assistive reading software. The average comprehension scores of the group were essentially unchanged.

Assistive reading software can benefit many people who have attention disorders, just as it has benefited people who have reading disabilities. The study results indicate that assistive reading software should be considered as a significant intervention to assist students who have attention disorders and as an accommodation to help them compensate for their disabilities.

Consistent evidence was obtained that reading speed during periods of sustained reading increased with the assistive reading software, therefore enabling assignments to be completed in less time.

### Fast ForWord, Attention, and Reading

Computerized programs have claimed to aide with the many attention and reading difficulties of students in the classroom. One program that has been designed to improve the language and reading of students with disabilities is the Fast ForWord program. The important factor about Fast ForWord is that it is supposed to change neurological functioning.

The Fast ForWord program is a computerized reading intervention designed for K-12 education institutions and clinical specialists whose students are reading below grade level. The Fast ForWord program developers claim that the program improves brain processing efficiency through intensive, adaptive exercises that use acoustically modified speech, allowing sounds to be stretched and emphasized, as well as, graphics that keep students attention. The Fast ForWord program also claims to be able to build and strengthen memory, attention, processing rate, and sequencing, which are the cognitive skills essential for learning and reading success. The program is designed to improve critical language and reading skills such as phonological awareness, fluency, vocabulary, comprehension, decoding, working memory, syntax, grammar, and other skills necessary to learn how to read or to become a better reader.

The seven exercises in the Fast ForWord program are presented in an engaging format with a built-in system of rewards to increase student motivation. The exercises use sounds and discrimination tasks to develop the student's syntactic and semantic skills. Immediate corrective feedback is given before continuing an exercise. At the end of a set of correct responses, students are rewarded with brief but highly motivating features such as lights and animations, amusing sounds, and fetching musical phrases. Because the developers say that the brain is being remapped, the schedule for using the product is frequent and intense. Students participate in computer-based individualized sessions 5 days a week, 100 minutes per day, for 4-8 weeks with the guidance of a Fast ForWord trained clinician or educator. The flexibility of the product permits the student to complete the daily exercises in one session or in sessions that are divided throughout the school day.

Numerous school districts have used the Fast ForWord program to improve the attention skills, cognitive and early reading skills critical for fluent reading. Many districts have done studies demonstrating that the computer-based program had positive impact on student achievement in their districts. On average, after using the Fast ForWord products, students demonstrated substantial increases in measures of their language skills and these specific skills had an impact on reading and academic achievement. Scores months after Fast ForWord participation claim that that students' maintained an increased rate of learning during the school year. The studies suggest that the students' established the needed goals for reading and attention within the classroom setting. Positive results were achieved by using the Fast ForWord program five days a

week for 60-100 minutes a day. The program also helped to keep the students' attention with the graphics and cartoon-like animation. Many students are attracted to the sounds and game-like manner the program is displayed as (Scientific Learning Corporation, 2003).

Many studies investigated the effects of the Fast ForWord program on the language and reading skills of students from various middle schools from around the U.S. The students were academically at-risk with few of the students having success meeting the basic skills expected at their grade level. On average, after Fast ForWord use, students in the many districts who were proficient or nearly proficient readers made improvements in their reading ability. The Scores from before and after Fast ForWord participation show that, on average, students made significant increases in their reading comprehension skills as well. A recent 2007 – 2008 study (Scientific Learning Corporation) found significant improvements among the Fast ForWord participants. One hundred sixty-three students who first used the Fast ForWord products during the 2007 – 2008 school years also achieved significant improvements in their scores with an average improvement of 4.0 points. These results support earlier studies demonstrating that using the Fast ForWord products strengthens students' comprehension skills and helps them benefit more from the reading curriculum enriched with more language skills.

Multiple middle schools have done studies with students' classified with developmental delays, specifically those with mild to moderate cognitive delays or autism spectrum disorders. After using the Fast ForWord program, students with developmental delays made significant gains in their attention and language ability. For

example, data compiled by Scientific Learning Corporation on children with autism spectrum claim to show one- to three-year gains in receptive and expressive language skills, auditory perceptual skills, and auditory memory after six weeks of training. These claims show that a learning environment that is centered on language skills coupled with a focus on attention, cognitive and early reading skills can help students with developmental delays attain a higher level of language achievement.

Middle school districts were interested in evaluating the effectiveness of a curriculum rich learning environment with a focus on reading fluency and comprehension skills, as well as, cognitive skills as a way for improving reading achievement of low-performing students in a school setting. In one study, (School District of Philadelphia, 2003) commercially available computer based products (Fast ForWord Middle & High School and Fast ForWord Language to Reading) were used to evaluate the effectiveness of this approach. Results from this study claimed that on average, low-performing middle school students can significantly increase their reading achievement by using Fast ForWord products. These results support the original studies on improved language skills, and demonstrate that the Fast ForWord program may also result in strengthened reading skills, allowing students to be better positioned to partake in a structured and more intensive classroom curriculum.

During the 2006-2007 school years, students in various middle school districts used the Fast ForWord products and had their reading and language skills evaluated with the Clinical Evaluation of Language Fundamentals-Fourth Edition (CELF-4) Screening Test and the Group Reading Assessment and Diagnostic Evaluation (GRADE). Overall,

students showed significant gains on both assessments. On these particular assessments, students achieved more than one reading level than previously shown by testing scores. In one school district approximately three and a half months, 62 third through eighth graders gained 1.2 years in reading fluency and reading ability, as measured by four subtests of the Woodcock- Johnson III. Significant gains were claimed on all four subtests used. Middle school students were able to fluently read text with a higher Lexile level after using Fast ForWord products. Students gained an average of three reading levels after being evaluated with an individual reading inventory. The results on these testing instruments created positive results for students with reading difficulties and helped them with confidence while in the classroom.

The Scientific Learning Corporation reports a number of studies on its website in which the Fast ForWord program has been implemented with various populations of students. The majority of the studies are pre-test and post-test studies and provide a minimum amount of information by which to judge their validity and interpretation. In a pre-/post-test study in which no control group is used, it is impossible to know whether the gains seen are attributable to the intervention or whether they might have been seen even without the intervention. For example, they may be attributable to other factors in the child's school or out-of-school experience occurring over the same time period as the Fast ForWord training.

The field studies without comparison groups report consistent improvements in measures of phonemic awareness, phonemic decoding, and reading comprehension, and many of these gains are in standard score units. That is, they show that exposure to the



program helped children improve their reading skills relative to average children. This is a substantial accomplishment since many remedial efforts in the schools do not produce similar gains (Torgesen, et al., 2001), but as was mentioned earlier, in the absence of sufficient information about the students, the conditions of their instruction, and appropriate comparison groups, the results are very difficult to interpret.

There have been many studies examining the effects of brain functioning in students with various reading disabilities. One study in particular suggests that the area of the brain that deals with language and auditory processing can be changed to positively impact reading processes with the aide of a computerized reading program, such as Fast ForWord.

A study examining the effects of Fast Forward program as a reading intervention for children with reading difficulties was reported by a mix of investigators, some of whom are directly affiliated with Scientific Learning (Temple, 2003). This study reported substantial improvements in reading skills for 8-12 year old dyslexic children treated with the Fast ForWord program. The study also examined changes in brain functioning following the intervention by using measurements from functional magnetic resonance imaging (fMRI). Training with the Fast Forward program was provided for 100 minutes per day, five days a week, for about 28 days, which amounts to about 47 hours of training. The study did not employ a control group of dyslexic students, but rather used a group of normal readers to control for changes in brain function that might result from repeated testing with fMRI technology. After the training, students with dyslexia improved in reading comprehension and language ability. The brain function showed

changes as well, which were both “normalizing” and “compensating”. Normalization of the brain includes increased brain function in the left temporo-parietal cortex and compensating effects includes increased activity in regions of the brain that were not normally active during such tasks.

The study showed that it was possible to study the brain effects of training in human children. Second, the study showed that the Fast ForWord program changed the brain function in children with dyslexia. The major difficulty in interpreting these results as evidence for improvement in reading is that the study did not employ a contrast group of dyslexic students. However, if the students were selected because of low scores on the reading measures prior to training; it is statistically likely that they would obtain higher scores when tested again eight weeks later, even in the absence of a treatment effect.

Not all studies agree with the findings that the Fast ForWord program increases receptive and expressive language, reading skills, and aides with academic performance. One study (Borman, Geoffrey and Benson, James, 2006) assessed the outcomes of elementary and middle school aged students. The study collected data of pre-test and post-test reading comprehension skills using district-wide and state-wide assessments. Random assignments were given to students that were using the Fast ForWord program and a control group. The study assessed whether the Fast ForWord programs could help academically at-risk students learn literacy skills that are commonly measured in schools across the nation.

Many challenges arose when trying to implement the program. The most common difficulty was student scheduling, and teacher motivation to use the program.

Another challenge was that the program was geared toward students with more severe speech, auditory, and language difficulties. The program's potential impact on a more general population of at-risk students is less well received. The final complications relates to outcomes on the district and state assessments. The effects on achievement tests typically used by schools are for accountability purposes, rather than effects on oral language competencies. The results from this experimental study suggests that the Fast ForWord program did not, in general, help students in eight participating schools improve their language and reading comprehension outcomes.

The findings also raise many questions about the appropriateness of the program for at-risk students. Accountability issues are also in question, due to the district and state wide assessments. The validity of the program is also in question because of the rigorous scheduling and implementation of 90-100 minutes per day. For positive achievement results to take place, only a high level of perseverance by teachers and students was needed to improve literacy outcomes. Finally, Students that were assigned to the Fast ForWord program did not gain reliable achievement advantages in the short term, but the study does not know whether these students will have gains in the longer term. The study does not recognize any other skill/s, if any; the Fast ForWord students may have improved.

The development of reading and spelling skills in children with reading disabilities, using the Fast ForWord program, was studied by Hook, Macaruso, Jones (2001), Both short term and long-term gains over a period of two years were considered. In the short term, the Fast ForWord program was compared to the Orton Gillingham

program (OG group) and in the long term the Fast ForWord program was compared to a control group. The children from both groups had similar reading difficulties and received multisensory, structured language instruction over a period of two years. The Fast ForWord program and the OG group made similar gains in phonemic awareness; however the children in Fast ForWord did not show major gains in word identification or word attack. Speaking and Syntax gains were increased immediately after Fast ForWord treatment, but were not maintained over two years. The LC group and Fast ForWord group did not differ significantly over the two year period. Children in both groups made considerable progress in phonemic awareness and reading. In conclusion, the Fast ForWord program did not show significant benefits, in reading comprehension, compared to the Orton Gillingham program.

Turner and Pearson (1999) reported the results of the use of the Fast ForWord program to improve the speech and language comprehension abilities of these children with specific language impairment (SLI). Some children exhibit great improvement after completing Fast ForWord Language, but other children show only minimal improvement. Fast ForWord Language is a structured program that offers promise for children with receptive language disorders. Unfortunately, the program is too expensive for some school districts to purchase and is not appropriate for every SLI student. The Fast ForWord Language program, is continually up-dated and amended by Scientific Learning Corporation and changes are made when necessary. The Fast ForWord Language Program requires commitment from everyone involved. The students must be determined to complete each day's exercises and follow the program rules. The parents must

encourage their children, and the teachers, as well as, the monitors must be enthusiastic about the program and dedicated to complete the program daily for student success.

### Summary

In summary, assistive reading software, such as the Fast ForWord Program, can benefit many people who have attention disorders. Many studies indicate that assistive reading software should be considered as a significant intervention to assist students who have attention disorders and as an accommodation to help them compensate for their disabilities. In one study, (Sanders and Neville, 2003) students who received the training showed increases in receptive language. In addition, children receiving training showed larger increases in the effects of attention on neural processing following training relative to the control group. The enhanced effect of attention on neural processing represented a large effect size and was specific to changes in signal enhancement of attended stimuli. In another study, (Burns, Hecker, Elkind, Katz, 2002) the main results were that the assistive software allowed the students to attend better to their reading, to read with less stress and fatigue, reduce their distractibility, and to read for longer periods of time. The decrease in distractions was proportional to the number of distractions per hour in unassisted reading. Consistent evidence was obtained that reading speed during periods of sustained reading increased with the assistive reading software, therefore enabling assignments to be completed in less time. The software did not have a significant effect

on comprehension of the entire group of students, but it did benefit those who had very low comprehension test scores.

The Fast ForWord program claims to have positive benefits on students' attention during reading performance and comprehension. Results from the various case studies, from school districts, claim that students who used the Fast ForWord program showed significant gains in reading skills as compared to a control group. The Fast ForWord program also makes claims that the program can double the positive benefits of the classroom reading instruction. The independent studies from various school districts showed positive results after completing the Fast ForWord program. The control group made an average of four months improvement in reading performance over the same time period. Low performing students made significantly more progress in their reading development following the use of Fast ForWord software for an average of 32 school days. The use of a comparison group and independent repeated measures of reading progress support the theory that these significant changes in elementary, middle, and high school readers were due to the effects of combining classroom reading instruction with cognitive and language development software.

If these results represented the true effects of the Fast ForWord program on student language and reading development, then the program represents a significant addition to the instruments available to classrooms to help students with reading difficulties. However, there are several reasons to suspect the results may be overly optimistic. First, many of the studies have very small sample sizes. Second, many of the results simply represent the difference in the test scores of students who participated in the Fast

ForWord program from before the training and after the training. These students may have shown an increase in their language or reading skills even without the intervention due to their regular school instruction or maturation.

The effects of training with the Fast ForWord program are most consistently found for the area of language comprehension, or phonemic awareness. The Fast ForWord program does not show consistent results for reading outcomes such as phonemic decoding, word recognition or reading comprehension. What is not clear from the research at this point is whether the Fast ForWord program has unique instructional advantages when compared to conventional methods of direct instruction in phonemic awareness or reading comprehension. One cannot determine whether the gains represent a causal effect of the Fast ForWord program because they are not compared to gains made by comparable students who did not participate in FFW over the same time period. The activities in the Fast ForWord program do not directly teach print reading skills. They are based on the idea that improvements in basic language processing skills will generalize improvements in reading accuracy and comprehension. Until this assumption is verified in research, this remains a potential weakness.

## Chapter III

### Methodology

#### I. Subjects:

The participants were students at Bankbridge Regional School who had multiple disabilities with an attention disorder as their primary diagnosis. The twelve students selected to participate in the study were from one middle school, self-contained classroom, from grades seven through nine. The students ranged in age from two thirteen year old students, eight fourteen year old students, and two fifteen year old students, with an average or mean age of fourteen. The subject sample included two African Americans, two Hispanics, and eight Caucasians. Students were all diagnosed with multiple disabilities. Seven students were diagnosed as attention deficit hyperactivity disorder (ADHD) as well as, cognitively impaired and five students were classified as high spectrum autism as well as having an attention deficit disorder (ADD). 67% of the students, in the study, have reading levels two to three years below grade level and the major deficit is attention during reading and comprehension during and after reading stories or narratives, according to each student's Individual Education Plan (IEP). (See Table 1)



Table: 1

Student	Gender	Age/ Grade	Race	Disability	Reading Level
A.Y.	female	14/7	Caucasian	ADHD/ Cognitively Impaired	5th
A.H.	male	14/7	Hispanic	ADHD/ Cognitively Impaired	5th
B.T.	female	14/8	Caucasian	Autistic/ADD	8th
B.C.	female	13/7	Caucasian	Autistic/ADD	7th
C.K.	male	15/8	Caucasian	Autistic/ADD	8th
D.R.	male	14/7	Caucasian	ADHD/ Cognitively Impaired	5th
D.V.	male	14/8	Hispanic	Autistic/ADD	5th
G.V.	female	14/8	Caucasian	ADHD/ Cognitively Impaired	8th
G.S.	male	13/7	Caucasian	Autistic/ADD	5th
M.M.	male	14/8	African American	ADHD/ Cognitively Impaired	5th
S.S.	male	15/9	African American	ADHD/ Cognitively Impaired	7th
T.D.	male	14/9	Caucasian	ADHD/ Cognitively Impaired	6th

## II. Setting:

Participating students were from a regional school serving students with special needs serving southern, New Jersey. The Bankbridge Regional School serves students from a variety of districts, ranging from middle to high school age special education or behavioral programs. The special education programs are designed for

students with mild to moderate disabilities, such as cognitively impaired, visually impaired, hearing impaired, ADD, ADHD, emotionally disturbed, bipolar disorder, autistic spectrums and asperger syndrome. The middle school classrooms are self-contained settings that comprises of one special education teacher and one assistant, as well as, one to one aides, as needed for individual student's. The self-contained settings are where all academic work is completed within the same classroom and students only leave for specials, such as music, independent living, gym, or vocations. Each student has access to a computer for academic research (Science and Social Studies reports), as well as, for computerized educational programs. BBR offers many computerized Language Arts programs throughout the academic day. The computer programs, such as the Fast ForWord Program, are used to assist with classroom academics. The students' work on the Fast ForWord program for a set time of thirty minutes, after lunch at 11:15 am, from Monday through Friday.

### III. Method:

#### Measures

A teacher-made rubric for attention was used to measure each student's attention skills during the thirty-minute Fast ForWord program. The rubric consisted of off task behaviors, including talking while on the FFW program, playing with the computer mouse, looking around the classroom, laying head down, not focusing on the program at hand. The rubric also consisted of a column for paying attention while

on the FFW program. Each day the rubric was used by teacher observation, during the times of 11:15 to 12:45pm. Checkmarks every 5 minutes were placed in each column, depending on the student's individual behavior. A total of six checkmarks per student were collected each day during the FFW program. A total of forty days of observation data was collected, from the starting date of January 12, 2009 until the ending date of March 23, 2009. The student's individual absences were also taken into consideration when getting the percentages for individual student behaviors.

The students were also assessed for word reading and reading comprehension while on the Fast ForWord program. Weekly bar graphs showing each student's individual progress were collected and examined.

Students were also monitored while on an additional computerized reading program, called Achieve 3000. Achieve 3000 consists of narratives/stories using multiple choice questions, open-ended questions, and true/false questions for a total score. The Achieve 3000 program is targeted for middle school students. The program level sets each student and gives them an age appropriate reading level that aides in comprehension, using interesting events and present day topics. The program was developed to aide in attention to important details, as well as, comprehension of a story line. Two days a week and 45 minutes a day the twelve students participate in the Achieve 3000 program and the attention skills from the program were recorded on a teacher-made rubric. The rubric consisted of off task behaviors, including talking while on the Achieve 3000 program, playing with the

computer mouse, looking around the classroom, laying head down, and not focusing on the program. The rubric also consisted of a column for paying attention while on the Achieve 3000. Checkmarks every 3 minutes were placed in each column, depending on the student's individual behavior. A total of 15 checkmarks per student were collected every Monday and Thursday, during the Achieve 3000 program.

A traditional reading program was also used to observe the attention skills of the twelve students without the intervention of a computer. The reading class was a traditional means for teaching students, which included novel reading, reading out loud, comprehension worksheets, vocabulary words, oral questioning, and writing tasks. A teacher-made rubric was also used to observe attention skills during the period. The rubric consisted of off task behaviors, including talking during the reading period, playing with items from desk, looking around the classroom, laying head down, and not focusing. The rubric also consisted of a column for paying attention during the reading period. Checkmarks every 5 minutes were placed in each column, depending on the student's individual behavior. A total of six checkmarks per student were collected each day during the traditional reading program.

### Implementation

Twelve students were selected to participate in a computerized reading program, due to low comprehension levels from district test scores/teacher-made tests and lack of attention skills observed during all academic areas while in the classroom. The FFW

program is a computerized reading program comprised of three programs: FFW Language (elementary and middle school/high school versions), FFW Language-to-Reading, and FFW Reading. FFW language focuses on developing oral language skills that will create a “foundation for reading.” The program focuses on four major areas that are deemed critical for language acquisition: phonological awareness, listening comprehension, language structures, and sustained focus and attention. (FFW Middle and High School Language contain much of the same content as FFW Language but have more mature graphics). FFW Language-to-Reading focuses on making the connection between spoken and written language. The program attends to skills such as sound/letter recognition, decoding, vocabulary, syntax and grammar as well as listening comprehension and word recognition. FFW Reading focuses on building reading skills such as word recognition and fluency, decoding, spelling and vocabulary and passage comprehension.

The students completed a thirty-minute program for five days a week. While on the program, attention skills were observed by the teacher with the use of a rubric for attention. After each day of the program was completed, scores from the FFW program were used to show any reading growths in the form of bar graphs. All students in this study were on a Fast ForWord Reading series (Language to Reading or Reading 1 through Reading 5).

## Chapter IV

### Results

This study presents the observation data, of middle school students, during a thirty-minute computerized reading program, called Fast ForWord. The attention skills of each student was charted and documented to show actual data during the Fast ForWord program from the time of 11:15 am until 11:45 am, five days a week. Additional charts were used to evaluate the attention skills of the students for the Fast ForWord program compared to other computerized and non-computerized reading programs. The three charts represent different attention skills of the students exhibited during the Fast ForWord program, Achieve 3000 computerized reading program, and a traditional reading program. The attention skills charted are Paying Attention, Talking , Not Focusing , Looking Around , Laying head down, and Playing with the mouse/items from desk.

The twelve students selected participated for a maximum total of forty calendar days from start to finish and the maximum number of times each behavior could be exhibited was 240 times per student with a group total of 2880 times. The percentage of the program completed, the participation, and the attendance of each student were all taken into consideration when evaluating the data. The total values of each data chart reflect the total number of days that each student used the Fast ForWord program.

The observation data collected showed that, as a group, the majority of students paid attention to the Fast ForWord Program. Distractions decreased, word skills and

reading comprehension increased, on the FFW reading bar graphs, in all program areas. The students paid attention 67% of the time, while the mean or average number of times students were observed paying attention was 161 out of a group total of 1,935 times. The range was reported as 179 times as a group, with 226 as the high number and 47 as the low number (figure 1). The next highest percentage was the off-task behavior of talking while on the Fast ForWord program (figure 2). The students talked 11% of the time, while the mean or average number of times students were observed talking was 26 out of a group total of 316 times. The range number was 79 with the high number as 79 and the low number as 0. The third highest percentage was the off-task behavior of not focusing on the program. The students didn't focus while on the program 7% of the time, while the average number of times observed not focusing was 15 out of a group total of 182 times. The range number was reported as 33, with the high number as 33 and the low number as 0 (figure 3). The off-task behaviors of looking around (figure 4) and laying head down (figure 5) while on the program was 4% of the time with an average number of 8 out of a group total of 90 times. The range number for laying head down was 60 and looking around was 41. The off-task behavior of playing with the mouse (figure 6) while on the program was 1% of the time, with an average of 3 times out of a group total of 38 times and a range number of 25.

Figure 1: Number of Times Paying Attention during the FFW Program

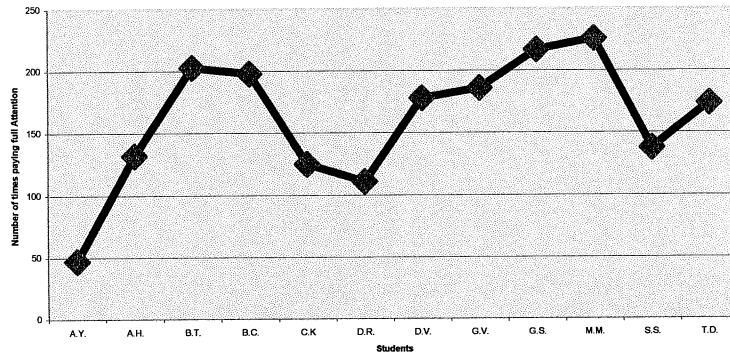


Figure 2: Number of Times Talking during the FFW Program

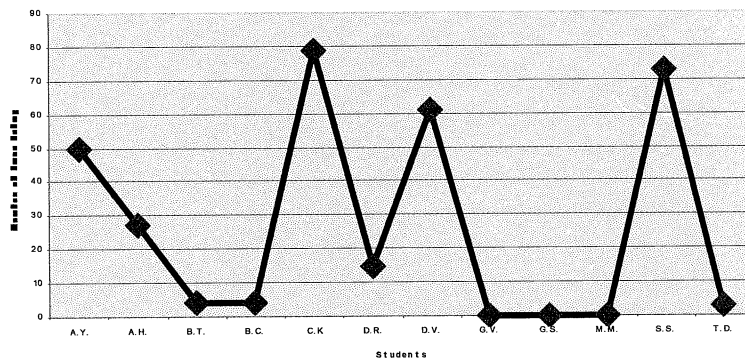


Figure 3: Number of Times Not Focusing during the FFW Program

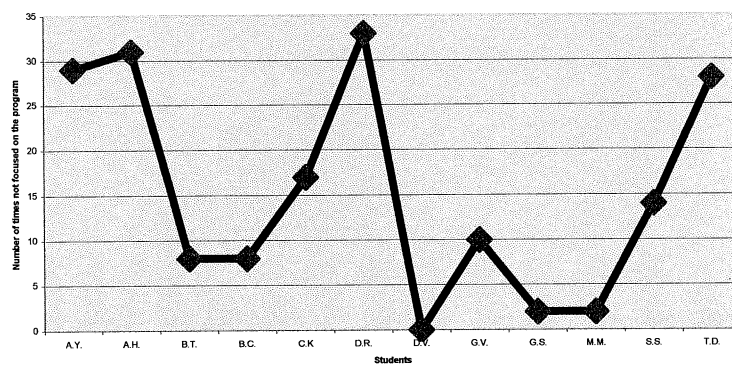




Figure 4: Number of Times Looking Around during the FFW Program

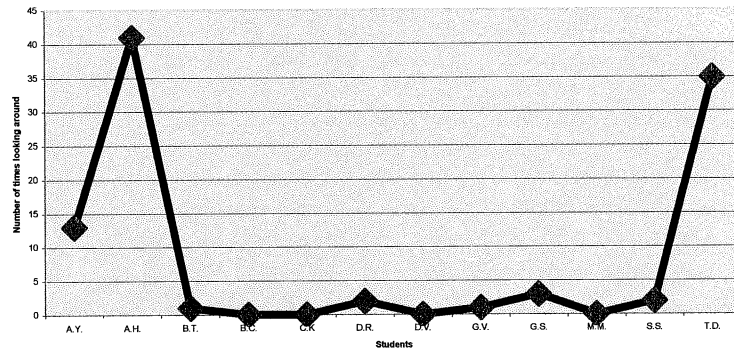


Figure 5: Number of Times Laying Head Down during the FFW Program

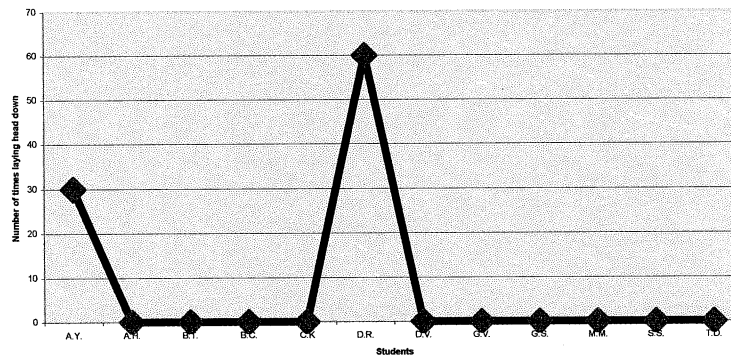
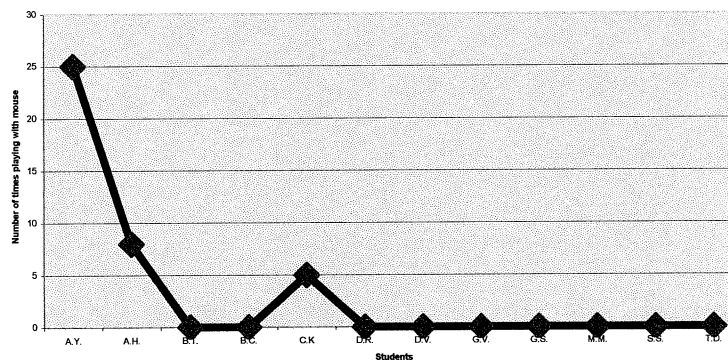


Figure 6: Number of Times Playing with the Mouse during the FFW Program



The observation data collected for the Achieve 3000 computerized reading program as a group showed a high percentage of students that paid attention. The students as a group paid attention 61% of the time, while the mean or average number of times observed was charted as 145 times out of a total of 1,744 times. The range was reported as 136 with 200 times being the high score and 64 as the low score (figure 1). The second highest percentage as a group was the off-task behavior of not focusing on the program (figure 2). The students didn't focus on the Achieve 3000 program 13% of the time, with an average of 30 times as a group. The range was 69 times with the high score of 74 and a low score of 5 times. The next highest percentage as a group was the off-task behavior of talking while on the program (figure 3). The percentage of talking while on the Achieve 3000 program was 11% with an average of 26 times as a group. The range had a high score of 75 and a low score of 3 making the range a total of 72 times as a group. Looking around the classroom while on the Achieve 3000 program (figure 4) had a percentage of 4% with a group total of 127 times with an average of 11 times and a range of 38. The students were observed playing with the mouse (figure 5) 3% of the time with a group total of 73 times, with an average of 6 times and a range of 23. The off-task behavior that was charted as the least percentage was laying head down while on the Achieve 3000 program (figure 6). Students laid their heads down a group total of 2% with a total of 46 times, with an average of 4 times, and a range of 23.

Figure 1: Number of Times Paying Attention during the Achieve 3000 program

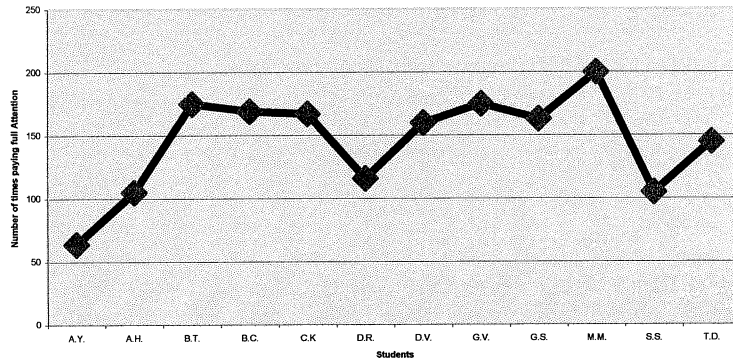


Figure 2: Number of Times Not Focusing during the Achieve 3000 program

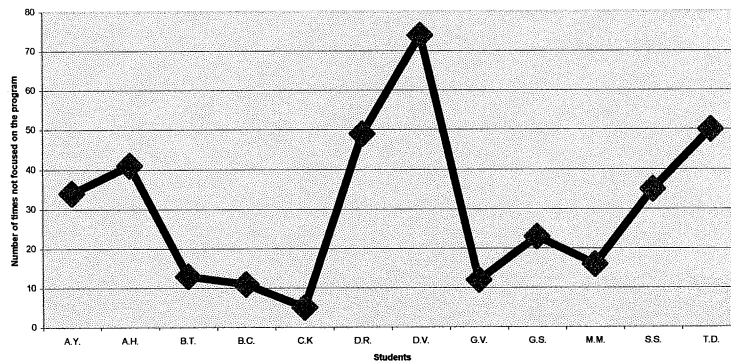


Figure 3: Number of Times Talking during the Achieve 3000 program

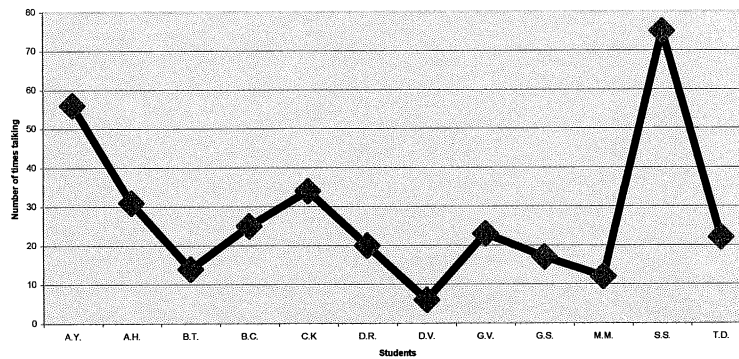


Figure 4: Number of Times Looking Around during the Achieve 3000 program

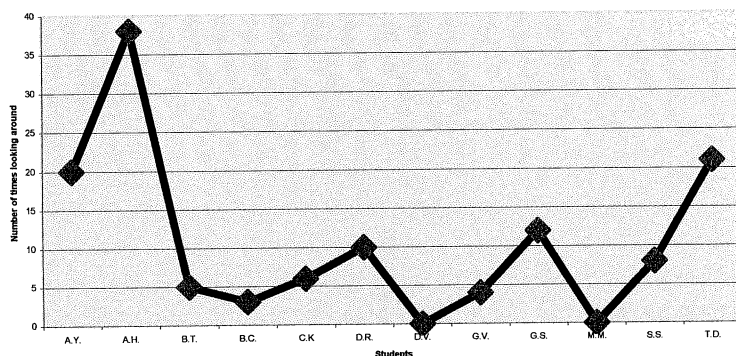


Figure 5: Number of Times Playing with the Mouse during the Achieve 3000 program

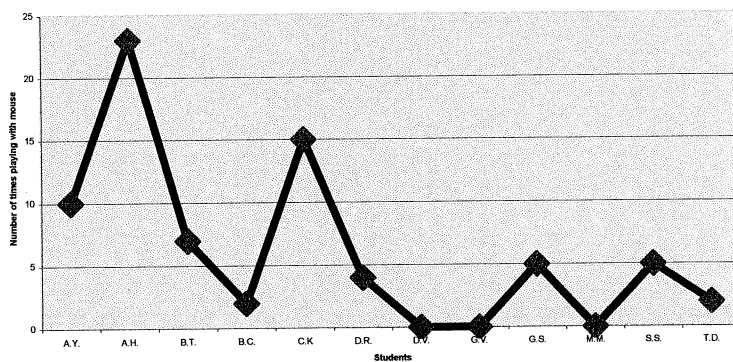
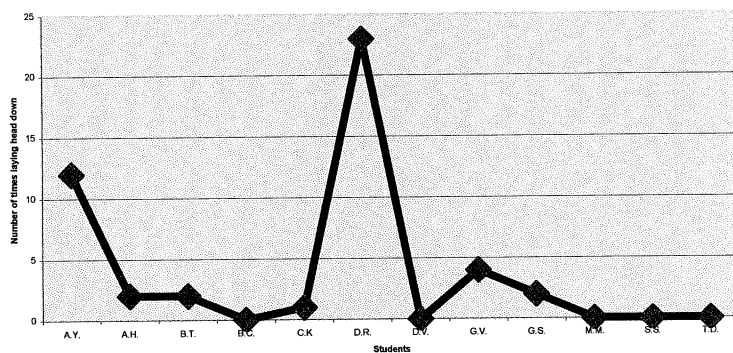


Figure 6: Number of Times Laying Head Down during the Achieve 3000 program



The traditional reading program had students, as a group, paying attention 44% with 1,255 as a total number of times as a group (figure 1). The average time paying attention was 105 times with a range of 111 times, 153 being the high score and 42 being the low score. The traditional reading program had the students paying attention less than half of the time, while the two computerized programs, Fast ForWord and Achieve 3000 program, had the students paying attention more than half of the time. Not focusing during reading (figure 2) was the second highest off task behavior with a percentage of 15% out of a total number of 430 times. The average total was 36 times and the range was 45, with a 62 as the high number and 17 as the low number. The off-task behavior of talking during the reading class (figure 3) had a percentage of 11% out of a group total of 311 times, and an average of 26 times. The range was 33 with a high number of 4 and the low number of 10. Playing with items from desk (figure 4) had a percentage of 10% out of a group total of 288 times, with an average of 24 times. The high number was 36 and the low number was 5, making the range a 31. The off-task behavior of looking around (figure 5) had a percentage of 8% out of a group total of 236 times, with an average of 20 times. The range had a high number of 40 and a low number of 8 making the range number 32. Laying head down during reading (figure 6) had a percentage of 5% out of the group total of 148 times, with an average of 12 times. The range was 45 with high range number of 45 and the low number of 0.

Figure 1: Number of Times Paying Attention during Traditional Reading Program

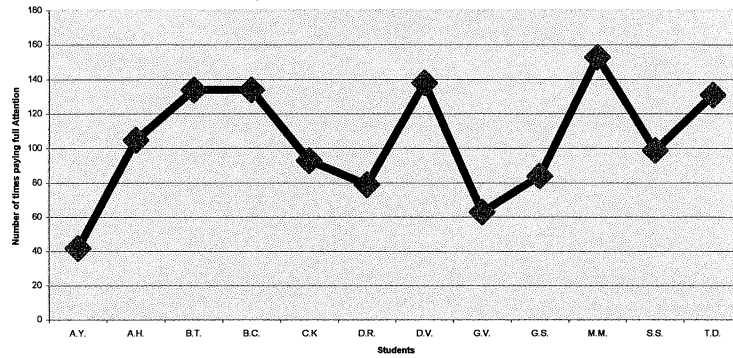


Figure 2: Number of Times Not Focusing during Traditional Reading Program

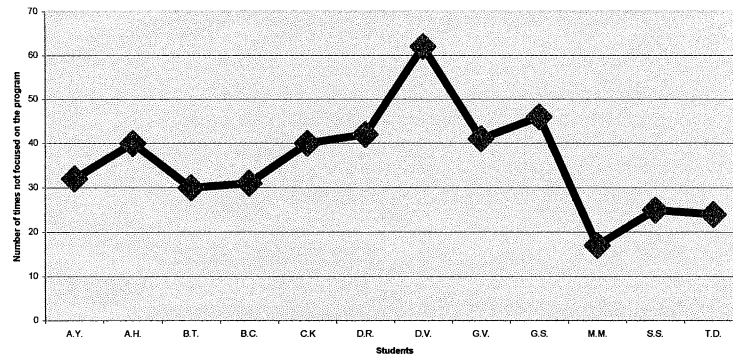


Figure 3: Number of Times Talking during Traditional Reading Program

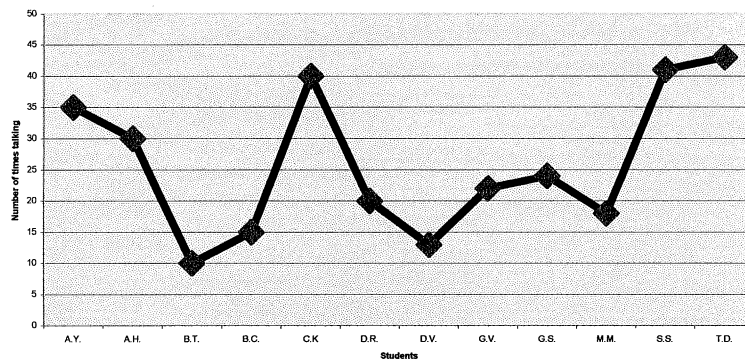


Figure 4: Number of Times Playing with Items from Desk during Traditional Reading Program

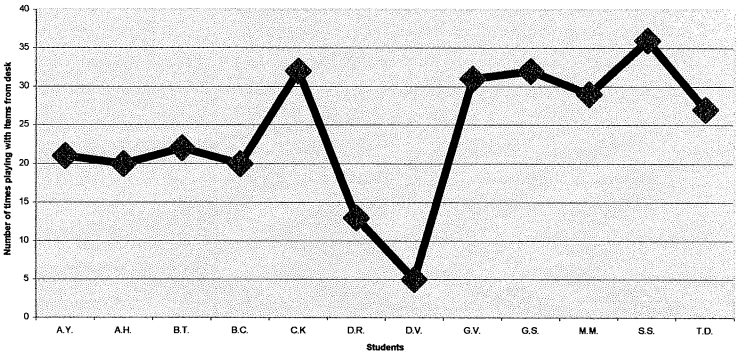


Figure 5: Number of Times Looking Around during Traditional Reading Program

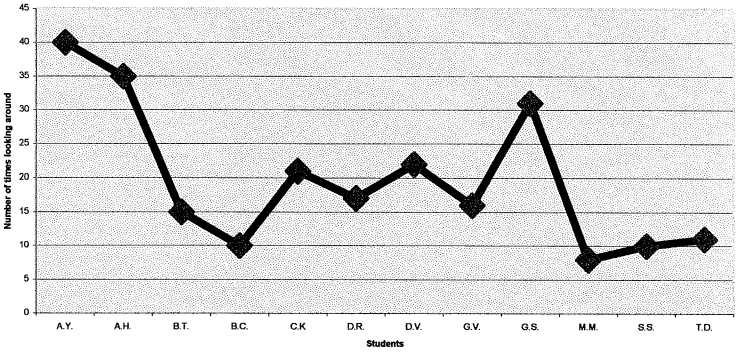


Figure 6: Number of Times Laying Head Down during Traditional Reading Program

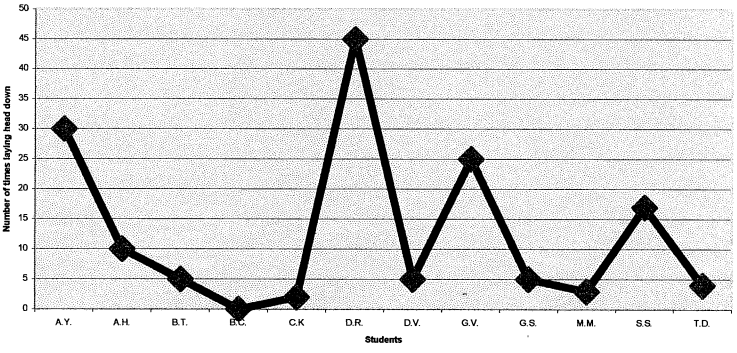


Table: 2

Program	Off Task Behaviors	On Task Behaviors
Fast ForWord Program	25%	67%
Achieve 3000 Program	32%	61%
Traditional Reading Program	49%	44%

Table 2: illustrates three different reading programs, with percentages of off-task behaviors and percentages of on-task behaviors for the twelve students combined.

The total off task behaviors for the Fast ForWord Program consisted of 25% which included 316 times talking, 38 times playing with the mouse, 98 times looking around, 90 times laying head down, and 182 times not focusing on the program. The total number of off-task behaviors was 724 times out of a total of 2,880 times. The percentage of on-task behaviors was 67% and had a total number of 1,935 total times out of 2,880 times.

The total off task behaviors for the Achieve 3000 Program consisted of 32% which included 315 times talking, 73 times playing with the mouse, 127 times looking around, 46 times laying head down, and 363 times not focusing on the program. The total number of off-task behaviors was 924 times out of a total of 2,880 times. The percentage of on-task behaviors was 61% and had a total number of 1,744 total times out of 2,880 times.



The total off task behaviors for the traditional reading program consisted of 49% which included 311 times talking, 288 times playing with items from desk, 236 times looking around, 148 times laying head down, and 430 times not focusing on the program. The total number of off-task behaviors was 1,413 times out of a total of 2,880 times. The percentage of on-task behaviors was 44% and had a total number of 1,255 total times out of 2,880 times.

The Fast ForWord program had the lowest percentage of off-task behaviors and highest percentage of on-task behaviors compared to the Achieve 3000 computerized program and a traditional reading program, not using a computer. The off-task behaviors that were lower on the Achieve 3000 program compared to the Fast Forword program were talking and laying head down. The one off-task behavior that had a lower percentage during the traditional reading class compared to the two computerized programs was talking. The two computerized reading programs have been observed to have more on- task behaviors reported as more than 60% of the time, while the traditional reading program had less than half the time paying attention or 44% of on-task behaviors.

## Chapter V

### Discussion

The purpose of this study was to examine the affects of a computerized program, called Fast ForWord, on student's attention during reading compared to other reading programs. The study also observed another computerized reading program called Achieve 3000, as well as, a traditional reading program, without the use of computers. The study observed twelve middle students, with learning and behavior disabilities, during a thirty minute, computerized reading program. The observation data included off-task behaviors such talking, playing with the computer mouse, looking around, laying head down, and not focusing on the program, and on-task behaviors, such as paying attention.

This study presented many interesting observations, during a forty day period. The results indicated that the Fast ForWord program had the highest percentage of on-task behavior and the lowest percentage of off-task behaviors. The only off-task behaviors that were higher than the Achieve 3000 reading program were talking and laying head down. The Achieve 3000 program also had a high percentage of paying attention, however the off-task behaviors of not focusing and playing with the mouse are at a higher percentage. The traditional reading program had a lower percentage of the on-task behavior of paying attention, compared to the two computer programs, but also had a lower percentage rate of the off-task behavior of talking during the class. All of the other

off-task behaviors were at a higher percentage than the two computer programs. All three reading programs, whether it be the computerized version or the traditional, have benefits and downfalls in one or more of the areas observed and charted.

The findings of this present study are consistent with the research by Burns, Hecker, Elkind, and Katz (2002) and Sanders and Neville (2002). Both studies indicated that the reading software allowed students to attend better to the reading, to read with less stress, and to decrease the distractions while reading. The research also found following the training on a computerized program receptive language and attention, in students, increased. The present study showed that there were less distractions and more focus during the FFW reading program with more confidence and increased reading scores. The computerized reading program did not have a significant effect on comprehension for the entire group of students, only a few students. Both studies also agree with the fact that the reading software can benefit many students who have attention disorders, but should only be considered as a significant intervention to assist students with reading, as well as, an accommodation to help students compensate for their disabilities.

### Recommendations

During this study, there were many variables that could have been changed or completed differently. The sample of participants in the study was limited to twelve and had more males than females participants. For future research the study should include a larger number of participants/students, equal amounts of male participants to female

participants, different age groups/grades, different disabilities, and students from different school districts may be beneficial for more detailed data. In addition, using data from pre and post reading comprehension tests would determine if individual student's comprehension levels were increased after using the Fast ForWord program. Different areas of the curriculum, such as science and social studies, should be assessed for attention, due to the comprehension that the students need to process and use as important information. A different measurement instrument could be used to further examine student attention, rather than only using observation rubrics.

I believe the research could be extended by using a larger population of students for a longer period of time during the computerized program. Another way to extend the study would be to take data after the Fast ForWord program, during other subjects, to determine whether or not attention skills carry over to other curricula. Comparing multiple computerized reading programs could also be assessed to determine if the student as an individual or if students as a group have increased attention skills, word attack skills, and/or comprehension skills. Using only teacher observation to assess attention levels is a biased way to determine a student's actual ability. A control group of students should be used in future studies to clarify if computerized reading programs, such as the Fast ForWord program, does in fact improve attention and comprehension skills of students with learning and behavior disabilities.

## Conclusions

In conclusion, for the present study, the Fast ForWord reading program did increase the students' attention and focus as a group. The students were observed to keep full attention and focus during the program 67% of the time and received bar graphs weekly with reading comprehension growth. Using a constant time period (after lunch) and creating a tranquil environment (turning down the lights) assisted student concentration and decreased distractions.

Many studies have shown positive increases in attention, language, and reading development for students on the computerized programs. However, these results may be overly optimistic. First, many of the studies had small sample sizes. Second, many of the results represented test scores of students who only participated in the FFW program from before and after training. Most students may show an increase in attention, language, and/or reading comprehension skills even without the intervention, due to their regular school instruction or maturation. Assistive software, such as the Fast ForWord program, can benefit many people who have attention disorders and reading difficulties, but should be used as an intervention to assist students who have disabilities.

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Appendix A

The Fast ForWord Program and Attention Skills

Date: \_\_\_\_\_ Time: \_\_\_\_\_

Students	Talking	Playing with mouse	Looking around	Laying head down	Not focusing	Paying Attention
A.Y.						
A.H.						
B.T.						
B.C.						
C.K.						
D.R.						
D.V.						
G.S.						
G.V.						
M.M.						
S.S.						
T.D.						

Appendix B

The Achieve 3000 Program and Attention Skills

Date: \_\_\_\_\_ Time: \_\_\_\_\_

Students	Talking	Playing with mouse	Looking around	Laying head down	Not focusing	Paying Attention
A.Y.						
A.H.						
B.T.						
B.C.						
C.K.						
D.R.						
D.V.						
G.S.						
G.V.						
M.M.						
S.S.						
T.D.						

Appendix C

Traditional Reading Program and Attention Skills

Date: \_\_\_\_\_ Time: \_\_\_\_\_

Students	Talking	Playing with items from desk	Looking around	Laying head down	Not focusing	Paying Attention
A.Y.						
A.H.						
B.T.						
B.C.						
C.K.						
D.R.						
D.V.						
G.S.						
G.V.						
M.M.						
S.S.						
T.D.						