Comparative Effects of Two Error Correction Procedures during Repeated Reading for Students with Learning Disabilities

Xiaoqing Yang
Kennesaw State University

Follow this and additional works at: http://digitalcommons.kennesaw.edu/etd
Part of the Special Education and Teaching Commons

Recommended Citation
COMPARATIVE EFFECTS OF TWO ERROR CORRECTION PROCEDURES
DURING REPEATED READING FOR STUDENTS WITH
LEARNING DISABILITIES

by

Xiaoqing Yang

A Dissertation

Presented in Partial Fulfillment of Requirements for the
Degree of
Doctor of Education
In
Teacher Leadership for Learning
In the
Bagwell College of Education
Kennesaw State University

Kennesaw, GA
30144
Dissertation Signature Page

The dissertation of

XIAOQING YANG/ 000210293

Inclusive Education

Titled: Comparative Effects of Two Error
Correction Procedures during Repeated Reading
for Students with Learning Disabilities

submitted to the Bagwell College of Education in partial fulfillment of
the requirements for the degree of:

Doctor of Education

has been read and approved by the Committee:

Changam Lee

Dissertation Chair Signature

06-09-2011

DATE

Babin Jiang

Committee Member Signature

6-09-2011

DATE

DATE

DATE
ACKNOWLEDGEMENT

Once upon a time, in a suburban town of Northeastern China, there lived a little girl with many dreams. One of them was to achieve the highest level of education so her parents would be proud of her. You see, her parents were born during a period of time when education was not readily available to everyone. They spent ten years of their lives in the Cultural Revolution and missed the opportunities to go to college. All through her life, the little girl felt the obligation to fulfill her own dreams and those of her parents. Mom and Dad, I hope you are proud of me. This is for you two and for me! Thank you for giving me life and bringing me up! Thank you for allowing me to enjoy freedom and liberty so far away from you! Thank you for giving me courage, love, and support! Thank you for being there every time when I need you!

I also want to dedicate this work to those working moms who resist giving up their dreams. The past four and half years have been arduous. As much as I enjoy doing research, I had to be a mom, a wife, and a teacher first. It was hard coming back from work after a long day trying to find a minute here and there to work on my school work, knowing in the back of mind I had to take care of two young children and get up the next morning to go to work. However, as witnessed by so many of my fellow cohort members and myself, it is doable as long as you do not give up.

Now I would like to thank the following people, without whom this work would not have been completed. First and foremost I would like to thank my dissertation Chair, Dr. Changnam Lee, for his guidance and assiduous support that made this work possible. Dr. Lee was like a captain: he celebrated with me when my ship was sailing along, gently pulled the boat in the right direction when I was stuck, and kindly waited when I simply
needed a break. He is not only a sharp scholar, but also a very kind man. His insights, encouragements, suggestions, and guidance were instrumental to the completion of this document. Dr. Lee, thank you from the bottom of my heart!

I am also indebted to my other committee members, Dr. Guichun Zong, Dr. Leigh Funk, and Dr. Binbin Jiang, who provided invaluable guidance and timely support throughout the dissertation process. Through their attention to detail, understanding, and persistent encouragement, these professors helped me complete this work.

I also want to thank the program coordinator, Dr. Harriet Bessette, for her academic and professional guidance during the past four years. She guided all of us in the Ed. D. cohort toward achieving our academic potential. Her professionalism and knowledge have helped shape my view of education.

I give my everlasting gratitude to my loving and supportive husband, Zhen Xu, for taking care of the children when I could not. Thank you for cooking for us, putting the children to bed, and playing with them. Thank you for picking up around the house and doing the laundry when my schedule got crazy. Thank you for supporting me in the fulfillment of my dreams. I also like to thank my two children, Tianyu and Tianran, for being in my life and giving me lots of love and kiss each day. Thank you for playing quietly and tiptoeing around my office during the last several months. Thank you for being patient and loving. You make my life worthwhile.

Last and most importantly, thank you GOD for fulfilling my life with so much to be grateful for. Thank you for providing my family with everything we need and so much more. Thank you for making me who I am and loving me. Thank you for putting important people in my life to help me. May you, my LORD, be glorified above all.
ABSTRACT

COMPARATIVE EFFECTS OF TWO ERROR CORRECTION PROCEDURES DURING REPEATED READING FOR STUDENTS WITH LEARNING DISABILITIES

By Xiaoqing Yang

This dissertation reports the findings from a main study and an extended study. The purpose of the main study was to examine the comparative effects of two error correction procedures during repeated reading interventions on the reading fluency and accuracy of nontransfer and transfer passages for learning disabled (LD) fourth grade students. Repeated reading with corrective feedback (RRCF) and repeated reading with word study (RRWS) were used. RRCF sessions consisted of the teacher’s corrective modeling contingent upon the student’s error during the first passage reading, three practice readings with the same passage, and a fifth reading for data collection. During RRWS interventions, corrective modeling was replaced by explicit phonics-based instruction and practice with intensive scaffolding. Data were collected on fluency and accuracy using nontransfer and transfer AIMSWeb passages. Both interventions were effective on fluency and accuracy of nontransfer passages; however, effects on transfer passages were less conclusive. Both interventions had moderate effects on accuracy of transfer passages, but effects on fluency of transfer passages were minimal and inconsistent. The percent of non-overlapping data indicated no significant difference between the two interventions. Interviews with participants revealed high social validity for both treatments and preference for RRCF.
The purpose of the extended study was to investigate the relationships among the dependent variables. Three students read AIMSWeb fluency passages four times each while data on fluency, accuracy, and comprehension were collected after each read; results revealed moderate to high correlations among the three variables. Implications and results of the social validity survey were discussed.
# TABLE OF CONTENTS

LIST OF TABLES ........................................................................................................ IX

LIST OF FIGURES ..................................................................................................... X

CHAPTER ONE: INTRODUCTION ............................................................................ 1
  Statement of the Problem ....................................................................................... 1
  Background ............................................................................................................ 3
  Purpose of the Study ............................................................................................. 6
  Significance of the Study ...................................................................................... 7
  Review of Relevant Terms .................................................................................... 8
  Organization of Study ........................................................................................... 11
  Literature Search .................................................................................................. 11

CHAPTER TWO: LITERATURE REVIEW ................................................................. 13
  Introduction .......................................................................................................... 13
  Reading Fluency ................................................................................................... 15
  Reading Theories .................................................................................................. 16
  Stages of Learning ............................................................................................... 21
  Repeated Reading ................................................................................................ 23
  Nontransfer Effect versus Transfer Effect ............................................................ 24
  Error Correction ................................................................................................... 28
  Summary ................................................................................................................ 35
  Assumptions .......................................................................................................... 35

CHAPTER THREE: METHODOLOGY ..................................................................... 36
  Research Design ................................................................................................... 36
  Setting .................................................................................................................... 38
  Participants ........................................................................................................... 39
  Human Subject Protections .................................................................................. 41
  Materials ............................................................................................................... 42
  Dependent Variables ............................................................................................ 45
  Procedures/Independent Variables ....................................................................... 46
    Preintervention Assessment ............................................................................... 46
    Grouping of Participants ................................................................................... 48
    Baseline .............................................................................................................. 49
    RRCF .................................................................................................................. 49
    RRWS .................................................................................................................. 50
  Procedural Fidelity ................................................................................................ 56
  Interobserver Reliability ....................................................................................... 57
  Social Validity ....................................................................................................... 57
  Extended Study ..................................................................................................... 58
  Data Analysis ........................................................................................................ 59
    Visual Inspection ................................................................................................ 59
    Descriptive Analysis .......................................................................................... 60
Percentage of Non-overlapping Data (PND) ................................................................. 61

CHAPTER FOUR: RESULTS .......................................................................................... 63
Question 1: Effects of RRCF and RRWS on Reading Fluency ................................. 63
Question 2: Effects of RRCF and RRWS on Reading Accuracy ............................. 70
Question 3: Comparative Effects of RRCF and RRWS ........................................... 76
Question 4: Social Validity ......................................................................................... 76
  Social Significance of the Goals .............................................................................. 76
  Social Appropriateness of the Procedures ................................................................. 77
  Social Importance of the Effects .............................................................................. 77
Extended Study ........................................................................................................... 78

CHAPTER FIVE: DISCUSSIONS ................................................................................... 82
Findings and Interpretations ...................................................................................... 82
Limitations of Methodology ....................................................................................... 84
Implications for Future Research ............................................................................. 84
Implications for Future Practice .............................................................................. 86
Conclusion .................................................................................................................. 88

REFERENCES ............................................................................................................. 89

APPENDIX A: LOCAL COUNTY IRB FORM .............................................................. 100
APPENDIX B: UNIVERSITY IRB APPROVAL ......................................................... 101
APPENDIX C: PARENTAL CONSENT FORM ............................................................ 102
APPENDIX D: STUDENT ASSENT FORM ................................................................. 104
APPENDIX E: DIRECTIONS FOR ADMINISTERING AIMSWEB FLUENCY
  PASSAGES .............................................................................................................. 105
APPENDIX F: DATA COLLECTION FORM ............................................................... 106
APPENDIX G: DATA COLLECTION FORM FOR EXTENDED STUDY .............. 107
APPENDIX H: PROCEDURAL CHECKLISTS .............................................................. 108
APPENDIX I: PROCEDURAL FIDELITY RATING SCALES ................................. 110
APPENDIX J: SOCIAL VALIDITY INTERVIEW QUESTIONS ................................. 111
# LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Summary of Error Correction Comparison Studies</td>
<td>29</td>
</tr>
<tr>
<td>2</td>
<td>Participants’ Demographic Data</td>
<td>40</td>
</tr>
<tr>
<td>3</td>
<td>Pre-Intervention Assessments</td>
<td>48</td>
</tr>
<tr>
<td>4</td>
<td>Correlation of RRWS Treatment with Phonics Instruction</td>
<td>53</td>
</tr>
<tr>
<td>5</td>
<td>Effects of RRCF and RRWS on Reading Fluency (WCPM)</td>
<td>64</td>
</tr>
<tr>
<td>6</td>
<td>Effects Sizes of RRCF and RRWS on Reading Fluency</td>
<td>65</td>
</tr>
<tr>
<td>7</td>
<td>Effects of RRCF and RRWS on Reading Accuracy</td>
<td>70</td>
</tr>
<tr>
<td>8</td>
<td>Effects Sizes of RRCF and RRWS on Reading Accuracy</td>
<td>71</td>
</tr>
<tr>
<td>9</td>
<td>Correlation Coefficient for Extended Study</td>
<td>81</td>
</tr>
</tbody>
</table>
## LIST OF FIGURES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Reading process for fluent and non-fluent readers</td>
<td>17</td>
</tr>
<tr>
<td>2</td>
<td>Verbal Efficiency Theory</td>
<td>18</td>
</tr>
<tr>
<td>3</td>
<td>Double Deficit Reading Model by Wolf and Bowers (2000)</td>
<td>23</td>
</tr>
<tr>
<td>4</td>
<td>WCPM on Nontransfer and Transfer passages for Group One</td>
<td>66</td>
</tr>
<tr>
<td>5</td>
<td>WCPM on Nontransfer and Transfer passages for Group Two</td>
<td>67</td>
</tr>
<tr>
<td>6</td>
<td>Percent of Words Correct on Nontransfer and Transfer Passages for Group One</td>
<td>72</td>
</tr>
<tr>
<td>7</td>
<td>Percent of Words Correct on Nontransfer and Transfer Passages for Group Two</td>
<td>73</td>
</tr>
<tr>
<td>8</td>
<td>Reading Fluency, Comprehension, and Accuracy for Extended Study</td>
<td>77</td>
</tr>
</tbody>
</table>
CHAPTER ONE: INTRODUCTION

Statement of the Problem

Reading is one of the most important skills children must have to be successful at school and in life (Perfetti, 1985). Therefore, it is unfortunate that many students struggle with reading. According to the 2009 report completed by National Assessment of Educational Progress (NAEP), 33% of fourth grade students read below the basic level, which shows partial mastery of prerequisite knowledge and skills that are fundamental for proficient work at the fourth grade level (NAEP, 2009). According to the NAEP data, the 2009 scores were not significantly different from those of 2007. Furthermore, the report showed that more than half of African American (52%) and Hispanic (51%) fourth grade students read below the basic level. For students with disabilities, the data were even more discouraging. The 2009 report showed that 65% of the students with Individualized Education Programs (IEPs) or 504 plans read below the basic level (NAEP, 2009). Even though there was a significant improvement since 1998, a year during which 75% of the students with IEP and 504 plans read below basic level, the data for the past four years had remained stagnant.

According to the same NAEP (2009) report, the state of Georgia, where the current study was implemented, ranked number 30 on the fourth graders’ reading performance nationwide. While the overall reading data for Georgia was comparable to the national average (37% below the basic level), students with disabilities performed worse than the national average with 70% below the basic level (NAEP, 2009). In
addition, students with disabilities performed significantly worse in 2009 compared to 2007 (52% below basic level), indicating an urgent need to address reading problems in Georgia (NAEP, 2009).

Reading problems impact children throughout and beyond their schooling years, and can cause life-changing consequences. Children who have problems in reading are more likely to have low academic performance, drop out, and engage in problem behaviors (Torgeson et al., 2006). Reading problems experienced by low-performing readers at an early age have the tendency to worsen over time (Stanovich, 1986).

Cunningham and Stanovich (2001) described the cognitive effects of reading as “reciprocal and exponential” (p. 137). They posited that reading volume had a direct positive effect on readers’ vocabularies, comprehension skills, common knowledge, and general ability. They stated that an early start in reading was important in predicting a lifetime of literacy experience; regardless of the level of reading comprehension ability that the students eventually attain (Cunningham & Stanovich, 2001). For example, students who have reading difficulties in the first grade are very likely to develop difficulties in writing by the fourth grade (Juel, 1988). Seventy-five percent of students with literacy problems in the third grade will still experience difficulties in the ninth grade (Biancarosa & Snow, 2004). Students who do not develop reading fluency by the third grade normally struggle with reading throughout their lives (National Reading Panel (NRP), 2000). Consequently, there are students reaching the upper grades in need of reading remediation, and they tend to remain poor readers and struggle academically in future schooling years.
The need to address the reading problems is further accentuated by the increasing demand for accountability. The No Child Left Behind Act (NCLB, 2002) calls for all schools to make adequate yearly progress (AYP) in order to receive federal funding. AYP, to a large extent, is measured by students’ reading scores on standardized assessments. Because the accountability requirements include all students, including those who have disabilities and are from culturally diverse backgrounds, teachers recognize the pressure of increasing all students’ reading performance (NCLB, 2002). Therefore, there is an urgent demand for teachers, especially those in elementary schools, to implement research validated interventions in order to teach all students to read and become life-long learners (NRP, 2000).

Background

To properly address struggling readers’ needs in reading, educators must first understand the specific difficulties the readers experience during reading. In the final report of the National Assessment of Title One, Torgeson et al. (2006) classified the problems that struggling readers encounter in late elementary schools into three categories: accuracy, fluency, and comprehension. They explained that struggling readers make more word recognition errors when they read than do proficient readers. When struggling readers encounter unfamiliar words, they rely more on guessing using context clues because their phonemic analysis skills are deficient. In addition, struggling readers read significantly less fluently as compared with proficient readers due to the large proportion of words at the grade level that they cannot recognize at a glance (Torgesen & Hudson, 2006). The combined problems in accuracy and fluency cause many struggling readers to experience difficulties with comprehension. They tend to make more errors
that distort the meanings of words or phrases or that cause misinterpretation of reading materials (e.g., misreading the word *mouse* for *house*) than proficient readers, and are less likely to correct their errors (Stanovich, 1986). Another factor that contributes to comprehension problems is vocabulary and background knowledge, which can be caused by the smaller amount of time struggling readers devote to reading or the lack of rich language exposure at home (Allington & McGill-Frazen, 1989).

Charged with the task to analyze extensive amounts of research and report effective methods of teaching reading, the NRP (2000) identified the following five critical components of reading instruction necessary for students to become proficient readers: phonemic awareness, phonics, fluency, vocabulary, and text comprehension. It purports that reading fluency (i.e., the ability to read text quickly, accurately and with proper expression) is an important reading component because it is a bridge between word recognition and comprehension (NRP, 2000). Fluent readers read effortlessly and accurately, and as a result, the effort needed to comprehend text is not expended on decoding and word recognition (Kuhn & Stahl, 2003).

Fluency develops gradually over a considerable amount of time and through substantial practice (Perfetti, 1985). In its report to Congress, the NRP (2000) analyzed two approaches to teaching fluency. One of the approaches is independent silent reading, which encourages students to read silently on their own, inside and outside the classroom, with minimal guidance or feedback. Examples of such programs are Sustained Silent Reading (SSR), Drop Everything and Read (DEAR), Accelerated Reader (AR), or other incentive programs. However, the NRP found that there was only correlational evidence between independent silent reading and reading achievement. These correlational studies
suggested that the more children read, the better their fluency, vocabulary, and comprehension. However, correlation does not imply causation, which makes it difficult to conclude that independent silent reading can improve reading fluency and comprehension. One recent study incorporated independent silent reading as part of a school enrichment model (Reis, McCoach, Little, Muller, & Kaniskan, 2011). The findings suggested that the enrichment model was more effective than the traditional whole group basal instruction. More experimental studies like this one are needed to further validate the effectiveness of independent silent reading in other settings.

The other approach is repeated reading (RR), which is “a supplemental reading program that consists of rereading a short and meaningful passage until a satisfactory level of fluency is reached” (Samuels, 1979, p. 404), for a prescribed number of times, or until the student demonstrates a set number of rate improvements (Fuchs, Fuchs, Hosp & Jenkins, 2001). RR encourages students to read passages orally with systematic and explicit guidance and feedback from the teacher. Repeated reading helps students by building the total number of words they can recognize automatically. It also helps improve students’ comprehension and oral performance with each succeeding attempt (Chard, Vaughn & Tyler, 2002; Therrien, 2004). Improved performance on oral reading leads students to improved confidence and positive attitudes towards oral reading (Chard et al., 2002; Therrien, 2004). Additionally, because high-frequency words occur in literally all reading situations, the increase in automatic sight word knowledge developed through repeated readings transfers beyond the practice texts (Chard et al., 2002; Therrien, 2004). Repeated reading practices include independent repeated reading, paired reading, shared reading, and assisted reading. NRP (2000) found that repeated oral
reading is an instructional strategy that had a positive and significant impact on word recognition, fluency, and comprehension for readers across the grade levels and reading abilities.

Purpose of the Study

The purpose of the current study was to examine the comparative effects of two error correction procedures, word study and corrective feedback, during repeated reading interventions on the reading fluency and accuracy of both nontransfer and transfer passages for the fourth grade students with learning disabilities (LD). Nontransfer passages are passages that the students read multiple times for fluency practice. Transfer passages are new passages that the students have not practiced before. Word study is a custom-designed error correction procedure that differentiates phonetically regular errors and phonetically irregular errors. Corrective feedback refers to the traditional word supply error correction procedure. This investigation was designed to determine whether the two interventions would increase reading fluency and reading accuracy on nontransfer passages and transfer passages, their comparative effects on reading fluency and accuracy, and how they were accepted by the students who received the interventions. These two interventions are chosen because prior research has demonstrated their promising effects when combined with repeated reading (Chard, Vaughn & Tyler, 2002; Therrien, 2004).

Research Questions

The following research questions guided this research investigation:

R1 What are the effects of repeated reading with corrective feedback (RRCF) on reading fluency and reading accuracy of nontransfer and transfer passages for the fourth grade students with LD?
R2  What are the effects of repeated reading with word study (RRWS) on reading fluency and reading accuracy of nontransfer and transfer passages for the fourth grade students with LD?

R3  What are the comparative effects of RRCF and RRWS on reading fluency and reading accuracy of nontransfer and transfer passages for the fourth grade students with LD?

R4  How are RRCF and RRWS accepted by students who experience these two procedures?

Significance of the Study

The current study extended the current body of literature on repeated reading of students with LD in a multitude of manners. First, the current study was implemented with a group of students with LD who were not recommended for reading fluency treatment in the past (Chard et al., 2002; Therrien, 2004). Fluency practice has, for the most part, been recommended for students who are phonologically aware and are able to decode but remain dysfluent (Chard et al., 2002). The participants of the current study were fourth grade students who did not have a solid foundation in phonological awareness. Most of the students demonstrated deficits both in rapid naming and phonemic awareness.

This study also examined the transfer effects of repeated reading (i.e., reading materials that were new to the participants). There has only been limited evidence in current literature supporting the transfer effects of repeated reading.

In addition, two repeated reading interventions were examined in the study. The first, repeated reading with corrective feedback, has been extensively studied in previous
research (Chard et al., 2002; Therrien, 2004). The second, repeated reading with word study, was developed specifically for this study based on the theories of stages of learning (Mercer & Mercer, 2005), effective teaching strategies (Coyne, Kame‘enui, & Carnine, 2007) and reading theories (LaBerge & Samuels, 1974; Perfetti, 1985, 1992). The effects of these two interventions would enlighten the practitioners and researchers as to error correction procedures during repeated reading.

This study was not only significant in terms of contribution to the field of repeated reading research, but also in terms of the potential positive effect these interventions have on the participants. As a teacher researcher, the primary professional goal of the investigator was to increase the students’ reading performance and their chances for success in future schooling years. The participating students had been behind in reading for years, which left detrimental effects on the students’ academic performance, motivation, self-esteem, and family life. Improvements in reading skills would change the quality of life for these students because reading influences virtually all academic disciplines.

Review of Relevant Terms

The following terms and definitions will be used in the study. They include:

*Automaticity*. Automaticity is fast, accurate, and effortless identification of words (automatic word recognition) (Armbruster, Lehr, & Osborn, 2003).

*Comprehension*. Comprehension is getting meaning from what is read. It involves making connections among words and ideas presented in a text and the reader’s own background knowledge (Armbruster et al., 2003).
Curriculum-based measurement (CBM). CBM is easily used as a formative measurement tool with multiple forms that allow for the ongoing monitoring of progress.

Fluency. Fluency is the ability to read text accurately and quickly while having the capacity to read with expression, divide text into meaningful chunks, and use emphasis and tone.

Frustration reading level. Frustration reading level is defined as the level at which the student can identify words within the passage with 80-85% accuracy (Bos & Vaughn, 2008).

Grapheme. A grapheme is a unit (a letter or letters) of a writing system that represents one phoneme. For example, letter f and letters ph, gh are all graphemes for phoneme /f/.

Independent silent reading. Independent silent reading is a classroom practice in which students are encouraged to select their own reading material and given class time to read silently on their own. (NRP, 2000).

Instructional reading level. Instructional reading level is defined as the level at which the student can identify words within the passage with 94-96% accuracy (Bos & Vaughn, 2008).

Phoneme. A phoneme is the smallest part of spoken language that makes a difference in the meaning of words. English has about 41 phonemes, such as m, s, th, and ch.

Phonetically regular words. Phonetically regular words are those words that have common phoneme-grapheme relationships and can be easily and accurately sounded out or decoded, such as the words cat, hill, sand and mud.
**Phonetically irregular words.** Phonetically irregular words often have uncommon phoneme-grapheme relationships and/or spellings. Examples of irregular words are *was*, *come*, *give* and *of*.

**Phonics.** Phonics is the understanding that there is a predictable relationship between phonemes (the sounds of spoken language) and graphemes (the letters and spellings that represent those sounds in written language).

**Phonological awareness.** Phonological awareness is defined as the ability to manipulate the individual phonemes of oral language.

**Random automatized naming.** Random automatized naming represents the ability to efficiently and automatically recall previously learned phonological representations.

**Sight words.** Sight words are words that are recognized automatically. According to this definition, sight words can be either regular or irregular words provided the reader recognizes them immediately.

**Specific learning disabilities (SLD).** A specific learning disability is defined in IDEA as a disorder in one or more of the basic psychological processes involved in understanding or in using language, spoken or written, that may manifest itself in an imperfect ability to listen, think, speak, read, write, spell, or do mathematical calculations. The term includes such conditions as perceptual disabilities, brain injury, minimal brain dysfunction, dyslexia and developmental aphasia. The term does not apply to children who have learning problems that are primarily the result of visual, hearing or motor disabilities, intellectual disabilities, emotional or behavioral disorders, or environmental, cultural, or economic disadvantage.
Organization of Study

This chapter introduces the current study’s problem statement, background, purpose, research questions, significance, and definition of terms. The subsequent chapters are organized as follows: Chapter Two summarizes the research literature and other publications related to this study including the historical background, theoretical traditions and assumptions; Chapter Three details the methodology utilized in this study including the investigation’s design, setting, participants, human subject protections, materials, dependent variables, procedures/independent variables, data analysis, procedural fidelity, interobserver reliability, and social validity. Chapter Four describes the results of the study; and Chapter Five provides a summary, discussions of findings, conclusions, implications, and recommendations for further research.

Literature Search

To obtain relevant studies, Educational Resources Information Center (ERIC), PsycINFO, Exceptional Children, Education Index, Education Abstracts FTX, Dissertation Abstracts International, and International Education were searched from 1966 to 2011. The investigator used the following three categories of key words to obtain the articles: treatment, population/subjects, and dependent measures. Key words were identified by examining existing literature in reading fluency research and by referring to the thesaurus for computerized databases. The key word for “treatment” was repeated reading. Key words for “subjects/population” included elementary, elementary-age, students with disabilities, disabled, poor reader(s), remedial reader(s), nonfluent/disfluent readers, and reading difficulty/problems. Key words for “dependent measures” included reading fluency (speed and/or accuracy), and (reading) comprehension. The abstracts
obtained from the searches were examined to include only experimental studies that used any form of group design or single subject designs. Studies were obtained in libraries on campus, via the online databases, or via interlibrary loan. The reference lists of previous literature reviews and obtained studies were also reviewed to search for relevant studies.
CHAPTER TWO: LITERATURE REVIEW

Introduction

Reading skills have been addressed by our country’s legislation and initiatives to ensure a quality public education for all children. Organizations such as the National Institute of Child Health and Human Development (NICHD), National Reading Panel (NRP), and National Institute for Literacy (NIFL) have studied reading research and provided information pertaining to literacy development. The NRP (2000) identified five critical components of reading instruction: phonemic awareness, phonics, fluency, vocabulary, and text comprehension. Fluency was identified as one of the areas that needed the most improvement because it serves as a bridge between word recognition and comprehension. Explicit, systematic, and extensive instruction in these elements of reading were essential for most students with reading difficulties to meet the ultimate goal of reading fluently and comprehending texts (NRP, 2000). In 2003, the NIFL released Put Reading First and identified five identical components for reading instruction. Also in 2001, the No Child Left Behind Act (NCLB) charged teachers to utilize research-validated reading practices when addressing their students’ reading needs. Moreover, the NCLB Act mandated annual testing of all students from the third through eighth grades and required federal funding be tied to the progress schools make on these standardized assessments.

At the state level, Georgia, where the current study was conducted, has applied to join Race to the Top grant provided in the American Recovery and Reinvestment Act of
2009 (ARRA) to support new approaches to school improvement. As part of the initiative, Georgia is adopting new formative and benchmark assessments during the 2012-2013 school years to provide teachers with critical feedback so they may improve their instruction throughout the course of the school year. In addition, teachers’ and principals’ salaries will be partially determined by how well their students perform on standardized testing. This initiative has inevitably made it imperative to close the gap between students with disabilities and their general education peers.

Students with reading difficulties often qualified for special education under the category of LD (Allington & McGill-Franzen, 1989). According to the Twenty-eighth Annual Report to Congress on the Implementation of IDEA (2006), 6.1 million students ages six through 21 received special education services, an increase of one million from the year 1995. Among these students, 47% represented students with LD and the majority of them had difficulties with reading (Fuchs, Fuchs, Mathes, Lipsey, & Roberts, 2001). Having sufficient reading practices was crucial to this group of students. “Matthew’s Effect,” as described in Stanovich (1986), illustrated how the “the rich get richer” and “the poor get poorer” (p. 380). Fluent readers read more and more and improved their reading abilities, while those who read poorly read less and fell farther and farther behind their peers. This lack of practice then led to a delayed development in automaticity and fluency at the word recognition level, which burdened the cognitive process that was required for text integration and comprehension (LaBerge & Samuels, 1974; Perfetti, 1985; Stanovich, 1986). Thus, reading for meaning is obstructed, the negative reading experience continues and the vicious circle spirals. Similarly, Chall (1983) emphasized
the pivotal role of practice in enabling children to move from the stage of “learning to read” to the stage of “reading to learn”.

Reading Fluency

Reading fluency has been identified to be one of the crucial components of reading instruction (NRP, 2000). Reading fluency was “the ability to read connected text rapidly, smoothly, effortlessly, and automatically with little conscious attention to the mechanics of reading, such as decoding” (Meyer & Felton, 1999, p. 284). NRP (2000) defined reading fluency as “the ability to read text quickly, accurately, and with proper expression” (Chapter 3, p. 5). Both of the definitions suggested three components of fluency: speed, accuracy, and expression. Speed and accuracy were also referred to as automaticity. Automaticity was the fast, effortless word recognition that came with a great deal of reading practice. In the early stages of learning to read, readers may have been accurate but slow and inefficient at recognizing words. Continued reading practice helped word recognition become more automatic, rapid, and effortless.

In their review of current theory and assessment of reading fluency, Kuhn, Schwanenfluged, Meisinger, Levy, and Rasinski (2010) posited that even though included in most definitions, prosody features such as pitch, duration, stress, and pausing are not included in the current operational definitions of reading fluency. They viewed prosody as a cognitive structure that allowed one to hold an auditory sequence in working memory; it could also have clarified ambiguous sentences. Kuhn et al. (2010) asserted that reading fluency should be viewed and operationalized as the combination of accuracy, automaticity, prosody, skilled reading, and a bridge to comprehension. However, due to the lack of easily accessible and usable ways to measure prosody,
fluency has yet to be redefined empirically. Kuhn et al. (2010) did offer the following theoretical definition of fluency:

Fluency combines accuracy, automaticity and oral reading prosody, which taken together, facilitate the reader’s construction of meaning. It is demonstrated during oral reading through ease of word recognition, appropriate pacing, phrasing, and intonation. It is a factor in both oral and silent reading that can limit or support comprehension. (p. 240)

Reading Theories

Fluency was important because it provided a bridge between word recognition and comprehension (NRP, 2000). Several theories existed that attempt to explain the process of reading fluency acquisition. These included (a) the resource-based theories developed by LaBerge and Samuels (1974), which was later expanded by Perfetti (1985), (b) the instance theory or information encapsulation theory developed by Logan (1988), and (c) the interactive-compensatory theory proposed by Stanovich (1980).

According to LaBerge and Samuels’ (1974) automaticity theory (AT), children who struggled with decoding drained their allocated attentional resources for lower level processes, thus leaving inadequate attention to comprehension. As shown in Figure 1, LaBerge and Samuels (1974) proposed three memory stores: visual, phonological, and semantic. According to this model, when a word is recognized automatically, the visual word code is transferred directly to semantic memory without having to go through phonological codes. When students encounter a difficult word that they could not recognize automatically, the visual pattern codes have to activate the spelling pattern
codes and phonological codes to recognize the word. This labored process takes the readers’ attention away from the comprehension process (Samuels, 2004).

Figure 1. Reading process for fluent and non-fluent readers.

Perfetti’s (1985, 1992) Verbal Efficiency Theory (VET) expanded AT beyond lower-level decoding processes. VET posited that even higher-level reading processes, such as using metacognitive strategies and activating background knowledge, could also have been automatized through extended practice. Perfetti (1985) stated that “individual differences in comprehension are produced by the individual differences in the efficient operation of local processes” (p. 100). As shown in Figure 2, this theory assumed a hierarchy among individual reading process subcomponents: lexical access, propositional encoding, and text modeling. Lexical access refers to the process where words are recognized and matched to both a concept and phonological representation. Propositional encoding takes place when the recognized meanings of individual words are integrated with the meanings of other words in the immediate context to form units of meaning. Finally, text modeling refers to the integration of propositions into a coherent mental representation of the text. Therefore, if the goal of reading is elaborative and efficient text
modeling, lexical access has to be automatic to support the encoding of propositions and their integration.

**Figure 2: Verbal Efficiency Theory.**

In other words, the efficiency of lower-level processes determines the attentional resources available for higher-level processes. If readers are quick and accurate in identifying words, they will have more attentional resources for executing resource-demanding reading comprehension. On the other hand, readers with poor decoding skills expend most attentional resources on decoding processes, not for higher level comprehension processes. Consequently, these readers are less efficient at retaining information in their working memory to integrate propositions and generate inferences in order to make meaningful representations of text. Comprehension suffers as a result.

AT and VET have been supported by many studies. For example, NAEP (2009) found that students who were low in fluency were also low in reading comprehension. Moreover, oral reading fluency has been shown to predict comprehension better than direct measures of reading comprehension such as questioning, retelling, and completing.
cloze items (Fuchs et al., 2001). Klauda and Guthrie (2008) conducted a group design research study with 278 fifth grade students and examined the relationships of three levels of reading fluency (the individual word, the syntactic unit, and the whole passage) to reading comprehension. The results revealed that reading fluency at each level related uniquely to reading comprehension. The results supported an automaticity effect for word recognition speed and syntactic processing skills.

Proposing the information encapsulation theory, Logan (1988) examined automaticity from a different perspective. The primary feature of this theory is the development of a knowledge base through which the reader codes information without considering alternative possibilities about what the word is or what it means (Logan, 1988). This theory assumes that encoding into memory and retrieval from memory are “obligatory, unavoidable consequences of attention” (p. 493) and that every encounter with a task lays an instant representation of it in memory. When people first encounter a task, their performance is based on an algorithmic computation that involves thinking and reasoning. As the number of encounters increase, learners begin to build their knowledge base. When the knowledge base is extensive enough and reliable enough, performance can be based entirely on memory retrieval, and the algorithm that once supported initial encounters can be abandoned entirely. The key causal property is the development of a high-quality representation in memory that allows automatic access to the information in the knowledge base. Non-automatic performance takes place when the reader has a lack of knowledge rather than the scarcity of resources. In addition, Logan (1988) posited that adding one memory trace to the initial encounter, or even the first 10 encounters, would have greater impact on the readers’ ability to retrieve that memory trace than would
adding one memory trace to the one-hundredth encounter. This aspect of the theory has important implications for reading practice. This theory implies that poor readers with inadequate reading skills can improve their reading by extensive practices that built up their knowledge base. It also supports extensive practices during the acquisition stage of learning.

The interactive-compensatory model by Stanovich (1980) suggests that poor readers use contextual information to compensate for weak word recognition skills. The model has two major components: contextual facilitation of word perception and facilitation of comprehension. Contextual facilitation of word perception is not a usual part of skilled normal reading; in fact, it would have been a waste of cognitive capacity for good readers who read with ease and in an automatic fashion to even consider using this strategy. Contextual facilitation or facilitation of word perception is useful only to poor readers to compensate for their difficulties in decoding. Good readers perceive words by using data driven strategies, saving cognitive capacity for comprehension monitoring. As readers developed more data-driven strategies, they use phonetic strategies to self-correct errors (Stanovich, 1980). This model suggests that higher-level processes could compensate for deficiencies in lower-level processes. For example, when a word is encountered in a sentence context, “bottom-up” (text-driven or word processing) and “top-down” (meaning driven or hypothesis forming) processes operate simultaneously. Thus, a reader with poor word recognition skills actually tends to rely more on contextual factors because these factors are more accessible than text-driven factors and provide additional sources of information (Stanovich, 1980).
Stages of Learning

It is instructive to think of repeated reading within the context of stages of learning. Mercer and Mercer (2005) described stages of learning as levels through which a student learns a skill or behavior. As the student advanced through the stages of learning, the skill or behavior becomes increasingly more functional. The stages of learning progress as follows: (a) entry level, (b) acquisition, (c) proficiency, (d) maintenance, (e) generalization, and (f) adaptation. Teachers provide instruction in the acquisition stage and help foster an accurate performance of a skill. At the proficiency stage, the goal is to develop fluency or a behavior that can be performed with both accuracy and speed (Mercer & Mercer, 2001). Thus, repeated reading can be thought of as a well-organized practice strategy resulting in improved decoding skills.

Similarly, Chall (1983) described six stages of learning to read which can facilitate the understanding of reading fluency. The first stage, pre-reading literacy learning, includes the development of concepts of print and phoneme awareness. The second stage includes the beginning of formal reading instruction and the development of a learner’s sound symbol correspondence. It is the third stage of the reading process, often referred to as the ungluing from print stage, during which students develop fluency. Students in this stage have already established basic decoding ability and are developing automaticity in processing a printed text as well as making use of the prosodic features in the text such as appropriate stress and intonation in their reading. Chall (1983) suggested that after mastering the ungluing from print stage, it can be easier for students to read for meaning. Therefore, in the next stage, students make a shift from learning to read to reading to learn. In this stage, students learn to interact with expository text and complex
vocabulary. Finally, students enter the last stage of reading in which they are able to consider multiple viewpoints and critically evaluate what they read.

More recently, Wolf and Katzir-Cohen (2001) shifted their view to address fluency as a skill that must be accumulated when acquiring literacy instead of as an outcome of a series of skills. They concurred with the double deficit model (Wolf & Bowers, 2000) that some students with reading disabilities have specific problems in naming speed, which differs from characteristics of students who face challenges related to phonological processing. Wolf and Bowers’ (2000) double deficit model (see Figure 3) of reading disability differentiates two groups of students with reading disabilities: those who exhibit deficits in random automatized naming (RAN) and those who exhibit deficits in phonological awareness. A deficit in random automatized naming represents a difficulty in efficiently and automatically retrieving stored phonological representations. Students who are not able to identify and manipulate the phonic elements of speech are not be able to map those sounds onto specific orthographic patterns, which makes it difficult for them to decode unfamiliar words. In addition, some students who fall in the double deficit subtype demonstrate the co-occurrence of phonological and naming-speed deficits. Interventions for students who decoded accurately but remain dysfluent should focus on improving fluency.
Repeated Reading

Several strategies have been used to increase reading fluency for students with and without disabilities. Of these strategies, repeated reading, a reading intervention designed to increase reading fluency, has been examined most often and was frequently used in treatment packages with other strategies such as modeling, error correction, performance feedback, and reinforcement (Chard et al., 2002; Lo, Cooke, & Starling, 2011; Therrien, 2004). During repeated reading, students read a short passage that ranges from 50-300 words (Dowhower, 1989; Samuels, 1979). Dowhower (1989) indicated that accuracy on the initial reading should be approximately 85%. Though the exact number of readings varies, students should read the passage three to five times until reaching satisfactory fluency (Dowhower, 1989; Samuels, 1979; Therrien, 2004). O’Shea, Sindelar, and O’Shea (1985, 1987) also found that the mean fluency effect size increased more than 30% when the passage was read three (ES = .85) or four (ES = .95) times, compared to when it was read two times (ES = .71).

Therrien (2004) suggested that students should read to adults rather than peers, which allows for more effective feedback to be provided immediately. Therrien (2004)
and O’Shea et al. (1985, 1987) studied the cues that teachers used with repeated reading interventions and concluded that two types of cues, fluency and comprehension, should be used to direct students’ attention to specific aspects of the passage. In addition, O’Shea et al. (1985, 1987) concluded that students with LD read at similar speed when cued for comprehension and fluency, but remembered more about what they read when cued for comprehension.

Extensive evidence exists to demonstrate the benefits of repeated reading on students’ reading fluency. Research studies for repeated reading included nondisabled students (O’Shea et al., 1985; Rasinski, 1990) and students with LD (Chard et al., 2002). The repeated reading intervention has also been used successfully with students in the second through eighth grades who have an instructional reading level between the first and fifth grades (Chard et al., 2002; Therrien, 2004). It has been used experimentally between a teacher or a competent tutor and the student (Vadasy, & Sanders, 2008), through peer tutoring (Kamps, Barbetta, Leonard, & Delquadri, 1994), and through parent tutoring (Gortmaker, Daly, McCurdy, Persampieri, & Hergenrader, 2007). The NRP (2000) found that repeated oral reading procedures were effective in improving reading fluency and overall reading improvement.

Nontransfer Effect versus Transfer Effect

Existing literature on repeated reading generally examined its effects in two categories: nontransfer effect and transfer effect (Therrien, 2004). Nontransfer effects represent students’ ability to fluently read and/or comprehend a passage after reading it multiple times (i.e., nontransfer passages). Transfer effects represent students’ ability to
fluently read and/or comprehend new passages after having previously reread other reading materials (i.e., transfer passages).

Ample evidence in the literature supports the nontransfer effect of repeated reading. Several meta-analyses examined the effects of repeated reading on reading fluency and comprehension. Chard et al. (2002) synthesized 24 fluency building interventions and concluded that repeated reading interventions for students with LD were associated with improvement in reading rate, accuracy, and comprehension. Similarly, Therrien (2004) reviewed 33 studies on repeated reading that was published before June, 2001, and reported an average effect size of .83 for fluency and .67 for comprehension on nontransfer passages—passages that were read repeatedly. These reports indicated that repeated reading was an effective strategy for improving reading fluency and comprehension on a passage that was read repeatedly. Furthermore, similar effects were evident when students’ disabilities were taken into consideration, indicating that repeated reading has been an effective strategy for students without disabilities and students with LD when a passage is repeatedly read. Morgan and Sideridis (2006) used multilevel random coefficient modeling to analyze fluency intervention results from 30 single-subject studies involving 107 students with or at risk for LD. They concluded that repeated reading produced average to above average effects on reading fluency. The major finding from this meta-analysis was that goal-setting with or without subsequent reinforcement produced the highest effects on reading fluency.

In contrast, existing studies on the transfer effects of repeated reading often offered mixed and less conclusive results. Rashotte and Torgesen (1985) found statistically significant effects of non-taped repeated reading on reading speed only on
passages that shared similar content with the training passages. Carver and Hoffman (1981) reported significant transfer of effects to passages that were presented in a similar format (multiple choice, cloze passages) to the training passages. Herman (1985) reported gains in reading speed, word recognition, and a decrease in miscues on new passages. Swain and Allinder (1996) used a multiple baseline design across subjects to examine the effects of repeated reading on the reading performance of three second-grade students with LD. The authors maintained that repeated reading increased students’ reading rates, which in turn affected oral reading CBM, but these improvements did not transfer to maze CBM. This means that RR had a positive effect on reading fluency but did not improve participants’ reading comprehension as measured by maze CBM. Therrien (2004) indicated that repeated reading had only moderate effect size on fluency and non-significant effect size on comprehension when students read a new passage. Interestingly, students with LD produced a higher effect size on transfer passages for both fluency and comprehension than students without LD.

Ardoin, McCall, and Klubnik (2007) examined the effects of two repeated reading interventions in increasing students’ reading fluency on transfer passages. Students were asked to read one passage four times during one intervention and read two similar passages twice each during another intervention. While both interventions were effective in increasing students’ reading fluency, students who read one passage four times obtained greater gain in fluency on the transfer passages. Similarly, Martens et al. (2007) examined fluency gains on transfer passages and retention of fluency gains over time in the absence of practice. They discovered that there was a significant fluency gain on transfer and nontransfer passages with students who were reading beyond the pre-primer
level. They also found that gains in fluency were retained over a two-day period in the absence of practice for both intervention groups.

A recent study conducted by Lo et al. (2011) involving three second-grade students at risk for reading failure revealed improvement of reading rates (i.e., the number of words read correctly per minute) on transfer passages. The treatment package included initial performance cueing (showing the students’ their previous graphs), previewing of difficult words in the passage, initial timed passage reading, performance feedback and error correction (word supply), error word practice, unison reading, repeated performance cueing (encouraging students to outperform previous scores), and timed passage rereading. This study included multiple efforts to have the students set and exceed their previous goals. Similarly, in their multilevel random coefficient modeling meta-analysis, Morgan and Sideridis (2006) found that goal setting and reinforcement produced most gains in reading fluency during fluency training and growth over time. Even though it is very premature to conclude that goal setting was the critical component in repeated reading, future studies should be conducted to analyze which component in the intervention package lead to the gain on transfer passages.

As a result of repeated reading’s mixed transfer effect, some reviews did not support the use of repeated reading. Chard, Ketterlin-Geller, Baker, Doabler and Apichatabutra (2009) employed rigorous quality standards proposed by Horner et al. (2005) and Gersten et al. (2005) while examining the research articles on repeated reading during the past 30 years, and concluded that repeated reading was not an evidence-based practice for students with and at risk of LD. The authors indicated the
need for better designed and more rigorous research studies that examined the effects of repeated reading.

Error Correction

A recent tenet in repeated reading research is to determine which type of error correction procedure is most beneficial in increasing students’ reading ability. This is important since error correction is a crucial component in repeated reading (Therrien, 2004). However, interpretation of these studies is limited due to the differences in the operational definitions of error correction. In general, current literature included three types of error correction procedures: meaning-based, phonics-based, and traditional word-supply. According to the review completed by Watson, Fore, and Boon (2009), meaning-based error correction refers to prompting students in various ways to think about whether the miscued word made sense in the context of the sentence. Phonics-based error correction occurs when students are prompted to either sound out the words or to analyze the words phonetically. Word-supply is simply providing the students with the correct pronunciation of the word after a designated amount of time has elapsed or after the students misread the word.

Phonics-based error correction can be accomplished in several ways. One of the methods, word boxes (Clay, 1993), has been previously utilized in Reading Recovery lessons as a phonics technique for supporting students with reading problems with the acquisition of phonemic awareness and word identification. This method consisted of a drawn rectangle divided into sections corresponding to the number of sounds in a word. Magnetic or tile letters were placed below the boxes and the students slid the letters into the respective sections as each sound was articulated. Devault and Joseph (2004) used
word boxes as the error correction procedure during repeated reading practices with three secondary level students with severe reading disabilities. They found that repeated reading with the use of word boxes increased the students’ reading rate on nontransfer passages. A second phonics-based error correction required the students to sound out the misread or unknown word, paying attention to the beginning, middle and the end of the word (Perkins, 1988). Another phonics-based error correction that has been noted in the literature was called the interspersal of unknown to known words (Nist & Joseph, 2008). Interspersal procedure facilitated the acquisition of unknown words by mixing unknown words with words students have already learned. It is a procedure that had been used for sight words acquisition. Some recent research has utilized this procedure as an error correction method during repeated reading practice (Nist & Joseph, 2008).

A few studies examined the comparative effects of the different error correction methods. These studies are listed and compared in Table 1. Of the seven comparison studies reviewed, five studies compared the traditional word supply method with the phonics or meaning changing method, and found that the traditional word supply method was as effective as the phonics method on reading fluency, whereas the meaning supply method was more effective on reading comprehension (Pany & McCoy, 1986; Pany & McCoy, 1988; Perkins, 1988; Spaai, Ellermann, & Reitsma, 1991; Watson, Fore, & Boon, 2009). One common limitation of the comparative studies is that only nontransfer effects were reported. Therefore, it is important to compare the transfer effects of error correction methods.

Table 1.

*Summary of Error Correction Comparison Studies*
<table>
<thead>
<tr>
<th>Study</th>
<th>Treatments</th>
<th>Dependent Variables</th>
<th>Results</th>
<th>Limitations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pany and McCoy (1986)</td>
<td>word-supply, sounding out the word, corrective cueing (read another way), passage rereading, defining misread words, and practicing target words</td>
<td>reading accuracy and comprehension for students with LD</td>
<td>All types of feedback were superior to no-feedback.</td>
<td>Data on transfer passages not reported.</td>
</tr>
<tr>
<td>Pany and McCoy (1988)</td>
<td>total feedback and meaning changing feedback</td>
<td>Reading accuracy and comprehension of LD students</td>
<td>Both treatments were superior to non-treatment.</td>
<td>Data on transfer passages not reported.</td>
</tr>
<tr>
<td>Perkins (1988)</td>
<td>general (ask the student to try again), word-supply, sounding out the word, and no feedback</td>
<td>Word level reading accuracy for 48 boys with LD in acquisition stage of learning</td>
<td>Any type of feedback was superior to no feedback.</td>
<td>Data on transfer passages not reported.</td>
</tr>
<tr>
<td>Spaai, Ellermann, and Reitsma (1991)</td>
<td>Word-supply, segmented feedback, and no feedback group</td>
<td>single word reading accuracy for 66 first grade general education students</td>
<td>Whole word condition to be superior to the other conditions on measures of accuracy</td>
<td>Dolch sight words list might have skewed the results. No transfer data.</td>
</tr>
</tbody>
</table>
Shany and Biemiller (1995) Teacher-supplied feedback vs. tape-supplied feedback reading comprehension, listening comprehension, and reading speed Both treatments better than control. No difference between the treatment groups. No effect on word identification or decoding compared to control. Did not differentiate students from general education with students with LD.

Crowe (2005) Decoding group vs. meaning based group Reading comprehension Meaning-based superior to decoding group on formal and informal reading comprehension tests. No data on fluency.

Watson, Fore, and Boon (2009) Word supply vs. phonics based Reading fluency for 3 students with LD Both procedures improved the reading rate for all the students. Two of the students performed better under the word-supply group while one student performed better in the phonics-based group. The study did not provide any data on transfer passages.

Pany and McCoy (1986) conducted a review of corrective feedback studies and analyzed the effect of phonics-based feedback on reading accuracy and comprehension with children with low reading ability. The different feedback methods that were compared included word-supply, sounding out the word, corrective cueing (read another way), passage rereading, defining misread words, and practicing target words. The authors’ review showed that all forms of corrective feedback were superior to no-feedback conditions on word recognition and comprehension tasks. Word-supply and
sounding out the words produced similar positive results and word meaning method was the least effective on comprehension.

Pany and McCoy (1988) compared the effects of two types of corrective feedback, total feedback and meaning changing feedback, on the reading accuracy and comprehension for 16 third-grade students with LD. Under the total feedback condition, all errors were corrected; under the meaning-changing feedback condition, only meaning changing errors were corrected (i.e., articles, non-critical modifiers, proper nouns that appeared only once or connectives were not corrected). Results indicated that both treatment conditions were superior to non-treatment resulting in greater response accuracy for comprehension questions and less errors during reading. The total feedback condition was slightly more effective than the meaning-changing condition on all measures.

In another study, Perkins (1988) compared four error correction techniques on 48 elementary boys with LD. All the participants were in the acquisition stage of learning phonics. The four types of treatments included general (ask the student to try again), word-supply, sounding out the word, and no feedback. Students were asked to read nonsense consonant-vowel-consonant words. The author concluded that any type of feedback was superior to no feedback. Both word-supply and sounding out the word produced the highest correct response rates. Even though the findings of this study were limited to word level reading as compared to passage level reading, Perkins (1988) made a major contribution to the field by recognizing the need to differentiate feedback techniques based on the students’ stages of learning. She posited that for students in the acquisition stage of skill development, when errors occurred frequently, correction
procedures could strengthen practice of correct responses, but for proficient readers, feedback may function differently.

Spaai, Ellermann, and Reitsma (1991) conducted another study at the word reading level. They compared three types of error correction procedures were compared with 66 first grade general education students on single word reading accuracy. Word-supply and segmented feedback were compared with a no feedback group. In the word-supply group, the whole word was provided upon the students misreading the word, whereas in the segmented feedback group, each individual phoneme was provided when the students misread the word. Results showed the whole word condition to be superior to the other conditions on measures of accuracy. However, the words were chosen from the Dolch sight words list. Thus, the results might have been skewed towards the word-supply group because not all Dolch sight words were appropriate for segmented feedback (Spaai, et al., 1991).

Shany and Biemiller (1995) used a pre- and post- group design and compared the effect of a teacher-assisted word supply procedure and a tape-assisted reading strategy. A total of 39 third and fourth grade students participated. In the teacher-assisted group, the students orally read the passages to the teacher, who provided the whole word when needed. In the tape-assisted group, the students followed pre-recorded tapes while reading silently to themselves. Students from both groups performed significantly better than the control group on measures of reading comprehension, listening comprehension, and reading speed in text verbal efficiency with no significant differences between the two treatment groups. There was not a significant increase in word identification and decoding between the treatment groups and the control group. An interesting finding
from this study was that the children in the tape-assisted group read twice as much material but achieved similar levels as compared to the teacher-assisted group.

In a recent pre- and post-test treatment comparison design, Crowe (2005) examined the effects of two types of oral reading feedback strategies on the reading comprehension of eight students between the ages of 8 and 11 with low reading abilities. Students in the traditional decoding feedback group were encouraged to sound out the word, asked to reread the misread word, provided the word when needed, shown how to divide the words into syllables, and provided phonemic cues. Students in the meaning-based feedback group were provided with a preparatory set to activate their background knowledge, encouraged to summarize the passage, provided with explanation of unfamiliar words, and shown the pronoun references. Results indicated that the students in the meaning-based feedback group outperformed the students in the decoding feedback group on reading comprehension as measured by formal and informal assessment procedures. Students in the meaning-based feedback also could recall significantly more details after a four-day interval than the decoding feedback group.

Finally, Watson, Fore, and Boon (2009) examined the effects of two error correction procedures, word-supply and phonics-based, on the oral reading fluency of students with mild disabilities. Three students in the fourth grade were asked to read passages in their frustration level (80-85% accuracy). In the word-supply group, students were provided with the whole word upon misread words. In the phonics-based group, the students were provided the phoneme-by-phoneme sounding out of the words. If the students did not read the word correctly after phonetic modeling, they were provided the whole word and asked to continue reading. Results indicated that both procedures
improved the reading rate for all the students. Two of the students performed better under the word-supply group while one student performed better in the phonics-based group. The study did not provide any data on transfer passages.

Summary

Reading is an important life skill that many children with LD lack. Extensive practice may improve reading fluency that poor readers need to close the gap between themselves and their peers. A preponderance of evidence in the literature supported the positive effects of repeated reading on reading fluency, even though well-designed research is still in need. Most of the studies that were reviewed reported nontransfer effects of repeated reading. When a student repeatedly reads a passages, his/her reading rate and accuracy are expected to increase. New tenets in repeated reading research have focused on its transfer effect as well as how to correct students’ errors to maximize the effectiveness of repeated reading.

Assumptions

The current study was grounded in the assumption that students with LD were of normal intelligence but suffered information-processing difficulties (Stanovich & Siegel, 1994; Swanson & Alexander, 1997). It was assumed that they had specific deficits with phonological processing, particularly at the word-recognition level (Stanovich & Siegel, 1994; Swanson & Alexander, 1997). The RRWS procedure also assumed that when a student showed inadequate reading fluency, the student may have had deficits in the acquisition of decoding skills.
CHAPTER THREE: METHODOLOGY

Research Design

The purpose of the current study was to examine the effects of two error correction procedures, word study and corrective feedback, during repeated reading interventions on the reading fluency and accuracy of both nontransfer and transfer passages for the fourth grade students with LD. A single subject design (multiple baseline design across participants) (Baer, Wolf, & Risley, 1968) was used to investigate the effects of the intervention procedures. Collecting data with a multiple baseline design is an experimental research method that documents a causal, or functional, relationship between independent and dependent variables using within- and between-subjects comparisons to control major threats to internal validity and requires systematic replications to enhance external validity (Wolery & Gast, 2000). It is very popular to teacher practitioners who do not always have access to a large number of participants to use group designs (Wolery & Gast, 2000). In addition, multiple baseline designs are beneficial in cases where reversal of behaviors is not desirable, ethical, or possible (Baer et al., 1968).

According to Horner et al. (2005), single-subject research documents a practice as evidence-based when (a) the practice is operationally defined; (b) the context in which the practice is to be used is defined; (c) the practice is implemented with fidelity; (d) results from single-subject research document the practice to be functionally related to
the change of independent variables; and (e) the experimental effects are replicated across a sufficient number of studies, researchers, and participants to allow confidence in the finding. Even though the purpose of the current study was not to determine whether repeated reading is an evidence-based intervention, the above criteria were used to ascertain that all of the above elements were present to describe the study in detail. Based on the extensive existing research, the investigator of the current study hypothesized that the students’ reading fluency would increase with the implementation of the interventions. Because reversing the positive effect (e.g., decreasing reading fluency) would not be desirable, ethical, or possible after the skills were mastered, a multiple baseline design was chosen as the research design.

When using multiple baseline designs, the intervention is systematically implemented in a stepwise fashion across multiple behaviors, settings, or subjects (Baer et al., 1968). In this study, a multiple baseline design across participants was utilized. When utilizing this kind of design, the treatment or independent variable is applied to one of the participants once a baseline has been established. At the same time, the other participants remain in baseline. Once improvement is seen for the first participant, the treatment is started with the second participant, and so on. The reasoning behind this design is that if one participant shows improvement when and only when the treatment is started, it is probable that improvement is due to the treatment. If gains are also noticed in the other participants who are in baseline, it can suggest that some factor other than the treatment affects the dependent variable, which weakens the functional relationship between the treatment and the dependent variable. However, if gains are noticed only when the treatment is implemented, a functional relationship between the treatment and
the dependent variable can be established (Wolery & Gast, 2000). Another feature of the current study is counterbalancing the two groups. The three participants in group one received RRCF followed by RRWS, while the three participants in group two received RRWS followed by RRCF. Since there were two treatments involved in the study, counterbalancing was utilized to control the order effect (Baer et al., 1968; Wolery & Gast, 2000).

Single subject designs have been widely used to examine the effects of repeated reading for students with disabilities. In the synthesis conducted by Chard et al. (2002) on the effects of repeated reading for students with LD, 21 studies were identified as meeting their selection criteria. Out of the 21 studies, 11 used some variation of single subject designs.

Setting

The study took place in an elementary school located in the suburbs of a large city in a Southeastern U. S. state. The school served approximately 1,300 students and was situated in a middle class neighborhood. The population of the school was composed of 71% White, 11% Hispanic, 11% Black, 2% Asian, and 5% Multi-racial. Among all the students, 29% qualified for free or reduced lunch. The school included 57 general education classrooms and two self-contained special education classrooms for students in Kindergarten through fifth grade.

The study took place in the participants’ existing interrelated special education classroom. The classroom was located inside the school building and was free from irregular noise or interruptions. The investigation was conducted by the participants’ special education teacher. Prior to the study, the investigator had been working at the
same school for three consecutive years. She had a Master’s and a Specialist’s degree in Special Education and had achieved National Board Certification. She was trained to use AIMSWeb, which is a computer-based progress monitoring system that has reading fluency and comprehension passages from kindergarten up to the eighth grade. During each session with the individual participant, the other students were present in the classroom and were assigned independent work activities either on the computer or at their seats. Sessions were conducted in a one-to-one arrangement with the student and investigator seated facing each other at the investigator’s desk placed at one end of the classroom. Reading materials were presented on a regular student desk placed between the participant and the investigator.

Participants

One female and five male students from the fourth grade participated in the study. All participants were receiving special education services in accordance with state and federal guidelines under the category of specific learning disability (SLD). Two students demonstrated the characteristics of having attention deficit disorder (ADD) but were not officially diagnosed or on medication during the study. Among the six participants, four were Caucasian, one was African American, and one was Hispanic. All participants were receiving their reading instruction from the investigator during the same 50-minute class period according to their IEPs. To protect the participants’ confidentiality, they were assigned pseudonyms. No identifying information appeared on any documents that were accessible by anyone other than the investigator. Only pseudonyms were used during data collection, graphing, and reporting.
Prerequisite skills necessary for inclusion in the study were hearing and vision within normal limits with or without the aid of corrective devices, the ability to decode at least 40 words in a passage of at least the first grade level, to comprehend and verbally respond to verbal feedback, to comprehend and follow multi-step instructions, and to have shown sufficient levels of motivation to participate. Prerequisite skills were assessed during the preceding week when the investigator taught the participants, through consulting the participants’ previous teachers, or based upon IEP reports stating such criteria had been met. Among the eight students available to the investigator, two students were excluded from the study due to irregular school attendance. Table 2 shows the participants’ demographic data.

Table 2.

Participants’ Demographic Data

<table>
<thead>
<tr>
<th>Student</th>
<th>Gender</th>
<th>Age</th>
<th>Ethnicity</th>
<th>Achievement Standard Scores</th>
<th>Time in Spec. Ed.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Decoding</td>
<td>Comprehension</td>
</tr>
<tr>
<td>Deon</td>
<td>Male</td>
<td>9-10</td>
<td>Afr. Am.</td>
<td>80&lt;sup&gt;a&lt;/sup&gt;</td>
<td>84&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Dalton</td>
<td>Male</td>
<td>9-5</td>
<td>Cauc.</td>
<td>77&lt;sup&gt;a&lt;/sup&gt;</td>
<td>78&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Edward</td>
<td>Male</td>
<td>10-1</td>
<td>Hisp.</td>
<td>84&lt;sup&gt;b&lt;/sup&gt;</td>
<td>89&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Howard</td>
<td>Male</td>
<td>9-5</td>
<td>Cauc.</td>
<td>83&lt;sup&gt;b&lt;/sup&gt;</td>
<td>80&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Josh</td>
<td>Male</td>
<td>9-11</td>
<td>Cauc.</td>
<td>89&lt;sup&gt;a&lt;/sup&gt;</td>
<td>85&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
<tr>
<td>Kate</td>
<td>Female</td>
<td>9-4</td>
<td>Cauc.</td>
<td>78&lt;sup&gt;a&lt;/sup&gt;</td>
<td>79&lt;sup&gt;a&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

<sup>a</sup> Wechsler Individual Achievement Test
<sup>b</sup> Woodcock Johnson Achievement Test

After the initial data collection with the multiple-baseline design, some new questions arose with regard to the relationships between reading fluency and
comprehension, which necessitated an extended study. Three participants, Deon, Howard and Kate, were selected based on their performance during the initial study to participate in the extended study for two additional weeks.

Human Subject Protections

It was crucial for the investigator to protect human subjects involved in the study, especially because she was working with minor students. The following steps were taken to ensure human subject protection:

1. School administrators were informed of the research and Request for Permission to Conduct Data Collection Activities within the System (see Appendix B) were completed and submitted.

2. The investigator followed the appropriate institutional guidelines to acquire permission from the university where she was pursuing the Doctor of Education (see Appendix C for the IRB Form).

3. After both IRBs were approved, participants’ parents were contacted by the investigator with regard to the purpose of the study, the procedures, the potential benefits, and the potential risks. Parent Consent Forms (see Appendix D) were sent home and signatures were acquired. Parents were given a copy of the consent form.

4. After parental consents were acquired, the investigator informed the participants of the purpose, procedures, potential benefits, and potential risks with regard to the study. Student Assent Forms (see Appendix E) were given to the participants and signatures were acquired.
5. During the implementation of the study, the investigator did not discuss the participants, the progress, or the results of the study with any irrelevant parties. When discussing the study with relevant parties such as the investigator’s advisor, her dissertation committee, her administrators, and the IRB review boards, the investigator used the participants’ pseudonyms only. No identifying information was revealed.

6. All documents such as IRB reports, informed consents, student assents, protocols, recording sheets, graphs, charts, and audio tapes used in the study were stored in a locked file cabinet after the completion of the study for three years. After three years, all documents used would be shredded or erased.

Materials

AIMSWeb passages. Fluency passages from AIMSWeb (Edformation, 2005) were used in this study. AIMSWeb is a computer-based progress monitoring system that has downloadable reading passages from kindergarten up to the eighth grade. Students were assessed and asked to read passages at their instructional level. These passages are grade-based narrative reading passages of 150 to 300 words. AIMSWeb passages were chosen due to their high reliability and validity. For this study, it is important that the passages used in each grade level are of equal difficulty. Equal difficulty of passages was established empirically through the calculation of alternate-form reliabilities. Specifically, in the passage selection phase, all possible pairs of students’ passage scores were correlated within each grade. Those passages not highly correlated (> 0.70) with other passages within the same grade were discarded. As a result, the alternate-form reliabilities across first to eighth grades range from 0.80 to 0.90, indicating high
reliability for the passages (Shinn & Shinn, 2002a, 2002b). Similarly, the multiple validity coefficients were also available for each grade level from the AIMSWeb Training Workbook (Shinn & Shinn, 2002a, 2002b), which reported reading validity coefficients in the 0.60 to 0.80 range, supporting the construct validity.

Out of the 33 AIMSWeb passages available in each grade level, three passages were used for preintervention assessments. The remaining thirty passages were used during the main study baseline, main study intervention phases, and extended study. One passage was used per day. The order of the passages followed its numeric order as listed in AIMSWeb. During the baseline, the participants only read the passage once. During the intervention phases, the participants read the passages five times each. The first time they read the passages, transfer data on their reading fluency and accuracy were taken. After the teacher implemented the intervention, the participants practiced the same passage three additional times, followed by fifth passage reading for nontransfer data collection.

When administering the AIMSWeb passages, directions detailed in the AIMSWeb Training Workbook (Shinn & Shinn, 2002a, 2002b) were followed. The Standard Directions were followed the first time the passages were administered and the shorter version of the directions was followed thereafter (Shinn & Shinn, 2002a, 2002b).

Samples of a reading fluency passage student copy (see Appendix F) and reading fluency teacher copy (see Appendix G) were provided. Directions for administering the fluency passages (see Appendix H) are also provided.

AIMSWeb Maze passages. Maze passages from AIMSWeb (Edformation, 2005) were used in the extended study. According to Fuchs and Fuchs (1992), the maze task has
been described as a global measure of reading, requiring decoding, fluency, and comprehension. The maze task represents not only word level processes but also “processing meaningful connections within and between sentences, relating text meaning to prior information, and making inferences to supply missing information” (Fuchs, Fuchs, Hosp, & Jenkins, 2001, p. 240). It is deemed as a reliable and valid measure for reading comprehension (Fuchs, Fuchs, & Hosp, 2001). AIMSWeb Maze is a multiple-choice cloze task that students complete while reading silently. The first sentence of a 150 to 400 word passage is left intact. Thereafter, every seventh word is replaced with three words inside parenthesis. One of the words is the exact one from the original passage. During a maze task, students were asked to read a passage silently and supply a missing word that would be appropriate in the context of each sentence or passage.

According to the AIMSWeb Training Workbook (Shinn & Shinn, 2002a), the AIMSWeb Maze task was administered under a three minute time constraint. At the end of the three minutes, the investigator collected the student’s passage and compared it with an answer key. Numbers of raw scores of correct answers were used to measure reading comprehension.

*Data collection form.* The data collection form was developed for the investigator to use during the data collection (see Appendix K). The form was used to collect student reading fluency and accuracy data. The form was duplicated for each student. A similar data collection form (see Appendix L) was used during the extended study to collect students’ reading fluency, accuracy, and comprehension. This form was also duplicated for each student.
Timer. A Taylor® timer with a countdown setting were used to keep time during oral reading fluency and comprehension measurements.

Pencils. Standard Number 2 pencils were used.

Dependent Variables

There were four dependent variables in this study: reading fluency, reading accuracy, reading comprehension, and social validity of repeated reading procedures. Reading fluency was measured by the number of words correctly read per minute (WCPM) on the reading passages included in the AIMSWeb assessment system. Students read each passage aloud for one minute while the investigator recorded errors. Directions for administering the fluency passages were followed as outlined by the AIMSWeb Training Workbook (Shinn & Shinn, 2002a). The researcher counted errors for the following: (a) mispronunciations, (b) substitution, (c) three second pauses or struggles (word supplied by investigator), and (d) omission. The following situations were counted as errors according to the AIMSWeb Training Workbook: (a) dialect differences, (b) self-corrections, (c) repetitions, and (d) insertions (Shinn & Shinn, 2002a). All errors were underlined on the investigator’s copy of each passage with the errors (when applicable) recorded above the misread words. For example, if the participant mispronounced the word “site” for “sit”, the word “site” was underlined with the word “sit” written above it. When the investigator had to provide the word to the participant or when the word was omitted, no words were recorded above the errors. Fluency was calculated by subtracting the number of errors from the total number of words and dividing this by the number of minutes used, which was one minute.
Reading accuracy was defined as the percent of words read correctly out of all words read. It was calculated by dividing the number of words read correctly by the total number of words read, then multiplying by 100. Reading comprehension was an additional dependent variable in the extended study. It was measured as the number of words correctly circled on the AIMSWeb Maze passages.

Social validity is a subjective, yet necessary, assessment in applied behavior analysis to evaluate the social importance of any intervention (Wolf, 1978). Eliciting participants’ opinions validates an intervention on three critical levels: the goals of the intervention, the appropriateness of the procedures being used, and the social importance of the effects of the intervention (Wolf, 1978). Social Validity Interview Questions (see Appendix O) that target the above three goals were administered to the participants on an individual basis at the conclusion of the study. The investigator took notes as the participants answered the questions and reported generic findings in the results section.

Procedures/Independent Variables

The independent variables of this study were the treatment packages: RRCF and RRWS. The specific procedures are described below.

Preintervention Assessment

The purpose of the preintervention assessment was to determine what level of AIMSWeb passages should be used for each participant. The assessment package consisted of a total of twelve fluency passages: three from each of the grade levels up to the fourth grade. Three passages from each grade level were administered to ensure that the correct level was selected for each participant. The passages included in the preintervention assessment were not used again during the intervention phases.
The investigator assessed the participants individually starting with the passages in Grade 4. Passages were presented one at a time with the instruction, “Read this passage the best you can.” At the end of each session, participants were only given nondescriptive comments such as, “You have worked very hard!” After the participants read all the passages at one grade level, the passages in the next less difficult level were presented. This continued until the participants’ frustration reading levels were identified. The frustration level was defined as the level at which the participants could read 80-89% of the passages correctly (Bos & Vaughn, 2008). Once the frustration level was determined, passages at that grade level were used for the remainder of the study, and the preintervention assessment stopped. None of the students had to read all 12 passages before his or her frustration level was identified. Participants’ WCPM and accuracy were recorded.

It should be noted that most of the current literature recommends passages in the students’ instructional reading level or above to be utilized for fluency practice (Chard et al., 2002; Therrien, 2004). According to Bos and Vaughn (2008), frustration level represents 80-89% accuracy, and instructional level represents 90-94% accuracy. In the current study, the purpose was to examine the comparative effects of two error correction procedures, so it was crucial that the participants make sufficient errors during reading. Therefore, passages in the participants’ frustration level were chosen. A recent study by Watson, Fore, and Boon (2009) followed the same rationale and guideline. Table 3 shows the results from the pre-intervention assessments and placement decision. Among the six participants, Howard was placed on Grade 2, Dalton and Josh were placed on Grade 4, while Deon, Edward and Kate were placed on Grade 3.
Table 3.

*Pre-Intervention Assessments*

<table>
<thead>
<tr>
<th>Student</th>
<th>4&lt;sup&gt;th&lt;/sup&gt; Grade</th>
<th>3&lt;sup&gt;rd&lt;/sup&gt; Grade</th>
<th>2&lt;sup&gt;nd&lt;/sup&gt; Grade</th>
<th>Placement</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>WCPM</td>
<td>Accuracy</td>
<td>WCPM</td>
<td>Accuracy</td>
</tr>
<tr>
<td>Howard</td>
<td>19</td>
<td>61%</td>
<td>39</td>
<td>85%</td>
</tr>
<tr>
<td>SLD</td>
<td>26</td>
<td>81%</td>
<td>13</td>
<td>62%</td>
</tr>
<tr>
<td></td>
<td>28</td>
<td>76%</td>
<td>20</td>
<td>65%</td>
</tr>
<tr>
<td>Dalton</td>
<td>53</td>
<td>84%</td>
<td>63</td>
<td>91%</td>
</tr>
<tr>
<td>SLD</td>
<td>50</td>
<td>88%</td>
<td>68</td>
<td>89%</td>
</tr>
<tr>
<td></td>
<td>64</td>
<td>86%</td>
<td>67</td>
<td>93%</td>
</tr>
<tr>
<td>Josh</td>
<td>71</td>
<td>84%</td>
<td>69</td>
<td>95%</td>
</tr>
<tr>
<td>SLD</td>
<td>69</td>
<td>81%</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>60</td>
<td>81%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deon</td>
<td>29</td>
<td>53%</td>
<td>49</td>
<td>84%</td>
</tr>
<tr>
<td>SLD</td>
<td>35</td>
<td>74%</td>
<td>36</td>
<td>81%</td>
</tr>
<tr>
<td></td>
<td>44</td>
<td>85%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Edward</td>
<td>53</td>
<td>84%</td>
<td>40</td>
<td>85%</td>
</tr>
<tr>
<td>SLD</td>
<td>40</td>
<td>80%</td>
<td>48</td>
<td>87%</td>
</tr>
<tr>
<td></td>
<td>44</td>
<td>83%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kate</td>
<td>29</td>
<td>74%</td>
<td>36</td>
<td>82%</td>
</tr>
<tr>
<td>SLD</td>
<td>20</td>
<td>74%</td>
<td>36</td>
<td>84%</td>
</tr>
<tr>
<td></td>
<td>29</td>
<td>83%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Grouping of Participants*
After the preintervention assessment, participants were randomly assigned to Group One or Group Two. All the students’ names were written on small pieces of paper and placed in a hat. The investigator randomly drew three names. The students whose names were drawn were placed in Group One and the remaining students were placed in Group Two. Participants in Group One were in baseline condition first, followed by RRCF and then RRWS. Participants in Group Two were in baseline condition first, followed by RRWS and then RRCF.

**Baseline**

Initial reading fluency levels were documented by baseline performance. During baseline, fluency passages from AIMSWeb were administered to the participants. Procedures outlined AIMSWeb training workbooks (Shinn & Shinn, 2002a; 2002b) were followed. Participants read each passage only once and fluency and accuracy measures were recorded.

**RRCF**

During the RRCF condition, the participants were first administered an AIMSWeb fluency passage on the selected level. Procedures for administration and data collection were followed as outlined in the *Dependent Variable* subheading. At the end of the one minute period, the investigator recorded the number of words the students read correctly as the reading fluency on the unpracticed passage. Then the investigator started the corrective feedback (CF) section of the treatment. During this section, the investigator referenced the errors marked on the investigator’s copy of the passage read. The investigator pointed to each of the word the participant missed starting with the first word, and said, “Repeat after me.” After the investigator read each word, she waited for
the participant to correctly repeat. If the participant did not correctly read the word the first time, the investigator repeated the word until the participant was able to read the word correctly. The investigator corrected all the errors that the participant missed following this procedure. After all the corrections were completed, the investigator asked the participant to read the passage correctly three more times by giving the following direction: “Now practice reading the passage correctly three more times. After you finish, I will test you on your reading fluency.” If the participants asked for the investigator’s help during their practice, the investigator would follow the corrective feedback script. When the participant finished practicing, the investigator asked the participant to read the same passage for his or her fluency and accuracy assessments.

**RRWS**

During the RRWS condition, the participants were administered an AIMSWeb fluency passage. Procedures for administration and data collection were followed as outlined in the *Dependent Variable* subheading. At the end of the one minute period, the investigator recorded the number of words the students read correctly as the reading fluency on the unpracticed passage. Then the investigator started the word study (WS) section of the treatment shown in Table 3. After the treatment package was completed, the investigator asked the participant to read the passage correctly three more times by giving the following direction: “Now practice reading the passage correctly three more times. After you finish, I will test you on your reading fluency.” If the participants asked for the investigator’s help with any words during their practice, the investigator would follow the corrective feedback script. When the participant finished practicing, the
investigator asked the participant to read the same passage for his or her fluency assessment. Reading fluency and accuracy data were recorded.

The treatment package for RRWS was developed (see Table 4) to address the needs of those students who needed fluency training, but did not have a solid foundation in phonics. A phonetic instructional component was added to the repeated reading procedures. The phonetic instructional component was based on practices of effective phonics instruction. There is a general agreement among the current literature that effective phonics instruction is characterized as being phonemically explicit (Ehri, Nunes, Stahl, & Willows, 2001; Foorman & Torgesen, 2001; Manset-Williamson & Nelson, 2005; Mesmer & Griffith, 2005; NRP, 2000; Swanson, 1999), which is defined as “direct, systematic and comprehensive instruction to build phonemic awareness and phonemic decoding skills” (Foorman & Torgesen, 2001, p. 208). Foorman and Torgesen (2001) further argued that to effectively teach students who are at risk for reading failure, instruction should also be “more intensive and more supportive” (p. 206). To increase the intensity, either the total time of classroom instruction can be increased or instruction can be provided in a small group or individually (Foorman & Torgesen, 2001). To increase the support for children during phonics instruction, teachers need to scaffold instruction through carefully planned interactions and dialogues (Swanson, 1999).

Several researchers also have tried to isolate the specific components to effective phonics instruction. Manset-Williamson and Nelson (2005) asserted that effective phonics instruction should incorporate elements such as direct explanation, modeling, guided practice with continual monitoring and feedback, review, and mastery learning. Swanson (1999) conducted a meta-analysis of the instructional components of 180
intervention studies and concluded that the following instructional components are important to predict the treatment outcomes: sequencing, drill-repetition and practice-feedback, segmentation, direct questioning and responses, control difficulty or process demands of a task, technology, small group instruction, and strategy cues. Table 4 presents how the current RRWS treatment was aligned with the phonics instruction characteristics and components.
### Correlation of RRWS Treatment with Phonics Instruction

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Components</th>
<th>RRWS Components</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Foorman &amp; Torgesen, 2001)</td>
<td>(Swanson, 1999)</td>
<td></td>
</tr>
</tbody>
</table>
| **Explicit** | • Sequencing: breaking down the task, step-by-step  
• Segmentation: small units  
• Directed questioning and responses: dialectic questioning | • Errors from reading are corrected at phoneme level, word level, and sentence level.  
• Multiple examples similar to the errors are provided.  
• Teacher and student engage in constant dialogue. |
| **Intensive** | • Small group instruction  
• Technology: use a variety supportive material or media including structured text | • Intervention conducted individually in the special education classroom.  
• Procedural checklist used by the investigator. |
| **Supportive** | • Drill repetition and practice review: repeated practice and review  
• Control difficulty or processing demands of a task: scaffolding, teacher demonstration  
• Strategy cues: teacher verbalize procedures, think aloud | • Missed phoneme is corrected with multiple examples for phonetically regular words.  
• Missed word is corrected through a spelling technique for phonetically irregular words.  
• Teacher provides models for correct reading.  
• Teacher provides verbal cues when needed by the participant. |
Specifically, the investigator first categorized all the errors the students made in two categories: phonetically regular words, and phonetically irregular words. In general, phonetically regular words are those words that have common phoneme-grapheme relationships and can be easily and accurately sounded out or decoded, such as the words *cat*, *may*, and *outside*. Phonetically irregular words, on the other hand, often have uncommon phoneme-grapheme relationships or spellings. Examples of irregular words are *was*, *come*, *give* and *of*. It is difficult to accurately sound out phonetically irregular words. When these words are sounded out, an incorrect pronunciation often results: *was* might be pronounced /w/a/s/ (rather than /w/u/z/), *come* might be /k/O/m, *give* might be /g/i/v/ and *of* might be /o/f/ (rather than /o/v/). According to this definition, sight words can be either phonetically regular or irregular words.

After the words were categorized, the investigator followed the word study procedures for each category. The phonetically irregular word errors correction routine was as follows:

1. Write down the mispronounced words in a list
2. The investigator points to the first word on the list.
3. Say, “This word is ___ (supply the correct word). What word?”
4. Wait for the student to say the word.
5. Say, “Yes, ____ (word). Spell ____ (word).”
6. Wait for the student to spell the word.
7. Say, “What word?”
8. Wait for the student to say the word.
9. Move to the next word.
During the phonetically regular words errors correction routine, the investigator first listed all words according to their error patterns and then listed three more words with the same sound pattern with the sound pattern underlined. For example, if the student mispronounced the word “site” for “sit”, the word list may look at this:

\[
\begin{array}{l}
\text{site} \\
\text{bite} \\
\text{kite} \\
\text{write}
\end{array}
\]

Then the investigator pointed to each word as she followed the phonics word study script.

1. Point to the underlined sound in the first word, and say “This letter/(these letters) makes the sound ___(sound). What sound?”
2. Wait for the participant to say the sound.
3. Offers a short explanation of the phonics rule.
4. Say, “Listen to how I sound the word out.” Then sound out the word and blend the word.
5. Say, “Now, repeat after me.”
6. Wait for the participant repeat after each word.
7. Say, “Now it is your turn. Sound out each word and blend the sounds together. Start with the first one.”
8. Wait for the participant to sound each word out and blend them.
9. Go to the next word on the list.
Procedural Fidelity

Detailed, step-by-step Procedural Checklists (see Appendix M), for fluency administration, RRCF, and RRWA were prepared for the investigator to use during the implementation of the study. The checklists were copied front and back on a piece of green 8.5” x11” paper and laminated so the investigator would use it throughout the study. The investigator made every effort to strictly follow these directions and scripts.

The investigator’s department chair served as the procedural fidelity (PF) observer. The observer had 15 years of teaching experience in the field of special education and has been trained to use AIMSWeb. She had a Master’s degree in the field of special education and had implemented repeated reading in her own classroom. A Procedural Fidelity Rating Scale (see Appendix N) was developed for the observer to use. She was provided with the procedural checklists for all baseline and treatment conditions, and was asked to observe how well the investigator followed the procedural checklists. She marked “Y” if the target condition was present, “N” if the target condition was not present, and “NA” when the target condition was not applicable to the observed session. At least 30% of all baseline and intervention sessions were observed for fidelity checks. The PF percentage was calculated by dividing the number of “Ys” by the sum of the number “Ys” and “Ns”. The PF was 100% during baseline, 100% during RRCF and 95% during RRWS.

Procedural fidelity = number of Y’s/(Number of Y’s + Number of N’s) X 100
Interobserver Reliability

Interobserver agreement (IOA) was calculated on the reading fluency measure. The same observer for PF served as the IOA. IOA on reading fluency was accomplished by audio-taping 30% of participants’ readings and having a second rater independently code it according to the fluency definition. Inter-scorer agreement (ISO) was calculated on a word-by-word basis by comparing the scored passage reading of the first and second observer. Each word in the passage was scored as an “agreement” if both observers coded it as correct or incorrect. A word was scored as a “disagreement” if the observers coded it differently. For each passage reading, ISO was calculated as the number of agreements divided by agreements plus disagreements, and was then displayed as a percentage. IOA on reading comprehension was accomplished by having the second rater independently grade 30% randomly selected maze passages according to the answer keys. The number of agreements was divided by the number of agreements plus disagreements, and was then displayed as a percentage. The IOA was 95% for fluency and 100% for comprehension. The observer reported that sometimes the tape was not very clear, thus resulting in the 95% IOA for fluency.

\[
\text{Interobserver Agreement} = \frac{\text{Number of agreements}}{\text{Number of agreements} + \text{disagreements}} \times 100
\]

Social Validity

Social Validity Interview Questions (see Appendix O) were administered to the participants on an individual basis at the conclusion of the study. The investigator took
notes as the participants answered the questions. The investigator then summarized the result and reported findings in the results section.

Extended Study

A two-week extended study was conducted after the main study was concluded. During the data analysis of the main study, the researcher raised some additional questions regarding reading fluency and accuracy. To further explore the relationship between reading fluency, accuracy and comprehension, the researcher extended the current study with some additional data collection.

The extended study was conducted after receiving university and local school system’s IRB approval for the extension (see Appendices B and C). It was conducted four weeks after the completion of the initial study. Three students, Deon, Kate and Howard, were selected to participate in the extended study. They represent the high, average and low readers in the group. It should be noted that even the high level reader of the group reads below grade level and has difficulties with word recognition. The participants were asked to read a single passage four times. As the participants read each time, the researcher recorded their reading fluency and accuracy following the data collection procedures described in the initial research. After each read, the participants were given the AIMSWeb Maze on the same passage to complete for the measure of comprehension. Because data collections were conducted after each read, the process took three times longer than during the main study. The participants showed visible signs of tiredness after the completion of the first passage. To avoid any negative effect on their performance, the interventions took place every other day. The participants’ reading fluency and accuracy were measured the same way as in the main study. The
participants’ reading comprehension was measured by the number of Maze multiple choice questions circled correctly. The participants’ reading fluency, accuracy, and comprehension were recorded (see Appendix L) and later graphed on bivariate plots.

Data Analysis

A total of five types of data analysis were used to answer the research questions. For Questions One and Two, visual inspection, percentage of non-overlapping data (PND), and descriptive analysis that compare the participants’ growth with the Rate of Improvement (ROI) were used. For question Three, visual inspection and PND were used. For Question Four, coding and analysis of interview scripts were used. For the extended study, visual inspection and statistical analysis for calculating correlation coefficients was used. The results of the analysis are presented in Tables 4, 5, 6, 7, and 8 and Figures 4, 5, 6, 7, and 8.

Visual Inspection

Participants’ outcomes of reading fluency, accuracy, and comprehension on both nontransfer and transfer passages were plotted on bivariate plots. Charts were generated to present the average fluency and accuracy of each participant across baseline and interventions. Directions from Dixon et al. (2009) regarding the creation of single subject design graphs in Microsoft Excel were followed to generate graphs. Three types of changes were noted in the data patterns: level, trend, and variability (Wolery & Harris, 1982). Level is defined as the relative value of the data pattern on the dependent variable. Changes in level represent changes in the value of the data series as measured on the dependent variable at the point of intervention. It is determined by identifying the median of data points within a phase and drawing a horizontal line through the median. Trend
represents the direction in which the data pattern is progressing. A data series that is systematically increasing or decreasing over time, even though it may be stable, is described as a trend.

There are multiple procedures for calculating estimates of trends in data. In this study, the split-middle method of trend estimations described in Wolery and Harris (1982) was followed because it is calculated easily without a computer and its predictive validity is known. The steps are: (a) count the data points in the phase for which a trend line is being drawn and divide them into two equal parts; (b) for each half of the data, calculate the median x-axis value and draw a vertical dashed line through the median; (c) for each half of the data, calculate the median y-axis value and draw a horizontal dashed line through the median; (d) draw a straight line through the two sets of intersecting dashed lines at their points of intersection (this straight line is known as the quarter-intersect line); (e) draw a line parallel to the quarter-intersect line that has 50% of the data points on or above it and 50% of the data points on or below it. This resulting line is the split-middle line of trend estimation. Variability is the dissimilarity of scores in a given experimental condition (Kahng et al., 2010). It is demonstrated by the drawing horizontal lines through the highest and the lowest data points of a phase and examining the distance between the two lines.

**Descriptive Analysis**

Participants’ mean reading fluency rates during the baseline and each of the intervention phases were put in Table 5 and Table 6. The mean reading fluency was defined as the sum of all the fluency data points in a phase divided by the number of data points (i.e., scores) in the phase. The participants’ expected growth at the end of the six
week treatment was also included in Table 5 and Table 6 to determine if the participants have met their goal. The expected growth was based on the ROI calculated by AIMSWeb. The ROI was calculated by subtracting the WCPM all score from the WCPM spring score and dividing by the total of 36, which is the number of weeks of instruction that occurred during that time. Thus, average weekly gains in words per minute for students at each percentile rank at each grade level were determined. Appendix P shows the AIMSWeb Growth Table. To use this table, the ROI must first be identified according to the student’s reading grade level and WCPM, then multiplying the number of weeks of intervention with ROI, resulting in the expected growth WCPM. After that, the original WCPM must be added with the expected growth to find the expected WCPM at the end of the intervention.

For example, Tyler is a 10 year old student whose instructional reading level is 50 WCPM on third grade passages in fall. Tyler’s teacher would like to implement a reading fluency intervention for 10 weeks, and she would like to know how much gain she should expect Tyler to make at the end of the 10 weeks. To calculate Tyler’s expected gain in WCPM, the teacher would take the ROI that corresponds with Grade 3, 25th percentile (50 WCPM), and multiply it by 10. In Tyler’s case, the corresponding ROI is 0.9; therefore, Tyler’s teacher can expect him to gain 9 WCPM or read a total of 59 WCPM after 10 weeks of intervention.

*Percentage of Non-overlapping Data (PND)*

First introduced by Scruggs, Mastropieri, and Casto (1987), PND summarizes single-subject treatment effects by calculating the percentage of treatment data points that do not overlap with the highest or lowest baseline data point. PND is one of the most
frequently used effect size descriptors because it is simple to calculate and interpret. To calculate PND, if the treatment’s effect is expected to increase outcome, a horizontal line is drawn through the highest point in phase A (e.g., the baseline) through points in phase B (e.g., RRCF), the number of points in phase B above the horizontal line are counted, and that number is divided by the total number of points in phase B. PND can also be used to compare the effects of two treatments. The higher the PND, the stronger the support for a treatment’s effect. In this study, the criteria outlined by Scruggs, Mastropieri, Cook, and Escobar (1986) were used to decide the strength of the effect. Specifically the criteria are:

- PND < 50% suggests ineffective treatment
- PND 50% - 70% suggests minimal effectiveness
- PND 70% - 90% suggests moderate effectiveness
- PND > 90% suggests high effectiveness
CHAPTER FOUR: RESULTS

The purpose of the current study was to examine the comparative effects of two error correction procedures, word study and corrective feedback, during repeated reading interventions on the reading fluency and accuracy of both nontransfer and transfer passages for the fourth grade students with LD. Six fourth grade students participated in this study. The sequence of the conditions for each group and each student’s reading fluency and accuracy are shown in Figures 4, 5, 6, 7 and 8. In addition, students’ mean scores of reading fluency and accuracy during each intervention are shown in Tables 5 and 7. Effect size comparisons among the baseline and the two treatments are shown in Tables 6 and 8. Correlation coefficient results from the extended study are shown in Table 9.

Question 1: Effects of RRCF and RRWS on Reading Fluency

Table 5 shows the mean scores of words read correctly per minute for each treatment phase for all six participants. For the baseline phase, the average fluency rates (calculated by dividing the sum of all the WCPM data points divided by the number of WCPM data points), were recorded. For each treatment condition, each participant’s average reading fluency and average reading fluency gain were recorded. The expected WCPM based on the ROI is also presented in Table 5.

Table 5 shows that all six participants increased their reading fluency on nontransfer passages during RRCF and RRWS. The average gain during RRCF ranged from 25 to 51 words per minute while the average gain during RRWS ranged from 19 to
54 words per minute. Josh and Deon’s gains were higher during RRCF while Kate’s gain was higher during RRWS. All students met and exceeded the expected growth on nontransfer passages.

Table 5.

*Effects of RRCF and RRWS on Reading Fluency (WCPM)*

<table>
<thead>
<tr>
<th>Student</th>
<th>Group</th>
<th>Baseline</th>
<th>Goal</th>
<th>RRCF Nontransfer</th>
<th>RRCF Transfer</th>
<th>RRWS Nontransfer</th>
<th>RRWS Transfer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Howard</td>
<td>1</td>
<td>41</td>
<td>49</td>
<td>77</td>
<td>49</td>
<td>76</td>
<td>38</td>
</tr>
<tr>
<td>Dalton</td>
<td>1</td>
<td>63</td>
<td>67</td>
<td>114</td>
<td>63</td>
<td>117</td>
<td>69</td>
</tr>
<tr>
<td>Josh</td>
<td>1</td>
<td>71</td>
<td>76</td>
<td>118</td>
<td>67</td>
<td>104</td>
<td>72</td>
</tr>
<tr>
<td>Deon</td>
<td>2</td>
<td>47</td>
<td>52</td>
<td>74</td>
<td>52</td>
<td>88</td>
<td>48</td>
</tr>
<tr>
<td>Edward</td>
<td>2</td>
<td>47</td>
<td>52</td>
<td>66</td>
<td>51</td>
<td>72</td>
<td>53</td>
</tr>
<tr>
<td>Kate</td>
<td>2</td>
<td>38</td>
<td>42</td>
<td>83</td>
<td>50</td>
<td>77</td>
<td>43</td>
</tr>
</tbody>
</table>

On the transfer passages, the results were mixed and less significant. Some participants’ mean WCPM decreased during the interventions. The average gain across participants during RRCF ranged from one to eight words per minute. Dalton did not make any gains, while Josh read four fewer words per minute. The average gain across participants during RRWS ranged from one to 12 words per minute. Howard read three fewer words per minute. However, examination of the expected growth indicates that Howard and Deon met their expected growth in fluency under RRCF, Dalton and Edward met their expected growth under RRWS, while Kate met her expected growth under both conditions.
Table 6 shows the PND of reading fluency under the baseline and treatments. Four comparisons were made: RRCF versus baseline, RRWS versus baseline, RRWS versus RRCF, and RRCF versus RRWS. The first two comparisons were used to answer the first research question and the last two comparisons were used to answer the third research question. Analysis of the PND clearly demonstrates the effects of both interventions on nontransfer passages. One student showed moderate effectiveness on transfer passages under RRCF, while another student showed minimal effectiveness under RRWS.

Table 6.

Effects Sizes (PNDs) of RRCF and RRWS on Reading Fluency

<table>
<thead>
<tr>
<th>Student</th>
<th>Group</th>
<th>RRCF v. Baseline</th>
<th>RRWS v. Baseline</th>
<th>RRWS v. RRCF</th>
<th>RRCF v. RRWS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Howard</td>
<td>1</td>
<td>100% NT*</td>
<td>80% T**</td>
<td>100% T</td>
<td>17% NT</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Dalton</td>
<td>1</td>
<td>100% NT*</td>
<td>0% T**</td>
<td>100% T</td>
<td>57% NT</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0%</td>
<td>57%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>20%</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Josh</td>
<td>1</td>
<td>100% NT*</td>
<td>0% T**</td>
<td>100% T</td>
<td>0% NT</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0%</td>
<td>33%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>75%</td>
<td>0%</td>
</tr>
<tr>
<td>Deon</td>
<td>2</td>
<td>100% NT*</td>
<td>42% T**</td>
<td>100% T</td>
<td>20% NT</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>60%</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>17%</td>
<td>0%</td>
</tr>
<tr>
<td>Edward</td>
<td>2</td>
<td>100% NT*</td>
<td>25% T**</td>
<td>100% T</td>
<td>20% NT</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0%</td>
<td>20%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>25%</td>
<td>25%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Kate</td>
<td>2</td>
<td>100% NT*</td>
<td>25% T**</td>
<td>100% T</td>
<td>25% NT</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>25%</td>
<td>25%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>25%</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0%</td>
<td>0%</td>
</tr>
</tbody>
</table>

* Nontransfer passages  ** Transfer passages

Similar patterns can be observed from the bivariate graphs shown in Figure 4 and Figure 5, which display the number of words read correctly per minute for all six participants during the baseline and the interventions. Participants in Group One received RRCF followed by RRWS, and participants in Group Two received RRWS followed by
RRCF. During baseline, five out of the six sets of data points were not of substantive trend, or not of the trend in the direction that is predicted by the intervention. In this study, because the intervention aimed to increase participants’ reading fluency, an increasing trend during treatment is considered to be a substantive trend while a stationary or decreasing trend is considered to be a non-substantive trend. Dalton’s data in baseline demonstrated an increasing trend, which compromised the ability for his data to document the effect of the interventions. To support the explanation of his data, the split-middle line of trend estimation was drawn for the baseline data. Any data points that fell above this line document the effects of the interventions while any data points that were on or fell under this line could not document the effects of the treatment.

For reading fluency of the nontransfer passages, there was an immediate increase in the levels above the baseline immediately when the interventions were implemented. The trends for five of the six participants were either increasing or stationary during the interventions with the exception of Josh’s data, which slightly decreasing. Even though some participants showed some, no overlaps occurred between the baseline data points and those during interventions with the exception of one of Edwards’ data points. Thus, the data for both groups presented sufficient evidence to indicate that both RRCF and RRWS were effective in increasing student’s reading fluency on nontransfer passages. Dalton’s baseline data were of increasing trend, but all of his data points during both interventions were either on or above the split-middle line of trend estimation. In addition, an abrupt change in level was observed upon the implementation of the intervention, which indicates the effectiveness of the interventions, although the evidence of the interventions is weaker than those of the other students.
On the contrary, the effectiveness of the interventions on the reading fluency of transfer passages was not supported by visual inspection of the graph. First, the change in levels upon the implementation of the interventions was minimal and inconsistent. Edward demonstrated a slight change in level under RRWS, but four out of five of the data points overlapped with those in baseline. Howard demonstrated an increase in level under RRCF, but one out of five data points overlapped with those in baseline, and his intervention data were in a decreasing trend. The trends of the data points on transfer passages for all of the participants were either decreasing or stationary with the exception of Dalton’s data under RRWS. However, those data were below the split-middle line of trend estimation. In addition, most of the data points for all of the participants overlapped with those during baselines and the variability was high. Thus, the current data could not support the effectiveness of either RRCF or RRWS on participants’ reading fluency of transfer passages.

All three types of data analysis on reading fluency indicated that both RRCF and RRWS were effective on WCPM for nontransfer passages, while only minimal to moderate effectiveness was documented on transfer passages.
Figure 4. WCPM on Nontransfer and Transfer passages for Group One.
Figure 5. WCPM on Nontransfer and Transfer passages for Group Two.
Question 2: Effects of RRCF and RRWS on Reading Accuracy

Table 7 shows the mean levels of accuracy for each intervention phase for all six participants. Reading accuracy was defined as the percentage of words read correctly. It was calculated by dividing the number of words read correctly by the total number of words read, then multiplying by 100. The average accuracy for each participant shown in Table 7 was calculated by dividing the sum of all the accuracy data points under each phase by the total number of accuracy data points in that phase. All six participants increased their reading accuracy on nontransfer passages during RRCF and RRWS. The average gain during RRCF ranged from 11% to 15% while the average gain during RRWS ranged from 10% to 17%.

Table 7.

Effects of RRCF and RRWS on Reading Accuracy

<table>
<thead>
<tr>
<th>Student</th>
<th>Group</th>
<th>Baseline</th>
<th>RRCF Nontransfer</th>
<th>RRCF Transfer</th>
<th>RRWS Nontransfer</th>
<th>RRWS Transfer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Howard</td>
<td>1</td>
<td>85%</td>
<td>97%</td>
<td>87%</td>
<td>98%</td>
<td>91%</td>
</tr>
<tr>
<td>Dalton</td>
<td>1</td>
<td>86%</td>
<td>98%</td>
<td>97%</td>
<td>93%</td>
<td></td>
</tr>
<tr>
<td>Josh</td>
<td>1</td>
<td>87%</td>
<td>99%</td>
<td>94%</td>
<td>97%</td>
<td>94%</td>
</tr>
<tr>
<td>Deon</td>
<td>2</td>
<td>82%</td>
<td>97%</td>
<td>89%</td>
<td>99%</td>
<td>90%</td>
</tr>
<tr>
<td>Edward</td>
<td>2</td>
<td>85%</td>
<td>96%</td>
<td>92%</td>
<td>97%</td>
<td>91%</td>
</tr>
<tr>
<td>Kate</td>
<td>2</td>
<td>85%</td>
<td>98%</td>
<td>92%</td>
<td>100%</td>
<td>92%</td>
</tr>
</tbody>
</table>

On the transfer passages, all the participants made gains, but not much gain as on the nontransfer passages. Five out of the six participants read 6-7% more accurately.
during RRCF and all the participants read 6-8% more accurately during RRWS. None of the students’ reading accuracy decreased during either of the interventions.

Table 8 shows the PNDs of reading accuracy under the baseline and treatments. Four comparisons were made: RRCF versus baseline, RRWS versus baseline, RRWS versus RRCF, and RRCF versus RRWS. The first two comparisons were used in answering the second research question and the last two comparisons were used to answer the third research question. Analysis of the PNDs clearly demonstrates the effects of both interventions on nontransfer passages. Unlike reading fluency, four students showed minimal to moderate effectiveness on transfer passages under RRCF, while five students showed minimal to moderate effectiveness on transfer passages under RRWS.

Table 8.

Effects Sizes (PNDs) of RRCF and RRWS on Reading Accuracy

<table>
<thead>
<tr>
<th>Student</th>
<th>Group</th>
<th>RRCF v. Baseline</th>
<th>RRWS v. Baseline</th>
<th>RRWS v. RRCF</th>
<th>RRCF v. RRWS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Howard</td>
<td>1</td>
<td>100% 20%</td>
<td>100% 58%</td>
<td>17% 42%</td>
<td>0% 0%</td>
</tr>
<tr>
<td>Dalton</td>
<td>1</td>
<td>100% 20%</td>
<td>86% 57%</td>
<td>14% 14%</td>
<td>0% 0%</td>
</tr>
<tr>
<td>Josh</td>
<td>1</td>
<td>100% 50%</td>
<td>100% 67%</td>
<td>0% 0%</td>
<td>25% 0%</td>
</tr>
<tr>
<td>Deon</td>
<td>2</td>
<td>100% 82%</td>
<td>100% 60%</td>
<td>0% 20%</td>
<td>50% 0%</td>
</tr>
<tr>
<td>Edward</td>
<td>2</td>
<td>100% 75%</td>
<td>100% 80%</td>
<td>0% 0%</td>
<td>0% 13%</td>
</tr>
<tr>
<td>Kate</td>
<td>2</td>
<td>100% 50%</td>
<td>100% 25%</td>
<td>0% 0%</td>
<td>50% 25%</td>
</tr>
</tbody>
</table>

* Nontransfer passages  ** Transfer passages

The analysis of the bivariate plots yielded similar conclusions. Figure 6 and Figure 7 displayed the percent of words read correctly on nontransfer and transfer
passages for all participants. Three out of the six participants, Dalton, Deon, and Kate, each had one very low data point during baseline, which significantly brought down their average percent of words read correctly. Four of the six students’ data during baseline were in slightly increasing trends. The last three of Howard’s and Deon’s data points were higher than the previous ones, and the last five of Edward’s and Kate’s data points were higher than the previous one.

In single subject designs, an intervention should not be implemented when the baseline data were unstable. However, the increasing trends in this study were not reflections of the researcher’s oversight. There were two dependent variables in this study: reading fluency and reading accuracy. Even though they were both recorded and graphed, only one of them could be used to guide the researcher’s decision for phase changing. Because the main purpose of repeated reading interventions was to increase participants’ reading fluency, it was used to guide the researcher’s decision as to when the data were stabilized enough to change to another phase. One possible reason for the increase in participants’ reading accuracy was that repeated reading itself was reinforcing to the participants and they wanted to read better. It also should be noted that the reading accuracy for all participants initially fell between the 80 to 85 percent range because the selection criteria of their reading levels was to find passages in the participants’ frustration reading level so they could produce enough reading errors to demonstrate the effects of the interventions.

For the reading accuracy of nontransfer passages, there was an immediate increase in the levels as soon as the interventions were implemented. The trends for five of the six participants remained stationary at a high level (95-100%) during the
interventions. None of the data points on nontransfer passages during RRCF or RRWS overlapped with those during baselines. Thus, the data presented sufficient evidence for the effectiveness of RRCF and RRWS reading accuracy for nontransfer passages.

For reading accuracy of transfer passages, all participants in Group One demonstrated an immediate increase in their accuracy level upon the implementation of RRCF. Howard’s and Dalton’s data points during interventions had multiple overlapping points with those in baseline. Howard’s data demonstrated a decreasing trend during RRCF and an increasing trend during RRWS. Josh’s data points during both interventions did not overlap with those during baseline. The trend of his data was stationary and remained at higher accuracy levels in the intervention conditions. In Group Two, Edward was the only one whose reading accuracy increased immediately following the implementation of RRWS. His data demonstrated an increasing trend during RRWS and a decreasing trend during RRCF. Kate improved her reading accuracy slightly during the interventions, but her data points during intervention phases remained on the similar level as that of the four last data points in the baseline. Deon’s reading accuracy increased during both interventions. Despite some overlapping data points, the general trends of his reading accuracy were stationary, especially at the end of RRCF. In general, it seemed that both of the interventions were effective at increasing two out of six participants’ reading accuracy on transfer passages, and RRWS was effective at increasing one additional participant’s reading accuracy.
Figure 6. Percent of Words Correct on Nontransfer and Transfer passages for Group One
Figure 7. Percent of Words Correct on Nontransfer and Transfer passages for Group Two
Question 3: Comparative Effects of RRCF and RRWS

When comparing the effects of RRCF and RRWS, PNDs as recorded on Table 6 and Table 8 were used. For reading fluency, Josh demonstrated moderate effectiveness (PND = 75%) on nontransfer passages favoring RRCF. Deon demonstrated minimal effectiveness (PND = 60%) on nontransfer passages favoring RRWS, and Dalton demonstrated minimal effectiveness (PND = 57%) on transfer passage favoring RRWS. For reading accuracy, neither intervention demonstrated any advantages over the other one as demonstrated by low PNDs. It can be concluded that the two interventions were comparatively similar in their effectiveness on reading fluency and accuracy.

Question 4: Social Validity

All participants were interviewed individually at the end of the study to evaluate the social validity of the interventions. Three questions were asked to evaluate the social significance of the goals, social appropriateness of the procedures, and the social importance of the effect respectively. Each interview lasted three to five minutes per participant. Interviews were conducted in the same room where the interventions were implemented. The researcher took notes as the participants answered the questions. The participants’ responses were analyzed to find trends among the participants’ answers.

Social Significance of the Goals

To the questions “Do you think reading faster and better is important and why?”, participants unanimously agreed on the importance of “reading faster and better.” All of the students thought that reading faster made them better readers and more confident in reading. Dalton stated that reading fluency was important because it was fun and because he liked to be timed when he read. Kate, Howard, Deon and Edward also said the
interventions made them feel better about themselves. Kate said that she felt special and enjoyed the individual time with the researcher.

**Social Appropriateness of the Procedures**

When asked, “How do you like the strategies your teacher used with you? Which one do you like better and why?”, five out of the six students said they liked whole word correction (RRCF) better than phonics-based correction (RRWS). The main reason that the participants preferred RRCF is that it was “easy to do”, “shorter”, and “takes less time”. Howard liked RRCF and RRWS equally because they were “different from the other assignments (in class).” As to the specific elements participants like about RRCF, all students mentioned that it was fast and easy to do. In comparison, RRWS took longer to finish and they had to read more words, which the participants saw as negative; however, they liked both interventions due to the fact that they were both “more fun” than their usual class work. They also emphasized on the effect of the interventions saying that they “felt more successful about their reading.”

**Social Importance of the Effects**

When asked about if they were satisfied with the effect of the interventions, participants were unanimously in agreement that the interventions helped them be better readers. They said they felt special and liked how they could “beat the timer.” All of the students thought they read better after the interventions. They said knowing they could read more and more words each time made them want to read better. Josh said the interventions made him realize that he could read so much better, and he felt proud.
In general, the interventions were very well received by the participants, who unanimously agreed on its effect and social benefits. RRCF was the preferred intervention by most participants because it was easy to use and less time-consuming.

Extended Study

The purpose of the extended study was to explore the relationship among the dependent variables: reading fluency, accuracy and comprehension. Edward, Deon and Kate participated in the extended study, which took place four weeks after the conclusion of the main study and lasted for two weeks. Figure 8 represents the participants’ reading fluency, reading accuracy and reading comprehension after each read. Two y-axes were used to accommodate the three different types of data. The main y-axis on the left represents the WCPM. The secondary y-axis on the right represents the percentage correct for both reading accuracy and reading comprehension. Visual inspection of the figure indicates that as the participants’ reading fluency increases, their reading comprehension and accuracy also seem to increase the majority of the time.
Figure 8: Reading Fluency, Comprehension, and Accuracy for Extended Study
To further analyze the relationships among the three variables and the strength of their linear associations, the correlation coefficients of these variables were calculated. A correlation coefficient, a number between -1.0 and +1.0 is a measure of the strength of linear association between two variables. A positive correlation means that as the values of one variable increase, the values of the other variable also increase. A negative correlation means that as the values of one variable increases, the values of the other variable decreases. The following categories from Lewis-Beck, Bryman, and Futing (2005) were used when interpreting the calculated correlation coefficient value:

- 0 to 0.2, Very weak to negligible correlation
- 0.2 to 0.4, Weak, low correlation (not very significant)
- 0.4 to 0.7, Moderate correlation
- 0.7 to 0.9, Strong, high correlation
- 0.9 to 1.0, Very strong correlation

In this study, correlation coefficients were calculated using SPSS. Because the participants read each passage four times and there were four passages total, each participant resulted in 16 sets of data points of fluency, accuracy, and comprehension. All three participants’ data points were entered in SPSS. Results of the 2-tailed Pearson Correlation were recorded in Table 9. As shown in the table, there was strong, high correlation between fluency and comprehension, as well as between fluency and accuracy, and moderate correlation between comprehension and accuracy.
As listed in Table 9 and Figure 8, all three participants demonstrated moderate to strong correlations among their reading fluency, comprehension and accuracy. The correlation between fluency and accuracy is the strongest at 0.74, the correlation between fluency and comprehension is the next strongest at 0.735 and that between accuracy and comprehension was the weakest at 0.671. This means that as students’ reading fluency increased with repeated reading interventions, their reading accuracy and comprehension of the same passage also increased.
CHAPTER FIVE: DISCUSSIONS

Findings and Interpretations

The purpose of the current study was to examine the individual and comparative effects of word study and corrective feedback during repeated reading interventions on the reading fluency and reading accuracy of both nontransfer and transfer passages for the fourth grade students with LD. The study also examined the social validity of the interventions and explored the relationship of reading fluency, comprehension and accuracy. Results from this study contribute to extending the limited body of literature on the best method to correct students’ reading errors during oral repeated reading practices. Findings from the current study indicated that both RRCF and RRWS procedures are effective on the reading fluency and accuracy of nontransfer passages. However, effects on transfer passages were less conclusive. RRCF and RRWS both had moderate effect on reading accuracy of transfer passages while their effect on the reading fluency of transfer passages was minimal and inconsistent. PND indicated no consistent difference between the effects of the two interventions. Interviews with the participants revealed high social validity for both treatments with more participants preferring RRCF to RRWS for its feasibility. The extended study revealed moderate to high correlations among reading fluency, comprehension and accuracy. The correlations between fluency and comprehension (r = .74), fluency and accuracy (r = .74) was stronger than that between accuracy and comprehension (r = .67).
Consistent with extensive existing literature, the current study demonstrated the effects of repeated reading on students’ reading fluency and accuracy of nontransfer passages (Chard et al., 2002; Therrien, 2004).

The findings from the extended study are consistent with automaticity theory’s assertion that fast accurate word recognition frees cognitive resources for reading comprehension (LaBerge & Samuels, 1974). The present study may be viewed as evidence of AT; that is, faster speeds of word recognition may indicate that fewer cognitive resources are needed for these activities. Therefore, more cognitive resources are available for reading comprehension.

According to the current study, RRCF and RRWS both had moderate effect on the reading accuracy of transfer passages, while their transfer effects on reading fluency were minimal and insignificant. The current study revealed a stronger effect on reading accuracy of transfer passage than reading fluency. A possible explanation is that the participants lacked word recognition skills, and some were still in the acquisition stage of reading decoding. While the error correction procedures supported the student’s increase in word recognition, it may take a longer time for the students to transfer the effects of the intervention to transfer passages for fluency.

The correlation shown among reading fluency, comprehension, and accuracy was also consistent with the previous research (Therrien, 2004). It is surprising to the researcher that the correlation between accuracy and comprehension, even though moderate, was the weakest of all three. This indicates that reading fluency, which is reading accuracy and speed, could be a better predictor than reading accuracy of students’ overall reading comprehension.
Limitations of Methodology

The results of the study should be interpreted with several limitations. One of the methodological limitations was that reading comprehension was not included as a dependent variable in the main study due to time constraints and manageability of instructional time. Each passage takes three minutes for data collection and because six participants were included, including comprehension data would mean to reduce the instruction time by about 20-30 minutes per day in addition to the time required for the intervention and data collection. Since the researcher used her small group reading segment to conduct this study, reducing the participants’ instructional time by 20-30 minutes every day for six weeks would not be appropriate.

The second limitation is the operational definition of fluency: rate and accuracy. A reader who is fluent does not only read accurately and quickly but also with appropriate expression (NRP, 2000). Prosody (e.g., intonation, pausing, pitch, and stress) was not measured in this study due to the lack of a convenient measure for prosody and the possibility that prosody may not be subject to short-term interventions (Samuels, 2007). Future interventions that occur over a longer period of time can experiment using prosody as a dependent measure.

Implications for Future Research

The findings from this study highlight several additional areas for future researchers to consider. First, the current study provided evidence that repeated reading intervention, when combined with two kinds of error correction procedures (RRCF and RRWS), is effective in improving students’ oral reading fluency on nontransfer passages. The study did not include a treatment condition incorporating the meaning-based method
or error correction procedures that prompt the students to pay attention to if the misread word makes sense in the context of the sentence. Future studies should examine the effects of RR combined with meaning-based error correction procedures on the reading fluency, accuracy, and comprehension of students with LD.

Second, the present study was consistent with most of the previous research on the transfer effects of RR. While the nontransfer effects of RR were evident in most studies, its nontransfer effects were mixed and inconsistent (Chard et al., 2002; Therrien, 2004). These findings, on the other hand, appear to be inconsistent with Lo et al.’s (2011) findings that a RR treatment package improved students’ transfer reading fluency. The treatment package included multiple components with an emphasis on goal-setting. Even though it is premature to conclude that goal setting was the critical component in RR, future studies should be conducted to analyze which specific component of the package (modeling, previewing vocabulary, self-graphing, etc.) is most effective in promoting the transfer effects of RR practice.

One important finding from the extended study is the relationship among reading fluency, accuracy, and comprehension. Fluency is highly correlated with both accuracy and comprehension, while accuracy and comprehension are moderately correlated. This is consistent with the NRP’s (2000) affirmation that fluency is the bridge between word recognition and comprehension. The present study demonstrated that increased reading fluency can improve students’ reading comprehension. Future researchers may explore the direction of causality of fluency, accuracy, and comprehension; specifically, whether increased fluency causes comprehension to improve or vice versa, or whether fluency and comprehension share a reciprocal causal relationship. One possible method to investigate
this question is to examine the effects of reading comprehension strategies on comprehension, fluency and accuracy over time. In the current study, participants’ reading errors were classified into phonetically regular and phonetically irregular words during RRWS treatment. However, during the data analysis phase, the impacts of the two different types of errors were not compared. Future studies should compare the types of errors and their impact on reading fluency and reading comprehension. Future researchers can also classify errors differently and compare their impact on fluency and comprehension. For example, errors can be classified into content words (e.g., walk, cloud, animals, etc) and non-content words (e.g., in, of, etc).

Implications for Future Practice

Implications for classroom practice were particularly important to the researcher in this present study due to her role as a classroom teacher. It was pivotal that the treatment procedures combined with RR could be easily implemented within typical classroom constraints, such as time and effort. Because oral reading is a common practice in class and because existing literature has linked students’ reading fluency with their reading comprehension, it is imperative for teachers to utilize the most effective method for error correction. Several such implications can be noted. First, the error correction procedure used in this study, especially RRCF, is straightforward and simple for teachers to use. Detailed scripts have been included so classroom teachers can implement the interventions with fidelity. Furthermore, the amount of time required to implement the interventions should be considered when choosing what type of error correction procedures to use. Based on the present study, RRCF and RRWS appeared to be equally effective on nontransfer reading fluency and accuracy. Since RRCF is easier to use and
takes less time to implement, it is recommended for classroom practice when time is a constraint. In the current study, the substantial gains for student accuracy and fluency were the result of five to six minute sessions which typically occurred four to five times each week.

It should also be noted that three types of data analysis were used to answer research questions one and two. The three methods produced different conclusions on transfer passages. Visual inspection did not demonstrate any effect for either treatment; PND demonstrated minimal effectiveness for one student and moderate effectiveness for another student; and ROI demonstrated effectiveness for five out of six students. One explanation of these discrepancies is that each of the data analysis methods has its strengths and weaknesses. Because the length of the intervention is only six weeks, most students’ expected gain was between four and five words, which cannot be clearly inspected by sight. Practitioners and researchers should explore the use of multiple methods of data analysis when documenting the effects of interventions so sound and unbiased conclusions can be drawn.

The impact of this study also transcends the classroom setting. The abilities of analyzing students’ data, conducting research, and sharing with others are examples of teacher leadership (Katzenmeyer & Moller, 2001). Teacher leadership is crucial in developing professional learning community and creating sustainable changes at the school and district level (Katzenmeyer & Moller, 2001). This study is a testimony that working teachers can incorporate daily instructional practice and research.
Conclusion

The present study investigated the comparative effects of two error correction procedures during repeated reading interventions on the reading fluency and accuracy of nontransfer and transfer passages for fourth grade students with LD. Findings indicated that both interventions were effective on fluency and accuracy of nontransfer passages; however, effects on transfer passages were less conclusive. Interviews with participants revealed high social validity for both treatments and preference for RRCF. Future research should expand the present study by investigating the effect of meaning-based error correction combined with RR. Relationships among reading fluency, accuracy, and comprehension were explored. RRCF was recommended for classroom implementation due to its commensurate effect and feasibility.
REFERENCES


MN: Edformation, Inc. Retrieved on April 9, 2010, from
Revisiting the specificity hypothesis. *Journal of Educational Psychology*, 89, 128-158.


APPENDIX A: LOCAL COUNTY IRB FORM

Request for Permission to Conduct Data Collection Activities within the System

5/11/2010

Ms. Yang:

Dr. Harrison has approved your research project to be conducted at Carmel Elementary School. We will send to you through county mail a copy of the signed permission form for your records. Please let us know if you have any questions.

Thank you.

Sarah

Sarah Tusing, Secretary to
Dr. Susan Padgett-Harrison
Director of Assessment
Cherokee County School District
ESA - Building G - Room G05
770-721-6206
770-479-4938 (Fax)
APPENDIX B: UNIVERSITY IRB APPROVAL

6/22/2010

Xiaoqing Yang, Student
Department of Inclusive Education
1000 Chastain Road, #0124
Kennesaw, GA 30144-5591

RE: Your application dated 4/21/2010, Study number 10-268: The Effects of Two Repeated Reading Interventions on the Fluency and Comprehension of Fourth and Fifth Grade Students with Learning Disabilities

Dear Ms. Yang:

I have reviewed your application for revision of the study listed above. The requested revision involves changes to the protocol. Your request is eligible for expedited review under FDA and DHHS (OHRP) regulations.

This is to confirm that I have approved your request for revision as follows: delete three questions, modify one and add one.

You are granted permission to conduct your study as revised effective immediately. The date for continuing review remains unchanged at 4/26/2011, unless the study is closed before that date.

Please note that any further changes to the study must be promptly reported and approved. Contact me at 770-423-6679; fax; email: gzhan@kennesaw.edu if you have any questions or require further information.

Sincerely,

Ginny Q. Zhan, Ph.D.
Institutional Review Board Chair

cc: clee91@kennesaw.edu
APPENDIX C: PARENTAL CONSENT FORM

My signature below indicates that I have read the information provided and have decided to allow my child to participate in the study titled “Effects of Two Repeated Reading Interventions on the Reading Fluency of Fourth Grade Students with Learning Disabilities” to be conducted at my child’s school between the dates of 8/1/2010 and 03/31/2011. I understand that the signature of the principal and classroom teacher indicates they have agreed to participate in this research project.

I understand the purpose of the research project will be to examine the effects of two repeated reading interventions on the reading fluency of the fourth grade students with learning disabilities and that my child will receive two different repeated reading interventions in random order. During one of the intervention, repeated reading with corrective feedback, my child will be asked to read passages from AIMSWeb and provided with feedback to correct the words he/she missed. During the other intervention, repeated reading with word study, my child will be asked to read passages from AIMSWeb and provided with instruction and word practice with the words he/she missed. The instructional component of the second intervention is designed by my child’s teacher based on principles of stages of learning, effective reading strategies and current reading theories. My child’s teacher will record the number of words my child reads at each session. My child will be involved in the study 4 times a week for 6 weeks. My child will be asked at the end of the study as to how she/he likes the interventions.

Potential benefits of the study are:
1. Increasing reading fluency on practiced and transfer passages
2. Increasing level of acceptance from peers
3. Increasing level of acceptance from teachers
4. Increasing level of self-confidence

I agree to the following conditions with the understanding that I can withdraw my child from the study at any time should I choose to discontinue participation.

- The identity of participants will be protected. Only pseudonyms will be used in the reports to protect students’ identity. No identifying characteristics of the participants will be mentioned in the reports or discussions about this study. All documents (IRB reports, informed consents, student assents, protocols, recording sheets, graphs, charts, audio tapes, etc.) used in the study will be stored in a locked file cabinet after the completion of the study for three years. The records will be available for inspection and copying by authorized personnels. After three years, all documents used will be shredded or destroyed.
• Information gathered during the course of the project will become part of the data analysis and may contribute to published research reports and presentations.

• There are minimum inconveniences or risks involved to my child participating in the study, which is stress related to not achieving to the level of frequency perceived by the student.

• Participation in the study is voluntary and will not affect either student grades or placement decisions. If I decide to withdraw permission after the study begins, I will notify the school of my decision.

• I will be given a copy of this application form with all signatures.

If further information is needed regarding the research study, I can contact (Xiaoqing/Christine Yang, Carmel Elementary School, 770-926-1237, 2275 Bascomb Carmel Rd, Woodstock, GA 30189).

Signature____________________________________________________   Date
Parent

Signature____________________________________________________   Date
Principal

Signature____________________________________________________   Date
Classroom Teacher/Investigator
APPENDIX D: STUDENT ASSENT FORM

Mrs. Yang has explained to me that she will be conducting a study that involves repeated reading. She has explained to me that I will be asked work with her individually on reading fluency. I know that I can choose not to participate in this study at any time and I can ask questions at any time. I know that the results from this study maybe appear in reports, publications, and studies, but my real name will never be used. I give Mrs. Yang my permission to use me as a participant in her study.

Signature________________________________________________________________

Student ___________________________________________ Date ________________
APPENDIX E: DIRECTIONS FOR ADMINISTERING AIMSWEB FLUENCY PASSAGES

R-CBM Standard Directions for 1-Minute Administration

1. Place the unnumbered copy in front of the student.

2. Place the numbered copy in front of you but shielded so the student cannot see what you record.

3. Say: “*When I say ‘Begin,’ start reading aloud at the top of this page. Read across the page (DEMONSTRATE BY POINTING). Try to read each word. If you come to a word you don’t know, I’ll tell it to you. Be sure to do your best reading. Are there any questions?*” (Pause)

5. Say: “*Begin*” and start your stopwatch when the student says the first word. If the student fails to say the first word of the passage after 3 seconds, tell them the word, mark it as incorrect, then start your stopwatch.

6. Follow along on your copy. Put a slash (/) through words read incorrectly.

7. At the end of 1 minute, place a bracket ([ ]) after the last word and say, “Stop.”

8. Score and summarize by writing WRC/Errors.

**Familiar Shortened Directions**

Substitute…

“When I say ‘Begin,’ start reading aloud at the top of this page.” (Source: Shinn & Shinn, 2002)
APPENDIX F: DATA COLLECTION FORM

Name of student: ________________________  Group Number: 1___  2___

<table>
<thead>
<tr>
<th>Date</th>
<th>Passage Read</th>
<th>Condition</th>
<th>Practiced Fluency</th>
<th>Unpracticed Fluency</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>B</td>
<td>L</td>
<td>No Read</td>
</tr>
<tr>
<td></td>
<td></td>
<td>C</td>
<td>F</td>
<td>WCPM</td>
</tr>
<tr>
<td></td>
<td></td>
<td>W</td>
<td>S</td>
<td>Accuracy</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>No Read</td>
<td>WCPM</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Accuracy</td>
</tr>
</tbody>
</table>

BL: Baseline, CF: corrective feedback; WS: word study; WCPM: correct word per minute; No CRT: Number correct; No ATMD: Number attempted
APPENDIX G: DATA COLLECTION FORM FOR EXTENDED STUDY

<table>
<thead>
<tr>
<th>Date</th>
<th>Passage Read</th>
<th>Condition</th>
<th>Fluency # Read</th>
<th>Fluency WCPM</th>
<th>Accuracy</th>
<th>MAZE Circled</th>
<th>MAZE Correct</th>
<th>MAZE Accuracy</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>B</td>
<td>CF</td>
<td>W</td>
<td>S</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

BL: Baseline, CF: corrective feedback; WS: word study; WCPM: correct word per minute; No CRT: Number correct; No ATMD: Number attempted
APPENDIX H: PROCEDURAL CHECKLISTS

Procedural Checklists (Front)

Fluency Checklist

1. Places student copy in front of reader.
2. Places examiner copy out of view of reader.
3. Seated appropriate distance from reader.
5. Starts stopwatch when student says first word.
6. Marks errors on examiner copy.
7. Times accurately for 1 minute. Stays “Stop”.
8. Stops stopwatch.
9. Marks last word read with a bracket.
10. Collect fluency passages

RRCF Checklist

1. Point to the first error on the student copy.
2. Say “repeat after me”.
3. Model the word’s correct pronunciation.
4. Repeat the words as needed until the student can say it correctly.
5. Move on to the next word until the all the errors are corrected.
RRWS Checklist

For phonetically irregular words:

1. Say “This word is ___. What word?”
2. Wait for the student to say the word.
3. Say “Yes, ____ (word). Spell ___ (word).”
4. Wait for the student to spell the word.
5. Say “What word?”
6. Wait for the student to say the word.
7. Move to the next word.

For phonetically regular words:

1. List three more words with the same sound pattern as the error.
2. Underline the targeted sound pattern.
3. Point to the underlined sound in the first word, and say “This letter/(these letters) makes the sound ___(sound). What sound?”
4. Wait for the participant to say the sound.
5. Offers a short explanation of the phonics rule.
6. Say “Listen to how I sound the word out.” Then sound out the word and blend the word.
7. Say “Now, repeat after me.”
8. Wait for the participant repeat after each word.
9. Say “Now it is your turn. Sound out each word and blend the sounds together. Start with the first one.”
10. Wait for the participant to sound each word out and blend them.
APPENDIX I: PROCEDURAL FIDELITY RATING SCALES

Observer: _______________ Investigator: __________________

Dates: ________________________________________________

Please rate how well does the investigator follow the by putting “Y” if the condition is present, “N” if the condition is not present and “NA” if the condition is not relevant to the session being observed. Use the Fluency Checklist, the Maze Checklist, the Corrective Feedback (CF) Checklist and Word Study (WS) Checklist as your reference.

<table>
<thead>
<tr>
<th>No</th>
<th>Description</th>
<th>Sessions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1 2 3 4 5 6 7 8</td>
</tr>
<tr>
<td>1</td>
<td>Follow the Fluency Checklist when student read the passage the 1st time.</td>
<td>[ ]</td>
</tr>
<tr>
<td>2</td>
<td>Follow the appropriate procedure (RRCF Checklist or RRWS Checklist) for interventions.</td>
<td>[ ]</td>
</tr>
<tr>
<td>3</td>
<td>Allow student time to practice 3 more times.</td>
<td>[ ]</td>
</tr>
<tr>
<td>4</td>
<td>Follow the Fluency Checklist when student reads practiced passage.</td>
<td>[ ]</td>
</tr>
<tr>
<td>5</td>
<td>Follow the Fluency Checklist when student reads an unpracticed passage.</td>
<td>[ ]</td>
</tr>
<tr>
<td>6</td>
<td>The investigator is well prepared with all materials and equipments present.</td>
<td>[ ]</td>
</tr>
</tbody>
</table>
APPENDIX J: SOCIAL VALIDITY INTERVIEW QUESTIONS

Social Significance of the Goals:

1. Do you think read faster and better is important? Why?

Social Appropriateness of the Procedures:

2. How do you like the strategies that Mrs. Yang used with you? Which one do you like better? Why?

Social Importance of the Effects:

3. Are you satisfied with the improvement in your reading? How does it make you feel?