A Culturally Responsive Reading Intervention for African American Students At Risk for Reading Failure

THESIS

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By

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Abstract

Previous reading studies have emphasized the importance of providing systematic, explicit, reading instruction for emergent readers. This study sought to determine the effectiveness of Reading RACES (RR), a computer program designed to deliver the repeated reading intervention utilizing culturally relevant passages. Specifically, this study examined the effects of RR on the oral reading fluency (ORF) and comprehension gains for first-grade learners in an urban setting and whether these gains would generalize to novel, generic passages. Five first-grade African American students at risk for reading failure were selected to participate in this study. Results indicated a functional relation between the use of RR and student gains in ORF and comprehension. All students who participated in this study demonstrated moderate to substantial gains on their ORF and comprehension on CR passages. Additionally, the data show that the reading generalized to novel passages and maintained even one month following intervention.
Dedication

This thesis is dedicated to Sasha. Your support and sacrifice has kept me focused during this process. Thank you for your positivity and unwavering support.
Acknowledgements

I would specifically like to thank Dr. Gwendolyn Cartledge, Dr. Moira Konrad, and Dr. Ralph Gardner for their continuing support and guidance. I am extremely grateful to have been provided with the opportunity to participate in this research and learn from the very best. I have learned an immense amount over these past two years, and I am excited to continue to grow professionally in this field. I feel truly blessed to have such encouraging, intelligent, and kind professors who genuinely care about helping struggling students.

Thank you to Morris Council III for being an exceptional partner, role-model, and friend. I have you to thank for my desire to continue to pursue a career in academia. Your guidance and advice have helped me grow personally and professionally. I look forward to continuing to work with you on future endeavors.

Finally, thank you to my loving family for your endless support and encouragement throughout this process. You are my inspiration and have helped me stay calm, focused, and motivated. I could not have succeeded without all of these important people in my life.
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Publications


Fields of Study

Major Field: Educational Studies

*Specialization*: Special Education & Applied Behavior Analysis
Table of Contents

Abstract..........................................................................................................................ii

Acknowledgements.........................................................................................................iv

Vita.....................................................................................................................................v

List of Tables....................................................................................................................vii

List of Figures..................................................................................................................viii

Chapter 1: A Review of the Literature.............................................................................1

Chapter 2: Methods..........................................................................................................15

Chapter 3: Results............................................................................................................31

Chapter 4: Discussion.......................................................................................................59

Appendix A: List of culturally relevant and AIMSweb passages.................................79

Appendix B: Training Script............................................................................................81

Appendix C: Procedural Integrity Checklist .....................................................................83

Appendix D: Sequence of Intervention ...........................................................................85

Appendix E: ORF Data collection sheet..........................................................................87

Appendix F: Maze comprehension assessment..............................................................89

Appendix G: Student social validity questionnaire.........................................................91

Appendix H: Teacher validity questionnaire ...................................................................94

vi
List of Tables

Table 2.1 Participant Information...........................................................................................................17

Table 3.1 DIBELS Next Scores on ORF for Beginning (BOY) and End of the Year (EOY).................................................................33

Table 3.2 Baseline and Post Intervention Scores on CR and AIMSweb passages..................................................................................35
List of Figures

Figure 3.1 Group Means on AIMSweb and CR baseline and intervention cold reads.................................................................34

Figure 3.2 Correct Words per Minute per session..........................................................36

Figure 3.3 Correct Responses to Maze Comprehension per Session.........................................................37
Chapter 1: Literature Review

Students in Urban Communities and Achievement

For decades, gaps in the quality of education have led to persistent problems for marginalized groups in the United States (Lo, Chuang, & Haskell, 2009). This is especially the case for students attending high-poverty urban schools. According to the National Association for the Education of Young Children (NAEYC, 2003), by the time students in urban areas enter school, many are well behind in their reading and academic skills. There are multiple contributing factors such as poverty, inexperienced teachers, inadequate resources, and racial segregation. Furthermore, often those tasked with helping impoverished learners in urban settings view performance problems from a deficit perspective. This perspective blames students for any school failure claiming, for example, that family lifestyle is a cause for the lack of readiness or subsequent school failure (Delpit, 1995). The deficit model contends that compared with their white peers, marginalized groups in urban schools have less competence, less intelligence, and less motivation (McKenzie & Scheurich, 2004). In her presidential address to the American Educational Research Association, Ladson-Billings (2006) urged educators to rethink the meaning of the achievement gap when explaining the disparities between culturally different groups of students. She offered that although these disparities do exist, it is actually a result of an “education debt” rather than an actual achievement gap. Ladson-
Billings contended that formal education in the US has long poorly served low-income students.

An alternative and more productive viewpoint is that students in urban environments are just as capable as achieving as their more affluent peers. When students who are at risk for academic failure receive systematic instruction, they are able to make significant gains (Moats & Foorman, 2008; Musti-Rao & Cartledge, 2007; Torgesen et al., 2001). Educators have a responsibility to provide all students with effective, systematic, evidence-based instruction in the classroom. The purpose of this chapter is to review the professional and empirical literature relative to the components of this intervention: (a) culturally relevant pedagogy, (CRP); (b) oral reading fluency (ORF), (c) repeated reading instruction (RRI), and (d) computer assisted instruction (CAI). Also reviewed is the educational framework through which the intervention will be delivered (i.e., multi-tiered systems of support, MTSS).

**Culturally Relevant Fluency Intervention**

**Culturally Relevant Pedagogy**

The cultural deficit model has long been used to blame the student for academic struggles or failure. According to Irvine (2012), when analyzing a student’s performance, it is critical to take into account the teacher-student relationships, student and teacher expectations, and both the institutional and societal contexts. In an effort to change this deficit model, Ladson-Billings (1990) coined the term *culturally relevant pedagogy* (CRP) to describe a new theoretical framework that could assist teachers in helping their marginalized students. Ladson-Billings wrote that CRP places an emphasis on student achievement and helps students affirm and accept their cultural identities.
Ladson-Billings (1995) stated that it is critical for “culturally relevant pedagogy to provide a way for students to maintain their cultural integrity while succeeding academically,” (p. 476). The purpose of CRP is to incorporate “student culture as the basis for helping students understand themselves and others, structured social interactions, and conceptualize knowledge” (Ladson-Billings, 1992, p. 314).

Culture is fluid and is a combination of human thought, activity, and belief systems. Therefore, it is critical that teachers continue to revamp and update their own teaching practices to include a more dynamic view of culture (Ladson-Billings, 1992).

Further adapting or extending Ladson-Billings’s pedagogical model, Paris (2012) argued that instead of utilizing culturally relevant pedagogy, we should embrace culturally sustaining pedagogy (CSP). This approach urges teachers to support students in sustaining cultural competence in their communities while also encouraging students to access the dominant culture. This type of pedagogy seeks to foster, “linguistic, literate, and cultural pluralism,” (p. 93) as a way of schooling. Rather than emphasizing the goal of fostering a monocultural society based on White, middle class norms, schools need to embrace cultural pluralism and cultural equality (Paris, 2012). The goal of CSP is to teach students how to navigate through surrounding cultures while still embracing and incorporating their own.

Gay (2002) emphasizes the importance of culture with a greater focus on instructional methodology. According to Gay, learning for CLD students can be improved when presented with instruction that incorporates their cultural characteristics, experiences and perspectives. Further, Gay suggests that there are a wide variety of techniques for incorporating culturally diverse experiences and perspectives in classroom
teaching. Teaching can be enhanced by integrating ethnic and cultural diversity into fundamental aspects of instruction in the classroom such as mathematics, reading, writing, and science. She specifically encourages teachers to incorporate samples of ethnic literature in teaching reading skills such as comprehension and inferential learning. In addition to adding cultural components to reading, teachers need to also focus on bolstering specific reading components to improve reading skills for struggling students.

**Oral Reading Fluency**

According to the National Reading Panel (NRP, 2000), there are five essential components of reading: (1) phonemic awareness, (2) phonics, (3) fluency, (4) vocabulary, and (5) comprehension. These components are essential pillars for creating successful, competent readers. One of the ultimate goals for reading is for students to comprehend and make meaning from the text they are reading. One of the five areas of reading that is critical for reading success (i.e., comprehension) is reading fluency. According to the NRP (2000), oral reading fluency (ORF) is the ability to read text quickly, accurately, and with expression. Fuch, Fuchs, Hosp, and Jenkins (2001) argue that ORF can be an indicator of strong reading proficiency due to the need of combining various skills (phonemic awareness, phonics, and rapid word recognition) at one time. Statewide assessments place high importance on reading fluency due to the nature of their timed assessments that require extensive reading. Learners who struggle with reading fluency often struggle on these assessments and perform below their peers. Additionally, reading fluency is a double edge sword in that students who struggle with reading fluency typically read less than those who do not struggle. Stanovich (1986) coined this phenomenon as the “Matthew Effect” suggesting that low achieving readers have a
decreased likelihood that they will gain the necessary skills to become proficient readers. The NRP (2000) provided evidence that typically developing children and children showing risk as early as first grade show substantial differences in their reading fluency skills. Fluency norms have been developed by Good and Kaminski (2002) to identify students who are not developing fluency and to monitor their progress. Although it has great importance, fluency is one component that is rarely explicitly taught (Carnine, Silbert, Kame’enui, & Tarver, 2010). Reviews of fluency studies indicate the majority of these intervention studies include students in third grade or higher (Chard, Vaughn, & Tyler, 2002; Kuhn & Stahl, 2003). Kuhn and Stahl suggest this might be because educators believe fluency is a skill that develops later. Another concern stated by Guerin and Murphy (2015) is that schools often only assess fluency in terms of correct words read per minute. Although CWPM is one way to measure fluency, it is critical that the comprehension component of reading fluency not be neglected. The ultimate purpose of being a fluent reader is to have the ability to derive meaning from the text. Students who struggle with fluency must determine how to decode words while simultaneously constructing meaning from the text (Kuhn & Stahl, 2003). It is no surprise that students who struggle with reading fluency often struggle with comprehension as well. It is critical for educators to help provide effective reading intervention for these struggling readers. One evidence based technique specifically to address this area of fluency is repeated reading intervention, (RRI).

**Repeated Reading Intervention (RRI)**

Repeated reading interventions are designed to address limited fluency skills. The repeated reading procedure involves reading a short passage aloud several times. Often,
the instructor models and provides feedback and corrections to the student. Students will read the same passage a certain number of times until they reach a certain reading rate goal specified in words per minute (Samuels, 1979). Existing literature on RRI has shown its effects on students’ ability to read non-transfer or practice passages (stories students have repeatedly read) and transfer passages (novel stories that have not been read by the student). Many of these reviews have suggested that RRI can improve fluency for non-transfer stories with moderate to large effect sizes (Chard, Vaughn, & Tyler, 2002; Morgan & Sideridis, 2006; NICHHD, 2000; Therrien, 2004; Therrien, Wickstrom, & Jones, 2006). However, these same studies have shown less robust effects for transfer passages (Ardoin, Eckert, & Cole, 2008; Therrien, 2004). According to Therrien (2004) there are several components that can be responsible for improving the results of RRI. These components include: (a) corrective feedback on students’ performance, (b) modeling the passage, and, (c) rereading a passage until a prescribed criterion has been met.

Guerin and Murphy (2015), give one example of obtaining positive effects within a seven-week intervention with RRI for three struggling adolescent readers. The goal was to improve fluency and comprehension. Teachers modeled reading passages to students, which were then read repeatedly by the students at their own pace. Students tracked and recorded their rate and accuracy and then answered selected comprehension questions about the passages. Students practiced their RRI strategy both orally and silently. Results showed that students displayed greater accuracy and prosody when reading a text, which also contributed to students’ improved scores on comprehension questions. Furthermore, many students continued to use the RRI strategy when reading their texts,
even when they were not prompted to do so by their teacher. According to this study, students were moving beyond surface fluency and acquiring a deeper fluency as demonstrated by increased comprehension.

Haptak and Tracey (2007) investigated the effects of assisted repeated-reading on the ORF of four, first-grade students showing varying levels of reading risk. Students participated in intervention for 10–15 minutes twice a week for eight weeks. The teacher individually led each student through the repeated reading procedure with his/her instructional leveled text. Students would then graph their final correct words per minute (CWPM) during that session. Results showed that all students increased their ORF scores from baseline. Researchers also noticed transfer of skill to unrelated texts although it was not specifically measured. Overall, the researchers concluded that the repeated-reading strategy provided students with critical practice necessary for improving their reading skills.

Although RRI is an evidence-based practice used to improve fluency, it is challenging to utilize this practice in low-income areas due to lower staff ratios, fewer resources, and time constraints.

**Computer-Assisted Instruction (CAI)**

The use of computer software programs has been shown to be an important component of reading instruction. Interventions delivered through the computer present highly structured activities that allow students to progress at their own pace. Research studies have shown the benefits of CAI for improving literacy skills (Hall, Hughes, & Filbert, 2000; MacArthur, 2009). Results from a study by Keyes, Cartledge, Gibson, and Robinson-Ervin (2016) provide support for CAI repeated reading interventions as a way
to promote reading fluency for struggling young readers. In their study, six second-grade students received the Read Naturally Software Edition (RNSE) treatment packages for 7-12 weeks. ORF scores improved for all of the students in the study. Five out of the six participants also increased their ORF on both generalization measures. In a similar study, Gibson, Cartledge and Keyes (2011) examined the effects of using a computerized supplemental reading program on the ORF and comprehension of 8 African American first graders. Their intervention lasted for 14-16 weeks and results showed improved ORF scores for all of the participants. Five out of eight participants were able to reduce their reading risk status as measured on the DIBELS and all but one participant increased their reading rates. Findings from this study support the use of computerized supplemental programs to improve reading skills.

CAI can be used to provide reading instruction to students without direct teacher instruction. CAI has been used to implement effective teaching practices such as explicit, strategic, and systematic instruction as well as timely corrective feedback and reinforcement (Hall, Hughes, and Filbert, 2000). According to Carnine (1989) the original purpose for using CAI was to enable teachers to reallocate teaching time for students, so struggling students could receive more intensive support. CAI allowed more instructional interactions between the struggling student and the material. In a review conducted by Hall, Hughes and Filbert (2000), students with LD who utilized CAI increased their performance in reading, decoding or reading comprehension. Seventeen studies specifically designed to evaluate CAI in reading for students with learning disabilities showed encouraging results that CAI could be used to provide the critical, systematic instruction required for students with reading challenges. Furthermore, they
noticed that providing CAI helped address the “Matthew Effect” by providing additional supplemental instruction to struggling readers who typically would be reading less than their peers. Teacher shortages, school financial limitations, and time constraints can all impact the amount of reading instruction that occurs. Utilizing a computer with well developed software may help students with learning risks to receive more practice opportunities. In addition to providing systematic and explicit practice, CAI can be more motivating for students by providing more opportunities for active engagement and interaction (Lonigan et al., 2003); reinforcement (Macaruso & Walker, 2008); and modeling (Lonigan et al., 2003).

**Multi-tiered Systems of Support (MTSS)**

With the reauthorization of the Individuals with Disabilities Education Improvement Act (IDEIA, 2004), federal mandates require teachers to accommodate students with diverse academic and behavioral needs. In order to assist general educators, multi-tiered systems of support (MTSS) such as response to intervention (RtI) and positive behavior interventions and supports (PBIS) have been established. Harlacher, Sakelaris, and Kattelman (2014) described MTSS as a way to address growing instructional challenges faced by educators in the schools. MTSS provides evidence-based techniques of varying intensity to increase the achievement of all students, regardless of their academic abilities. The California Department of Education (2016) defines the purpose of MTSS as providing a framework for teachers to make data-based decisions to support differentiated learning and individualized student needs. The MTSS framework is designed to implement instruction according to varying levels of support. These multilevel systems present at least three levels of preventive to intensive
instruction to support students’ academic or social success. RtI is an example of an MTSS academic system. The first level includes high quality core instruction (typically the general curriculum) and is effective for 80% of the student population. Students who do not respond to this level of instruction are provided with supplemental evidence-based instruction with moderate intensity (i.e., level two). Within this level, the team monitors instruction for effectiveness (Fuchs & Fuchs, 2006; Sullivan & Castro-Villarreal, 2013). Typically, this second level involves 15% of students. Finally, students who do not respond to this second level of instruction are provided with intensive, individualized support (5% or fewer students). Students who still do not show improvement at this intensive level may often be referred for evaluation to determine eligibility for special education.

The intervention used in this study, Reading RACES (RR), corresponds to level two of the MTSS. The following section will describe previous research that has implemented this computer-assisted repeated reading program, designed to deliver culturally relevant and engaging passages to students showing risk for reading failure.

**Previous Research on Reading RACES**

The Reading RACES (Relevant and Culturally Engaging Stories) program was created through a multi-disciplinary research project that incorporated faculty, students, and staff from the Computer Science and Engineering (CSE) and Special Education departments at The Ohio State University. Initially, the project was funded by a three-year U.S Department of Education, Institute of Educational Sciences (IES) grant. Over the past few years, the RR program has continued to advance its technological capabilities (e.g., user interactivity and voice recognition). These advances have made it
possible for students to take a more active role in their learning and in the program. Each technological improvement has made the studies more nuanced and has placed a slightly different focus on the overall research aims of the researchers. The initial aim of implementing this program was to provide a level two, supplemental reading intervention for students who were struggling to succeed in the general education setting (i.e., level one). By providing this type of intervention, the researchers hoped to prevent or minimize reading failure and potential special education referral by improving students’ ORF and text comprehension.

Bennett et al, (in press) completed the first study using the RR program. In this study, the researcher utilized a multiple baseline design across participants to determine whether the RR program would improve the participants’ ORF and comprehension on AIMSweb and CR passages. Seven second-grade students showing reading risk and three comparison peers participated in this study. The researcher assessed students using paper copies of AIMSweb passages and mazes. During intervention the students followed the following steps: (a) listen to the computer introductory script describing the directions; (b) listen to the human voice model the passage; (c) read the passage along with the model; (d) read the passage independently up to 3 times with experimenter delivered feedback; (e) read the practice passage for a one-minute timing if the student previously met his/her goal; and (f) take a 3-min maze comprehension assessment. After participants met their goals and completed the maze for the CR passage, they then read an AIMSweb passage and completed the matching maze comprehension assessment.

Comparison peers did not participate in this intervention and were simply assessed on their reading fluency. After the 7 participants completed intervention, the
comparison peers completed a 4-week intervention. Results showed that six out of seven target participants made substantial gains on their ORF and comprehension and maintained these skills during 2-week and 1-month maintenance checks. Additionally, all comparison peers made significant gains in their ORF after receiving a shortened intervention.

The next two studies by Barber (2015) and Green (2015) utilized an updated version of the RR program, affording more student independence and fewer researchers on staff than Bennett et al.’s (in press) work. These studies also utilized a multiple baseline design across participants and wanted to also determine whether students’ ORF and comprehension measures would improve. Both Barber (2015) and Green (2015) conducted the study in first grade classrooms with students at-risk for reading failure. Barber (2015) selected three English Language Learner (ELL) students with Somali backgrounds to receive intervention. Intervention occurred for 7 to 11 weeks and all participants increased their ORF and comprehension on novel and CR passages. Likewise, Green (2015) worked with 4 first-grade students who all made significant gains in ORF and comprehension of novel CR and AIMSweb passages after participating in intervention for 9 to 13 weeks.

RR had additional updates added to the program so that everything was contained with the software requiring no paper responding. These modifications led to Council’s (2016) study, which sought to determine whether a paraprofessional could successfully facilitate the intervention without significant support from the researchers as well as verify the findings of the previous studies. Five second-grade students and the school librarian participated in this study. Similarly, with the previous studies, a multiple
baseline probe across participants was utilized to determine the effects of RR on the ORF and comprehension of these selected students. Findings from this study extend the research conducted with this RR program to first-grade struggling readers.

The current study is a partial replication of the Council (2016) study. A principal focus in the current study was to determine the beneficial effects of RR on the fluency and comprehension of first-grade children within an urban school who showed reading risk.

**Purpose of this Study**

This study sought to (a) determine to what degree RR could be effectively implemented as a supplemental intervention in a school setting with minimal adult supervision, and (b) evaluate the effectiveness of the RR program on students ORF and comprehension of both CR and AIMSweb passages.

**Research Questions**

1. To what extent can first-grade students with reading risk attending urban schools utilize the RR program independently?

2. What effect will RR have on the ORF of CR passages for first graders who are showing reading risk?

3. What effect will RR have on the ORF generalization to non-treatment passages (i.e., AIMSweb) passages for first graders showing reading risk?

4. What effect will RR have on the comprehension of CR passages for first graders showing reading risk?
5. What effect will RR have on the comprehension of non-treatment generalization passages (i.e. AIMSweb generalization) for first graders showing reading risk?

6. Will students maintain progress following intervention?

7. How will student participants report feeling about utilizing the RR program?

8. How will classroom teachers view the RR program?
Chapter 2: Method

Setting and Participants

District. This study took place at an urban elementary school located in a large Midwestern metropolitan city. This district is one of the largest in the state, with over 53,000 students, and over 80% of the district’s students came from economically disadvantaged homes. Over 56% of the students were Black, non-Hispanic students. Additionally, one out of every seven students spoke English as a second language. This district received an F on the “Gap Closing” measure which determines how well students are doing in math, reading, and graduation. It also received an “F” on the “Progress” measure, which, indicates how much students learned over the course of the year.

School building. Participants in this study were recruited from an inner city elementary school within this district. The school selected for this study is a neighborhood school that serves pre-K through 5th grade students. The school served approximately 375 students. Over the past five years, the student population has declined by eight percent. The student population at the time of this study was 92% Black, 5% White (non-Hispanic), 2% Multiracial, and 1% Hispanic.

According to the 2014-2015 school performance index, this school’s K-3 Literacy initiative also received a failing grade. This measure reports on how successful the school was at getting struggling readers on track to proficiency in third grade and later years.
**Library.** The study took place in a specific designated area in the library at the school. The library contained a computer station in the back of the room with enough outlets to plug in the laptops to accommodate this research project. Typically, four laptops were set up around a small, round table. The middle of the library had five, small tables where classes would sit during their scheduled library time. The back of the library was mostly free from distractions and away from many of the books.

**Students.** Six first graders from two separate classrooms were selected for this intervention. One student (Megan) did not complete the study due to switching to another school before intervention. Students who showed risk for reading failure were selected. The researchers assessed all students in the first grade with parental permission to determine eligibility for participation in this study. Students were assessed using the Dynamic Indicators of Basic Early Literacy Skills Next Edition (DIBELS Next; Good & Kaminski, 2011) first grade beginning of the year (BOY) benchmark. Specific assessment measures were used such as Letter Naming Fluency (LNF), Phonemic Segmentation Fluency (PSF), the mid-year Oral Reading Fluency (ORF) passages, and Nonsense Word Fluency (NWF). Students were also assessed on the Word Identification (WI) pre-test and the Passage Comprehension (PC) Pre-test of the Woodcock Reading Mastery Test-R (WRMT-R) (Woodcock, 1998). Inclusion criteria for this study were as follows: (a) score below the 50th percentile on the WI and PC assessments on the WRMT-R and (b) a minimum of 18 correct letter sounds (CLS) on the DIBELS Next NWF subtest; For the DIBELS Next, students needed to be in either the below benchmark (18—26 CLS) or At or Above Benchmark (27 CLS or higher). Prerequisite decoding skills were critical because this intervention did not specifically address
 decoding. Students in the *Well below benchmark* risk level (0—17 CLS) would not be selected. A total of six participants meeting the above criteria were selected to participate in the study. A summary of participant information including age, race, and gender can be found in Table 2.1.

**Classroom reading instruction.** Classroom teachers provided whole group instruction utilizing Fountas and Pinnell to the students in first grade. Teachers assessed students’ reading level at the beginning of the year with the Fountas and Pinnell assessment kit and gave students a specific reading level based on their abilities. Worksheets and reading materials were typically assigned to the whole class to complete.

<table>
<thead>
<tr>
<th>Name</th>
<th>Age</th>
<th>Gender</th>
<th>DIBELS</th>
<th>WRMT-R Standard Scores</th>
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<tr>
<td></td>
<td></td>
<td></td>
<td>NWF</td>
<td>Median ORF</td>
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<td>F</td>
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<td>8</td>
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<tr>
<td>Noah</td>
<td>6-1</td>
<td>M</td>
<td>23</td>
<td>13</td>
</tr>
</tbody>
</table>

**Materials**

**Woodcock Reading Mastery Test-Revised (WRMT-R).** Students were provided with two measures on the Woodcock Reading Mastery Test-Revised (WRMT-R): Word Identification, and Passage Comprehension (Woodcock, 1998). Students were given the initial pretest during the first two months of school. Post tests were given to the
students two months prior to the end of the school year. Each student was presented with a different form of the assessment for both the pre-test and the post-test.

**DIBELS Next.** Students were also assessed using the DIBELS Next standardized assessment. First-grade students were assessed using three probes on this assessment: Phonemic Segmentation Fluency (PSF), Nonsense Word Fluency (NWF), and Oral Reading Fluency (ORF). DIBELS Next was designed to measure basic early literacy skills for students in kindergarten through third grade. The PSF probe is a one-minute timing where the assessor says a word and the student has to give its component sounds. Students were given a point for each distinct sound mentioned within each word. The NWF probe was also a one-minute timing that provided nonsense words for students to decode. Students earned points for any correct letter sounds (CLS) that they were able to read. Finally, the ORF probe was a one-minute timing where students needed to read a written passage. Students were given points for all of the correct words read during the allotted time.

**Computer equipment.** This study utilized four Dell laptop computers to deliver the Reading RACES (RR) software. One of these laptops was used as a server and was hooked up to a Linksys Wireless Broadband Router in order to run the reading program. The other three laptops were used to run the Reading RACES program and deliver culturally relevant (CR) and non-culturally relevant (NCR) passages to the participants. Each laptop had an accompanying Logitech headset with microphones that enabled students to hear the program and also audio recorded their readings. Additionally, students were provided with a wireless mouse in order to navigate independently throughout the program.
Data sheets. Researchers created a master list of the, randomized CR and AIMSweb stories for each participant (see Appendix A). Researchers collected IOA on only the initial cold read and the timed reading for each student. The primary observer would also utilize these data sheets to calculate the CWPM on the Listen to Me portion of the program. Prior to starting intervention, the researchers trained the participants how to utilize the program using a training script (see Appendix B). Researchers needed to ensure that students were being trained to utilize the program effectively and all participants were being taught to use the program in the same way. Procedural checklists were also used to calculate treatment integrity for the participants by determining whether or not participants were appropriately following the RR sequence. Additionally, a checklist was also used to check the procedural integrity of the primary experimenter to verify whether she was implementing the program appropriately (see Appendix C). Students who were easily distracted were provided a visual checklist for the sequence of the intervention (see Appendix D) Participants were also provided with a 3 X 5 notecard containing their password and username for the program. Additionally, students were allowed to select a sticker/temporary tattoo from the “sticker station” if they were able to meet their reading goal for that day. These stickers were provided to the students during baseline, intervention, and maintenance.

Culturally relevant (CR) passages. There were a total of 25 first grade CR passages used for first-grade intervention. Previous researchers on this project created these novel CR passages. Passages were designed to reflect the interests, real life experiences, and background of this specific population (i.e., young, urban, African American students). Teachers, parents, and students were interviewed and provided with
questionnaires to reflect their current interests and experiences. The research team conducted both individual interviews and group discussions to obtain valid information about this population. Researchers asked questions about their interests in food, culture, fun activities and future aspirations and goals. Researchers also reviewed CR books and novels pertaining to urban/African American children. After conducting the interviews, researchers began writing their own stories to reflect the collected information. To ensure that stories were appropriate for the grade level and had a similar difficulty level, researchers used the Spache Readability Index to determine appropriate grade level and then equated all the first-grade passages (Spache Readability Index, n.d). The Spache Index showed that first-grade passages had a grade range of 1.4 to 2.7. The research-team reviewed each passage to ensure cultural authenticity, grade appropriateness, and decodability (i.e., a minimum of 70% of the words in each passage needed to be decodable at a first-grade level.

The order of the stories to be given to each student was randomized before beginning intervention. The researchers printed two copies of every story for IOA purposes. Researchers collected student oral reading fluency (ORF) data using the preprinted data sheets (see Appendix E).

**Culturally relevant maze passages.** Maze comprehension assessments were created to mirror the CR passages. The maze assessment was to determine student comprehension of the read passage. Approximately every 7th word was removed from the passage and the student had to select from a set of three possible words the correct word to insert in the blank. Within the set of three words were two distracters that made sense in the sentence but were not related to the passage the student had just read. For
example if the sentence said, “Johnny wanted to play with the ______, student might be
given the options, “cat, ball, rat” and have to select the word “ball” if the story was about
soccer. Students needed to click on the bubble with the correct word choice. The student
showed comprehension when he/she clicked on the correct word (see Appendix F).
Following the maze, RR calculated the correct responses and generated a graph so
students could visually see their progress on this assessment. If students received a
perfect score on their maze assessment, they would receive a star on their graph.

Generalization passages. The generalization passages were taken from a
database called AIMSweb (aimsweb.pearson.com). AIMSweb is a curriculum-based
measurement (CBM) program that provides progress monitoring and screening of basic
academic skills such as reading, language arts, and math. In this study these passages are
referred as non-culturally relevant (NCR) passages because the passages are generic and
not specifically focused on being culturally sensitive. Passages were selected from this
database based on the grade level difficulty of 1.4- 2.6 as measured by the Spache
readability formula


Student reinforcers. Researchers created a sticker station where students could
pick a sticker after completing their intervention passage for the day. Stickers represented
a wide range of student interests such as popular cartoons, current shows, and various
movie characters.

Dependent Variables

The first dependent variable was students’ correct words per minute (CWPM)
during the cold read of CR oral passages on RR. Words were counted toward the
student’s score if it was read correctly within three seconds. Words were also counted as correct if the student made an initial error and then independently corrected his or her mistake. A word was counted as incorrect if it was mispronounced by the student or not said within three seconds. After the one-minute timing, the researchers would input the students’ final word read along with the errors and the computer would calculate the CWPM for the student. Researchers would then verify the computer’s count and record this number. Students received “corrective feedback” by practicing the words they missed on their cold read during the “practice words” component of the intervention following their cold read.

The second dependent variable was students’ correct responses on the CR maze assessment. Answers were counted as correct if the word selected was the original word from the story. The computer would calculate the correct responses and place this number on a line graph for students to see. Students were given a total of three minutes to finish this assessment. Corrective feedback was not provided for this assessment.

The third dependent variable was students’ CWPM on the generalization passages. Students read generalization passages upon meeting their goal in reading the CR passages. If students were able to reach their reading goal on their first attempt for three consecutive CR stories, they were provided with a generalization passage. If students needed to repeat a story for a second day, they would not be given a generalization passage until they had successfully completed reading three CR stories.

The fourth dependent variable was students’ scores on the generalization mazes. These mazes functioned exactly as the CR mazes.
The fifth dependent variable was the DIBELS Next benchmark assessments given to first grade students at the beginning of the year (September) and at the end of the year (May). Researchers followed the instrument’s directions while providing the assessments for the participants. Measures assessed were the Nonsense Word Fluency (NWF) assessment and the Oral Reading Fluency (ORF) probes.

**Independent Variables**

The independent variable for this study was the RR program. The RR program was designed to deliver the CR and generalization passages and the repeated reading intervention using these passages. There were 3–4 sessions a week per participant, with each session lasting approximately 25–40 minutes. Participants were in intervention for 11–15 weeks. Each student worked independently on the laptop. There were multiple participants in the library at one time. Participants would receive feedback from the RR program after reading a story. They also received positive praise statements from the researchers.

**Reading RACES software.** The RR computer program was designed to deliver a repeated reading intervention using CR and AIMSweb stories. A total of 25 CR stories and 17 AIMSweb stories were delivered through this software. The software allowed students to listen to a human model read a selected passage and then provided the students with opportunities to practice reading that same passage. Students’ CWPM were charted on a graph at the beginning of the session. While practicing the stories, students could click on any unknown words and the computer would read the word to the students. The computer also provided students with practice words that they missed during their initial cold read. During the practice word portion, the computer would model reading the
isolated word and then read the word within the context of the sentence. The software also delivered the maze comprehension assessment and charted students’ progress on a graph for them to view.

**Praise and corrective feedback.** Students who successfully reached their reading goal at the end of their session were allowed to pick a stick from the sticker station. Students were also praised by the researchers and school librarian for focusing, working hard, or reaching their goals. During the practice phases of the intervention, the students were given corrective feedback on any errors made during the reading. During the assessment portions (i.e., cold read, timed read and maze), students were not provided with any corrective feedback.

**Experimental Design**

The experimental design used for this study was a multiple baseline design across participants (Cooper, Heron, & Heward, 2007). The design was used to analyze the effects of the RR program on the student's’ (ORF) and comprehension on CR and AIMSweb passages. Students were also assessed on whether or not they were able to follow correctly the computer sequence (i.e., procedural integrity).

**Baseline.** Initially, the researcher provided students with a total of six stories, three CR and three AIMSweb, in a randomized order. When given a passage during baseline, the students simply clicked on the “timed reading” button and read for one minute. Researchers collected these cold read oral reading fluency data. After the cold read, students completed the three-minute maze assessment that coincided with the passage they had read. Researchers also recorded this data. Students were only given one passage per day. After at least six days of baseline, the researchers analyzed the data...
to determine which students should be placed in the first tier for the study. Two participants with the lowest stabilized (i.e., steady state) scores were selected to enter intervention first.

**Training Students for Reading RACES.** Prior to entering intervention, participants received training on how to utilize the Reading RACES software program. A training script was utilized to ensure procedural fidelity for all of the participants. The researchers followed the script and modeled each step for the participants to follow. Participants were taken through the exact sequence of the program using the training CR story “Grandma’s House” to practice each step. This story was solely utilized for the purposes of training and was not included in the actual intervention. In addition to the modeling from the researchers, the RR program also provided verbal directions prior to beginning each step in the program. Participants needed to follow every step on the training checklist correctly, before beginning intervention.

The Reading RACES software consisted of the following sequence:

- Begin (i.e. the participant read a novel CR or AIMSWEB passage)
- Practice words pre-teaching activity
- Read to me (i.e., the computer models reading the story to the participant)
- Read along (i.e., the participant reads along with the computer)
- Listen to me (i.e., student independently reads the passage for up to three 1-minute timings until the goal is reached. Students may click on unknown words for assistance)
- Timed reading (i.e., 1-minute fluency timing), and
- Maze comprehension passage (i.e., 3-minute timing)
**Begin.** Once the participants had selected their reading goal they then choose their story. After selecting their story they clicked on the *begin* button which prompted them to read with their best effort for a 1-minute timing. After the 1-minute timing, the errors were inputted and the computer told the participant how many correct words were read in the 1-minute timing. If the students surpassed their goals, the computer would say, “*Congratulations! You read ______ words per minute. Your goal is _____ words per minute. You reached your goal without even practicing!* Click on the “OK” button. The student was then prompted to skip directly to the *timed reading* portion of the program.

If the participant read less than the targeted goal the computer would say, “*Very nice! You read ______ words per minute. Your goal is _____. With a little practice I know you can reach your goal.* Click on the “OK” button.

**Practice Words.** The computer used the words participants missed during the cold read as the practice words. Researchers clicked on the errors made during the cold read and saved this information so the computer could generate practice words. The computer also used predetermined words that were selected based on their level of difficulty. The participants would have each isolated word modeled to them by the computer. The computer would prompt the student to read the word be saying, “*say the word _______.*” After, the students were prompted “*Let’s read the entire sentence.*” At this point, the computer would model reading the word within the context of a sentence from the story to the students. Students would then practice reading this sentence as well.

**Read to me.** After completing all of the practice words, the students would be prompted to click on the “Read to me” button. The computer would say, “*Now you will listen as the story is read. Follow along as the words are highlighted in blue.*” During
this portion of the program, students would listen to the story as a prerecorded human voice modeled reading the passage. As the story was read, each word was highlighted in blue so the students could follow along and track with their eyes. Researchers would watch the students and mark on their procedural checklist whether students were following along with the computer during this portion of the intervention.

**Read along.** Next, the students would click on the “read along” button. The computer would prompt the student, “*Now you will read along as the story is read. Make sure to read loud and clear into the microphone. If you need help, you can click on the word and I’ll stop and say the word. Then we will begin again from the beginning of the sentence. After I read the title you can begin.*” Just as with the “read to me” portion, a prerecorded human voice would read the same passage however this time, the student was expected to read along with the computer. Just like before, blue highlighting would help the students keep track of where they should be reading.

**Listen to me.** After practicing the story with the voice model, the students were given an opportunity to practice reading the story independently. The students were given a 1-minute timing to read the passage and meet their predetermined goal that was set in the beginning of the session. During this session, students were allowed to click on any unknown words and the computer would read the word. Any words clicked on by the students were counted as errors by the researchers. Students were given a total of three attempts to try to meet their goal and continue to the timed reading portion of the program. After each read, the students’ CWPM were calculated and the computer would highlight the word students would need to reach in order to achieve their reading goal. If students did not meet their reading goal after three attempts, they would stop the program.
and try again starting with the “listen to me” portion the following day to ensure that students did not experience frustration. If the participant did not reach his/her goal after two days, the goal was systematically lowered by 5 CWPM for the third day.

**Timed Reading.** The timed reading portion assessed the students’ independent reading fluency after going through the repeated reading intervention. This was the student’s final attempt to read the passage. During this phase, students were given one-minute to read the passage. In this phase, the computer would not provide any corrective feedback to the participants and the participants could not click on any unknown words for support. After reading the passage, students were shown their progress on a graph that tracked each of the student’s timed reading. Once the participants reached their reading goal, they were told to move on to the maze portion of the intervention. If the participant did not meet his/her reading goal on the timed reading, the student received one final chance to complete the timed reading assessment. In total, the students had the opportunity to read the same passage 5-8 times per session. The maximum amount of time a student could read the same story was three sessions.

**Maze.** After the participant reached his/her goal on the timed reading component, they were prompted to click on the maze button. The maze assessment measured the students’ comprehension of the passage they just read. The computer gave the students directions and students needed to select the correct word to complete the sentence during a 3-min timing. There were approximately 11 to 18 response opportunities for students to complete on this assessment. The majority of the passages had a total of 15 response opportunities for students to answer. After three minutes, the computer calculated the
students’ scores and placed the data on a graph for students to view. Perfect scores were represented on the graph as stars.

**Graphing.** During the intervention there were three opportunities for the students to view their data on a graph (1) cold read; (2) timed reading and (3) maze results. The participants’ graphs were a permanent product for students to keep track of their progress. They also served as a motivation for students who enjoyed seeing their scores increase.

**Social Validity**

**Participant social validity.** Participants were provided with a response survey at the culmination of the intervention. Surveys were given to the students by the secondary researcher to ensure there was no bias. The questionnaire contained a variety of questions to the participants such as what components they enjoyed about the intervention, what they would change, and how they felt about participating in the project (see Appendix G).

**Teacher social validity.** Classroom teachers participating in the intervention were also provided with questionnaires to determine their feelings about the RR program and its influence on their students’ reading (see Appendix H). Teachers were provided with the questionnaires in advance to complete and then met with the researchers to go over their responses and share additional feedback about the RR program.

**Interobserver Agreement (IOA)**

Two graduate assistants (GAs) were trained according to the predetermined criteria during all phases of the project (i.e., pre-test, baseline, training, intervention, generalization probes, maintenance, and social validity measures). Each GA took turns serving as the secondary observer in order to verify the first observers’ data collection. A second observer was present for at least 50% of baseline, training, intervention,
generalization probes, maintenance, and social validity for each participant in the study. Exact agreement calculated by the total agreements divided by the number of agreements plus disagreements and multiplied by 100.

**Treatment Integrity**

Checklists were used to calculate the treatment integrity of the primary observer and participants for all phases of the intervention (baseline, training, intervention, generalization probes, maintenance and social validity). The researcher was observed during each phase of the study and IOA was calculated based on a predetermined checklist. To receive 100% for the procedural integrity, the researcher needed to follow every step on the checklist correctly. Additionally, data were collected on the participants in order to ensure that they were following each step of the treatment appropriately. Researchers utilized a procedural checklist that contained each critical step of the intervention. Researchers collected data on the number of prompts students needed to complete each step correctly.
Chapter 3: Results

This chapter presents the results of the study. Data are presented on interobserver agreement (IOA), treatment integrity, students’ treatment integrity, and students’ reading growth measures in ORF and comprehension.

Interobserver Agreement

Primary experimenter. Two GAs (one doctoral candidate and one master’s student) were trained using procedural integrity checklists to serve as both primary and secondary observers. Each experimenter was required to have at least 90% treatment integrity and 90% agreement before he/she was able to observe participants in this study. IOA was calculated during each phase of the intervention for each student using exact agreement. Agreements were divided by the number of agreements plus disagreements, multiplied by 100, and rounded to the nearest 10th in order to determine the percentage. Each researcher was observed by a second observer for at least 70% of the subtests during pre- and post-tests, baseline for CR and AIMSweb passages, and maintenance. The breakdown is as follows: pre- and post tests 100%, 100% of baseline including CR and AIMSweb passages, 80.4% of treatment probes (i.e., cold reads), 78.9% of intervention sessions (i.e. timed readings), and 82.1% of generalization probes.

The mean IOA calculations for the five student participants for each phase of intervention are as follows: IOA for the Woodcock Reading Mastery pre-and post-tests was a mean agreement of 99.4% (range: 96.7–100%), data were collected on 100% of the
administered subtests. During baseline, which utilized both CR and AIMSweb passages, agreement was 98.9% (range: 85.7–100%). For the treatment probes (i.e., cold reads) the mean agreement was 98.9% (range: 93.1–100%). The intervention (i.e., timed reading) mean agreement was 98.2% (range: 95.3–100%). Finally, the maintenance mean agreement was 99.72% (range: 97.2–100%).

**DIBELS.** Three DIBELS subtests (NWF, PSF, DORF) were administered in the beginning of the year (i.e. September) and the end of the year (i.e. April/May) to all participants in the study. All assessments were given individually to the students in the library, free from distraction. DIBELS Next does not include an ORF measure at the beginning of first grade so it was not possible to get a level of risk for the DORF. Researchers used the middle of the year (MOY) ORF passages to assess students at the beginning of the year as a screener. Table 3.1 demonstrates that all participants made moderate to significant growth on the DORF assessment when looking at their increase in CWPM and percentage growth. Most notable is Jerry, who went from only reading 8 CWPM at beginning of the year to reading 44 CWPM at the end of the year.
Table 3.1 DIBELS Next Scores on Oral Reading Fluency for Beginning (BOY) and End of the Year (EOY).

<table>
<thead>
<tr>
<th>Name</th>
<th>BOY</th>
<th>EOY</th>
<th>(Percentage Growth from BOY)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Raw Score Average</td>
<td>Risk Level</td>
<td>Raw Score Average</td>
</tr>
<tr>
<td>Mia</td>
<td>8</td>
<td>N/A*</td>
<td>37</td>
</tr>
<tr>
<td>Tristen</td>
<td>10</td>
<td>N/A</td>
<td>33</td>
</tr>
<tr>
<td>Jerry</td>
<td>8</td>
<td>N/A</td>
<td>44</td>
</tr>
<tr>
<td>Jack</td>
<td>4</td>
<td>N/A</td>
<td>12</td>
</tr>
<tr>
<td>Noah</td>
<td>10</td>
<td>N/A</td>
<td>44</td>
</tr>
<tr>
<td>Megan</td>
<td>13</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

*No Risk Level assigned at the beginning of first grade

Figure 3.1 demonstrates that all participants made substantial gains from baseline through intervention on both AIMSweb and CR oral reading fluency measures. The group average CWPM more than tripled on AIMSweb passages and more than doubled on the CR CWPM. Maze comprehension scores on AIMSweb and CR passages also showed increases.
Figure 3.1 Group Means on AIMSweb and CR baseline and intervention cold reads.

**ORF and Maze Results**

Table 3.2 shows individual participants’ mean ORF scores during intervention on both AIMSweb and CR passages compared with baseline scores. Additionally, this table shows the average scores for maze assessments on AIMSweb and CR passages compared to baseline scores. Student percentage growth is also depicted. Finally, 2-week and 1-month raw scores on AIMSweb maintenance probes are shown. All students demonstrated moderate to significant percentage growth on both AIMSweb and CR passages.
Table 3.2
Baseline and post intervention scores by mean on CR and AIMSweb passages for CWPM and correct responses on maze passages, and percentage growth for both measure.

<table>
<thead>
<tr>
<th>Participant</th>
<th>AIMSweb CWPM</th>
<th>CR CWPM</th>
<th>AIMSweb Maze</th>
<th>CR Maze</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Baseline (BL)</td>
<td>Intervention (% growth)</td>
<td>*2week (raw)</td>
<td>*1month (raw)</td>
</tr>
<tr>
<td>Mia</td>
<td>9.7</td>
<td>22.4 (130.9%)</td>
<td>41</td>
<td>35</td>
</tr>
<tr>
<td>Tristen</td>
<td>11.7</td>
<td>25.6 (118.8%)</td>
<td>52</td>
<td>32</td>
</tr>
<tr>
<td>Jerry</td>
<td>8.4</td>
<td>38.8 (361.9%)</td>
<td>52</td>
<td>52</td>
</tr>
<tr>
<td>Jack</td>
<td>6</td>
<td>15.8 (163.3%)</td>
<td>24</td>
<td>22</td>
</tr>
<tr>
<td>Noah</td>
<td>20</td>
<td>46.5 (132.5%)</td>
<td>57</td>
<td>58</td>
</tr>
</tbody>
</table>

Students received intervention 3-4 times a week for 10-12 weeks.

(*) = Maintenance data
Figure 3.2 Correct Words Per Minute per Session.

Ext Session- Students repeated this story if they did not reach goal criterion after 3 reads
Figure 3.3 Correct Responses to Maze Comprehension per Session.
Mia

Mia participated in the intervention for a total of 15 weeks. She was selected to begin intervention first because of her descending baseline probes.

**CR CWPM.** During baseline, Mia read a total of three novel CR passages. Her average CWPM score on these passages was 11.7 CWPM (range: 7–16). The average number of errors during baseline was 7 (range: 6–8). Upon starting intervention, Mia did not demonstrate a significant increase in CWPM on novel CR passages. Her goal was initially set to reach 30 CWPM by the end of the intervention. Mia initially struggled to reach this goal and needed to repeat the third story during intervention because she did not meet her goal of 30 CWPM on the treatment (i.e. timed reading) portion of the Reading RACES program. The researcher noticed that Mia demonstrated significant fatigue while going through the steps of the program. This was evidenced by Mia continuously yawning, becoming distracted (i.e., looking around the room, trying to stand up, turning her body, playing with the equipment), and making comments such as “I’m tired, when is this over?” The program took the full amount of time (approximately 40 minutes) for Mia to complete each day because she consistently needed to complete three full “listen to me” practice sessions to meet her reading fluency goal. Initially, Mia tried to get out of completing the sessions by complaining that her head hurt, her stomach hurt, or she was tired. Midway through the intervention, the researcher noticed a change in Mia’s general attitude toward the program as well as her elevated CR CWPM scores. Once Mia was able to reach her goal of 40 CWPM, she no longer needed to repeat any stories because she consistently met her timed reading fluency goal. By the middle of this intervention, Mia’s cold read CWPM scores were averaging around 25 CWPM on a
novel story. Mia also made more positive affirmations such as, “I’m a good reader, I can read now, can I read more stories?” It was noted that many of the errors that Mia made during this time period were primarily proper nouns such as names and “La’Kisha and Jamal”. Mia’s mean CWPM score throughout the intervention was 19.5 CWPM compared to a baseline score of 11.7 which signifies 66.7% percentage growth. An additional perspective comparing her last 3 data points to baseline shows Mia read an average of 21.3 CWPM with a percent increase of 82.1%.

**CR Maze.** Mia’s data for maze responses on CR passages (Figure 3.3) show that she made significant gains throughout the intervention. When provided with CR maze passages during baseline, Mia averaged two correct responses (range: 0–2 correct). Mia did not read the passages aloud, and simply clicked on all of the bolded bubbles in a random order. She stated that she just wanted to “click all of the bubbles.” Immediately after intervention started, the researchers noticed that Mia started reading all of the maze passages aloud and started clicking on bubbles only as she read the choices. It was also noted during the last ten intervention sessions, that when Mia clicked an incorrect answer choice and continued reading, she was able to figure out that the answer did not make sense and go back and change her answer. Mia did not previously demonstrate this skill during baseline. Mia’s mean score on the CR passages during intervention was 7.8 correct answers showing 41% growth (Table 3.2) on this assessment from baseline. Mia’s last three data points show a percent increase of 10.3% compared to baseline.

**AIMSweb CWPM.** Mia read three AIMSweb passages during baseline. Her mean score on these passages was 9.7 CWPM (range: 5–14). This mean was higher than her mean on CR passages. After starting the intervention, Mia had one session where she
scored similarly to baseline (14 CWPM). However, despite this one session, Mia continued to show significant increases on novel generalization passages. Mia’s mean CWPM during intervention was 22.4 CWPM a 130.9% percentage growth from baseline. Mia read an average of 25 CWPM on her last three sessions compared with baseline, displaying 157.7% growth. After the intervention, Mia completed two maintenance probes for these generalization passages. The first probe occurred two weeks after intervention. Mia’s was able to read 41 CWPM on this probe showing that not only did she maintain her progress from intervention, but that she increased her previous fluency scores. She completed a one month probe following the completion of the intervention where she read 43 CWPM. Although this was a slight decrease from her previous maintenance checkpoint, it was still well above her baseline and fluency scores from intervention. In order to be considered at Benchmark, Mia needed to read 47 words correctly in one minute. Mia was extremely close to reaching benchmark during her maintenance probes.

**AIMsweb Maze.** Mia’s maze response data on AIMSweb passages (Figure 3.3) show that when she read novel generalization passages during baseline, her mean score was 1.3 (range: 0–2). Similarly with the CR Maze, Mia simply clicked on all of the bubbles and did not read the passage aloud. She finished clicking on all of the bubbles long before the three minutes were up. During intervention, Mia began reading her passages aloud. Her mean score during intervention was 7.8 correct selections; the data showed a 40% increase. Unlike baseline, Mia never finished completing an entire generalization maze passage. Rather than rushing through and randomly clicking on bolded words, Mia took her time and read each sentence to see what would be the best
selection. On her two week maintenance probe, Mia correctly answered 11 selections on the maze, demonstrating an increase following intervention. Mia’s one month maintenance check was also higher, with 10 correct answers selections on the maze.

**DIBELS Assessment.** Mia completed the DIBELS assessment as a pre-test in the fall and as a post-test during the spring. When Mia first completed the Oral Reading Fluency measure, her median score was 8 CWPM (range: 5–8). When Mia completed the post-test during the spring, her median score was 37 CWPM. According to the DIBELS First Grade Benchmark Goals Mia still falls into Below Benchmark (32–46 words) category. Even though she was not quite at benchmark, Mia’s scores showed a 362.5% percentage increase since the beginning of the year.

**IOA and Treatment Integrity.** IOA was collected with a secondary observer for all phases of the study. Mia’s IOA scores were as follows: 100% IOA on the WRMT-R pre-and post- tests, 100% IOA on her DIBELS assessments, 100% IOA during baseline, 97.1% IOA on intervention sessions, 98% IOA on treatment sessions (i.e. timed reading), 99.1% IOA on generalization passages and 98.6% on her maintenance probes.

**Social validity.** When interviewed after the completion of the intervention, Mia remarked that she really liked reading on the computer because she became a better reader. She said she could also read more quickly. Mia told the researcher that she enjoyed looking at her reading fluency and maze graphs. She especially liked seeing the numbers go up after every session. Mia also mentioned that she liked that the computer would help her with words when she was stuck. She thought other students in her class would also like a chance to read with this program. Mia’s favorite story was a CR passage called “Jolita’s Birthday.”
Tristen participated in intervention for a total of 15 weeks. He was selected for the first tier of intervention because his baseline data showed a descending trend.

**CR CWPM.** During baseline, Tristen read a total of three CR passages. His mean score was 11.7 CWPM (range: 9–14). The average number of errors was 10.3 (range: 8–15). Tristen made a small initial jump upon starting intervention. On his first novel CR passage, he was able to read 19 CWPM which was 5 words greater than the highest read in baseline. The data showed fluctuations with Tristen’s CWPM early in the intervention. Tristen initially struggled to meet his daily fluency goal and had to repeat seven stories throughout the intervention as a result of not meeting his preset reading goal. Similarly with Mia, Tristen demonstrated signs of fatigue/lack of focus early on in the intervention. Some of these behaviors included swiveling in his chair, playing with his headphones, attempting to talk with the researcher, and looking around the room. To help Tristen focus, the research implemented the “Student/Teacher” game. Tristen earned a tally if he was on task and focused, and the teacher earned a tally if he was “caught” off task. The person with the most tallies at the end of the session would win the game. This game helped Tristen to stay focused. He requested to play it every morning when he came to the library. After using the teacher/student game for a full week, it was no longer needed for Tristen. During intervention, Tristen’s mean CWPM score was 18 CWPM; he had a 53.8% percentage increase. When averaging his last three CR sessions, Tristen read 24.3 CWPM showing a 107.7% increase.

**CR Maze.** Tristen’s data for the maze responses on CR passages show that when he read novel CR passages during baseline, his mean comprehension score was 3 correct
answers (range: 2–4). During baseline, Tristen did not appear to understand how to complete the maze and would try to click all of the selections rather than reading through each of the sentences. It was also noted that Tristen did not read these passages aloud. Initially, Tristen would click on words that did not make sense when read in sentence. For example if the sentence said, “the boy played with the ____,” and the options were ball, big, happy, Tristen would select the word “happy.” This selection indicated that he did not comprehend the sentence and was simply guessing. Once intervention started, Tristen demonstrated a steady increase. The researcher noted that like Mia, Tristen began reading the passages aloud during intervention. Tristen’s mean on the CR Maze during intervention increased to 7.3 correct responses (Range: 5–13), with percentage increase of 143%. Tristen also showed more enthusiasm while taking the maze as demonstrated by comments like, “I want to get a perfect on the maze, can I take another maze?” Tristen enjoyed spending time looking at his graph for his maze data and often pointed out that he was close to getting a perfect score. He also would point out his increases on the graph to the researcher. Rather than distractedly looking around the room as the maze was in progress, Tristen used his full three minutes to work on the assessment.

**AIMSweb CWPM.** During baseline Tristen read three novel AIMSweb generalization passages with a mean fluency score of 11.7 CWPM (range: 7–15). Tristen completed five AIMSweb generalization passages during intervention. On each subsequent passage, Tristen was able to read more correct words per minute than he did during baseline. His data (Figure 3.2) indicate that there are no overlapping data points when reading generalization passages. During intervention, Tristen’s mean CWPM was 25.6 (range: 19–37) which is a percentage increase of 118.8%. Tristen more than doubled
his CWPM from baseline through intervention. Tristen averaged 28 CWPM on his last three data points compared with baseline, increasing by 139.3%. During the 2-week maintenance check following intervention, Tristen read a total of 52 CWPM which was the most words he read on any generalization passage. Tristen read a total of 32 correct words per minute on his one month maintenance probe. Although this was lower than his 2-week maintenance check, it was still significantly higher than his performance during baseline and his scores throughout intervention.

AIMSweb Maze. Tristen’s maze response data on AIMSweb passages (Figure 3.3) show that when he read novel generalization passages during baseline, his mean comprehension score was 2.7 correct responses (range: 2–3). Tristen’s scores on the maze comprehension questions increased to five correct responses directly after intervention started. When taking the second AIMSweb maze assessment, Tristen’s score decreased to two correct responses, the same score during baseline. Although Tristen showed a dip during this session, this was the only instance where he scored the same as his baseline. Tristen consistently answered seven questions correctly on the next three AIMSweb comprehension assessments, well above his baseline scores. Tristen increased his correct responses by 137%. Tristen read the AIMSweb passages aloud just like he did with the CR mazes.

During the 2–week maintenance check, Tristen’s maze comprehension scores mirrored his AIMSweb ORF scores. Tristen showed a huge spike when he correctly answered 15 comprehension questions on this assessment. Similarly with his ORF score on the AIMSweb generalization passages, this was the highest score he received on this assessment throughout the entire study. Tristen’s scores on his 1-month maintenance
check also paralleled his performance on his 1–month AIMSweb generalization passages; Tristen’s score of 10 correct questions was slightly less than his previous maintenance check of 15, but still well above baseline. Tristen’s scores on his maintenance checks indicate that not only was he able to maintain these skills, but he could also continue to increase them as he continued reading.

**Social validity.** A second researcher interviewed Tristen at the conclusion of the study to get his input about the RR program. When asked whether he liked using the RR program, Tristen said, “yes, it was fun and I learned how to read good.” He told the researchers that now he was a better reader and he is getting a higher grade in reading. Tristen liked being able to read many different stories and he said he would really like it if he could pick the stories he would want to read. Tristen’s favorite story was a CR story called, “Archie.” He liked this story because it was about football and he really likes to play football. Tristen said that he would like to keep reading on the RR program next year.

**DIBELS Next.** Tristen completed the DIBELS assessment as a pre-test in the fall and as a post-test during the spring. When Tristen first completed the Oral Reading Fluency measure, his median score was 10 CWPM (range: 8–10). When Tristen completed the post-test during the spring, his median score was 33 (range: 26–33) CWPM. According to the DIBELS First Grade Benchmark Goals Tristen still fell into the *Below Benchmark* (32–46 words) category. However it should be noted that Tristen’s scores on this assessment show a 230% percentage increase.

**IOA and Treatment Integrity.** IOA was collected with a secondary observer for all phases of the study. Tristen received 98.3% IOA on the WRMT-R pre-and post- tests.
He also received 97.9% IOA on his DIBELS assessments. Tristen received 96.9% IOA during baseline, 95.6% IOA on intervention sessions, 93.2% IOA on treatment sessions, 99.1% IOA on generalization passages and 100% IOA on his maintenance probes.

**Jerry**

Jerry started intervention with the 2nd tier of students because his first six baseline points had an increasing trend and he needed additional probes to stabilize. Jerry’s participated in the intervention for 13 weeks.

**CR CWPM.** Jerry’s data for his CWPM on CR passages (Table 3.2) show that when he read three novel passages during baseline, his mean fluency score was 9.6 CWPM (range: 8–11). Immediately after starting intervention, Jerry showed significant oral reading fluency gains on novel passages. During his first cold read on a CR passage during intervention, Jerry’s fluency score was 31 CWPM, more than triple his score during baseline. Halfway through the intervention, Jerry was consistently reading novel CR passages with a fluency of at least 40 to 50 CWPM. As is evident from figure 3.2, there were no overlapping ORF data points between baseline and intervention. Jerry initially stated that he enjoyed reading on the computer and often asked the researcher if he could read more than one story each session. Jerry’s mean score during intervention was 33.5 CWPM. Initially Jerry was reading well below benchmark however by the end of the intervention, Jerry’s ORF scores were at benchmark for first grade. Jerry demonstrated a 250% percentage increase growth during intervention. Jerry read an average of 45.7 CWPM on his last three sessions compared with baseline which indicates a 376% increase. Out of all of the participants in this study, Jerry showed the most substantial gains.
**CR Maze.** Jerry’s data for the maze responses on CR passages (Figure 3.3) show that when he read three novel CR passages during baseline his mean comprehension score was 2.3 correct responses (range: 1–4). Jerry did not initially read the maze passages aloud. He was able to finish all of the mazes but it appeared that he was just clicking on random responses because most of his selections did not make contextual sense. Upon starting intervention, Jerry made an immediate increase in his maze scores. During his first intervention session, Jerry correctly answered 6 maze questions. Jerry began reading the passages aloud during the three minute maze timings. He commented that he liked seeing his graph go up during the maze and appeared motivated to increase his score each session as evidenced by his new ability to focus during the entire duration of the 3-minute assessment. Jerry continued to improve his scores on the maze comprehension assessment throughout the intervention. He was able to earn nine perfect scores on his maze assessments. Before starting the session each day, Jerry stated that he wanted to earn a star on his maze graph which indicated that a perfect score was met. Out of all of the participants in this study, Jerry received the most perfect scores on his maze during intervention. Jerry had a mean maze score of 11.4 correct responses during intervention which is a 378% percentage increase.

**AIMSweb CWPM.** Jerry’s data for the CWPM on generalization passages (Table 3.2) show that when he read novel passages on the computer during baseline, his mean fluency score was 8.4 CWPM (range: 6–12). Jerry’s reading was initially very labored and choppy. He took frequent deep breaths and looked around the room when he got stuck on a word. As soon as Jerry started intervention, the researchers immediately noticed a jump in his CWPM. On Jerry’s first novel AIMSweb passage during
intervention, he was able to read 24 CWPM; this score was double his highest baseline score. Jerry continued to increase his fluency scores on the generalization passages throughout the intervention. One his last three generalization probe, Jerry was able to score between 40-50 CWPM. During the 2-week and 1-month AIMSweb maintenance probes, Jerry was able to read 54 CWPM on both assessments. According to the DIBELS first-grade indicators, this would put Jerry at benchmark. Jerry’s mean fluency score during intervention was 38.8 CWPM. Jerry’s overall percentile growth from baseline to intervention was 361.9%. Another perspective comparing Jerry’s last three data points to baseline shows a 444% increase.

**AIMSweb Maze** Jerry’s data for the CWPM on AIMSweb passages (Figure 3.2) show that when he read novel generalization passages during baseline, his mean score was 2 correct responses. Jerry increased his score on the maze comprehension assessment immediately after starting intervention; He immediately jumped to a total of 7 correct responses. During intervention, Jerry read the entire passage aloud as he answered the maze questions. Jerry consistently showed increases on his maze comprehension passages throughout intervention. Because the generalization passages were longer than the CR passages, there were more opportunities for responses during the maze which meant that Jerry did not have enough time to answer all of the questions during the 3-minute timing. Unlike the CR mazes, Jerry did not receive any perfect scores due to the fact that he was unable to finish the entire passage. Jerry more than tripled the number of correct responses from baseline throughout intervention. Jerry’s mean comprehension score during intervention increased to 9.5 correct responses. From baseline through intervention, Jerry’s mean score showed a 375% percentage increase.
During the 2-week maintenance probe, Jerry correctly answered 10 questions on the comprehension assessment. This score was higher than all of his previous maze scores during intervention. On his 1-month probe, Jerry continued to show growth, increasing his score to 14 correct responses during the 3-minute timing; this was the highest score he received on all of the generalization passages.

**Social validity.** Jerry was interviewed by the second researcher in May after he finished the RR program. When asked if he liked the program Jerry said, “Yes and now I like to read.” Jerry mentioned that he was really excited and happy that he earned eight stars (perfect scores) on the maze comprehension portion of the program. He said he liked reading with Betty Buckeye and she made him a better reader. Jerry said, “Now I can read all of the signs around the school!” Jerry’s favorite story was the CR passage “Marcus Runs.” Jerry said he liked this story best because Marcus could run really fast. He also said that his other favorite story was CR passage, “Football in the Park.” Jerry mentioned that he thought other kids would like to use RR so they could also get better at their reading.

**DIBELS.** Jerry showed the greatest growth on the DIBELS assessment compared with the other participants in the study. Jerry’s median scores at the beginning of the year DORF measure was 8 CWPM (range: 7–8). On his end of the year DIBELS assessment Jerry increased his median score to 44 CWPM (range: 34–52). Jerry’s DORF score placed him in the “Below benchmark” risk category. Jerry was 3 words away from being placed in the “At benchmark” category.

**IOA and Treatment Integrity.** IOA was collected with a secondary observer for all phases of the study. Jerry received 98.5% IOA on the WRMT-R pre-and post-tests.
He also received 100% IOA on his DIBELS assessments. Jerry received 100% IOA during baseline, 95.6% IOA on intervention sessions, 100% IOA on treatment sessions, 97.37% IOA on generalization passages and 100% IOA on his maintenance probes.

**Jack**

Jack participated in intervention for 13 weeks. Researchers wanted to place Jack in the 1st tier of intervention because of his low scores, but his baseline data points showed an increasing trend. Jack needed additional probes to stabilize his data before starting intervention.

**CR CWPM.** Jack’s data for the CWPM show that when he read the CR passages without practice during baseline his mean fluency score was 3 CWPM (range: 2–4). On Jack’s first CR intervention passage he was able to read 5 CWPM which was just slightly higher than his score during baseline. Jack continued to display slow, steady progress on his fluency score on novel CR passages throughout the intervention. He frequently struggled to meet his timed reading goal and had to repeat four intervention stories in order to be able to move onto the next passage. Even when he repeated a story, Jack would still forget a word that he had read several times. For example, if Jack was reading a story about “football,” he might forget what it was about and say “soccer” instead. Jack’s mean score during intervention was 14.4 CWPM, a 144% percent increase from baseline. Jack read an average of 21.7 CWPM during his last three sessions compared with baseline, showing 623% growth. Although he did increase, his fluency score still remained well below benchmark for first grade.
**CR Maze.** Jack’s data shows a mean of 4.3 correct responses (range: 2–6) on the comprehension portion of CR passages. During baseline it was clear that Jack was just randomly clicking words on the assessment. He went out of order and just tried to click on as many bubbles as he could within the three minutes. Researchers could tell that he was just randomly clicking because many of his answers made no contextual sense. Similarly with his peers during baseline, Jack also did not read the maze assessment aloud. Jack’s scores during intervention display a more realistic picture of his comprehension. Although his scores show a dip, Jack was no longer randomly guessing and clicking on bubbles. Researchers could see slight progress because Jack attempted to read the passages aloud and work through the different answer choices. Jack still struggled significantly with the maze and still occasionally showed signs of random guessing. Towards the end of the intervention, it was evident to researchers that Jack’s comprehension was slightly improving because he would go back and change a wrong selection after he had read the entire sentence. This action showed that he was able to comprehend the sentence long enough to know that his previous selection did not make contextual sense. Jack’s mean comprehension score on CR passages was 5.2 correct responses. Jack’s percent increase on this assessment was 20.9%. Of all the participants in the study, Jack showed the least amount of growth.

**AIMSweb CWPM.** Jack’s data for his CWPM on the AIMSweb passages (34.3) show that when he read novel passages on the computer during baseline, his mean fluency score was 6 CWPM (range: 3–9). Jack struggled to read all of the passages and was only able to identify sight words such as “to, the, and, it, and so forth.” He was unable to sound out any of the decodable words within the text and would guess words
that did not make sense within the context of the passage. Jack only read five AIMSweb generalization passages during intervention because he typically needed to repeat his CR stories for a second day in order to meet his timed reading goal. His mean fluency score during intervention was 15.8 CWPM. Jack’s overall percent increase on AIMSweb passages during intervention was 163.3% Jack read an average of 19.7 CWPM on his last three sessions which is a 228% increase from baseline. On the 2-week maintenance check, Jack read 24 CWPM on his generalization passage. Though still significantly below benchmark, this score quadrupled his mean baseline score. On his 1 month maintenance check Jack dipped slightly from his previous assessment and read 22 CWPM, still well above his baseline mean.

**AIMSweb Maze.** Jack’s maze response data on the AIMSweb maze passages (3.2) show that when he read novel passages during baseline his mean comprehension score was 4 correct responses (range: 3–6). Similarly with the CR Maze assessments, Jack initially randomly clicked on as many bubbles as he could within the 3-minute timing. He did not go in any sequence and did not read the passage aloud. It was somewhat evident by his selections that Jack was not reading the passages and was blindly guessing. Upon starting intervention, researchers noted that Jack did not click on as many selections as he had during baseline, but instead he actually read the sentence aloud and tried to determine what might fit in the blank. Jack’s reading fluency was slower than the other participants and he was unable to complete any mazes during the allotted time. During intervention, Jack’s mean score on this comprehension assessment was 4.7 correct responses. This is a 17.5% percentage increase. By the end of the intervention, Jack did not blindly click on answer selections as he had previously done.
during baseline. Although Jack’s maze fluency did not increase, his response accuracy did. Rather than randomly clicking and having low accuracy, Jack focused on reading each word and selecting the correct response.

During the 2-week maintenance probe, Jay answered 2 questions correctly on his assessment. On his 1-month maintenance probe, Jay correctly answered 4 questions on the maze assessment.

**Social validity.** Jack enjoyed reading on the computer and told the secondary researcher that he “liked learning new stuff.” When asked if he thought his reading improved Jack said, that he kept “trying and trying for his reading to improve”. He liked seeing his data graphed because he could see that he was improving. He said he liked that Betty Buckeye was able to help him read new stories. He thought his classmates would enjoy using this program because they really like to read. Jack’s favorite story was “Dancing Jaycee.” Jack liked learning about the cheerleaders and hearing this new story. Jack felt like his reading got better and he said he would like to continue reading with RR next school year.

**DIBELS.** Jack was able to read 4 CWPM (range: 4–6) on the DIBELS pre-test at the beginning of the school year. The only words that Jack was able to recognize were “the, to, a, and.” Jack was unable to sound out any of the other words on this assessment. When given the DIBELS assessment at the end of the year, Jack was able to read 12 CWPM (range: 9–14). Jack was able to sound out additional words and use context clues to figure out some words in the story. Jack’s Score Level on this assessment falls into the “Well Below Benchmark.” Jack will continue to need intensive support for his reading.
However it is critical to note that Jack still demonstrated a 300% percentage growth on this assessment.

**IOA and Treatment Integrity.** Jack received 100% IOA on the WRMT-R pre- and post-tests. He also received 100% IOA on his DIBELS assessments. Jack received 100% IOA during baseline, 95.6% IOA on intervention sessions, 99.2% IOA on treatment sessions, 100% IOA on generalization passages and 100% IOA on his maintenance probes. Jack’s case was different from the other students in that he had significant memory challenges. Jack was able to follow the sequence of the intervention, but he needed periodic gestural prompts from the researcher to help him determine which button to click next. Once Jack clicked the correct step for the intervention, he was able to follow all of the directions given by Betty buckeye independently.

**Noah**

Noah participated in intervention for 11 weeks. Noah was placed in the 3rd tier of intervention because he had higher baseline scores and an increasing trend.

**CR CWPM.** Noah’s data show a mean fluency score of 10.3 CWPM (range: 9–20) when he was given three novel CR passages during baseline. Immediately after starting intervention, Noah’s fluency scores on novel passages were higher than baseline. Throughout the entire intervention, Noah only had to repeat one story to meet his timed reading goal of 70 CWPM. Noah’s mean fluency score during intervention was 41 CWPM. This is four times greater than his score during baseline and is an increase of 298.1%. Noah reached his highest repeated reading fluency score of 60 CWPM midway through the intervention.
**CR Maze.** Noah’s mean data on his comprehension assessment during baseline show that when he read three novel CR passages, he correctly answered 2 questions on the assessments (range: 0–3). Noah did not initially read the passages aloud during baseline. After starting intervention, Noah immediately increased his correct responses on the maze to a mean of 13.2 correct responses. This shows a percentage increase of 560%. Similarly with his peers, Noah also started reading the passage aloud during the 3-minute Maze timing. Like Jerry, Noah was extremely motivated by looking at his maze graph. He would often spend time pointing out how much he was increasing his scores and state that he wanted to earn a star. Noah got a perfect score on nine different passages throughout the intervention.

**AIMSweb CWPM.** Noah’s data for the CWPM on AIMSweb passages (Table 3.2) show that when he read five novel generalization passages, his mean fluency score was 20 CWPM (range: 3–30). Noah’s read 27 CWPM on his first passage during intervention which is within his baseline range. However, after this initial session, Noah continued to surpass his baseline scores. Noah’s mean score on the AIMSweb generalization passages increased to 46.5 CWPM. This is a 132.5% percentage increase. Figure 3.2 shows Noah steadily increasing his fluency throughout the intervention. On his 2-week maintenance probe Noah read 57 CWPM which was his highest cold read score throughout the study and above benchmark for first grade. On his 1 month maintenance check Noah read 53 CWPM. If Noah continued to read this fluently on other passages he would be reading slightly above benchmark for his grade level.

**AIMSweb Maze.** Noah’s maze response data on the AIMSweb passages show that when he read novel passages during baseline his mean comprehension score was 6.3
(range: 0–8) correct responses. Upon completing intervention, Noah’s mean comprehension score had 9.8 correct responses (range: 7–13). This is an overall percentage increase of 55.6%. Anecdotally, Noah also showed major improvement in his ability to comprehend the passages. Towards the end of the intervention, Noah was able to make self corrections as he was completing the maze assessment. For example, even if Noah clicked the wrong word initially, he was able to go back and change his selection after he finished reading the rest of the sentence. Noah was not able to do this skill earlier in the intervention and would have just left his answer and not gone back and changed it. Noah got eight perfect scores on the maze assessments. He was very excited to see the stars representing his perfect scores on his maze graph. After receiving his first star, Noah told the researcher that he wanted to earn more stars on the maze. During the 2-week maintenance check, Noah was able to get 16 correct responses on the maze. Noah’s 1-month maintenance probe showed a score of 13 which was slightly lower than his 2-week maintenance check but still significantly above his baseline scores.

**Social validity.** Noah thought reading on the computer was fun and he told the researcher that he has became a better reader since using RR. Noah liked seeing his data presented on the graphs, and especially liked seeing his stars on the maze graph. When asked whether he would like to continue to use RR Noah responded, “yes because it is fun.” He also thought other students in his class would enjoy the opportunity to use the program. Noah’s favorite story was the CR passage, “Snow Angels.” He liked hearing about all of the different things we can do in the snow. Noah said he would want to keep reading on the computer next school year.
**DIBELS.** Noah correctly read 10 words (range: 10–14) on his DIBELS BOY assessment. On his EOY assessment Noah read 44 CWPM (range: 39–51). Noah needed to read three additional CWPM in order to be considered “At or Above Benchmark.” Based on his assessment Noah was still slightly “Below Benchmark.” Noah’s overall percentage increase on this assessment was 340%.

**IOA and Treatment Integrity.** Noah received 100% IOA on the WRMT-R pre- and post-tests. He also received 98.8% IOA on his DIBELS assessments. Noah received 100% IOA during baseline, 95.6% IOA on intervention sessions, 99.2% IOA on treatment sessions, 98.6% IOA on generalization passages and 100% IOA on his maintenance probes.

**Social Validity**

Classroom teachers and study participants completed questionnaires following the intervention. Researchers met with the classroom teachers to discuss specific feedback about the project. The teacher from classroom A, who had four of the five students, expressed that she felt the students had performed “significantly better” in reading following the intervention. She mentioned that Mia was nearly reading at grade level using the Fountas and Pinnell (2006) reading system as a measure. She specifically mentioned that Tristen made significant improvements on his ability to identify sight words within a text. When speaking about Jerry and Noah, she underlined their immense success in the program and their huge jump in reading since beginning intervention. Teacher A noticed that the students who participated in the study were selecting more challenging books to read than their peers. In terms of behavioral growth, Teacher A pointed out that the students who participated in the study exuded more confidence in the
classroom and were more focused during reading instruction. When asked about the importance of providing reading intervention to struggling readers, Teacher A expressed that providing these interventions were extremely vital for the students to make necessary progress. She said she was often overwhelmed in the classroom and could not always find the time to work individually with each student needing support. Teacher B mirrored similar points as Teacher A. Although her student made less substantial gains, she did point out that he jumped two reading levels on the Fountas and Pinnell (2006) assessments. She noted that he was able to identify many more sight words following intervention than in the beginning of the school year. She also noticed that Jack expressed more of his ideas during class discussions of books or texts. Both teachers stated they would like their students to continue receive this intervention during the following school year.

Students also completed surveys and questionnaires following intervention. Overall, all of the students had a positive experience using the RR program. Each student’s specific feedback will be further discussed as each participant's data is analyzed.
Chapter 4: Discussion

This chapter discusses the results of the study according to the research questions and assessment measures. Answers to these questions and measures are based on data collected during the study as well as anecdotal data provided by the participants, teachers, and researchers. Limitations of the study, suggestions for future research, and the conclusions are also included in this chapter. This study was part of a larger development project (U.S. Department of Education, Institute of Educational Sciences [Grant No. R324A120103, 2012-2016]; Batelle Engineering, Technology and Human affairs BETHA Endowment 2015 designed to promote an oral reading fluency (ORF) intervention for primary-aged learners in low-income urban schools. This intervention was implemented as a means to systematically deliver a repeated reading intervention consisting of culturally relevant reading passages delivered through computer software (Cartledge et al., 2015b).

To what extent can first-grade students with reading risk attending urban schools utilize the RR program independently?

The discussion in this section is qualified according to some unanticipated limitations of the software. Although considerable progress was made in the software, the error correction procedure had not been perfected as originally intended at the beginning of this study. Instead of the participant reading errors being detected automatically by the computer, the researcher had to note the errors and click on the words on the computer,
which then were given through the computer as practice words in and out of context. Therefore, because of the researchers’ assistance for this step, it is not possible to state that the students were totally independent in their use of the intervention. The rest of this section discusses participant independence within this qualification.

All five student participants completed the RR program (i.e., finished reading all 25 CR passages). Four out of the five students were able to log on to the computer successfully and independently without any researcher assistance. Jack demonstrated some memorization challenges and needed to use a notecard containing his username and password to login to the program.

The intervention consisted of a total of 10 steps that were critical to ensuring that the program was being implemented with fidelity. All of the steps required students to follow Betty Buckeye’s verbal and written directions following the completion of each section. Betty Buckeye is the term used for the computer narration in the RR program that provided directions and corrective feedback to the participants. Although the participants demonstrated success in using RR software, none of the first graders completed the study with 100% procedural integrity due to issues of distractibility, reading stamina, etc. Tristen, Jerry, and Noah finished intervention with 95.6% procedural integrity while Mia finished with 97.1% and Jack with 99.2%.

Mia began the intervention with some resistance. After listening to the “Read to Me” component of the intervention, Mia would complain that her “eyes hurt” or that she did not feel well. Mia made statements such as “this takes so long” or “can I be done now?” She also asked for frequent drinks of water or reading breaks. At one point early in the study, Mia needed 15 prompts to focus on the program and keep reading. Once
Mia began seeing her scores increase, her off-task behavior significantly decreased. By the end of the study, Mia did not need any additional prompts to focus on the program. On several occasions, Mia asked if she could read an additional story after she completed her passage for the day. Overall, Mia was able to utilize the program with high procedural integrity despite her initial reticence.

Tristen started intervention with high levels of distractibility. Early in the study, Tristen was frequently moving in his seat, looking around the room, fiddling with the mouse or headphones, and talking to the researchers. Tristen had a hard time completing each step of the program without becoming distracted. Researchers initially tallied the number of prompts Tristen needed to stay on task. During the first half of the intervention, Tristen averaged 9 prompts per session (range: 1–10). However, as with Mia, once Tristen noticed slight increases on his reading graphs, he appeared more focused and motivated, with prompts decreasing to an average of 2 prompts (range: 0–4) during the second half of the intervention compared to a previous average of 9 in the first half. The researchers also observed that his behavioral improvements coincided with his steady progress on the reading and maze passages.

Jerry’s early behavior on the RR program mirrored that of Tristen and Mia. Initially, Jerry was very distractible and frequently looked around the room. He also wanted to go quickly through the program and often quickly clicked “ok” before listening to all of the directions. After three intervention sessions, Jerry became extremely motivated to display his best performance and he no longer needed any prompts from the researchers. Of all of the participants, Jerry displayed complete independence the earliest.
and for the longest period of the intervention. Like Mia, Jerry appeared to be motivated by his progress and wanted to continue reading additional passages.

Jack was compliant when using RR but struggled to remember the exact sequence of the program. When Jack was unsure what button to click, he would look to the researcher for guidance. Jack’s behavior indicated other memory challenges throughout the intervention such as remembering how to log on to the computer and remembering his personal login information.

Noah learned how to independently utilize the RR program after his first training session. He used his notecard with his username and password for only one week into intervention. Noah understood how to follow the sequence of the RR program and did not need any additional adult support to complete the program. During the first two weeks of intervention, Noah needed a few adult prompts to look at the computer screen during the “read to me” portion of the program.

The initial reluctance or distractibility evident in several of the participants might partly be due to their age or developmental levels. In addition to being early learners, they were struggling with the grade-level literacy expectations, which they understandably wanted to avoid. Furthermore, up to this point, the children probably had few, if any, systematic and persistent instruction that demanded sustained attention. An encouraging outcome is how all of the children, including Jack, the poorest responder, became consistently engaged once they saw the steady improvement in their own reading performance. This finding points to the benefits of daily feedback through graphing and the on-going application of structured, evidence-based instruction Without such structured interventions young children who show risk are likely to persist in avoidance
strategies, incurring even greater risk as the school year progresses. These findings are consistent with other RR research with young children showing even more pronounced behavior problems (Council, Cartledge, Green, Barber, & Gardner, 2016).

**What effect will RR have on the ORF of novel CR passages for first graders who are showing reading risk?**

All five participants in this study made moderate to significant progress from baseline novel CR passages to novel CR passages during intervention (Figure 3.2). These data demonstrated a functional relationship between participants’ ORF on novel CR passages and the RR program. Three of the five students (Mia, Tristen, and Jack) had overlapping data on their CR passages. Anecdotally, Mia originally struggled with reading stamina and would frequently complain about having to read for such long durations of time. Towards the second half of the study, Mia made positive comments about her progress and it was apparent that the helped to motivate her to try harder and focus more when doing the cold reads. Tristen also had one overlapping CR data point. This particular CR passage contained many, non decodable words such as “La’Kisha, and Jamal.” Jack had many overlapping data points and made very slight, but steady progress. He would benefit from more individualized reading support in addition to a supplemental intervention. Unlike these participants, Jerry and Noah had no overlapping data points and showed a perfect functional relationship between oral reading fluency and the RR program. All of the students showed increases in their ORF CWPM from the beginning of the study. Results from this study contribute to Therrien’s (2004) argument that to improve students’ abilities to read transfer passages, critical elements in RRI must be incorporated such as corrective feedback, modeling the passage, and repeated reading
until reaching the goal criterion. The RR program incorporated these elements and found data indicating the participants’ improved ability to read transfer passages.

**What effect will RR have on the ORF generalization to non-treatment passages (i.e., AIMSweb) passages for first graders showing reading risk?**

All five participants improved their AIMSweb ORF scores from baseline through the completion of the intervention. Both Tristen and Jerry had no overlapping data from baseline through intervention. Mia, Jack, and Noah each only had one AIMSweb passage that overlapped with their highest baseline probe. It is important to note that Mia was given this AIMSweb probe the day before Thanksgiving break. Researchers made a note that Mia seemed less focused and more distracted than usual during this data collection session. This finding of the students’ ORF improvements on their AIMSweb passages further strengthens Kuhl and Stahls’ (2003) argument that fluency interventions can and should be implemented for students younger than third grade. Evidently, these students in first grade were able to make critical gains and generalize these skills, providing some evidence that effective, early intervention earlier can help enhance students’ skills and possibly prevent larger subsequent achievement gaps.

**What effect will RR have on the comprehension of CR passages for first graders showing reading risk?**

Figure 3.2 demonstrates that all five participants who completed intervention made steady gains in their frequency of correct responses on comprehension maze assessments with the exception of Jack who fluctuated throughout intervention. Anecdotally, researchers noted that during baseline and the first half of intervention Jack randomly clicked on all of the responses on the maze. He did not take time to read any of
the responses but instead, clicked on the bubbles out of order. Jack struggled throughout this entire intervention with memory recall and comprehension. For example, if Jack was reading an entire passage about “football” he might click on the bubble “soccer” even though there was no mention of soccer anywhere in the passage. Figure 3.2 shows that Jack’s correct responses on the maze comprehension assessment decreased. However, by the end of the intervention and during maintenance, Jack used his decoding skills to sound out the words and make sense of what he was reading. Rather than randomly clicking on bubbles, he worked to figure out each of the possible selections. Although Jack was only able to answer three questions, he selected the correct bubble as opposed to his random guessing earlier in baseline and the first half of intervention.

Unlike Jack, Noah and Jerry showed a strong functional relationship between the RR software and their comprehension scores. The CR mazes usually contained an average 15 or more multiple selections. Both Jerry and Noah were able to achieve 8 perfect scores on the CR maze assessments. Also, during baseline, all of the students read silently but during intervention, students switched to reading the passages aloud.

Some researchers have questioned whether the maze is a valid measure for assessing comprehension. Specifically, January and Ardoin (2012) worried that the maze might not be a reliable measure because students may be able to respond accurately to a large portion of target words without having to comprehend what they are reading. In this study, researchers noticed that during baseline, nearly all of the participants were inclined to click on as many bubbles as possible to complete the maze in the allotted time. This information supports January and Ardoin’s concerns and shows that perhaps maze assessments should not be the only comprehension indicator because researchers
could not get a true sense of what the students did and did not comprehend. However, the researchers noticed that as students’ reading fluency improved on their passages, they developed a better understanding of how to complete the maze. Students no longer randomly clicked on bubbles to fill. Researchers found a strong correlation between the ORF increases and maze increases. The maze can be a valid measure of comprehension when students have an understanding of how to appropriately complete it. Towards the end of the study, researchers noticed that students often changed their original selections once they continued reading the passage and realized it did not make sense. This shows true comprehension of the text.

**What effect will RR have on the comprehension of non-treatment generalization (i.e. AIMSweb) passages for first graders showing reading risk?**

Figure 3.3 shows consistent gains for four out of the five participants from baseline AIMSweb maze passages to intervention. Based on figure 3.3, Jack made no improvements and appeared to decline in his correct responses. Similar to his CR mazes, this figure is not an accurate reflection of his progress because by the end of intervention, Jack was actually reading the text and selecting correct responses instead of randomly clicking on bubbles. Overall, maze responses on AIMSweb passages were lower than on CR passages. Only two students (Mia and Jerry) showed no overlapping data points from baseline through intervention. One possible explanation is that because these passages were only probes, students did not have any exposure to the text through the repeated reading procedure. Interestingly, four out of five students surpassed their baseline maze scores during their 2-week and 1-month maintenance probes. These results are consistent with other research (Fuchs, Fuchs, Hosp, & Jenkins, 2001) indicating that oral reading
fluency is an important indicator of overall reading competence, including reading comprehension. When looking at students’ data, a positive correlation between their CWPM and maze score is clear.

**Academic Measures**

All participants made steady gains on their DIBELS oral reading fluency (DORF) assessments (Table 3.2) from the BOY to the EOY. Four out of five participants made substantial gains with one participant making moderate gains. There are no DIBELS risk levels listed for the BOY of first grade. Therefore, changes in risk level for participants were not possible to determine. When looking at participant percentage growth, it is clear that each participant made substantial growth compared with their BOY performance.

Mia and Tristen both received a raw score of 8 CWPM on the BOY DIBELS assessment. Both students were able to more than triple their scores with Mia scoring 37 and Tristen scoring 33 CWPM on the EOY assessment.

Jack started out knowing only the words, “a,” “to,” and “the” on his BOY DIBELS assessment. Even though he was able to triple his score on his EOY assessment (from 4 to 12 CWPM), he still needed intensive support going forward. Jack was the only participant who remained in the *Well Below Benchmark* risk level. During the study, it appeared that Jack had significant memory problems. For example, he was the only student who needed to use his login card for the entire duration of the study. His username for the login card was simply his last name with the first initial of his first name. He also frequently forgot the sequence of the RR program and needed teacher support to figure out which button to click even though the buttons were in sequential
order. It appeared that there were some significant cognitive issues, some of which might have been caused by environmental factors. For example, at the end of the intervention the researchers were advised about some significant disruption in Jack’s immediate home environment that was extremely disruptive for him.

Jerry’s impressive gains from 8 CWPM to 44 CWPM was remarkable and was only 3 CWPM from reaching benchmark. Noah also made substantial improvement, increasing from 10 CWPM to 44 CWPM on the EOY assessment.

Like Jerry, Noah was only 3 words away from reaching benchmark and it is was highly possible that he would reach benchmark before entering second grade. These results indicated the importance of implementing reading interventions consistently, for longer periods of time so students have time to close significant gaps and eliminate reading risk. RR could potentially serve that purpose for students at risk for reading failure.

**How will student participants react to the RR program?**

Student questionnaires revealed that all of the participants expressed positive feelings about the RR program. Each participant said that he or she would like to continue to use the RR program in the future and thought that peers would enjoy this program as well. All of the students mentioned that RR helped their reading and they were now able to read harder books. Anecdotally, Jerry mentioned that he liked being able to read signs and posters around the school. By the end of intervention, Jerry would pause in the hallways to read any new posters on the walls and would excitedly state, “I can read these now!” Additionally, researchers recorded that Mia, Jerry, Noah, and Tristen all asked to read additional stories when their sessions were completed for the
day. Researchers noted that all of the students reported that their favorite passages were CR stories. On a few occasions during the intervention, students stopped to make a comment about the story they were reading to the researchers. For example, when Mia read the story “Dancing Deon,” she paused to tell the researcher that she and her friends also liked to dance to the “Dougie” during recess just like Deon.

**How will students maintain progress following intervention?**

All of five participants were able to maintain progress on their AIMSweb ORF probes taken 2-weeks and 1-month after completing intervention. None of the students’ data overlapped with their baseline performance. Mia, Jerry, and Noah demonstrated their highest ORF scores on these maintenance probes. On maze maintenance checks, four out of five students showed scores higher than baseline. Jack was the only student who had overlapping data points. However, the latter scores were a more valid reflection of his capabilities compared with his random clicking during baseline. Similarly with their ORF maintenance probes, Mia, Jerry, and Noah had the highest scores during these maintenance checks. This intervention allowed students to access reading instruction in their classrooms, which helped them to continue demonstrating reading growth after maintenance was collected.

**How will classroom teachers view the RR program?**

Both classroom teachers expressed positive views about the RR program. Teacher A, who had four of the five students, mentioned that all of the students who participated in the RR intervention showed the greatest gains in their statewide assessments. She also noticed that these particular students selected more challenging books to read during independent reading time in the classroom. Teacher B mentioned
that her student was always excited to read on the RR program. Her student’s confidence appeared to improve as evidenced by his increased classroom participation and interactions. Both teachers stated that supplemental interventions are essential components for closing the reading achievement gap in urban communities. They would both like students to receive this intervention in the upcoming school year. The teachers emphasized that they liked that the RR program incorporated stories with which students could identify. This feedback helps to emphasize the importance of students being able to maintain their cultural integrity while succeeding academically (Ladson-Billings, 1995).

**Limitations**

Significant technological changes have been made to the RR program since its beta version in 2013; however, the program still requires human support for implementation. The goal of the RR program was to create a software program that could be used independently by students with teacher supervision and monitoring. Accordingly, teachers with limited resources are able to provide essential multi-tiered support to multiple students at one time.

At the time of this study, humans were needed to support the program with error correction (clicking on the errors the students made while reading) and troubleshooting any technological glitches while the program was running. The computer proved to be highly reliable in terms of timings and sequencing, however the researchers needed to continue to monitor the program.

Procedural integrity checklists showed that the participants were able to execute the program with over 90% accuracy. However, researchers still needed to provide reinforcement and prompts to students who were off task or easily distracted. Research
suggests that CAI can be motivating for students, but nearly all of the first grade students required additional human support (Musti-Rao et al., 2015). Although students found their progress graphs to be reinforcing, researchers incorporated the sticker station as a way of providing additional reinforcement to the participants. It cannot be entirely determined how motivating the RR program is once the sticker reinforcement is removed.

A maximum of four students utilized the RR program at the same time in the library. Although students wore sound blocking headphones, it cannot be determined how distracting it might be for larger groupings of students to participate in the intervention at the same time. Students needed to read the stories aloud, and this could potentially be distracting if executed in a larger classroom setting.

The RR intervention was designed to deliver 25 CR stories. Students who started the intervention in the first tier finished all 25 stories early and could have benefitted from additional intervention. Future studies should expand the CR content to determine if students continue to make significant gains. CR stories were also designed to be culturally sensitive and many of the participants struggled to decode the names of the characters (i.e., La’Kisha, Jamal, Jonetta) in these stories as opposed to the AIMSweb passages that had basic decodable names such as Tom and Ben.

DIBELS Next assessments were not designed to determine Risk Level at the beginning of first grade. Although researchers were able to independently calculate the ORF scores for each participant, it could not be determined whether this intervention improved their risk level. Researchers needed to use the MOY DORF passages as an initial screener in the beginning of the year so they could only compare the BOY raw ORF scores with the EOY raw scores.
Although the maze comprehension was a standard method for assessing comprehension, it was not always a valid indicator of the student’s performance. During baseline, students would randomly try to fill in as many bubbles as possible. This inflated some of the scores so once students actually completed the assessment appropriately, some scores appeared lower, as was the case with Jack.

Finally, researchers did not provide additional CR probes to the students in Tiers 2 and 3 immediately before the students started intervention, allowing substantial time to lapse between CR baseline and intervention. It is possible that students could have “naturally” improved their CR scores before starting intervention. However, because the CR passages served principally for treatment and the AIMSweb passages used as the essential measure of reading growth, the AIMSweb probes give a valid indication of student performance prior to intervention and support the position of experimental control. Ideally, we would administer CR and AIMSweb probes immediately before intervention for all participants, but CR passages were limited to 26, and these passages were needed for the intervention. Experimental control is still apparent when looking at the generalization passages, which was the primary focus of this study. CR passages were critical for getting students invested in reading but reading success was based on the steady reading improvement with non-CR passages upon the introduction of treatment.

**Suggestions for Future Research**

Future researchers should work to ensure that RR can (a) be used independently by larger groups of students, (b) provide independent error correction, and (c) calculate correct and incorrect words without staff assistance. Additionally, it would be interesting to allow teachers to be able to insert classroom stories into the program so RR can be
utilized in conjunction with the classroom curriculum and objectives. It would also be worthwhile to include another form of comprehension assessment in addition to the maze to corroborate whether students comprehend the stories they are reading. Finally, adding reinforcement embedded into the program would enable the researchers to remove the sticker station and external rewards. This would also eliminate the need for additional adult supervision.

**Conclusion**

Findings from this study support previous research that RR can effectively be used to improve reading fluency and comprehension effectively for first-grade urban students at risk for reading failure. That data showing the ORF and comprehension scores for each student demonstrated a functional relationship between RR and reading outcomes. In addition to collected data, anecdotal reports showed improved reading confidence and initiative in the participants. Social validity questionnaires revealed that utilizing RRI was motivating for students. Student participants demonstrated that they were capable of independently utilizing the software and following the procedures with minimal staff support. RR utilized evidence based procedures (repeated reading and culturally relevant pedagogy) to provide a multi-level reading intervention that helped improve reading for first-grade students. This intervention shows potential to minimize reading risk for first-grade students in urban classrooms with limited resources. It will be critical to continue to make technological improvements to this program to ensure that it can be implemented in larger classroom settings.
References


Appendix A: List of culturally relevant and AIMSweb passages
<table>
<thead>
<tr>
<th>Set</th>
<th>Title</th>
<th>Date:</th>
<th>Date:</th>
<th>Date:</th>
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<th>Date:</th>
<th>Date:</th>
<th>Date:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mama Works</td>
<td>Date:</td>
<td>Date:</td>
<td>Date:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Grandpa’s Potato Pie</td>
<td>Date:</td>
<td>Date:</td>
<td>Date:</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>3</td>
<td>Dancing Jaycee</td>
<td>Date:</td>
<td>Date:</td>
<td>Date:</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Archie Hopscotch Game</td>
<td>Date:</td>
<td>Date:</td>
<td>Date:</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>5</td>
<td>Artist Laquita</td>
<td>Date:</td>
<td>Date:</td>
<td>Date:</td>
<td></td>
<td></td>
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<td></td>
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</tr>
</tbody>
</table>

**Aimsweb Number**

<table>
<thead>
<tr>
<th>Aimsweb Number</th>
<th>Title</th>
<th>Date Completed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-PP</td>
<td>Josh and Chris</td>
<td></td>
</tr>
<tr>
<td>2-1</td>
<td>The Bird Feeder</td>
<td></td>
</tr>
<tr>
<td>3-1</td>
<td>Goodbye Mom</td>
<td></td>
</tr>
<tr>
<td>4-PP</td>
<td>John was Walking</td>
<td></td>
</tr>
<tr>
<td>5-1</td>
<td>Molly lives on</td>
<td></td>
</tr>
<tr>
<td>6-PP</td>
<td>One day jack</td>
<td></td>
</tr>
<tr>
<td>7-PP</td>
<td>Grace and Beth</td>
<td></td>
</tr>
<tr>
<td>8-1</td>
<td>Sam was Happy</td>
<td></td>
</tr>
<tr>
<td>9-PP</td>
<td>Hope was the</td>
<td></td>
</tr>
<tr>
<td>10-1</td>
<td>It was Mr. Bees</td>
<td></td>
</tr>
<tr>
<td>11-1</td>
<td>Billy has a</td>
<td></td>
</tr>
<tr>
<td>12-1</td>
<td>Cat Loved Birds</td>
<td></td>
</tr>
<tr>
<td>13-1</td>
<td>Fred is Slow</td>
<td></td>
</tr>
<tr>
<td>14-PP</td>
<td>A Boy Named Tom</td>
<td></td>
</tr>
<tr>
<td>15-PP</td>
<td>Mom and Dad</td>
<td></td>
</tr>
<tr>
<td>16-1</td>
<td>Jeff was Happy</td>
<td></td>
</tr>
<tr>
<td>17-PP</td>
<td>Chris was Not</td>
<td></td>
</tr>
</tbody>
</table>
Appendix B: Training Script
### Training PL Checklist

**Date:**_________ **Experimenter:** _______ **Observer:**______

<table>
<thead>
<tr>
<th>Trainers Actions</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>*Ask student to check in with school personnel and wait to be assigned a computer.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>*Teach student how switch users and log into their account.</td>
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<td></td>
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<tr>
<td>*Tell student to click on Reading RACES icon.</td>
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<td></td>
</tr>
<tr>
<td>*Asked student to put on headphones; adjusted microphone so that it is in front of student’s mouth; ask participant to adjust the computer screen for best view.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Explained setting of the ORF goal using script; student adjusted CWPM based on their goal.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Then, student selected and listened to the program directions (“Hi, I’m Betty Buckeye…”). Student able to click “yes/no” after prompt given.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Checked if participant can use a mouse by having them click on training story “When I grow up”</td>
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<td></td>
</tr>
<tr>
<td>Select Begin and Read aloud for 1-minute</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Go through Pre-Teaching feature saying the correct words</td>
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<td></td>
</tr>
<tr>
<td>Student listened to the story 1 full time and eye gaze followed the blue highlighting feature.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student follows direction to move through the different steps.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Students click <strong>listen to me</strong>; student read independently for 1 min. Took a running record of this practice timed reading.</td>
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<td></td>
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<tr>
<td>Student click <strong>timed reading</strong>; completed timed reading by recording errors and computed CWPM (i.e., treatment probe).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Student click <strong>MAZE comprehension passage</strong>. Student was able to successfully click on missing words in the practice passage.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>*Teach student how to log out of their profile.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asked if there were any questions about the program; asked what the best part about the program was and recorded answer; asked what they would like to change about the program and recorded answer.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Participant Initials:** (1st)___________________________

* = Previously taught criteria
Appendix C: Procedural Integrity Checklist
Date:_________ Experimenter : _______Observer:______

| Used script to ask student to put on headphones; adjusted microphone so that it is in front of student’s mouth; ask participant to adjust the computer screen for best view and tell goal. | Yes | No | Comments |
| Clicked on incorrect words for the probe and clicked save | | | |
| Provided all unknown words (after a 3 sec pause or when a student asked for help on the probe) if necessary | | | |
| Marked on passage when time ended | | | |
| Allowed student to take the maze (for AIMSweb only) and Recorded the Maze scores | | | |
| Did not allow student to take maze if goal score was not reached | | | |
| Gave student neutral feedback and utilized the behavior management system when finished. | | | |
| Recorded the number of prompts the student required. | | | |

1st Grade Initials

Baseline

Treatment Probe
Appendix D: Sequence of Intervention
Archie was born in Ohio. He played football in high school. He ran fast on the football field. He was very good at football. Archie was smart, too. After high school he went to Ohio State. He played on the team from 1972 to 1975. He helped the team win a lot of games. Archie was one of the best football players ever. After he finished at Ohio State, Archie played pro football for 7 years. Then he went back to Ohio State for more school. He is very smart. Now he works for Ohio State.
Appendix E: ORF Data collection sheet
Grandma’s House

Grandma has a big house with lots of steps. She has a bad leg so I run up and down the stairs to get her medicine and slippers. I like to help her. Mama and I need to find a new home. Grandma wants us to live with her. I want to live with Grandma.

On Sunday, I was visiting Grandma. She fell on the steps and broke her leg. I was scared. I had to get help. I called 911. The ambulance took Grandma to the hospital. Grandma and Mama told me I did the right thing.

“We will live with Grandma,” said Mama. “She needs a good, smart, and kind boy like you.”
Appendix F: Maze Comprehension Assessment
Maze Comprehension Assessment

Arthur Ashe was a thin kid that grew up to be one of the best tennis players in the world. As a small child he liked (it to wonder) read books and listen to music (without only with) his mother. He also spent lots (of for my) time practicing. He became so good (course that win) he played at school and later (coming she he) played on the United States (flag team history). He was the best player in the (country pool point).

Arthur played tennis all over the (break world neighborhood) and he was the first black (woman man maybe) to play in some of the (songs games number). One time, one country would not (show visit let) him play because of the color of (his their dry) skin. He did not think this (down should was) fair and he worked to make (mind prizes changes) so all people could play. He (didn't did spring) make things better.

Mr. Ashe was a (hardly happen very) smart man. That is why he was (park not so) good at tennis. He knew how (to back with) play smarter than many other men. (They he loud) was also a very kind and (nice mean for) man. Mr. Ashe always wanted to (be find fantastic) a good person. When he was (young hungry plant), his dad kept telling him that he (should going sunny) always do the right thing, and (that for clever) is what he did. He always (worked sang floor) hard to do his best and to (do drop room) what was right.

After he finished (playing early set) tennis, Arthur still helped people. Later (in live letter) his life he became sick but he (still mess while) worked to help others. People still (remember requested money) what a wonderful man he was, (There Then Must) is even a tennis court in New York (that about food) is named after him.
Appendix G: Student social validity questionnaire
Participant Questionnaire

1) Did you like reading on the computer?
   a. Yes
   b. No
   Why?

2) Do you think you became better at reading new stories on paper?
   a. Yes
   b. No
   Why?

3) Did you like charting your data?
   a. Yes
   b. No
   Why?

4) Would you like to continue to read on the computer?
   a. Yes
   b. No
   Why?

5) Do you think the other kids in your class would like this program?
   a. Yes
   b. No
   Why?

   6) Use the mouse to find your favorite story. Why was it your favorite?

Name of story:
Reason:

7) Use the mouse to find your least favorite story. Why did you dislike this story?

Name of story:
Appendix H: Teacher Validity Questionnaires
Teacher Social Validity

1) Do you think your students became more fluent readers after the intervention was complete?
   a. A little better
   b. Somewhat better
   c. A lot better

   Students who improved their fluency: _________________________

   Students who need more help with fluency:______________________

2) Were your students able to read more challenging texts?
   a. Yes
   b. No

   Why or why not?

3) Did students increase their participation in reading?
   a. Yes
   b. No

   Why/why not?

4) Did you notice a change in the books selected by the readers?
   a. Yes
   b. No
5) Did you notice any changes in the students’ behavior throughout the study?
   a. Yes
   b. No

   Why/why not?

6) Would you say that the students became better at comprehending passages after
   the intervention was complete?
   a. A little better
   b. Somewhat better
   c. A lot better

   Students who improved their comprehension: __________________________

   Students who need more help with
   comprehension:____________________

7) How important do you think reading intervention programs are for struggling
   readers?

8) How can we improve this program?

9) Would you recommend this program to other teachers?