Reading Research for Students with ID: Effective Curriculum and Outcomes

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**Abstract**

The purpose of this study is to investigate the achievability and effectiveness of a computer-based repeated reading program, Read Naturally (RN). RN was used as a reading fluency intervention for post-secondary students with intellectual disabilities. Six post-secondary students, five males and one female, took part in a six-week multiple baseline study. Overall, RN increased the fluency rate of all six students. In baseline, the students had an overall mean of 61 WCPM. During intervention, the students had a collective mean of 77 WCPM. That was 15-point increase with a gain of 26%. There is strong evidence that RN had a positive impact on increasing students reading fluency.

**Reading Research for Students with ID: Effective Curriculum and Outcomes**

Reading is one of the most important academic skills taught to individuals to gain opportunity and success in our society (Chafouleas, Martens, Dobson, Weinstein, & Gardner, 2004). A good reader will have a foundation in phonemic awareness, sight word recognition, fluent reading of instructional-level text and strategy use to aid comprehension (Solis, Ciullo, Vaughn, Pyle, Hassaram, & Leroux, 2012). Although deficiencies in any of these core areas can lead to reading struggles, weak readers and students with disabilities particularly struggle with reading fluency. (Chard, Vaughn, & Tyler, 2002; Fuchs, Fuchs, Hosp, & Jenkins, 2001).

Reading fluency was defined as the ability to read printed text accurately and quickly. A fluent reader reads printed text with few miscues and with an expressive tone (Lee & Yoon, 2015). Reading fluency was measured as a gauge of automaticity. Specifically, fluent readers engage in automatic processing of connected text resulting in a focus on comprehension of what is read (Chafouleas et. al., 2004). Readers who are not fluent read slowly and have disconnected oral reading. This makes it impossible to focus on comprehension. One way to address reading fluency deficits was with repeated reading interventions.

Repeated reading is derived from a theory of automatic word processing which addresses the concepts of automaticity within reading fluency (Swain, leader-Janssen, & Conley, 2013). Repeated reading has been described as a suggested procedure to increase reading fluency (National Reading Panel, 2000). In conjunction with other interventions, such as passage review, performance correction, and error correction, repeated reading can have a positive impact on increasing reading fluency (Lee & Yoon, 2015). With repeated reading, students are required to read the same passage more than once in a period (Swain et al., 2013).

By addressing reading fluency deficits, it aids in comprehension of written text and offers greater access to society. However, our students with disabilities, mainly those with intellectual disabilities (ID) do not always receive the reading support needed. In turn, this may limit their access to opportunities in society and further widen the gap in employment or post-secondary education.

**Literature Review**

In 2011, only 32% of adults with intellectual disabilities (ID) ages 20-30 were employed compared to 74% of adults without disabilities (Sulewski, Zalewska, Butterworth, & Migliore, 2013). Further, a recent survey of 11,599 adults with ID in 16 states found that only 14.7% were competitively employed (Human Services Research Institute, 2012). Increasingly, students with ID are looking to post-secondary programs to help prepare them with skills needed to be successful both in post-secondary coursework and careers (Neubert & Moon, 2006). Reading ability is a key factor for success in these areas. Higher student reading ability allows greater access to job positions and sustainability within employment settings (Grigal, Hart, & Migliore, 2011).

Historically, existing programs for students with ID focus on independent living, functional, and social/personal skills (Neubert & Moon, 2006). Yet, reading has generally not been emphasized because educators often incorrectly assumed that students with ID cannot learn to read (Browder, Trela, Gibbs, Walkman, & Harris, 2007). Although reading instruction has historically been under-emphasized for persons with ID, recent advances in policy and research have begun to promote increased expectations for instruction and achievement in reading for this population (Browder et al., 2008).

Nevertheless, research in this area is almost nonexistent. My research involved discussing the lack of research in reading instruction for post-secondary students with ID. To promote success in academics, a computer-based repeated reading intervention is being implemented to potentially allow students with ID to increase their reading fluency. This will allow greater post-secondary opportunities. Furthermore, promoting entree to job positions and sustainability within the employment setting (Grigal et al., 2011). Increasing the reading ability for student with ID offers this population the chance to close the employability gap with their non-disabled peers.

**Research Purpose/Questions**

The purpose of this study was to investigate the achievability and effectiveness of a computer-based repeated reading program, Read Naturally (RN), as a reading fluency intervention for post-secondary students with ID. RN combines teacher modeling, repeated reading, and progress monitoring to create a powerful tool to individualize instruction. RN was developed to enhance reading fluency for struggling readers.

**Research Question**

RQ 1: Is there a functional relation between repeated reading using RN computer-based reading program and increasing the fluency rate of post-secondary students with ID?

**Method**

**Setting**

This study took place in a classroom at a large mid-Atlantic University that offers academic supports and social experiences (e.g. job coaching, internship, self-determination course, catalog courses) for students with ID. All sessions were conducted in a classroom. The sessions were, in the morning, on Tuesday, Wednesday, and Thursday. The intervention required that each student have a laptop and headphones. One instructor worked with three students at a given time.

**Participants**

Students with ID attend a four-year curriculum, where they graduate with a certificate of completion. There are six adult students ranging from the age of 20- 24. The study consisted of five males and one female, all who were identified as students with ID. The students identified in the study were selected by the school administrative team as possessing reading skills that were below their same-age peers. Students were excluded if they had a high decoding and word list equivalency above a fourth-grade level.

To validate the selection of the students, all students were administered placement fluency passages from the Qualitative Reading Inventory (QRI) assessment. This assessment found strengths and weakness of the students and identified their proper reading placement level. The reading program at the university was made up of two parts a) the RN intervention, and b) the classroom curriculum. The identified students with ID took part in the intervention as well as their scheduled reading curriculum. All students received a pseudonym for the study. All students signed a consent form and IRB approval was granted for the study. Table 1(see appendix A) was a description of the students.

**Participant 1.** Darren was a 20-year-old Middle Eastern male with Autism Spectrum Disorder (ASD). Darren’s reading equivalency was that of a sixth grader. He was a freshman and had no prior exposure to the intervention. Darren had the ability to retell setting and characters read in a story. He struggled in finding the problem and major events in a story read. English was his second language.

With the intervention, he read in a loud voice and made eye contact when talking to the instructor. He needed little prompting to begin the intervention. During intervention, he was focused and consistent with completing a whole session in the allotted time.

**Participant 2.** Charles was a 22-year-old Caucasian male with ASD. Charles read at an equivalency level of a fifth grader. He was a freshman and had no prior exposure to the intervention. Charles could retell a simple story. He struggled with selecting strategies to unknown words and making inferences to text read.

With the intervention, Charles read in an unsure voice and always made eye contact when talking to the instructor. He did not need any prompting to begin the intervention, but needed positive encouragement from the instructor throughout the intervention. During intervention, he was focused and consistent with completing a whole session in the allotted time.

**Participant 3.** Jason was a 21-year-old Asian male with Down Syndrome (DS). He was a freshman and had no prior exposure to the intervention. Jason was a strong decoder, but struggled to retell read passages. English was his second language.

With the intervention, Jason read loudly and had a heavy accent. He always made eye contact when talking to the instructor. He never required prompting to begin the intervention. During intervention, he was focused and always finished in the allotted time.

**Participant 4.** April was a 20-year-old Caucasian female with DS. April read at a grade equivalency of a third grader. She was a freshman to the program and had no prior exposure to the intervention. April had the ability to apply limited strategies (phonetic cues) when she encounters a word she does not recognize. April’s fluency rate was low compared to the students in the study. She could retell beginning, middle, and end of a story read.

With the intervention, April read in a quiet voice and rarely made any eye contact with the instructor. She needed consistent verbal prompting to begin the program. During intervention, she was on task and required no redirection to stay focused. She was consistent in completing a whole session in the allotted time.

**Participant 5.** Joey was a 22-year-old Asian male with DS, ASD, and Attention-Deficit/ Hyperactivity Disorder (ADHD). Joey read at a grade equivalency of a third grader. He was a freshman and had no prior exposure to the intervention. Joey could implement decoding strategies when he encounters words he does not recognize. He struggled with retelling a story.

With the intervention, Joey read in a loud voice. Joey often initiated conversations with his peers. He always made eye contact when talking to an instructor. He needed consistent redirection to begin the intervention. He was easily distracted. During intervention, he required consistent redirection to stay on task and finish the program. Joey rarely finished the intervention session in the allotted time.

**Participant 6.** Paul was a 24-year-old Middle Eastern male with ID. Paul read at an equivalency level of a third grader. He was a junior and had no prior exposure to the intervention. Paul struggled with decoding words and retelling a story read. English was his second language.

With the intervention, Paul read in a loud voice and spoke with a heavy accent. He always made eye contact when speaking to an instructor. He did not need prompting to begin the intervention. During intervention, he was focused and always finished in the allotted time.

**Independent Variable**

The intervention for this study was RN to improve fluency for post-secondary students with ID. RN was an interactive on-line repeated reading program with instruction or remediation presented on a computer that gives immediate feedback. The program was a self-paced direct instruction curriculum with audio and visual supports to enhance reading. It was supported by visual and auditory prompts that guide students through steps to develop fluency and phonics skills, support comprehension, and improve vocabulary. The program tracked student progress and used the data to aid the teacher in differentiating instruction with student’s interest of choice with reading passages. The program needed internet access, licenses for use, and computers.

There are eleven steps that must be implemented with this program. During treatment, the following 11 steps are (1) select a story: the instructor will select a story from the appropriate fluency level for that student, (2) key words: with audio support, the student learns a few vocabulary words that are key to understanding the story, (3) prediction: the student uses the story titles, illustration, and key words to write a prediction about the story, (4) cold timing: the student is timed for one minute and records the words-correct-per-minute score, (5) graph cold-timing score: The student graphs the number of words read correctly in blue on the Fluency Graph, (6) read along: The student reads along quietly with an audio recording of the story (teacher modeling) until he or she is able to read the story without errors. Usually a student reads along three times, but this varies depending on the age and ability of the student, (7) practice: The student reads the story quietly multiple times (repeated reading), timing himself or herself to check progress. The student continues to read the story until he or she can reach an individual goal, which is a predetermined number of words read correctly per minute, (8) answer the questions: The student answers comprehension questions about the story, (9) pass: The teacher does a hot timing. The teacher listens to the student read the story and determines whether or not the student passes the story and is ready to work on a new story. The student passes the goal when they have read the story with three or less errors, (10) graph hot-timing score: If the student passes, the hot-timing score is graphed in red on the fluency graph. The student graphs the hot-timing score above the cold timing score, which provides visual feedback on how much improvement the student made by working on the story and (11) retell the story: the student retells or summarizes the story, reinforcing comprehension (Read Naturally Live).

**Materials**

RN was used to support repeated reading to promote reading fluency. A total of eleven passages, ranging from 100 to 180 words from grades K-6 from the program were used. RN required a computer and internet access. Hard copies of the proper grade level reading passages were provided in the student’s individual folders during baseline and intervention. This allowed the instructor to check words correct per minute (WCPM).

**Baseline materials.** Materials included randomly selected hard copy reading passages from RN (PDF’s). The passages are expository passages selected from the student’s instructional level. Also, included are a classroom, pens, stop watch, and recording device.

**Intervention materials.** During intervention, students are exposed to RN with a laptop in a classroom. The students’ progress was individually checked with an intervention log that can later be used to track their individual progress. Also, included are a classroom, headphones, pens, stop watch, licenses for the program, and recording device.

**Dependent Variables**

The study investigated oral reading fluency of passages by recording WCPM as the dependent measure. Students with ID were asked to orally read an entire passage while the instructor followed along on a separate copy of the same passage. In table 2 (see appendix A), the instructor recorded all the students cold and hot times.

WCPM was a number found by calculating the number of words read correctly per minute, in experimental conditions on students’ reading ability. WCPM was configured by adding the total number of words read in a minute and then subtracting the total count by words read incorrectly (Chard et al., 2002).

**Research Design**

To support the research question, a single subject research method was implemented. Single subject research methods help to establish evidence based practices (Horner, Carr, Halle, McGee, Odom, & Wolery, 2005). The results from this study may have the potential to help establish a foundation in improving reading fluency for students with ID. The method chosen was a multiple baseline.

A multiple baseline, single subject research design was selected to compare the impact of a computerized reading program on reading fluency. A multiple baseline design met practical requirements in the research by (a) program efficacy, (b) no withdrawal of the intervention, (c) easy to check and conceptualize (Gast, Lloyd, & Ledford, 2014). With the research question of addressing reading fluency with a computerized reading program, students are gaining academic skills that are irreversible. This made a multiple baseline the best choice.

Taking a multiple baseline approach (Kratochwill, Hitchcock, Horner, Levin, Odom, Rindskopf, & Shadish, 2010), allowed for a systematic approach version of the replicated AB design. This research design allowed for replication across participants while keeping a systematic staggered intervention introduction. For example, in the design, all students are introduced to a baseline. When there was stability, with at least five points noted, the intervention was introduced to one participant. There should be an immediate change to the participant receiving the intervention (upward or downward depending on the study). Meanwhile, the remaining students should stay relatively stable. The intervention was introduced to the second student and so on until all students receive the intervention. This design allowed for replication across students while keeping a systematic staggered intervention introduction. The design must have three tiers with six phases. In this design, time restraints and threats to internal validity must be taken into consideration.

**Data Collection Procedures**

Prior to the intervention phase, students received explicit instructions on how to use RN by the instructor. All sessions were conducted in a classroom during the school day. The identified students received the intervention in the morning. The students were given the intervention for forty minutes, three times a week for nine weeks. The intervention was administered by an instructor in a doctoral program and two instructors in a graduate program in special education.

In the beginning of the study, students’ placement was decided by the results of their QRI scores. Next, the students were exposed to hard copies of RN, on their instructional reading level, to show stability in baseline. All their scores were recorded on their data sheet (see Appendix A, table 2). To receive intervention, an individual student must be given a minimum of five reading sessions and show stability. The decision to decide who received intervention was decided by the administrative team. The variables of behavior were a factor. To ensure maintenance, the students received the intervention two weeks post of the last recorded intervention

**Baseline procedures.** During baseline sessions, students were given the QRI passage to decide the proper reading grade level to start. Students’ read fluency passages saved as a PDF from RN. Students completed a 1 minute cold reading of the self-selected passage. Errors were counted and subtracted from the total words read for a cold score. Then the students read the remaining passage with the instructor. After the students read the entire passage independently, they answered the comprehension questions at the end of the passage. Finally, the students were given a 1 minute hot read of the passage previously read with the instructor. Errors were counted and subtracted from the total words read for a hot score. Each cold and hot read was audio recorded for reliability purposes. WCPM was recorded for cold and hot reads on the corresponding fluency passage by the instructor.

**Intervention procedures.** Prior to the intervention phase, students received explicit instructions on how to use RN from the instructor. During intervention phase, eleven steps were followed. The eleven steps included, (1) selecting a story, (2) reviewing key words, (3) prediction, (4) cold timing, (5) graphing cold timing, (6) read along, (7) practice, (8) answer the questions, (9) pass, (10) graph hot-timing score, and (11) retell the story. Out of the eleven steps, the research was present to see and record data for steps (4) cold timing, (5) graphing cold timing, (7) practice, (9) pass, and (10) graphing hot-timing score.

For instance, during intervention sessions, students used laptops assigned to the university. The students received RN for forty minutes a day, three times a week. All assigned laptops had RN installed. Each student had his or her own individual log in to track progress. At the beginning of each session, each student would come into the classroom, sit down at his or her computer, and begin working in RN. After the student selected a reading program for the session, they would notify the instructor. The instructor would then follow the earlier steps implemented in baseline to collect a hot and cold number for WCPM.

**Maintenance or generalization procedures**

All students received maintenance. The students received the intervention two weeks’ post of the last recorded intervention

**Interobserver Agreement**

All observers were trained to score RN by the research team. All observers were fellow graduate students in the field of special education. The observers listened to passages and scored each passage individually. IOA was computed by taking the number of agreements between the independent observers and dividing by the total number of agreements plus disagreements.  The coefficient is then multiplied by 100 to compute the percentage of agreement (Kratochwill et al., 2010). After the all the passages were scored, they met to review their scorers and discussed any inconsistencies in scoring. A total agreement of 100% was met with scoring passages.

**Procedural Reliability (or Fidelity of Intervention)**

Reliability data was collected for the independent and dependent variable by the instructor. There was a checklist provided for procedural steps to check the implementation of the independent variable (11 steps). Observations were made for all the sessions. With the instructor attending and taking part in every session of the intervention, 100% procedural reliability was observed for all sessions.

Dependent variable reliability was collected throughout the study for a total of 66% of the session. This was done by the recorded audio files of the reading passages. Reliability was recorded by point-by-point method (number of agreements divided by the disagreements plus disagreements multiplied by 100). The mean percentage of agreements was 98%, with a range from 94% to 100% (Kratochwill et al., 2010).

**Social Validity**

The three levels of social validity (goals, procedures, and effects) were addressed with the students (Gast, 2014). Before and after the intervention, each student was asked social validity questions about the program and their interpretation of being a proficient reader. In the beginning of the intervention, the students were videotaped and asked, (1) Why is reading important? (2) How does reading impact your life? (3) Do you feel like improving your reading is important? After the intervention, while the students were videotaped they were asked, (4) How did it make you feel to participate in making your own goals for Read Naturally? (5) Did you feel that you had input into your goals? (6) What did you do to meet your goals? (7) What are your goals for reading moving forward? (8) How did you like Read Naturally? (9) What did you like about Read Naturally? And (10) How would you change it?

**Data Analysis**

**Visual analysis.** In visual analysis, the target behaviors were observable and stable over time. The data was collected with interval sampling one time each session. Kratochwill & Levin, (2014) said that the four steps in visual analysis that need to be addressed are (a) baseline, (b) documentation of a predictable problem, (c) basic effects, and (d) experimental control. The six features used to assess basic effects were level, trend, variability, overlap, immediacy, and consistency. A percentage of non-overlapping data (PND) was used to calculate an equivalent effect size. PND was chosen because it was straight forward and simple to calculate and interpret (Gast & Spriggs, 2014). To calculate PND, intervention points that did not overlap with the highest or lowest baseline data point must be divided by the total number of all interventions that were observed (Scruggs, Mastropieri, & Casto, 1987).

**Results**

**Visual Analysis**

In figure 1(see Appendix B), six post-secondary students with ID were exposed to a computerized reading fluency program. The aim of the study was to increase the WCPM read by the student. Overall, findings for the study showed the use of RN increased the fluency rate of all six students. In baseline, the students had an overall mean of 61 WCPM. During intervention, the students had a collective mean of 77 WCPM. That was a 15-point increase with a gain of 26%. The overall trend displayed a positive increase with the intervention, indicating that the intervention had a positive impact on increasing WCPM. In baseline, the variability was high; however, in intervention the variability became stable for most of the students. There were three students with significant overlap in the study. All students had an immediacy of effect with the intervention. In assessing consistency, with increased WCPM, there is evidence of RN being effective for students with ID.

**Participant 1.** In response to research question one and seen in figure 1, Darren’s fluency during baseline had a mean of 84 WCPM (range from 79 to 94). In baseline, Darren showed a downward trend. There was little variability in his score. In intervention, Darren’s mean score increased to 118 WCPM. That was a 41% increase from baseline.

During intervention, Darren displayed an immediacy of effect. In intervention, after his first two sessions, his score dropped but then found stability through the rest of the intervention. He had no overlap. In the first two sessions, Darren’s score improved and then dropped for his third session before he found stability. Darren’s PND was 100%. The intervention was effective.

**Participant 2**. In response to research question one and seen in figure 1, Charles’s fluency during baseline had a mean of 82 WCPM (range from 78 to 88). In baseline, Charles had a flat stable score. There was little variability in his score.

During intervention, Charles’s mean score increased to 89 WCPM. That was a 9% increase from baseline. Charles had an immediacy of effect with the intervention. After his first two sessions, his score dropped and he struggled to gain stability throughout the intervention. He had an overlap with baseline and intervention. Charles’s PND was 40%. The intervention effect falls below 50%, which makes it ineffective.

**Participant 3**. In response to research question one and seen in figure 1, Jason’s fluency during baseline had a mean of 66 WCPM (range from 53 to 95). In baseline, Jason showed a positive upward trend. After the fifth session in baseline, he began to move in a downward trend. He had variability in baseline.

During intervention, Jason’s mean score increased to 72 WCPM. That was a 9% increase from baseline. With the intervention, Jason showed a slight immediacy of effect. Jason’s score did increase with his first initial session and then fell downward for his fourth session. He eventually began to stabilize. Jason displayed less variability in treatment than baseline. Jason had an overlap. Jason’s PND was 0%. In baseline, Jason scored 95 WCPM. In intervention, his highest score was 84 WCPM. The intervention was ineffective.

**Participant 4**. In response to research question one and seen in figure 1, April’s fluency during baseline had a mean of 43 WCPM (range from 40 to 48). In baseline, April showed a flat stable trend with little variability.

During treatment, April’s mean score increased to 60 WCPM that was a 40% increase from baseline. With the intervention, April displayed an immediacy of effect. She had a positive upward trend with little variability. She had very little overlap. April’s PND was 88%. The intervention was effective for April.

**Participant 5**. In response to research question one and seen in figure 1, Joey’s fluency during baseline had a mean of 48 WCPM (range from 32 to 66). In baseline, Joey showed variability of upward and downward trends.

During intervention, Joey’s mean score increased to 61 WCPM. That was a 27% increase from baseline. With the intervention, Joey displayed a slight immediacy of effect. After his first three sessions, his score dropped but then would increase in an upward trend and drop. This was his pattern throughout the intervention. Joey had an overlap. Joey’s PND was 50%. The intervention was ineffective.

**Participant 6**. In response to research question one and seen in figure 1, Paul’s fluency during baseline had a mean of 45 WCPM (range from 38 to 55). In baseline, Paul was stable with a flat trend with little variability.

During intervention, Paul’s mean score increased to 63 WCPM. That was a 40 % increase from baseline. With the intervention, Paul displayed an immediacy of effect. He had a positive upward trend with little variability. After his first two sessions, his score dropped but then found stability throughout the intervention. He had minimal overlap. Paul’s PND was 83%. The intervention was effective.

**Discussion**

The study reports finding from an intensive reading fluency intervention on reading outcomes of post-secondary students with ID. The study was to investigate the use of a repeated reading intervention, RN, to increase reading fluency measured by WCPM. Students were in a group that received RN for forty-five minutes a day, three times a week by a trained instructor and checked for fidelity by the doctoral instructor.

Results indicated that there was a moderate functional relation between RN to increase WCPM for students with ID (Kratochwill et al., 2010). In Figure 1, baseline was consistent for all students. Each student had at a minimum of five sessions in baseline. In baseline, the trends were flat or downward. There was one student that had an upward trend in baseline, but eventually stabilized over time. The intervention phase received a strong rating. Visual analysis showed an immediacy of effect for all participants. Students were introduced to the intervention when the prior participant displayed an upward trend. Vertical analysis was consistent (Gast & Spriggs, 2014). Per their PND, there were three students that the intervention was ineffective. The rest of students PND were effective or highly effective. 50% of the students displayed effective results from RN. All students increased their initial WCPM after the introduction of baseline. All students kept their gains after maintenance.

Another noteworthy finding from this study was the WCPM increased for all students regardless of their effectiveness measured by their PND. In the intervention, passages increased in reading levels over the course of the intervention. Some studies suggest that poor readers decrease in reading fluency improvements as the reading passages difficulty increases (Meyer & Felton, 1999). Still, this study does not reflect that notion. Unfortunately, this study did not research what factors supported the increase in WCPM. Also, observed was a decrease in individual errors in cold and hot recordings in the intervention.

**Practical Implications**

There was an increase for all six students in the study. The implementation of RN was practical. It is a scripted reading program. This can allow anyone the capability of implementing the program with fidelity. The program allowed the student to select their own story, which in turn can help with student buy-in. Individual RN license cost for the program was moderate compared to other reading programs. One limitation of the intervention was the materials needed to implement the program. RN required internet service, computers to support the program, headphones, and a classroom.

RN had practical applications for instruction. For instance, the program was designed to let students go at their own pace to master each fluency passage; however, the downside of this is watching students when they are doing their independent readings (cold, practice, and hot). It was vital that the instructor watch their independent practice. This stood important to ensure a correct fluency score. During the cold phase, the teacher must listen to the students to ensure they were reading words correctly. This helped students understand how to correctly pronounce a word and called their attention to the words they are not pronouncing correctly.

RN had software for the students to define words not known and take mini-quizzes for vocabulary related in the story. The software program can aid in student engagement throughout the intervention. RN recommends a teacher-student ratio of no more than 1:8; though, for the needs of students with ID, it is suggested a 1:4 ratio. The time for the students to work through the program should be a minimum of 40 to 45 minutes per session.

**Limitations and Future Research**

Although this study highlighted some exciting findings, there are several limitations the study should take into consideration. Of first concern was the time constraint. There were several instances where the students were held past the allotted time to complete their sessions. This could have created anxiety in students and affect their score. A second limitation was related to the amount of time exposed to the intervention. The students received the intervention three times a week for forty minutes. Preferably, four to five times a week for forty-five minutes would be ideal.

The study displayed an impact on reading fluency that a repeated reading program can have on students with ID. The program not only gave the students positive gains in the WCPM, but the students could sustain their gains after maintenance. As noted, reading fluency plays an important role in the ability to read (Chard et al., 2001). However, given the complexities of working with the population, future research should investigate using other direct reading fluency programs and document their impact.

**Reflection**

This study was a great experience. My area of focus included increasing reading fluency for students with ID (Mason LIFE). There were a multitude of variables that I did not consider throughout my study. Being a novice to single subject research, I am not sure that I could have prepared for theses variables. On the same token, this study exposed several challenges met that I was not fully prepared to handle. Though I learned many things during the project, I will focus on three overarching themes that had the greatest impact.

First and foremost, the complexities that come with designing and planning a single subject research study. In reflection, I should have spent more time planning my study. I was working with a research team at Mason Life and the team decided we should do a multiple baseline study for the students. I did not possess an understanding of what was needed in a multiple baseline study. As I was progressing through EDRS 823, I realized that there were “huge” gaps in my knowledge. For instance, I did not understand that students must have a minimum number of sessions in baseline. If a student was not showing stability in baseline, I could not give them the intervention. In turn, the next student could not receive the intervention until the first student was responding to the intervention in an upward trend. Knowing these factors going into the study, I would have been selective on my inclusion/exclusion criteria and how I justified who received the intervention first.

I did not have a clear rationale for my dependent variable. Specifically, I did not put enough thought into justifying why I should collect information on WCPM. I did not take into consideration other variables that I could have measured. Furthermore, I did not take into consideration reading grade level progression of students in the intervention. Reflecting, I should have set-up a time to meet with the administrative team to discuss this scenario. Overall, if I was to conduct this study again, I would give more thought into the design and what was needed to make the program run smoothly.

Secondly, I did not take into consideration all the material that was needed. To implement the intervention one must have internet capability and a working computer. There were times in the study, where students could not get on the internet, the students were booted out of the program, and the laptops would not connect to the webpage. The lesson I learned from this was two-fold, (a) always have other reading material to give to the students, including hardcopies, and (b) try to identify which student(s) will be emotionally affected if the internet connection is lost. I also did not take into consideration working headphones. On several occasions, the students’ headphones would not connect properly to the laptop. Additionally, my recording devices were outdated and I had to buy other audio recording devices. Material in a study should be on the top of a priority list and therefore a checklist should be made upfront with contingency plans for each item on the list.

Lastly, working with the population was an experience within itself. As a former special education teacher, I have worked with students with learning disabilities or behavior disorders for over 15 years. I was familiar with the characteristics of students with ID, but I never had the opportunity to work with them directly for long periods. I learned two things from this experience.

First, the Mason LIFE students are kind, trustworthy, and aware that they need help with reading. As an educator, I was ignorant to the fact that students with ID were self-aware of their reading struggles and highly desired to be a better reader. I was taken aback by their willingness to take part and work hard.

Second, even though the students are the ages of an adult, there social cognition is not equivalent to their age. As an instructor, I had to implement a lot of positive encouragement and nurturing behaviors. As I spent more time with the population, I found my teacher persona lowering and my parent persona taking the lead.

In conclusion, when thinking about this study I would have spent more time planning. I should have spent more time talking to experts in the field and making sure I had a clear design for the program. I should have developed an action plan and a checklist to support my implementation plan. I could have researched my population to gain a better understanding of what physical and emotional supports they would need for the intervention. Still, I would be selective of my student participants. I could have done a better job meeting with my administrative team to seek guidance in the study. Overall, I could have done a thousand things better. However, until I had a first-hand experience of implementing a single case design, I would not have known what worked and what needed to be refined. In the end, I feel that this was an invaluable, positive experience and yielded some interesting results for further research.

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**Appendix A**





**Appendix B**

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***Figure 1***