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Closing the Early Literacy Skills Gaps Through Supplemental Phonics Instruction

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This is to certify that the doctoral dissertation by

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and that any and all revisions required by
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Abstract

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MA, Binghamton University, 2005

BS, Buffalo State College, 2000

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Abstract

The purpose of this quasi-experimental quantitative study was to determine whether the supplemental phonics program, Fundations, improved reading skills over time. Ehri's theory of orthographic mapping served as the theoretical framework for this study. Archival data from 254 second grade students who did, or did not, participate in the supplemental phonics program Fundations when they were in kindergarten were analyzed using a one-way MANOVA via SPSS software. Participation in the Fundations program was statistically significantly associated with a significantly higher score in words correct, accuracy, and retell scores on the DIBELS assessment, F (3, 251) = 4.254, p = .006; Wilk's Λ = 0.952, partial $\eta 2$ = .048. Analyses examined the tests of between-subjects effects table to determine how the dependent variables differ. Participation had no significant effect on the words correct subtest score (F (1, 253) = 3.24; p =.073; partial $\eta 2$ = .013), the accuracy subtest score (F (1, 253) = 3.26; p = .072; partial $\eta 2$ = .013), and the retell subtest score of the DIBELS assessment (F (1, 253) = .006 p = .937; partial $\eta 2$ = .000). Of the respondents, 48.8% identified as male, and 51.2% identified as female. Additionally, 87.5% of respondents identified as White, while 12.5% identified as non-White. It is recommended that results from this study be shared with educators to expand the knowledge base and to assist with closing the reading gaps students may have. Results may be used to inform positive social change through informed curricular decisions for school districts, with the goal to improve overall school efficiency and student performance.

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Dedication

This dissertation is dedicated to my family. Without their support this would never have been possible.

Table of Contents

List of Tables iv

List of Figures v

Chapter 1: Introduction 1

Background 3

Problem Statement 6

Purpose of the Study 9

Research Questions and Hypotheses 9

Theoretical Framework for the Study 12

Nature of the Study 13

Definitions 14

Assumptions 15

Scope and Delimitations 16

Limitations of the Study 17

Significance of the Study 17

Chapter Summary 17

Chapter 2: Literature Review 19

Literature Search Strategy 21

Theoretical Foundation 23

Conceptual Framework 24

Literature Review Related to Key Variables and/or Concepts 25

Inherent Weakness in Previous Researcher's Approaches 37

Inherent Strengths in Previous Researchers' Approaches 39
Fundations 41
Dynamic Indicators of Early Literacy Skills (DIBELS) 44
Chapter Summary 47
Chapter 3: Methodology 48
Research Design and Rationale 50
Methodology 51
Population 51
Sample and Sampling Procedures 52
Archival Data 52
Data Analysis Plan 53
Independent and Dependent Variables 61
Threats to Validity 63
Internal Validity 63
External Validity 64
Ethical Considerations 65
Chapter Summary 66
Chapter 4: Results 67
Data Collection 68
Results 70
Descriptive Statistics 70
Assumptions 71

Statistical Analysis Findings 74
Summary 78
Chapter 5: Discussion 80
Interpretation of the Findings 80
Limitations of the Study 83
Recommendations 85
Recommendations Based on the Findings 85
Recommendations Based on the Discovered Limitations 85
Implications 86
Positive Social Change 86
Theoretical Implications 87
Methodological Implications 88
Recommendations for Practice 89
Conclusion 90
References 91
Appendix A: Data Use Agreement 101
Appendix B: Bar Graphs 104
Appendix C: Scatterplot 105
Appendix D: Normal Q-Q Plots 106

List of Tables

Table 1. Gender and Race 69

Table 2. Fundations Results 70

Table 3. Intervention Participation 71

Table 4. Multicollinearity 72

Table 5. Box's Test of Equality of Covariance Matrixes 73

Table 6. Tests of Normality 73

Table 7. Levene's Test of Equality of Error Variances 74

Table 8. Multivariate Tests 77

Table 9. Tests of Between-Subjects Effects 78

List of Figures

Figure 1. G* Power Analysis for One-Way MANOVA 57

Figure B1. Gender …..……103

Figure B2. Ethnicity……103

Figure C1. Scatterplot Matrix……..104

Figure D1. Normal Q-Q Plot of Words Correct……..105

Figure D2. Normal Q-Q Plot of Accuracy……..106

Figure D3. Normal Q-Q of Retell……107

Chapter 1: Introduction

The U.S. educational system was first developed to provide optional education to children whose parents wanted them to become more productive and successful (Neem, 2017). Education first became mandatory in Massachusetts in 1852 and has slowly expanded to the current national public education system. More recent legislation, such as the No Child Left Behind Act of 2001 (2002), has required public schools to take greater responsibility for the success of students. Browne-Ferrigno and Maynard (2005) explained that the educational system is held accountable through state and national tests to determine its effectiveness. Since 2000, a steady decrease has occurred in dropout rates, which may be related to greater school accountability. Fleming et al. (2021) stated that the dropout percentage in 2018 was 6.2% in the United States. However, although accountability measures (e.g., increased graduation rates and decreased dropout rates) have demonstrated overall improvement across the system, early literacy rates have been an area of continuous struggle for schools. Kilpatrick (2015) stated that only 55% of third grade students in the United States were on track to develop critical reading skills and many require intensive intervention.

The elementary years are a crucial time for students, and those who are not on grade level by the time they enter fourth grade often do not catch up and continue to struggle with reading throughout their educational career (Kilpatrick, 2019). Ashworth et al. (2019) discussed the emphasis on ending *social promotion*. The premise behind social promotion is that advancing students prevents decreased self-esteem and feelings of inadequacy, which may result in increased retention rates. However, as Ashworth et al.

explained, moving students to the next grade regardless of proficiency has resulted in fewer students repeating grades but not student success over time. Students who are retained have a greater likelihood of dropping out, and the gains from the retention were minimal and diminished over time. With this understanding, educators need to be strategic in what curriculum they choose and how it is implemented.

In the remainder of the chapter, I outline the background, problem, and purpose statements of the study, respectively. Next, I will present the research questions and hypotheses, theoretical framework, and nature of the study. I then define important vocabulary, assumptions, scope and delimitations, limitations, and significance of the proposed study. Lastly, I summarize the main points of the chapter and provide a transition to Chapter 2.

In the background section, I summarize the historical struggle educators have faced in developing adequate readers in the United States. Although this is an area with an abundance of research, a consistent method for ensuring that all students read proficiently is lacking. The problem is that literacy rates are lower than expected and it is unclear whether they can be improved using a better curriculum. The purpose of this study was to evaluate if the supplemental reading curriculum, Fundations, is effective at improving students' literacy skills.

I used three research questions to guide this study. The purpose of these questions is to investigate if improvement in reading levels in three different areas (words correct, accuracy, retell) can be observed among children participating in the Fundations curriculum versus a control group. I used Ehri's (1992) orthographic mapping as the

guiding framework for this study. Orthographic mapping is used to describe the cognitive process of storing written words for later recall. In the nature of the study section, I describe a concise rationale for the selection of the design and how educators need to deliver and differentiate information to students to improve student understanding.

In the definition section, I list and define important vocabulary words for this study that might not be commonly understood outside of this research area. Next, I outline the assumptions or beliefs related to my research topic that are commonly believed to be true but cannot be proven. Following this, in the scope and delimitations section, I describe the focus of my research and why I chose this topic. The limitations of the study include areas that could negatively impact the results of the research and therefore, must be acknowledged. Lastly, I describe the possible benefits my research may have on society and conclude the chapter with a summary. With this study, I aimed to contribute to the body of literature informing educators by providing evidence concerning the effectiveness of a supplemental program that can be used to increase student success in reading.

Background

The use of the supplemental reading program Fundations in the classroom has a short-term impact on students' reading scores (Chalfant, 2019; Terrell, 2017; Wilson, 2011; Wilson Training Corporation, 2020). Research is lacking to determine the impact Fundations has on reading scores over time. By analyzing the impact Fundations has on reading scores over time, researchers can determine its effectiveness and possible future use.

Low literacy rates have negatively impacted the educational landscape in the United States. Kilpatrick (2015) stated that up to 30% of students are not reading at grade level by fourth grade. In education, change is often slow or stagnant and implementing change can be difficult. Moreover, Bieber and Choi (2011) stated that interventions have only short-term progress because generic interventions, such as ability reading groups, provide only minimal support and cannot be used to meet the individual needs of students. In the following section, I provide an overview of the topic of reading, its history, how students have struggled, and what has been done to combat this problem.

Although research in the field of early literacy has been published for over 50 years, most information cited in this document is from the last 5 years. Previous researchers (e.g., Bond & Dykstra, 1967; Kilpatrick, 2015; Wilson, 2011) have focused on a multitude of theories and approaches related to supporting struggling readers with interventions. These approaches range from simply spending more time in the reading process to breaking down the process to the most basic level and acquiring those skills before attempting the full reading process. According to Kilpatrick (2015), students who do not have adequate basic reading skills are not going to be successful during silent reading time during the school day. Thus, the top-down approach to reading, or reading more often, may not be effective over time for improving reading skills (Kilpatrick, 2015). With such an approach, students may begin to memorize words and their sight-word vocabulary may increase due to seeing words multiple times in texts but decoding new words may still be a problem (Kilpatrick, 2015). If students do not have basic phonemic awareness skills, they will not be able to apply strategies to break down

unfamiliar words and solve them in the text they are reading. This inability to read unfamiliar words will slow the reading process and could be a significant issue when students attempt to read for information (Kilpatrick, 2015).

Recently, a shift has occurred in instructional reading practices used with students. Educators have begun to focus on addressing gaps in students' reading ability so teachers can support each student in acquiring appropriate reading skills at each grade level (Nichols, et al., 2020). To meet this standard, it is important to focus on the most basic parts of the reading process and only continue to the next step when students have demonstrated proficiency (Kilpatrick, 2015). Instruction in this bottom-up approach begins with knowing the letters, letter sounds, and phonemes before students begin to read full words. This approach is based on the premise that students who have a solid understanding of the reading process from independent letter sounds to groups of sounds are better able to read difficult text with unfamiliar words. Having this understanding improves overall reading ability, including decoding and comprehension (Kilpatrick et al., 2019).

Atwater et al. (2017) found that a supplemental reading curriculum for struggling preschool-aged children is beneficial. The authors concluded that providing interventions after a student is already struggling is ineffective and a better point of intervention is when students are first learning to read. Wilson (2011) stated that a supplemental reading curriculum provided to all students before gaps in ability form may have a positive impact on students' reading scores. Wilson discovered that the implementation of positive interventions after a student has begun to struggle may be too late. Accordingly,

including supplemental instructional tools for all students before any of them fall behind as a preventive measure may be more effective (Atwater et al., 2017). Intervention placement is important because it appears that students demonstrate better results if they are provided with this intervention before showing signs of struggle.

Bieber and Choi (2011) stated that although students demonstrated adequate phonemic awareness at the end of first grade while receiving the reading recover intervention program, many were unable to maintain average reading ability in their future years without supplemental assistance. As Bieber and Choi, Atwater et al. (2017), and Klingbeil et al. (2020) suggested, students who begin to struggle in reading and are provided an intervention will likely not retain learned material after the intervention ceases. Therefore, interventions and a supplemental program, such as Fundations, in addition to the reading curriculum, must be added from the beginning of students' academic careers to ensure that early literacy skills are stronger from the beginning.

Cihon et al. (2008) focused on an intervention program for at-risk kindergarten students. The authors found when a student falls behind in reading, complex tasks, such as inferential understanding of the material, become even more challenging (Cihon et al., 2008). Understanding the difficulty of complex reading tasks (e.g., reading for information) underscores the need for effective interventions that students can use to maintain skills after the intervention concludes.

Problem Statement

The low literacy rates seen throughout the United States may be overcome with better curricula and instruction. Kilpatrick (2015) stated that 27%–34% of fourth-grade

students in the United States read below grade level and those who do not have a strong foundation in basic reading skills will continually struggle with reading throughout school. The supplemental reading program Fundations was designed to support proficient reading ability among students by providing specific instruction focusing on phonics to supplement the reading curriculum (Wilson, 2011, Wilson Language Training, 2020). Phonics is the early stage of the bottom–up approach to reading and begins with the most basic pieces of the reading process (Ehri, 2020). Kilpatrick (2015) concluded that a reading program alone may not be sufficient to teach basic reading skills, including explicit phonics instruction for kindergarten students who are beginning to read.

The Fundations supplemental program can be used to improve student reading. In Terrell's (2017) study, every student who received the Fundations supplemental program was reading at or above grade level by the end of the program. Chalfant (2019) also reported positive results concerning students who received the Fundations program. Chalfant reported that all students who received the 13-week Fundations program in his research showed overall improvement in reading achievement.

My contribution to the educational arena will be a study that measures the impact Fundations has on students' reading scores over time. Researchers have found a correlation between students who were exposed to Fundations and higher scores on state assessments later in their educational careers. Chalfant (2019) and Terrell (2017) measured the impact of Fundations on reading ability using a pre/posttest format. In my study, I followed the same students for 2 years using data from the Dynamic Indicators of Basic Early Literacy Skills (DIBELS) assessment. The Fundations program was provided

to students in kindergarten, and I used reading scores from their second-grade school year to measure reading ability against their peers who did not receive the program.

The data that I used in this study were archival and gathered from a school district in a Northeastern state. Although studies by the Wilson Training Corporation (2020), Wilson (2011), and Terrell (2017) have revealed that Fundations improves reading scores, no studies to date have been conducted to measure the reading skill of students over time. This research is meaningful because it includes information regarding the effectiveness of a supplemental reading program to close reading gaps for students. A typical procedure in school districts is to wait until students begin to struggle and then remediate them. This remediation is provided through different interventions over time. However, it is unknown why gaps in students' abilities arise. If there are skills that students have not acquired, then the intervention would need to be focused on those areas. Many students have reading gaps and each one is unique. This makes the intervention teacher's job challenging. Providing nearly individualized instruction to large groups of students is incredibly difficult. The educational system in the United States currently functions this way (Kilpatrick, 2015).

Providing targeted instruction in parts of basic reading skills to all students may prevent some of these gaps from forming. Ramscar and Gitcho (2007) stated that children have a window in which they learn with fewer restrictions. In this study, I evaluated the effectiveness of the supplemental program Fundations with a population of students over 2 years.

Purpose of the Study

The purpose of this quasi-experimental study was to evaluate if the supplemental phonics program Fundations is effective at improving and maintaining students' reading scores due to fewer reading gaps in phonics, decoding, and comprehension. The purpose of Fundations is to provide supplemental instruction in basic reading skills (Wilson, 2011). This supplemental instruction is intended to improve the retention of basic skills and strategies, which may prevent reading gaps from forming and provide higher scores in reading over time according to the DIBELS assessment. The measurement tools include three subtests of the DIBELS assessment that measures phonics (accuracy), decoding (words correct), and comprehension (retell). I assessed if students who participated in the Fundations curriculum in kindergarten had significantly higher scores in the areas described at the end of their second-grade school year. This had not been done, so I tested it. The Wilson Language Training Corporation (2020) described that kindergarten students who participated in the Fundations program had higher state test scores in third grade than those who did not participate in the program. My research used the DIBELS assessment at the end of students' second-grade school year to assess reading scores and identify if students who received Fundations in kindergarten have higher scores over time compared to those who did not receive the program.

Research Questions and Hypotheses

My research was driven by three quantitative research questions and associated hypotheses. These quantitative research questions seek to understand the impact of Fundations on students' reading ability over 2 school years. The dependent variables

were the DIBELS subtest areas: words correct, accuracy, and retell. The independent variable was participation in the Fundations program (*No = 0, Yes = 1*). I analyzed data for the metric/continuous dependent variables (words correct, accuracy, retell) using multivariate analysis of variance (MANOVA). The dependent variables are continuous, and the independent variable is a grouping or categorical variable. Also, the data was determined to be statistically and conceptually related. Anderson (2003) discussed a positive correlation is needed between the dependent variables for the MANOVA to be effective. Grice and Iwasaki (2007) stated the statistical increase in power from the analysis of variance (ANOVA) to MANOVA may reveal smaller effects that make the data significant. The research questions and associated hypotheses guiding this study are as follows:

RQ1: Did kindergarten students who participated in the Fundations curriculum (2016–2017) have a significantly higher score in words correct than the students who did not participate in the curriculum (2015–2016) according to the words correct subtest of the DIBELS assessment administered at the end of the students' second-grade school year?

$H_0$1: No significant difference exists between the words correct subtest score of the DIBELS assessment for those who participated and those who did not participate in the Fundations curriculum.

H_a1: A significant difference exists between the words correct subtest score of the DIBELS assessment for those who participated and those who did not participate in the Fundations curriculum.

RQ2: Did kindergarten students who participated in the Fundations curriculum (2016–2017) have a significantly higher score in reading accuracy than the students who did not participate in the curriculum (2015–2016) according to the accuracy subtest of the DIBELS assessment administered at the end of the students' second-grade year?

$H_0$2: No significant difference exists between the accuracy subtest score of the DIBELS assessment for those who participated and those who did not participate in the Fundations curriculum.

H_a2: A significant difference exists between the accuracy subtest score of the DIBELS assessment for those who participated and those who did not participate in the Fundations curriculum.

RQ3: Did kindergarten students who participated in the Fundations curriculum (2016–2017) have a significantly higher score in reading comprehension than the students who did not participate in the curriculum (2015–2016) according to the retell subtest on the DIBELS assessment administered at the end of the students' second-grade year?

$H_0$3: No significant difference exists between the retell subtest score of the DIBELS assessment for those who participated and those who did not participate in the Fundations curriculum.

H_a3: A significant difference exists between the retell subtest score of the DIBELS assessment for those who participated and those who did not participate in the Fundations curriculum.

As there are three continuous dependent variables, data was analyzed using the one-way MANOVA. Understanding the assumptions enhances the effectiveness of this tool on the data to be subjected to the MANOVA in my research. The independent or grouping variable describes whether the students received the Fundations program or not. In my study, there were three dependent variables (words correct, accuracy, retell), which makes the MANOVA an appropriate test to use. The MANOVA is a more powerful test than the one-way ANOVA as the MANOVA allows for more than one dependent variable to be tested and can be run with multiple correlated dependent variables (Tabachnick & Fidell, 2012). With the use of three dependent variables, the MANOVA could produce more specific results that are necessary to reveal differences in the reading scores that I was seeking.

Theoretical Framework for the Study

The theoretical framework guiding this study was orthographic mapping, developed by Ehri (Rack et al. 1994). Ehri began gathering empirical data over 40 years ago (e.g., Ehri & Wilce, 1985) and continued to into the early 1990s. Rack et al. (1994) designed several tests in their research, which propelled Ehri's work into being widely used by other/fellow researchers (e.g. Dixon et al., 2002; Ehri & Wilce, 1985; Kilpatrick, 2015; Rack et al, 1994; Roberts, 2003; Scott & Ehri, 1990; Torgesen, 2004). Rack et al. continued stating that Ehri's (1992) theory was clarified by their work, which strongly supported the idea of phonetic cue reading. Subsequently, Torgesen (2004) described Ehri's theory of orthographic mapping to be "the most complete current theory of how children form sight-word representations" (p. 36). Orthographic mapping refers to the

process of storing written words for later recall and explains how students learn to read words by sight, spell words from memory, and acquire vocabulary words from print (Miles & Ehri, 2019). Ehri discussed that understanding the letter-sound relationship and meaning of a word was more effective for students in retaining that word in memory compared to whole-word memorization. For orthographic mapping to occur, students must understand phonemic awareness, letter-sound correspondence, and decoding (Ehri, 1992). Ehri described that orthographic mapping includes making letter-sound connections to assist the reader with permanently storing words in memory. Miles and Ehri (2019) described that phonemic awareness and phonics are necessities when learning to read and explained that letter-sound knowledge and phonemic awareness are paramount in the orthographic mapping process. According to Ehri (2020), orthographic mapping forms letter-sound connections that bond the spellings to pronunciations and meanings of words in memory leading to instant recognition of words. Ehri et al. (2009) asserted that phonemic segmentation practice with orthographic mapping assists in securing words into memory.

Nature of the Study

To address the research questions in the study, I chose a quasi-experimental quantitative design. Quantitative research is appropriate for interpreting standard reading scores measured over time to determine if Fundations had a positive impact on the scores. Choi (2014) described that quantitative research uses numerical data. Given the focus of my study, I collected and analyzed archival numerical data. This data set allowed me to isolate the two groups over time. My research was quasi-experimental in design and

exploratory in nature. Quasi-experimental is used to compare quantitative data related to an intervention when a controlled trial cannot be used, but when a control group can be identified. Bouikidis and Rutberg (2018) described that a quasi-experimental design includes an intervention and quantitative research may be used to determine relationships between variables and outcomes. This methodology fits my research because I investigated the impact an independent variable has on three dependent variables. Exploratory research assisted me in gathering the necessary data to make informed decisions about my hypotheses. I measured the causal impact of an intervention on a population. This included examining group means to determine if a correlation exists between students' reading ability and their participation in the Fundations program. Specifically, I determined whether there was a difference in students' reading ability between those who had the supplementary reading program Fundations and those who did not. Although this type of study cannot determine if the Fundations program was the sole cause of any differences in students' reading scores, it can provide preliminary evidence of the effectiveness of the program over time.

Definitions

Dynamic Indicators of Basic Early Literary Skills (DIBELS): A set of procedures and measures for assessing the acquisition of literacy skills (University of Oregon, 2020).

Fundations: A multisensory and systematic phonics, spelling, and handwriting program to help reduce reading and spelling failure (Wilson Language Training Corporation, 2020).

Phonics: A method for teaching people how to read and write an alphabetic language by demonstrating the relationship between sounds of the spoken language and the letters or groups of letters or syllables of the written language (Wilson Language Training Corporation, 2020).

Phonemic Awareness: *A* subset of phonological awareness in which listeners can hear, identify, and manipulate phonemes, the smallest mental units of sound that help to differentiate units of meaning (Wilson Language Training Corporation, 2020).

Reading Comprehension (Retell Subtest): The ability to process text, understand its meaning, and integrate it with what the reader already knows (University of Oregon, 2022).

Reading Decoding (Words Correct Subtest): The ability to apply knowledge of letter-sound relationships, including knowledge of letter patterns, to correctly pronounce written words (University of Oregon, 2020).

Reading Fluency (Accuracy Subtest): The ability to read with speed, accuracy, and proper expression (University of Oregon, 2020).

Assumptions

The main assumption in this study was that students' reading skills are affected by their participation in the Fundations curriculum beyond other interventions and the general education instruction they may have received in the same period. A second assumption was that the students received direct instruction in reading daily from a research-based program and the teachers are assumed to have been teaching the approved

curriculum as it has been provided to them. I assumed the following procedures were adhered to across testing sites regarding the DIBELS assessment:

- The test items were secure before administration and students did not have access to them before taking the assessment.
- All assessments were provided individually in similar environments throughout the school setting.
- All students understood the expectation of the DIBELS assessment and agreed to participate.
- Students understood the importance of this assessment and attempted to perform their best.
- The archival data collected from the students was input into Performance Tracker, the data collection system, by the trained DIBELS assessors, who are reading specialists in the school district.

Scope and Delimitations

This study topic was chosen because of the importance reading has for all academic and many life activities. Poor early literacy skills negatively affect students' success later in their academic careers (Kilpatrick, 2015). My study included students in a northeastern suburban school district that uses a standard curriculum. For data collection, DIBELS assessment data from students' second-grade school year was gathered to measure and analyze their reading abilities. This level of data, in conjunction with my analysis, provided a comprehensive response to the research questions.

Limitations of the Study

Recognizing limitations is a critical component of conducting research. Limitations with potential impact on my study include the influence of the progression of time. One limitation of this research study is that Fundations was not the only reading instruction the students received during their kindergarten year and the research-based reading instruction could also have had an impact on their reading ability. Further, because groups of students are in different classrooms, the quality of instruction may differ depending on the performance of the teacher.

Significance of the Study

Previous research on Fundations has been based on pre/posttest type studies rather than longitudinally. For instance, researchers have examined student improvement at the end of the Fundations program in kindergarten (e.g., Chalfant, 2019; Terrell, 2017), but none have explored the long-term impact of the program over several years using the DIBELS assessment. My research provided evidence concerning the long-term effectiveness of the Fundations program with a sample of students. Significant improvements in the reading scores of children receiving the program versus those who did not would offer support for the effectiveness of this program and encourage its use in other schools.

Chapter Summary

Students not reading at grade level is a significant concern in school systems today (Kilpatrick, 2015). Klingbeil et al. (2020) described the current intervention process as one that waits for a child to fail before offering support. The authors stressed

this remediate approach has proven unsuccessful unless students receive the remediation indefinitely. Atwater et al. (2017) stated that educators must implement effective pre-emptive strategies for teaching students to read proficiently. Providing teachers with the necessary instructional tools to accomplish this task is critical. One instructional reading tool designed to improve students' reading skills is Fundations. The purpose of my quantitative quasi-experimental research was to analyze the differences in reading scores of students receiving the supplementary reading program Fundations versus those who did not. The second grade reading scores were obtained from the DIBELs assessment and analyzed to determine if students who participated in the Fundations program as kindergarten students show a long-term positive impact on their reading scores in second grade.

Improving reading outcomes for students is crucial to ensuring academic success and success later in life. The Wilson Language Training Corporation (2020) has promoted the Fundations program as a tool public school districts can use to combat the problem of low reading scores. Results from my study provide further insight into whether providing supplemental instruction in basic reading skills in kindergarten has a long-term effect on reading scores.

In Chapter 2, I provide a review of the literature foundations of this study based on the relevance of providing supplemental reading instruction to kindergarten students. The review explored literature related to the reading process, previous researchers' recommendations, and recommendations for future research.

Chapter 2: Literature Review

The low literacy rates in the United States may be overcome with better curriculum and instruction. Kilpatrick (2015) described that 27%–34% of fourth graders in the United States read below grade level and students who do not have a strong foundation in basic reading skills will continually struggle with reading throughout their school years. Thus, educators must focus on providing support to students in earlier grades. The reading program Fundations is designed to increase proficient reading ability among students by providing specific instruction in phonics as a supplement to the reading curriculum (Wilson, 2011). The use of Fundations may bridge the gap in reading skills that the stand-alone reading curriculum has produced. Kilpatrick (2015) concluded that a reading program alone may not sufficiently teach basic reading skills, such as explicit phonics instruction, especially for kindergarten students who are beginning to read. In Terrell's study (2017), every student who received the Fundations supplemental program was reading at or above grade level by the end of the program. Chalfant (2019) also showed that similar-aged students who received the Fundations program demonstrated overall improvement in reading achievement.

Bieber and Choi (2011) and Klingbeil et al. (2020) have shown that students do not retain learned skills after a reading intervention is over. Klingbeil et al. (2020) expressed that after students met the exit criteria of a tier two reading intervention, many did not maintain their current progress and failed to meet benchmarks. Bieber and Choi stated that although supplemental instruction and interventions are successful, students' skills tend to regress without the explicit instruction that the intervention provided.

However, no research has evaluated the sustainability of learned skills based on data from the DIBELS over a long period. The DIBELS was used as an assessment-gathering tool. It is not an intervention and is not used to supplement the curriculum; data collected is used to guide instruction based on student performance.

The variables I used were based on data from the DIBELS, which is an assessment that provides a broad range of reading scores. The advantage of this assessment is that it is standardized, easy to interpret, and used across the country in different school districts, which allows for the comparison of scores. This comparison of scores is useful for identifying strengths and weaknesses in instruction across the country. The DIBELS assessment has a high-reliability score that signifies its consistency in scores across different conditions (University of Oregon, Center for Teaching and Learning, 2020). The assessment also has a high validity score, which signifies its accuracy and confidence in predictions that can be made from the test scores. Another strength of the assessment is that it can describe the competency levels of a student by measuring decoding, fluency, and comprehension in a single administration that typically takes less than 30 minutes to complete. A weakness of this assessment may be that it is quick to administer and may not show a full range of strengths in an individual reader.

My research was based on the premise that a significant problem exists with the current instruction in reading but that changes can be made that will result in improvement in this area. Atwater et al. (2017) discussed that intervention timing is extremely important. The authors explained that providing supplemental instructional tools for all students before they fall behind is effective as a preventive measure.

According to Atwater et al., educators must identify what past issues have occurred for struggling readers and create research-based targeted interventions in those areas for all students before they appear. The second major theme on my research is how that intervention is provided and to whom it is provided. Bieber and Choi (2011) explained that interventions are typically only provided to students who have fallen behind with the typical curriculum. Decades of data indicate reading deficits are a national problem (Kilpatrick, 2015), so prescribing the intervention to all students before they form gaps may be effective. Regardless of the timing of the intervention, it is important to determine if the students retain what they learn over an extended period. Bieber and Choi have shown that students who have fallen behind only show improvement while receiving the intervention. What remains unclear is whether students receiving interventions before they present with reading problems retain the skills and for how long.

In this chapter, I outline the literature search strategy, theoretical foundation, and literature review related to key variables. The chapter ends with a summary and conclusions. A literature search was used to gain information on the topic of reading and prepare a literature review that supports the purpose of my study. The theoretical framework, orthographic mapping, is described in detail, including how it relates to my study. The chapter concludes with an explanation of how previous research influenced the current study.

Literature Search Strategy

I searched the literature using the following databases: Walden Library databases, SAGE journals, Academic Search Ultimate, Scopus, and Education Resources

Information Center (ERIC). The keywords and search terms used included the following: *phonics, phonemic awareness, early literacy skills, barriers to learning that students encounter, orthographic mapping, socio-economic status, early childhood, exposure to written text, child development* and *reading ability*. The Walden Library provided access to databases that produced empirical and historical data. I used the following inclusion criteria when selecting articles: published in English, available in full text, published between 1967 and 2022 with a majority within the last 5 years and related to reading and academics, describing academic struggles, and the effectiveness of academic interventions. Although I focused on peer-reviewed articles, I did include reviewed dissertations to supplement primary data.

After relevant articles were retrieved, I reviewed the articles and references attached to determine if other related articles could be useful. Next, the articles were gathered and read for relevance and included if appropriate. I also retrieved approved dissertations with similar topics during the literature review process. The reference lists from these dissertations were reviewed as well to find relevant articles. Reviewing the dissertations produced two new relevant references that I have used in my dissertation.

The literature selection strategy involved reading the study abstract to determine if the article met the inclusion criteria; if so, I determined if the full text was available, downloaded it, and read the text for further evaluation. If the article was determined to have pertinent information, it was documented in the literature review section under the proper heading. Articles were evaluated on strengths and limitations. This allowed for

easier identification of knowledge gaps to form the basis to answer my research questions.

Theoretical Foundation

The theory guiding this research was orthographic mapping, developed by Ehri in the 1980s. Ehri (1980) described orthographic mapping as the process of storing a sight word as a group of letters distinct from other groups in long-term memory so they can be read again instantaneously. Orthographic mapping entails breaking the reading process down and helping learners understand that each letter makes a sound and that letters are combined to make words (Sargiani et al., 2018). Kilpatrick (2015) described that orthographic mapping is a process used to store printed words in long-term memory, which allows students to retain words permanently. This theory is closely related to phonics and the understanding of phonemes because students need proficient letter-sound understanding and sufficient phonemic awareness skills for orthographic mapping to be effective (Kilpatrick, 2015).

Miles and Ehri (2019) stated that the process of storing written words for recall is a process called orthographic mapping. Ehri (2020) discussed that understanding letter-sound relationships and the meaning of a word helped students retain that word in memory compared to whole-word memorization. Ehri (1992) described that orthographic mapping includes understanding letter-sound connections to assist the reader with permanently storing words in memory. Miles and Ehri described that phonemic awareness and phonics are necessities when learning to read and explained that letter-sound knowledge and phonemic awareness are paramount in the orthographic mapping

process. In other words, students must understand letter sounds and know them when seen on paper. Ehri (2020) stated that orthographic mapping forms letter-sound connections that bond the spellings to pronunciations and meanings of words in memory. This understanding is built upon in orthographic mapping and develops into instant recognition of words. Ehri et al. (2009) described that phonemic segmentation practice with orthographic mapping assists in securing words into memory.

Orthographic mapping describes how students learn and what they can retain at their developmental ages (Ehri, 1980). This understanding provides insight into how educators need to deliver information to ensure maximum retention of material. If proper instruction and intervention are provided in kindergarten, students will benefit from improved reading ability throughout their educational career (Kilpatrick, 2015). Moreover, if more time is spent with kindergarten students learning the building blocks of reading, fewer students may struggle with reading later in school.

Conceptual Framework

The conceptual framework includes the concepts of my research, past theories, and research and empirical findings that have benefited my understanding. Robinson (2018) concluded that the whole language reading approach was popular in the past and parts of it were successful. Nichols et al. (2020) found that constant exposure to text not only increased fluency in reviewed passages, but unfamiliar texts as well, suggesting students' reading ability will likely improve if they read more often. The silent reading activity in schools was created based on the belief that the more often students read, the better they will read. Bond and Dykstra (1967) described that phonics was a superior

approach to reading instruction compared to the traditional whole-word approach. Although this is true, the rate of acquisition varies greatly, and discrepancies became clear over time. Robinson (2018) articulated that educators must consider that not all students come to school with well-developed skills. According to Kilpatrick (2015), some students do not conceptually understand how to read, and their reading ability is gained from memorizing words they see frequently in the text.

I used a quasi-experimental design to compare scores on phonics (accuracy subtest), reading decoding (words correct subtest), and comprehension (retell subtest) over time between participants who received instruction using the evidence based Fundations curriculum and those who did not. The assessment tool was subtests of DIBELS administrations at the end of the students' second-grade school year. Standard scores were produced and used to determine if statistically significant differences exist between the groups.

Literature Review Related to Key Variables and/or Concepts

The scope of literature related to early literacy ranges over 50 years, but much of the information in my review is from the last 5 years. This includes different theories and approaches to the problem of struggling readers. Approaches to teaching reading have ranged from simply having students spend more time reading to breaking down the process to the most basic level and ensuring students acquire a set of skills before attempting full-word reading. According to Kilpatrick (2015), students who do not have adequate basic reading skills are not going to be successful during silent reading time during the school day. The top-down approach to reading based on the premise that

students learn by reading more often has proven over time to not be effective at improving reading skills (Kilpatrick et al., 2019). Although students will memorize words and build their sight-word vocabulary, reading unfamiliar words in a text will always be a problem. Kilpatrick stated that if students do not have a basic understanding of the reading process, they will not be able to apply strategies to break down unfamiliar words and solve them in the text when they are reading. This will slow the reading process down and could be a significant block for them when they are attempting to read for information later in their educational journey.

A shift has occurred in early literacy education toward focusing on the most basic parts of the reading process and continuing to build students' capacity using a step-by-step approach (Kilpatrick, 2015). Instruction begins with knowing the letters, letter sounds, and phonemes before students begin to read full words (Chalfant, 2019). This involves providing the intervention early regardless of performance, which may produce better readers. Ehri (1980) stated that, students who have a solid understanding of what letter sounds mean independently and how they group to make other sounds can better read difficult text with unfamiliar words. Having this skill improves overall decoding ability and comprehension.

Atwater et al. (2017) found that a supplemental reading curriculum for preschool-aged children is beneficial as a preventive measure. The authors emphasized that providing interventions to students after they have begun to struggle is ineffective and it is better to implement programs early. Wilson (2011) also discussed that a supplemental reading curriculum provided to all students before gaps in ability form has a positive

impact on students' reading scores and that implementing interventions after a student has begun to struggle may be too late. Atwater et al. (2017) stated that providing intervention before students struggle may be important to their reading success because intervention provided after a student has fallen behind has not produced desirable results in reading ability.

Bieber and Choi (2011) realized that with reading recovery, students demonstrated adequate phonemic awareness at the end of first grade but were not able to maintain average reading ability in their future years without supplemental assistance. Understanding that students will likely not retain learned material after supplemental assistance ceases underscores the need to incorporate supplemental instruction into the regular curriculum. Thus, appropriate interventions and supplemental programs must be provided from the beginning of students' academic careers to ensure they obtain early literacy skills.

Cihon et al. (2008) focused on an intervention program for at-risk kindergarten students. The authors found that after students fall behind in reading, complex tasks, such as inferential understanding of material become even more challenging. In other words, students who struggle in reading often cannot fully comprehend a complex task and what is asked of them to complete the task. Understanding the difficulty of complex tasks for students is an important foundation for my study because it helps explain that interventions are necessary and effective. The addition of my research includes intervening before students struggle and attempting to maintain skills after the intervention concludes.

Cole and Shea (2014) described that reading and writing lessons are combined early on to connect the relationship between the two and provide information about the printed word. Using reading and writing skills in tandem works to bridge the gap between these two skills that are strongly correlated. Describing the impact of writing and reading lessons used together is important because it shows that ancillary measures are necessary to build reading skills. The authors concluded that the reading curriculum alone is not enough to build strong reading skills for all students (Cole & Shea, 2014).

Gonzalez et al. (2008) discussed that more than half of students with behavioral disabilities in school also perform in the bottom 25th percentile of overall reading ability. The relationship between behaviors in the classroom and students not being engaged is strong and appears to harm student performance. Understanding behavioral relationships is important because it describes the compounding struggles students face in school if they fall behind in reading.

Lombardino and Park (2013) stated that phonological awareness is prognosticative of word reading skills. The authors studied the effectiveness of embedding word studies in the reading curriculum. The predictive relationship between reading constructs and component reading skills is important because struggling readers often lack the prerequisite skills to become functional readers in their educational future.

Nichols et al. (2020) stated that over the past 2 decades, reading fluency has been increasingly realized as a paramount variable for student success in reading. In their study of the history of reading fluency and its relatively recent resurgence, the authors found that consistent exposure to text not only increased fluency in reviewed passages but

unfamiliar texts as well. However, Nichols et al. also stressed that the curriculum may move too quickly for struggling readers and not enough time is spent on basic skills to ensure that all students are proficient in a skill before moving on. Thus, students require a reading curriculum that breaks down the simple processes of reading into easier-to-learn steps (Nichols et al., 2020).

Repko-Erwin (2017) stated that "kindergarten teachers are faced with the challenging task of meeting academic standards, nurturing children's social and emotional needs, while also teaching in ways that are culturally, linguistically, and developmentally responsive" (p. 70). Repko-Erwin focused on the complex nature of teaching and learning in kindergarten and highlighted that the first year of education is a crucial time for teaching students the basic skills needed for future learning. Understanding the complexities of kindergarten is important because it describes the challenges teachers face and the need for a precise and focused curriculum to ensure students learn the necessary building blocks of reading (Repki-Erwin, 2017).

The U.S. Department of Education (2017) studied Leveled Literacy Intervention (LLI) and found that this program did not show a significant increase in phonetic skills. Moreover, the report stated that the LLI would need to be provided in conjunction with a supplemental program to teach phonics specifically. It is important to understand what has not been effective to rule out possibilities and ensure that new interventions are attempted.

Wilson (2011) focused on a multi-tiered system of intervention that provides research-based instruction as a preventive measure for students. Wilson described that

part of the purpose of this system is to teach phonetic skills in detail and provide a stronger base for early literacy skills, as stronger phonetic skills may produce a higher level of skill in reading. The intent is to increase phonetic skills using the Fundations program and determine whether the increase in reading skills may be sustained over time.

The Wilson Language Training Corporation (2020) studied the effectiveness of the Fundations program and found test scores remained higher 3 years after students participated in the intervention. The findings indicated Fundations appears to be an effective intervention to use before students begin to struggle in reading. Also, it may be able to prevent future reading problems in students (Wilson Language Training Corporation, 2020).

When articulating the key statements and definitions inherent in my framework, I begin with the simplest and continue to the most complex processes in reading. Phonemic awareness and phonics are often used interchangeably but are two vastly different parts of the reading process. Phonemic awareness is the smallest mental unit and is related to the sounds of letters. Kilpatrick (2015) stated that phonemic awareness is the ability to hear, identify, and manipulate phonemes to help differentiate units of meaning. The reading process builds from previous information, and if the simplest piece of the reading process is not fully understood, then students will encounter difficulties in the next step.

Phonics is introduced after the phonemes are understood by students. Kilpatrick (2015) described phonics as a method of teaching students to read by correlating sounds with letters in an alphabetic writing system. Phonemic awareness is understanding that each word is comprised of a series of sounds and phonics focuses on how sounds look in

writing. The two aspects build on each other to first understand sounds and then be able to identify what sounds are made up of by looking at letters.

Reading decoding is the ability to use phonics and phonemic skills simultaneously to decipher words in isolation or text. Ehri (1992) defined decoding as the ability to apply knowledge of letter-sound relationships, including knowledge of letter patterns, to correctly pronounce written words. If students have strong skills in this area, they will be able to recognize familiar words quickly and figure out words they have not seen before (Ehri, 2020). As students progress academically, the level of difficulty increases as does the complexity. Being able to see a group of letters bunched together and produce a single word from that is difficult. When students are expected to perform this skill, it becomes clearer which students are lacking aptitude in phonics and phoneme areas (Kilpatrick, 2015). However, students with reduced reading ability may no longer want to participate in a program that highlights their skill deficiencies. This disengagement leads to further struggles and greater gaps among students in reading ability (Gonzalez et al., 2008). The ability for students to decipher words they have never seen before becomes extremely difficult for those with poor phonemic awareness skills; although some students make up for this deficit by having good memorization skills. In school, students study words and then are tested on them. The books read at early levels are almost exclusively sight words, and often the class will read new books together. With this instructional framework, a student can memorize words they have previously seen in a text, and it may appear they are reading well. After students begin reading independently and words in the text are unfamiliar, it becomes clearer which students have weaker

reading abilities. This process of decoding helps teachers identify who is struggling with reading and who may need further support to improve their reading skills.

After students can read written words from a text, the next step is for them to gain meaning. This is an added layer of difficulty and cognitive ability now plays a factor because all the previous processes need to be done quickly for the reader to take meaning from the text. Part of cognitive ability is how fast a student can process what they are taking in. Reading words slowly and a single word at a time significantly increases the difficulty of extracting meaning from the text, as meaning is gained from reading grouped words. Meaning is gained from reading when multiple words are grouped. Kilpatrick (2015) described reading comprehension as the ability to read text, process it, and understand its meaning. According to Kilpatrick, reading comprehension relies on two interconnected abilities: word reading and language comprehension. Students' background knowledge also affects reading comprehension, as students can better comprehend and retain the information they deem relatable to their lives (Kilpatrick, 2015). A student with weaker phonemic awareness skills and lacking background knowledge of a particular reading passage will struggle significantly to understand the meaning of the text (Kilpatrick, 2015).

Interventions have been used for decades in the education system to improve individual skills among students. However, traditionally, interventions have been applied to fix a problem rather than used proactively to build reading capacity. Klingbeil et al. (2020) found that interventions produce positive results while students are participating in the program, but their skills regressed after the intervention was discontinued. The

authors stressed that the problem with reactive interventions is that they are not designed to be permanent and cannot be applied to large populations of students over long periods. Thus, as instruction proceeds, problems in reading ability accumulate across multiple skill areas. Another issue with waiting for students to present with issues in reading is that the student may be lacking a specific skill in a targeted area that may be hard to identify. In reading, an issue with phonemes might be understood by the teacher as a decoding issue. So, the intervention provided would be focused on only improving decoding and may not address other deficient skills. Kilpatrick (2015) stated that if the underlying issue is related to phonemes, then the student will continue to struggle when they see a new word out of context. In the scenario described, a student identified with a deficit in decoding skills will no longer receive the intervention when their skills have improved based on their retention of a larger sight-word vocabulary. However, when the student goes to the next grade level and there are new vocabulary words, the student struggles again because it is a phoneme issue that was misidentified as a decoding issue.

I applied a new approach in my research, which is to provide instruction to all students in each area that is known to be a struggle for some later on. Reading is one area in which we have decades of information showing us that students consistently fall behind (Kilpatrick, 2015). In certain settings, it may be an instructional issue, but even when appropriate instruction is provided, certain students will need a higher level of support. It is difficult to predict who will struggle with reading before they begin kindergarten. Kilpatrick (2015) believed that students who attended preschool and/or reported having parents who studied with them have an advantage in academic

knowledge. However, children who have not attended preschool but have strong cognitive abilities can enter school with no understanding of letters and leave kindergarten reading at a higher level than their peers who went to preschool. Thus, applying a more intensive curriculum to all beginning readers is more likely to ensure all students receive sufficient support. Moreover, students who show greater reading ability will still benefit from the Fundations curriculum, as teachers can differentiate the curriculum to higher performers when necessary. This flexibility will allow all students to receive additional instruction in an area that is crucial for academia and life in general.

My research has benefited from previous research because I have used what has been done in the past to create and identify an area that has not yet been researched. My research addresses a knowledge gap because it includes data from an assessment conducted 2 years after the intervention. The intervention was provided in kindergarten, but the assessment was given in second grade to investigate if the intervention was successful at limiting gaps in reading. The results indicate that students who participated in the Fundations program present with higher reading scores over time compared to students that did not receive the curriculum. Students who learn the basics of reading in their kindergarten year are more likely to continue building strength in their reading skills and apply what they learned (Kilpatrick, 2015). After a student understands the rules of phonemic awareness, this should allow them to sound out unfamiliar words and continue to build strength in their reading skills (Miles & Ehri, 2019). As they approach new words and can decode them, then an assumption can be made that their sight-word vocabulary will increase quicker. This will improve fluency and each skill will continue

to build upon the other, which hopefully will create a proficient reader through kindergarten and Grades 1 and 2.

The DIBELS assessment measures several reading areas to identify the strengths and needs of the student (Smolkowski & Cummings, 2016). Understanding the process of reading is scaffolded, it would make sense that having a strong foundation in reading is paramount to the attainment of future reading skills that are more complex. This approach is the opposite of prior interventions that wait until the student has shown gaps in their reading ability and then attempt to correct them. Addressing a skill gap is a difficult task because the reading process involves building on previous skills; so although an issue may be evident in several skill areas, finding the root of the problem is often challenging. For example, an issue with phonemic awareness may show up in every area of a DIBELS assessment. The more basic the skill, the more areas in a complex task that this weakness will appear.

Early childhood represents a period when the brain has the greatest capacity to acquire and retain new skills (Ramscar & Gitcho, 2007). Consequently, it is imperative that educators make the most effective use of this window of time and appropriately instruct students on how to read. Also, children can only understand so much literal information during their early school years. With this understanding and recognizing that students can only focus for so long during each session, the importance of what is taught during those times becomes crucial. A large problem is that we are exposing students to too much information before they are ready, and we are wasting time. A student should not be studying or quizzed on sight words before they have been taught how letter sounds

are combined to create words. It is too common that we see kindergarten rooms having sight-word quizzes. The students that have average memory skills will be able to memorize a group of words but have no idea what they are doing or why. We now know that students have unaddressed phonemic gaps that negatively affect their ability to read as they get older. These gaps that build at such early ages need to be filled in with a more appropriate curriculum and reach mastery of these skills before introducing new instruction. Students should not be reading words out of context until they have been exposed to what words are and their purpose. Maximizing this early instructional time and making sure reading gaps are minimalized will create better and stronger future readers. Fundations, which focuses on phonemic awareness, supports appropriate instruction at the most crucial time in students' education.

The challenge, now that we know its effectiveness, is applying this information to school districts that historically have been slow to change. Kober and Stark (2011) stated that with the budgetary restrictions that many states are currently facing, change will likely be slower than ever. Duraku et al. (2022) explained that teachers can control many things in their classrooms, but introducing a new way of teaching requires training for it to be implemented effectively. Unfortunately, the Fundations program costs money, and school districts will have to determine if they have the funds to purchase the program.

My contribution to early literacy research is studying the impact of Fundations over 2 years. The program was provided to students in kindergarten, and I used data from their second-grade school year to measure reading scores. The data are archival and have been gathered from a school district in the northeast United States. Multiple studies

revealed that the Fundations program has a positive impact on reading scores, but none have measured the reading skills of students over time. This research is meaningful because the contribution to society is to determine if the Fundations program improves students' reading scores over time, which is critical to achieving success in their academic careers. Addressing this gap in research will provide information on intervention timing for school districts. A common unproductive procedure is to wait until students begin to struggle and then provide remediation. A concern is why some students are not reading at grade level. If there are skills that have not been acquired, then the intervention would need to be focused on those areas. It may be an area of instruction that is not provided to students thoroughly enough for all of them to fully attain it. However, many students likely struggle with one or more skills, and it is difficult to identify the unique needs of each student (Kilpatrick, 2015). Moreover, providing nearly individualized instruction to large groups of students is incredibly challenging (Klingbeil et al., 2020). Thus, a logical change is to provide more targeted instruction in parts of basic reading skills to all students to address all areas of concern. My study evaluated the effectiveness of the supplemental program Fundations with a certain population of students over 2 years.

Inherent Weakness in Previous Researcher's Approaches

Bieber and Choi (2011) realized that with reading recovery, students demonstrated adequate phonemic awareness at the end of the first grade but were not able to maintain that skill in their future years without supplemental assistance. Therefore, waiting until students fail, or are not successful, is not an advantageous strategy for

addressing skill deficits. Bieber and Choi stressed that interventions and a supplemental curriculum must be provided from the beginning of students' academic careers to ensure strong early literacy skills.

The currently low literacy rates in the United States may be overcome with better curricula and instruction. Kilpatrick (2015) described that 27%–34% of fourth graders in the United States read below grade level. The reason for this may be that students do not have a strong foundation in basic reading skills. Each student may have different gaps in their reading ability and identifying what those areas are and then implementing supplemental strategies to improve those skills is a nearly impossible task. The number of individuals it would take to accomplish this would be overwhelming, which is why this strategy has not been successful and likely will continue to be unsuccessful. By adding supplemental instruction, the added reading time will result in an improvement in skill, but the deficits that each student has may not be directly improved. If their deficit areas are not improved, they will begin to struggle again when the supplemental program is no longer available. The students will regress when they no longer have the opportunity for supplemental instruction because their weak skill areas have not improved. Thus, a better strategy may be to provide supplemental instruction for all students before gaps in reading occur. Another study that found similar results when attempting to implement interventions for students that were struggling academically focused on preschool-aged students. Atwater et al. (2017) focused on supplemental curriculum for struggling preschool-aged children and stressed the importance of providing proactive interventions to ensure improvement in reading ability. Atwater et al. (2017) discussed that

intervention placement is important because it provides information detailing that interventions provided after a student has fallen behind may not be as effective as an intervention before students show signs of struggle.

Inherent Strengths in Previous Researchers' Approaches

Wilson (2011) focused on a multi-tiered system of intervention that provides research-based instruction as a preventive measure for students. Part of this intervention process is teaching phonetic skills in detail and providing a stronger base for early literacy skills. Wilson (2011) described that supplemental intervention explicitly teaches the early foundations of reading that many struggling students lack. This intervention may be key to preventing future reading problems. In a follow-up to this research, The Wilson Language Training Corporation (2020) found that students who participated in the Fundations program had higher test scores 3 years after the program was completed. If students have limited deficits in basic reading ability, this may lead to fewer future reading problems. These findings are promising and may add clarity to such a large and confusing issue. Teaching students to read is one of the top priorities of school districts that have ever-increasing demands (Kilpatrick et al., 2019). Early literacy skills are a precursor to students' later success in school. Phonics is a key component for obtaining early literacy skills and future academic success for students. Kilpatrick (2015) reported that reading is crucial for academic success in all areas, including life after school. Elghotmy and Ghoneim (2015) discussed that learners need to use phonics skills first to read and write. Phonics development is a crucial piece to early literacy, as students first understand that each letter makes a sound and combining them creates words. Students

might not realize that letters are building blocks and work with other letters to create words. Words are not independent of the rules of language. The rules of language are followed which create and combine words to generate meaning. Early development is necessary because, during the first 3 years of school, each lesson and new skill builds on previously attained skills.

Reading curricula do not provide the depth needed in phonics. They are thorough, but additional resources are necessary for the early reading years to help ensure students do not develop gaps in their basic reading skills. The Fundations program provides additional resources necessary to fill this need. Fundations provides specific instruction in phonics and is used as a supplement to the reading curriculum. The reading curriculum alone may not provide enough instruction in phonics for kindergarten students who are beginning to read. In Terrell's (2017) study, every student who received the Fundations supplemental program was reading at or above grade level by the end of the program. Similarly, in Chalfant's (2019) research, all students who received the Fundations program showed an overall improvement in reading achievement.

The rationale for the dependent variables is that DIBELS is a standardized assessment used in many districts throughout the country. The scores it produces are easy to understand and provide valid and reliable measures of the dependent variables of interest in this study. The three dependent variables are words correct, accuracy, and retell. All three of these are subtests from the DIBELS assessment. Another benefit is that it gathers quantitative data which is clear, concise, and quickly can show results. Also, it

is thorough, providing multiple different subtest scores to measure different areas of reading.

Fundations

Recent peer-reviewed publications have focused on Fundations. Chalfant (2019) described that all the students in their research who participated in the Fundations program saw an increase in reading achievement. Terrell (2017) said that all students who participated in the Fundations program were at or above grade level by the end of the program. DIBELS results are the dependent variable and participation in Fundations is the independent variable of my research. DIBELS is a standardized assessment that has been normed. In recent research (Chalfant, 2019; Terrell, 2017; Wilson, 2011; Wilson Training Corporation, 2020), participation in the Fundations program was related to a positive impact on students' ability to understand phonemes and a means to provide early assistance to all students. The Wilson Language Training Corporation (2020) found that students who participated in the Fundations program achieved higher test scores 3 years after the program compared to those who did not participate in the program. This is promising information, but there is much less research on how students read over time. This is the most challenging piece of the reading process. How can we build capacity in students that will assist them in being stronger readers over time? Building students' reading abilities so they are stronger readers throughout their educational careers is the goal of educators. This is the most challenging task, and my research will shed more light on this.

What remains unclear is whether explicit instruction in key areas is more effective when provided to all students before anyone falls behind or as a reactive approach to addressing an identified issue. Some of the current practices are not effective. There are low literacy rates in the United States that may be overcome with better curriculum and instruction. Kilpatrick (2015) described that 27%–34% of fourth graders in the United States read below grade level.

The reason for students falling behind may be that students do not have a strong foundation in basic reading skills. The supplemental reading program Fundations was developed to increase proficient reading ability among students. Fundations provides specific instruction in phonics and supplements the reading curriculum. The reading curriculum alone may not provide enough instruction in phonics for kindergarten students who are beginning to read. Terrell (2017) stated that every student in her research who received the Fundations supplemental program was at or above grade level in reading by the end of the program. Chalfant (2019) reported that all the groups of students who received the Fundations program in his research had an overall improvement in reading achievement. The Fundations program is targeted at the most important part of academics (reading), is inexpensive compared to reading programs, and is easy to implement.

Currently, too many students are struggling with reading and the intervention process is not effective. Klingbeil et al. (2020) expressed that many students are unable to retain learned skill(s) when a given intervention is over. Klingbeil et al. continued that after students met the exit criteria of a tier-two reading intervention, many did not maintain their current progress and failed to meet benchmarks. Bieber and Choi (2011)

stated that although supplemental instruction and interventions are successful, students' skills tend to regress without the explicit instruction that the intervention provided.

What remains to be studied is the long-term effects of proactive reading intervention. DIBELS assessments will be analyzed more than 2 years after the students received the Fundations curriculum. The findings revealed that assessment scores among students differed based on whether they participated in the Fundations program in kindergarten. With this information, intervention placement may be more effective before students struggle in reading. Bieber and Choi (2011), Atwater et al. (2017), and Kilpatrick (2015) have shown that interventions provided after students are struggling are only effective while the intervention is being provided. As soon as the intervention ends, the student begins to fall behind again. The three dependent variables (words correct, accuracy, retell) were measured using a MANOVA to provide us with data about student functioning. If the students who received the independent variable (Fundations) have significantly fewer reading gaps according to the DIBELS assessment, then this may be an appropriate way to provide intervention.

The supplemental reading program Fundations may offer support to increase proficient reading ability among students. Fundations provides specific instruction in phonics and is used as a supplement to the reading curriculum. The reading curriculum alone may not provide enough instruction in phonics for kindergarten students who are beginning to read. Terrell (2017) stated that every student in her research who received the Fundations supplemental program was at or above grade level in reading by the end

of the program. Chalfant (2019) reported that all the groups of students who received the Fundations program in his research had an overall improvement in reading achievement.

Dynamic Indicators of Early Literacy Skills (DIBELS)

The accuracy subtest measures students' phonics skills. The first skill a student must be proficient in is their ability to understand the sound of each letter and how letters are combined to create words. This skill is a basic building block of the reading process and often does not receive sufficient instructional attention in classrooms. Reading series do have phonics instruction embedded in their textbooks, but it may not be thorough enough for all students. With a limited understanding of phonics, students demonstrate poor reading ability that continues to plague them throughout their academic careers. The DIBELS assessment identifies current phonics ability to better understand how to instruct students. The accuracy subtest can provide clear information on a student's current phonics functioning. These measures can be used to assess students' understanding of phonics before and after an intervention to determine the effectiveness of the program.

Research highlighting the importance of phonemic awareness and phonics first appeared in the mid-1960s, coincidentally almost the same time as the Coleman Report. In 1967, Bond and Dykstra reported the results of their nationally funded longitudinal study that has since become known as the "first-grade studies." Their main finding was that phonics is the superior approach to reading instruction compared to the traditional whole-word approach (Bond & Dykstra, 1967). Kilpatrick (2015) provided a synthesis of the past 50-plus years of research on this topic and concluded that "early, explicit, and systematic instruction in phonics, along with a direct instruction in phonological

awareness, can prevent reading difficulties and can also remediate reading difficulties" (p. 25). Phonemic awareness and phonics, which are the primary focus of literacy instruction during preschool and kindergarten, are critically important because they serve as the foundation of reading and future learning. These important predictive skills include exposure to vocabulary, phonemic awareness, letter identification and letter sounds, and finally, phonics itself.

During the development of phonological awareness, children begin to recognize letters and eventually their corresponding sounds. According to Kilpatrick (2015), the ability to identify letters is the intersection of two important skills: basic phonological awareness and visual memory. The relationship between letters and their sounds is known as the alphabetic principle. According to Kilpatrick (2015), the alphabetic principle is the realization that letters in words and sounds of language have a connection. Recognizing words is a core skill for strong readers and begins by learning the alphabet. Letter identification is, therefore, a prerequisite to becoming a skilled reader and the focus of parents and early childhood educators.

When students gain the ability to recognize letters, and this ability is coupled with basic phonological awareness and visual memory skills, they can learn letter sounds (Kilpatrick, 2015). In other words, knowledge of letter sounds is vital to learning to read. According to Kilpatrick (2015), an alphabet writing system is dependent on understanding the sounds associated with letters. Further, and more specifically, knowing the sounds of letters facilitates both sounding words out, known as the phonics skill of decoding, and sight-word recognition (Kilpatrick, 2015). Even more so than letter

identification, knowledge of letter sounds is a prerequisite to becoming a skilled reader and thus is an especially important skill for students in the kindergarten year.

After students understand individual letter sounds, they can begin to apply that knowledge to sound out entire words and begin reading. This process is the skill of decoding, and it forms the basis of phonics. Phonics decoding skills are considered essential to reading because they allow the reader to independently determine the meaning of unfamiliar words (Kilpatrick, 2015). Over time, via instruction at school and practice both at school and home, the number of unfamiliar words is reduced as more words become sight words. As mentioned, skilled readers can quickly and effortlessly recognize most of the words they read (Kilpatrick, 2015). However, getting to this point is not possible without phonics, which is still needed even by the strongest readers as children and adults are exposed to new words throughout their lives (Kilpatrick, 2015).

The next subtest is words correct, which measures the number of words accurately decoded by the student. This subtest measures the student's ability to combine letters and sounds to form words. The student is given credit if they can correctly decode a given word. Therefore, it is important to consider all three subtests to ensure an accurate measure of a student's reading ability.

The third and final subtest is retell, which measures students' comprehension skills. This is the most complex task because it takes the ability to correctly sound out each letter to make a word and create meaning from that. Each skill builds on the other and gaps in any area make the reading process difficult and eventually make learning difficult. The retell subtest asks students to read a given passage and then answer

questions about that passage. This task may be challenging for students with lower reading ability, as it requires students to be able to fully understand what they have read and assign meaning. This is one of the first complex tasks that young students are asked to perform.

Chapter Summary

A review of the contemporary literature regarding reading instruction, interventions, and supplemental materials and instruction reveals that improving reading instruction is challenging and has not successfully been attained. It remains unclear how educators can support students in retaining phonics skills over time and ensure students are proficient in one skill before new skills are taught. My research provides an original contribution to the practice of providing supplemental phonics instruction to all students to prevent reading struggles, and gaps in reading, from developing.

This study provided insight into the topic of providing supplemental phonics instruction before students begin to struggle academically and if that learned information can be retained over time. My study benefits educators and students by realizing the effectiveness of the supplemental reading instructional program Fundations. Improving students' reading abilities hopefully will increase positive student educational outcomes.

In Chapter 3, I outline the study design, methodology, and proposed statistical analysis. I will include an overview of how the archival data will be used and analyzed. The chapter will provide support for the choice of secondary data analysis and how it will answer the research questions associated with my research project.

Chapter 3: Methodology

In this quasi-experimental study, I evaluated if students receiving the supplemental phonics program Fundations in kindergarten was effective at maintaining reading scores at the end of their second grade school year compared to those receiving standard instruction. I was given approval for my study by the Institutional Review Board (IRB) on October 18th, 2023 and my approval number was 10-18-23-0454769.The Fundations supplemental curriculum is provided in kindergarten in hopes that students will demonstrate better basic reading and phonics skills with fewer reading gaps forming between kindergarten and second grade. The data that was analyzed from this school district comprises two cohorts of students to capture the reading scores of those who did not receive Fundations compared to those that participated in the program the next year (the first year it was offered). According to Kilpatrick (2015), up to 30% of students in third grade are reading below grade level.

To measure reading ability, three dependent variables (words correct, accuracy, retell) were selected from the DIBELS assessment measured at the end of the students' second-grade school year. Students' reading scores are measured using assessments related to phonics, reading decoding, and comprehension. The independent variable is participation in the Fundations program. Fundations is a supplemental early reading intervention used in conjunction with the reading curriculum. Data concerning who received the Fundations intervention will be coded (No = 0, Yes = 1). The measurement tools were three subtests of the DIBELS assessment. DIBELS Oral Reading Fluency (DORF) has three subtest scores that measure phonics, decoding, and comprehension.

The three subtests are words correct, accuracy, and retell. I determined that students who participated in the Fundations curriculum in kindergarten have significantly higher scores for these subtests compared to those who did not participate at the end of their second-grade school year using a one-way MANOVA. My research expanded on earlier research by the Wilson Language Training Corporation (2020), who described that students who participated in the Fundations program had higher state test scores in third grade than those who did not participate in the program.

The major sections in this chapter include the introduction, research design and rationale, methodology, data analysis, threats to validity, and ethical considerations. The research design and rationale sections describe the chosen methodology and significance of the study based on background literature. In this section, I describe the specific procedures or techniques used to identify, select, process, and analyze information about my topic. In a research paper, the methodology section allows the reader to critically evaluate the overall validity and reliability of a study. The data analysis section includes a summary of the proposed data collection and analysis. This process involves the interpretation of data gathered using analytical and logical reasoning to determine patterns or relationships. In this study, I used a single independent variable (participation in the Fundations program) and three dependent variables (words correct scores, accuracy scores, retell scores) to determine if participating in the supplemental reading program Fundations is a contributing factor in preventing reading gaps from forming and maintaining grade-level reading skills over time. The sampling procedure used is random sampling. The G*Power software was used to determine the minimum number of

participants needed for the study (see Faul et al., 2009). The students' data was randomly chosen to be used in my research. I used archival data from previous school years that have been uploaded to the school district's information system. I also discuss threats to validity, which include any factors that might have undue influence on the research or skew the data being collected. Lastly, I address the ethical considerations for my research, including avoiding any harm to children because of their participation in the study.

Research Design and Rationale

My research was driven by three quantitative research questions and associated hypotheses. These quantitative research questions seek to understand the impact of Fundations on students' reading ability over 2 school years. The dependent variables are the DIBELS subtests of words correct, accuracy, and retell. The independent variable is participation (*No* = 0, *Yes* = 1) in the Fundations program. As there are three metric/continuous dependent variables (words correct, accuracy, retell), data was analyzed using a one-way MANOVA. Huberty and Olejnik (2006) stated that MANOVA extends the capabilities of ANOVA by assessing multiple dependent variables simultaneously. Anderson (2003) asserted that multivariate analysis is one of the most useful methods to determine relationships and analyze patterns among more than one statistical outcome variable simultaneously. My research has three dependent variables, so the one-way MANOVA is a more appropriate test. Spector (1981) stated that a one-way MANOVA better controls Type I errors while maintaining statistical power with more rigorous data analysis. The dependent variables are continuous, and the independent

variable is a grouping or categorical variable. Furthermore, the data needs to be statistically and conceptually related. Anderson (2003) discussed a positive correlation between the dependent variables is necessary for the one-way MANOVA to be effective. Grice and Iwasaki (2007) described that the statistical increase in power from ANOVA to MANOVA may reveal smaller significant effects.

Methodology

The data for this study was archival and was collected in a school setting. The design for this study was selected based on the availability of reading scores measured using annual DIBELS assessments. I sampled data related to reading scores from students' second-grade school year and compare scores between students who received Fundations in kindergarten and those who did not. All data was originally collected in a suburban school district located in the Northeastern United States.

Population

The population for this study is students who were enrolled in kindergarten during the 2015–2016 and 2016–2017 school years. The district has one primary elementary building that houses students in grades kindergarten through second grade. This school district is located in a suburban area in the Northeastern United States. There are approximately 2,500 students in the entire district and 590 students in the primary elementary building. I examined the data of 128 randomly selected students from a total of 387 in the two grade levels (64 from each grade/school year).

Sample and Sampling Procedures

The target population for this study is two groups of kindergarten students who did or did not participate in Fundations. The sampling strategy is random sampling from previously collected student data. Data is from the kindergarten students who were enrolled in the school district from kindergarten until the end of their second-grade school year. Datum was obtained from DIBELS assessments given to students at the end of their second-grade school year.

The archival data included 128 kindergarten students who were enrolled in the school district during the 2015–2016 and 2016–2017 school years (64 from each set). The supplemental reading program Fundations was provided to the group of students who were in kindergarten during the 2016–2017 school year. DIBELS assessment data was gathered from students at the end of their second-grade school year for students who did participate in the intervention and those that did not.

Archival Data

A total of 387 students were identified as having available DIBELS data at the end of their second-grade school year. Results from using the G*Power software indicated that 96 participants were needed to test the null hypotheses with adequate power (.80). The students who received the Fundations curriculum attended kindergarten in 2016–2017 and the students who did not receive the intervention attended in 2015–2016. The data have been stored in a school-based database since that time and because it has already been gathered, it is considered archival data.

Data Analysis Plan

The research questions and associated hypotheses are as follows:

RQ1: Did kindergarten students who participated in the Fundations curriculum (2016–2017) have a significantly higher score in words correct than the students who did not participate in the curriculum (2015–2016) according to the words correct subtest of the DIBELS assessment administered at the end of the students' second-grade school year?

($H_0$1: No significant difference exists between the words correct subtest score of the DIBELS assessment for those who participated and those who did not participate in the Fundations curriculum.

H_a1: A significant difference exists between the words correct subtest score of the DIBELS assessment for those who participated and those who did not participate in the Fundations curriculum.

RQ2: Did kindergarten students who participated in the Fundations curriculum (2016–2017) have a significantly higher score in reading accuracy than the students who did not participate in the curriculum (2015–2016) according to the accuracy subtest of the DIBELS assessment administered at the end of the students' second-grade year?

$H_0$2: No significant difference exists between the accuracy subtest score of the DIBELS assessment for those who participated and those who did not participate in the Fundations curriculum.

H_a2: A significant difference exists between the accuracy subtest score of the DIEBLS assessment for those who participated and those who did not participate in the Fundations curriculum.

RQ3: Did kindergarten students who participated in the Fundations curriculum (2016–2017) have a significantly higher score in reading comprehension than the students who did not participate in the curriculum (2015–2016) according to the retell subtest on the DIBELS assessment administered at the end of the students' second-grade year?

$H_0 3$: No significant difference exists between the retell subtest score of the DIBELS assessment for those who participated and those who did not participate in the Fundations curriculum.

$H_a 3$: A significant difference exists between the retell subtest score of the DIBELS assessment for those who participated and those who did not participate in the Fundations curriculum.

The data was analyzed using SPSS version 27.0 software (see IBM Corporation, 2020). The three continuous dependent variables represent scores from the subtests of the DIBELS assessment (words correct, accuracy, retell) and were calculated as means. The means were compared using the one-way MANOVA, which is an extension of the independent samples *t* tests to compare means. The data was obtained from a Microsoft Excel file and then uploaded into SPSS, where it was cleaned and screened. The Excel file was created with the names and identifying information of participants removed to protect anonymity and confidentiality. The cleaning process included the dismissal of

participants who had missing or incomplete data. Before testing the research null hypotheses, the assumptions for the one-way MANOVA were evaluated. Any data that belongs to one student and does not meet the assumptions was removed from the analysis.

The one-way MANOVA is a more powerful test than the ANOVA, as MANOVA allows for more than one dependent variable (Tabachnick & Fidell, 2012). As this study has three dependent variables, the one-way MANOVA can produce more specific results concerning differences in reading scores. Further, the one-way MANOVA compares multiple means simultaneously while maintaining statistical power. Tabachnick and Fidell (2012) described the following assumptions that must be met to use MANOVA: (a) independent random sampling, (b) level and measurement of the variables, (c) absence of multicollinearity, (d) normality of the dependent variables, and (e) homogeneity of variance. Understanding these assumptions makes this tool appropriate to perform in this circumstance. Further, the data must be statistically and conceptually related. Anderson (2003) discussed a positive correlation is needed between the dependent variables for the one-way MANOVA to be effective. Grice and Iwasaki (2007) described that the statistical increase in power from ANOVA to MANOVA may reveal smaller effects that make the data significant.

The one-way MANOVA was used to determine the possible statistically significant differences between students who participated in the Fundations program and those who did not. The one-way MANOVA was used to analyze significant differences among three continuous, dependent variables (Denis, 2018). In my study, I used one

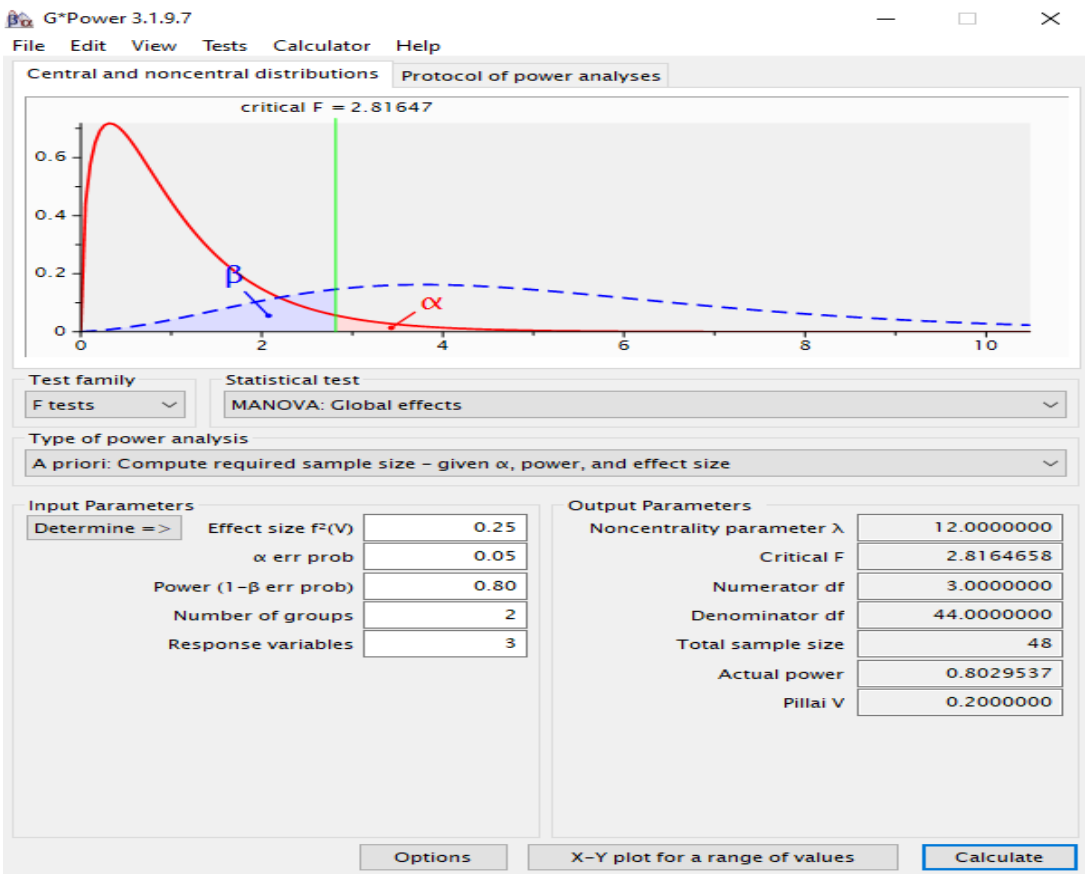
categorical variable (participation in the Fundations program) and three continuous dependent variables (words correct, accuracy, retell scores), which make the one-way MANOVA an appropriate test for exploring a possible relationship between the independent and dependent variables.

A priori power analysis was conducted using G*Power software to determine the required minimum sample size for the study based on the steps outlined by (Faul et al. 2009). Four factors were considered in the power analysis: significance level, effect size, the power of the test, and statistical technique. The significance level, also known as Type I error, refers to the chance of rejecting a null hypothesis given that it is true. I used a 95% confidence interval to provide adequate statistical evidence. Cohen (1988) described that the effect size refers to the estimated measurement of the relationship between the variables being considered, with a medium effect size being a balance between small and large effect sizes. Sullivan and Feinn (2012) said that effect size can refer to the raw differences between group means. The effect size is important because it describes how meaningful the relationship is between variables (Cohen, 1992). The small effect size may be too narrow, and a large effect size may be too wide. Morris and Fritz (2013) reported that a medium effect size is preferred because it strikes a balance between the variables being too closely related and not related enough. Shafer and Schwarz (2019) stated that the judgement about small, medium, and large effect sizes should be derived from previous studies. Past literature has described that a medium effect size of .25 is appropriate to show how strong the relationship is between the variables and is most used in the social sciences.

The power of a test refers to the probability of correctly rejecting a null hypothesis (Sullivan & Feinn, 2012). In quantitative studies, 80% power is usually used (Sullivan & Feinn, 2012). The statistical test used in G*Power for this study was global effects one-way MANOVA because there is only one independent variable (Figure 1). Given this study has only one independent variable, there was no interactions between independent variables and no repeated measures. To conduct the one-way MANOVA to detect a medium effect size at a 5% level of significance with 80% power, at least 48 participants per group ($N = 96$) are required. However, to err on the side of caution, 64 randomly selected participants were selected from each of the two groups, for a total of 128 subjects.

Figure 1

G Power Analysis for One-Way MANOVA*



Five assumptions were tested before completing a one-way MANOVA based on recommendations from Denis (2018). These assumptions included (a) independent random sampling, (b) level and measurement of the variables, (c) absence of multicollinearity, (d) normality of the dependent variables, and (e) homogeneity of variance. The statistical assumptions were all met to ensure the test provides results that are valid regarding the parameter the test is calculating. The first assumption that was met was independent random sampling. A total of 96 participants were randomly sampled from the archival data to be included in my research.

The next assumption is the level and measurement of the variables. When using the one-way MANOVA, two or more dependent variables must be measured as continuous variables. In my study, three scores (dependent variables) were obtained from the DIBELS assessment: words correct, accuracy, and retell subtests. Thus, my dependent variables were continuous. The assumption about the independent variables consisting of two or more categorical variables was also met since my independent variables have two levels/categories (*No* = 0, *Yes* = 1) that indicated whether a student participated in Fundations.

The next assumption was the absence of multicollinearity and linearity. There must be no multicollinearity among the dependent variables (Huberty & Olejnik, 2006). The dependent variables must be continuous, which were derived from scores on subtests from the DIBELS assessment. The absence of multicollinearity is checked by conducting correlations among the dependent variables (Field, 2013; Walden University, 2016). The dependent variables should all be related to each other, but any correlation over .80 is a concern for multicollinearity. Participants whose scores are highly correlated, indicating violations of the assumption of multicollinearity, may be omitted before the one-way MANOVA is conducted. The assumption of linearity was examined using a scatterplot matrix between the dependent variables. Linearity assumes that all the dependent variables are linearly related to each other (Field, 2013; Walden University, 2016). Linearity should be met for each group of the one-way MANOVA separately (Field, 2013; Walden University, 2016).

Equality of covariance matrices is an assumption tested by running a Box's M test (Friendly & Sigal, 2018). Discriminant analysis, a one-way MANOVA, and other multivariate procedures assume that the individual group covariance matrices are equal (homogeneous across groups). The test is commonly used to test the assumption of homogeneity of variances and covariances in one-way MANOVA and linear discriminant analysis. The Box's M test is strict, meaning the level of significance is .001 (Friendly & Sigal, 2018). In other words, if the *p*-value for the test is above .001, the assumption is met. Friendly and Sigal (2018) stated that Box's M test is sensitive to non-normality, so it is important to establish multivariate normality before using the test.

The next assumption that was tested is normality across the three dependent variables. The Shapiro-Wilk test was used to examine the normality of the data (Shapiro & Wilk, 1965). This test rejects the hypothesis of normality when the *p*-value is less than or equal to .05. This assumption will also be assessed by creating a Q-Q probability plot to detail all the scores and show any possible violation of normality. In these plots, the observed data is plotted against the expected quantiles of a normal distribution. If the probability plot is roughly a straight line, then it is likely that the data is normally distributed. A lack of a straight line on the probability plot would provide signs of non-normality of the population distribution. The probability plot was plotted against a theoretical distribution in such a way that the points should form approximately a straight line.

The final assumption that was tested is the homogeneity of variance. Homogeneity of variance is an assumption underlying *F*-tests in which the population

variances of two or more samples are considered equal. This assumption was tested using Levene's test to determine if the variances are equal across each of the variables.

After the assumptions were tested, violations were addressed by deleting cases or conducting data transformations. After the results indicated no violations, I then tested the null hypotheses to determine if participation in the Fundations program is associated with higher scores on the words correct, accuracy, and retell scores on the DIBELS assessment. Overall, the results of the one-way MANOVA were used to determine if the Fundations program is associated with higher sustained reading scores over 2 years.

Independent and Dependent Variables

The dependent variables for this study are words correct, accuracy, and retell, which are subtests of the assessment tool DIBELS. Standard scores for the three subtests compared multiple areas of reading to determine if participation in the Fundations program had a positive impact on reading scores over time. Data was collected from the end of the students' second-grade school year. Participation in the supplemental phonics program Fundations is the independent variable and will be entered as binary codes (*No* = 0, *Yes* = 1). Students were grouped based on whether they received Fundations, and samples from the two grade levels were used as the population. Students attending kindergarten in the 2015–2016 school year were not provided the supplemental phonics program, whereas those enrolled in the 2016–2017 school year did receive the program. These two groups make up the categories of the independent variable (those who had Fundations and those that did not).

Quantitative data on DIBELS assessments are archival; they have been collected by the teachers and posted on a data collection tool called Performance Tracker. A school district in the Northeastern United States allowed me access to the data collected. A signed letter from the school district detailing the data use agreement is provided in Appendix A. I had access to the software used to store the data (Performance Tracker) and downloaded only the agreed-upon scores to password-protected Excel files to which only I had access. This downloaded data was uploaded into SPSS to run the one-way MANOVA. The files stored in Performance Tracker were arranged in alphabetical order and included all three DIBELS subtests that each student has taken during their career in that school district. The reading specialists in the school district assisted me with accessing Performance Tracker, organizing the information, and downloading the files. I do not have access to Performance Tracker any longer. All the data contained in the Excel files was uploaded into SPSS for analysis. The three DIBELS subtests are words correct, accuracy, and retell. There was two sets of data compared including students who were provided the Fundations curriculum in their kindergarten school year (2016–2017) to another group of students who did not receive the curriculum in their kindergarten school year (2015–2016).

My study used a research design that compared students who did receive the supplemental curriculum Fundations in kindergarten to another group of kindergarten students who did not. The research design supports using the one-way MANOVA. The one-way MANOVA was used to compare the three DIBELS subtests scores (words correct, accuracy, retell).

Data collection was obtained from archival data collected from Performance Tracker, which is the school's data collection tool. SPSS, a statistical software program for social sciences, was used to analyze the data. The one-way MANOVA compared the mean differences with student performance on the dependent variables which are the three DIBELS subtest scores (words correct, accuracy, retell).

To address the research questions, I conducted the one-way MANOVA using SPSS. This test was run to determine if there was a statistically significant difference in students' reading scores over time between the students who received the supplemental reading program Fundations and those who did not.

The findings were reported using *p*-values, which determine the probability of falsely rejecting my null hypothesis. The alpha level of .05 was used for all statistical tests to determine significance. Also, f-value was used to discover the ratio of the between group variation and within group variation to determine statistical significance. The one-way MANOVA was run using the two groups, those who did have Fundations and those who did not, and the results will be compared against each other. There is three different scores for both sets (words correct, accuracy, and retell) and they were compared individually to each other and combined to find significance.

Threats to Validity

Internal Validity

Regarding internal validity, the first two potential threats to my research study are teacher instruction in each room and the research-based reading program the school district used. The teachers in each class were given scripted programs to use when

implementing the Fundations program. Although differences between classrooms are difficult to predict and control, the scripted program minimizes internal threats by providing a standardized program.

Other threats to validity include changes in the DIBELS assessment content, the testing experience, and issues related to student performance and maturity. First, the assessment may have been updated and altered. Any changes to the content of the assessment can have an impact on assessment results and how students react to different changes. Further, since this study employs a quasi-experimental design, a potential threat exists concerning low internal validity. Lastly, students respond to assessments differently: some students are not bothered by assessments whereas others become anxious and cannot perform their best. If students are not performing to their potential on the assessments, then the results may not truly show where the student is functioning. The maturity of students may have an impact on how well they learn and perform. By recognizing these potential threats and adopting measures to address them, I will establish stronger data to analyze and draw conclusions.

External Validity

External validity concerns include the demographics of the participants. This research included participants from a suburban environment in a northeastern state in the United States. Given the focus on one school district in one area of the United States, the results may not be generalizable to other districts in the state or country.

The research employs a quasi-experimental design. A true experiment would have been preferred; however, it was not possible due to the nature of the data and the school

setting. Randomly assigning students in an educational setting and controlling for demographics is not practical in this school setting. Standardization is challenging in school settings due in part to transient populations or other students who change placements during school years. Other unpredictable external validity concerns include students' experiences, motivation, and other factors that affect their ability to learn. Researchers have often questioned whether students' learning rates are related to experiences (nurture) or genetic factors (nature).

Ethical Considerations

It is not anticipated that this research could cause harm or pose any risk to the participants because I used archival data and no specific students, teachers, or school were identified in this research. I did not involve students or teachers in any way during this research and anonymity was safeguarded by the removal of all personal information before analysis. All data was reported in aggregate form using charts and tables. I have received permission from the school district to use the student data, and I have signed a data use agreement. The study was submitted to the Walden Institutional Review Board for approval. All appropriate authorizations were gathered before any data is collected or reviewed. It is anticipated that the results of this study will be made available to educational leaders following dissertational approval.

Informed consent procedures are not necessary because I used archival data, participants did not face any legal or economic hardships, and confidentiality and autonomy were protected per the American Psychological Association (2010) guidelines. Data have been stored in a data system that members of the school district have access to

and have granted me access through my research process. Overall, the design of my study enabled me to maximize the benefits of data analysis and minimize harm to the intended population.

Chapter Summary

In Chapter 3, I described the methodology of this study and how archival data was used to compare student reading scores. The DIBELS reading assessment is administered annually to measure reading ability. The subtests of interest for this study are words correct, accuracy, and retell. The means of the three tests were compared to determine if reading scores were higher for students who received the Fundations supplemental reading curriculum. A summary of the archival data collected was presented and interpreted in Chapter 4.

Chapter 4: Results

The purpose of this quasi-experimental study was to evaluate if the supplemental phonics program Fundations is effective at improving and maintaining students' reading scores due to fewer reading gaps in phonics, decoding, and comprehension. The research questions and hypotheses were as follows:

RQ1: Did kindergarten students who participated in the Fundations curriculum (2016–2017) have a significantly higher score in words correct than the students who did not participate in the curriculum (2015–2016) according to the words correct subtest of the DIBELS assessment administered at the end of the students' second-grade school year?

$H_0$1: No significant difference exists between the words correct subtest score of the DIBELS assessment for those who participated and those who did not participate in the Fundations curriculum.

H_a1: A significant difference exists between the words correct subtest score of the DIBELS assessment for those who participated and those who did not participate in the Fundations curriculum.

RQ2: Did kindergarten students who participated in the Fundations curriculum (2016–2017) have a significantly higher score in reading accuracy than the students who did not participate in the curriculum (2015–2016) according to the accuracy subtest of the DIBELS assessment administered at the end of the students' second-grade year?

$H_0$2: No significant difference exists between the accuracy subtest score of the DIBELS assessment for those who participated and those who did not participate in the Fundations curriculum.

H_a2: A significant difference exists between the accuracy subtest score of the DIEBLS assessment for those who participated and those who did not participate in the Fundations curriculum.

RQ3: Did kindergarten students who participated in the Fundations curriculum (2016–2017) have a significantly higher score in reading comprehension than the students who did not participate in the curriculum (2015–2016) according to the retell subtest on the DIBELS assessment administered at the end of the students' second-grade year?

$H_0$3: No significant difference exists between the retell subtest score of the DIBELS assessment for those who participated and those who did not participate in the Fundations curriculum.

H_a3: A significant difference exists between the retell subtest score of the DIBELS assessment for those who participated and those who did not participate in the Fundations curriculum.

In Chapter 4, I present the results based on the research questions. In addition, I also describe the data collection.

Data Collection

At the end of their second-grade school year, 387 students had available DIBELS data. The G*Power software indicated that 96 participants were needed to test the null

hypotheses with adequate power (.80). The students who received the Fundations curriculum attended kindergarten in 2016–2017, while those who did not participate in the intervention attended in 2015–2016. The data have been stored in a school-based database since then, and as it has already been gathered, it is considered archival data. Therefore, there were no discrepancies in data collection from the plan presented.

Furthermore, I conducted descriptive statistics to present the gender and ethnicity of the participants. Of the respondents, 48.8% identified as male, and 51.2% identified as female. Additionally, 87.5% of respondents identified as White, while 12.5% identified as non-White. The research included participants at a single school district from a suburban environment in a northeastern state in the United States. It is essential to note that the results are not generalizable to other districts. Hence, the sample does not represent the population of interest, causing threats to external validity.

Table 1

Gender and Race

	Frequency	Percent
Gender		
Male	125	48.8
Female	131	51.2
Ethnicity		
White	224	87.5
Non-White	32	12.5

Results

Descriptive Statistics

Table 2 presents a summary of the performance on three distinct tasks, namely "words correct," "accuracy," and "retell." The "words correct" task exhibited an average score of 96.11, with a low standard deviation of 5.601. This standard deviation suggests that the participants consistently performed around the mean for this task. However, the "accuracy" task revealed a lower mean score of 29.09 and a higher standard deviation of 12.195, indicating more variability in accuracy scores. Finally, in the "retell" task, the mean score was 2.22, and the standard deviation was 0.616, indicating a consistent performance with minimal variability.

Table 2

Fundations Results

	Mean	Std. Deviation
Words Correct	96.11	5.601
Accuracy	29.09	12.195
Retell	2.22	.616

Presented in Table 3 is a comprehensive breakdown of performance across three different tasks, namely "words correct," "accuracy," and "retell." categorized by participation status: "No" and "Yes." For the "words correct" task, nonparticipants achieved a slightly higher mean score of 96.66, with a relatively low standard deviation of 3.727, suggesting consistent performance among non-participants. Conversely, those who participated had a mean score of 96.12, with a similarly low standard deviation of 3.805, indicating consistent performance. Moving on to "accuracy," nonparticipants had a

lower mean score of 27.75, with a standard deviation of 11.551, indicating a broader variation in accuracy scores among nonparticipants. On the other hand, those who participated achieved a higher mean score of 30.47, with a slightly higher standard deviation of 12.471. Finally, for the "Retell" task, participants and nonparticipants had very similar mean scores of 2.22 and 2.23, respectively, with relatively low standard deviations of 0.594 and 0.641. As evidenced by Table 3, participation in Fundations did show a higher mean score in accuracy, but lower scores in words correct and retell.

Table 3

Intervention Participation

	Participation	Mean	Std. Deviation
Words Correct	No	96.66	3.727
	Yes	96.12	3.805
Accuracy	No	27.75	11.551
	Yes	30.47	12.471
Retell	No	2.23	.641
	Yes	2.22	.594

Assumptions

It is necessary to have two or more continuous dependent variables and a categorical independent variable to conduct a one-way MANOVA. In this study, the dependent variables, including words correct, accuracy, and retell subtests, were continuous. In contrast, the independent variable is participation in the supplemental phonics program Fundations, which has two categories (No = 0, Yes = 1).

Before performing a one-way MANOVA, checking for multicollinearity among the dependent variables is essential (Leedy & Ormrod, 2016). In this study, the dependent variables were found to be related, with correlations less than 0.80, which is acceptable (Table 4). Moreover, all the dependent variables should be linearly related to each other to perform a one-way MANOVA (Cooper & Schindler, 2014). To ensure linearity, I examined a scatterplot matrix between the dependent variables and found that linearity was met separately for each group of the one-way MANOVA (Appendix C).

Table 4

Multicollinearity

		Words Correct	Accuracy	Retell
Words Correct	Pearson Correlation	1	.343**	.317**
	Sig. (2-tailed)		<.001	<.001
Accuracy	Pearson Correlation	.343**	1	.643**
	Sig. (2-tailed)	<.001		<.001
Retell	Pearson Correlation	.317**	.643**	1
	Sig. (2-tailed)	<.001	<.001	

Another critical assumption for a one-way MANOVA is the equality of covariance matrices (Leedy & Ormrod, 2016). I tested the equality of covariance matrices using Box's M test and found that the assumption was met, as the *p*-value was greater than .001 (Table 5). Additionally, it is necessary to check the normality of the data by using a Q-Q probability plot, which showed a roughly straight line, indicating a normal data distribution (Appendix D). However, the Shapiro-Wilk test indicated that the data did not show a normal distribution, with a *p*-value below 0.05 (Table 6).

Table 5

Box's Test of Equality of Covariance Matrixes

Box's M	7.914
F	1.302
*df*1	6
*df*2	446831.369
Sig.	.252

Table 6

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	*df*	Sig.	Statistic	*df*	Sig.
Words correct	.241	255	<.001	.796	255	<.001
Accuracy	.102	255	<.001	.961	255	<.001
Retell	.332	255	<.001	.779	255	<.001

Table 7

Levene's Test of Equality of Error Variances

		Levene Statistic	*df*1	*df*2	Sig.
Words Correct	Based on mean	.044	1	253	.833
	Based on median	.256	1	253	.613
	Based on median and with adjusted *df*	.256	1	251.508	.613
	Based on trimmed mean	.178	1	253	.674
Accuracy	Based on mean	1.206	1	253	.273
	Based on median	1.029	1	253	.311
	Based on median and with adjusted *df*	1.029	1	252.969	.311
	Based on trimmed mean	1.188	1	253	.277
Retell	Based on mean	.360	1	253	.549
	Based on median	.153	1	253	.696
	Based on median and with adjusted *df*	.153	1	251.641	.696
	Based on trimmed mean	.211	1	253	.646

Statistical Analysis Findings

RQ1: Did kindergarten students who participated in the Fundations curriculum (2016–2017) have a significantly higher score in words correct than the students who did not participate in the curriculum (2015–2016) according to the words correct subtest of the DIBELS assessment administered at the end of the students' second-grade school year?

$H_0$1: No significant difference exists between the words correct subtest score of the DIBELS assessment for those who participated and those who did not participate in the Fundations curriculum.

*Ha*1: A significant difference exists between the words correct subtest score of the DIBELS assessment for those who participated and those who did not participate in the Fundations curriculum.

RQ2: Did kindergarten students who participated in the Fundations curriculum (2016–2017) have a significantly higher score in reading accuracy than the students who did not participate in the curriculum (2015–2016) according to the accuracy subtest of the DIBELS assessment administered at the end of the students' second-grade year?

$H_0$2: No significant difference exists between the accuracy subtest score of the DIBELS assessment for those who participated and those who did not participate in the Fundations curriculum.

H_a2: A significant difference exists between the accuracy subtest score of the DIEBLS assessment for those who participated and those who did not participate in the Fundations curriculum.

RQ3: Did kindergarten students who participated in the Fundations curriculum (2016–2017) have a significantly higher score in reading comprehension than the students who did not participate in the curriculum (2015–2016) according to the retell subtest on the DIBELS assessment administered at the end of the students' second-grade year?

$H_0$3: No significant difference exists between the retell subtest score of the DIBELS assessment for those who participated and those who did not participate in the Fundations curriculum.

H_a3: A significant difference exists between the retell subtest score of the DIBELS assessment for those who participated and those who did not participate in the Fundations curriculum.

I used a one-way MANOVA to determine if participation in the Fundations program is associated with higher scores on words correct, accuracy, and retell scores on the DIBELS assessment. Participation in the Fundations program was statistically significantly associated with a significantly higher score in words correct, accuracy, and retell scores on the DIBELS assessment, F (3, 251) = 4.254, p = .006; Wilk's Λ = 0.952, partial $\eta 2$ = .048 (Table 8). I examined the tests of between-subjects effects table to determine how the dependent variables differ (Table 9). According to the table, participation had no significant effect on the words correct subtest score (F (1, 253) = 3.24; p =.073; partial $\eta 2$ = .013), the accuracy subtest score (F (1, 253) = 3.26; p = .072; partial $\eta 2$ = .013), and the retell subtest score of the DIBELS assessment (F (1, 253) = .006; p = .937; partial $\eta 2$ = .000).

Table 8

Multivariate Tests

Effect		Value	*F*	Hypothesis *df*	Error *df*	Sig.	Partial Eta Squared
Intercept	Pillai's Trace	.849	472.091[b]	3.000	251.000	<.001	.849
	Wilks' Lambda	.151	472.091[b]	3.000	251.000	<.001	.849
	Hotelling's Trace	5.643	472.091[b]	3.000	251.000	<.001	.849
	Roy's Largest Root	5.643	472.091[b]	3.000	251.000	<.001	.849
Participation	Pillai's Trace	.048	4.254[b]	3.000	251.000	.006	.048
	Wilks' Lambda	.952	4.254[b]	3.000	251.000	.006	.048
	Hotelling's Trace	.051	4.254[b]	3.000	251.000	.006	.048
	Roy's Largest Root	.051	4.254[b]	3.000	251.000	.006	.048

Table 9

Tests of Between-Subjects Effects

Source	Dependent variable	Type III sum of squares	*df*	Mean square	*F*	Sig.	Partial Eta squared
Corrected	Words	17074.332[a]	1	17074.332	3.248	.073	.013
model	Accuracy	17569.693[b]	1	17569.693	3.262	.072	.013
	Retell	25.819[c]	1	25.819	.006	.937	.000
Intercept	Words	4260443.434	1	4260443.434	810.533	<.001	.762
	Accuracy	4196764.677	1	4196764.677	779.196	<.001	.755
	Retell	4162243.854	1	4162243.854	1002.991	<.001	.799
Participation	Words	17074.332	1	17074.332	3.248	.073	.013
	Accuracy	17569.693	1	17569.693	3.262	.072	.013
	Retell	25.819	1	25.819	.006	.937	.000
Error	Words	1329856.168	253	5256.348			
	Accuracy	1362663.307	253	5386.021			
	Retell	1049907.681	253	4149.833			
Total	Words	5590385.500	255				
	Accuracy	5623688.000	255				
	Retell	5227853.500	255				
Corrected	Words	1346930.500	254				
total	Accuracy	1380233.000	254				
	Retell	1049933.500	254				

Summary

A one-way MANOVA result showed a significant association between participation in the Fundations program and a higher score in words correct, accuracy, and retell scores on the DIBELS assessment, F (3,251) = 4.254, p = .006; Wilk's Λ = 0.952, partial η2 = 048. In contrast, between-subjects ANOVA results indicated that participation had no significant effect on the words correct subtest score (F (1, 253) = 3.24; p =.073; partial η2 = .013), the accuracy subtest score (F (1, 253) = 3.26; p = .072; partial η2 = .013), and the retell subtest score of the DIBELS assessment (F (1, 253) =

.006; p =.937; partial $\eta 2$ = .000). In Chapter 5, I interpret the findings and discuss the study's limitations, recommendations, implications, and conclusion.

Chapter 5: Discussion

The purpose of this quasi-experimental study was to evaluate if the supplemental phonics program Fundations is effective at improving and maintaining students' reading scores due to fewer reading gaps in phonics, decoding, and comprehension. The study included three measures of learning: words correct, reading accuracy, and reading comprehension. The study compared two cohorts of kindergarten students, one from 2015-2016 who did not participate in the curriculum and one from 2016-2017 who participated in Fundations. The results revealed that participation in the Fundations program was significantly associated with higher scores in all three subtests (words correct, accuracy, and retell), F (3, 251) = 4.254, p = .006; Wilk's $\Lambda = 0.952$, partial $\eta 2 =$ .048.

Interpretation of the Findings

RQ1: Did kindergarten students who participated in the Fundations curriculum (2016–2017) have a significantly higher score in words correct than the students who did not participate in the curriculum (2015–2016) according to the words correct subtest of the DIBELS assessment administered at the end of the students' second-grade school year?

RQ2: Did kindergarten students who participated in the Fundations curriculum (2016–2017) have a significantly higher score in reading accuracy than the students who did not participate in the curriculum (2015–2016) according to the accuracy subtest of the DIBELS assessment administered at the end of the students' second-grade year?

RQ3: Did kindergarten students who participated in the Fundations curriculum (2016–2017) have a significantly higher score in reading comprehension than the students who did not participate in the curriculum (2015–2016) according to the retell subtest on the DIBELS assessment administered at the end of the students' second-grade year?

The research questions examined how the Fundations curriculum affected students' reading abilities. Specifically, the researchers explored the effect of the independent variable (i.e., the Fundations curriculum) on the dependent variables (i.e., words correct, accuracy, and retell subtests) on the DIBELS assessment. The results revealed that participation in the Fundations program was significantly associated with higher scores in all three subtests (words correct, accuracy, and retell), F (3, 251) = 4.254, p = .006; Wilk's $\Lambda = 0.952$, partial $\eta 2 = .048$.

The findings align seamlessly with the existing body of research, which consistently underscores the effectiveness of supplemental reading programs in elevating overall reading achievement. Atwater et al. (2017) emphasized the need for early intervention through such programs to significantly bolster a student's reading proficiency, providing a solid foundation for future learning. Wilson (2011) reinforced this argument by suggesting that giving additional reading programs to all students can yield positive reading scores. Lombardino and Park (2013) highlighted the effectiveness of incorporating word studies into the reading curriculum.

Moreover, Cole and Shea (2014) emphasized the symbiotic relationship between reading and writing skills in building a solid foundation for reading proficiency. The

authors highlighted that a well-rounded approach combining reading and writing can lead to comprehensive and robust reading skills development. Nichols et al. (2020) further reinforced the importance of a systematic approach to building reading fluency, emphasizing consistent exposure to text, and breaking down the reading process into manageable steps. Finally, Repko-Erwin (2017) noted the need for a precise and focused curriculum in teaching and learning in kindergarten. By acquiring the fundamental building blocks of reading early on, students can set themselves on a trajectory toward successful reading development.

The finding that participation in the Fundations program is associated with higher scores in words correct, accuracy, and retell scores on the DIBELS assessment is intriguing, and it can align with the theoretical framework of orthographic mapping. Orthographic mapping refers to learning to recognize and store words in long-term memory by linking the visual form of a word to its phonological and semantic representations. This process is critical for reading fluency and comprehension, enabling individuals to recognize words quickly and accurately.

My finding implies that participation in the Fundations program positively affects the development of orthographic mapping. The program enhances phonemic awareness and decoding skills, which are essential to orthographic mapping. By providing explicit instruction on phonological awareness, phonics, and word recognition, Fundations could facilitate mapping written words to their corresponding sounds and meanings. The statistically significant association between Fundations participation and higher scores in words correct, accuracy, and retell tests on the DIBELS assessment highlights the

program's effectiveness in enhancing students' orthographic mapping abilities. This finding reinforces the importance of early literacy interventions that strengthen orthographic mapping skills, as they can significantly affect a child's reading development and academic success.

Limitations of the Study

There were threats to the study's external validity. The study was conducted solely at a single school district in the Northeastern United States, which restricted its generalizability to other districts. Furthermore, the study was conducted during the 2015-2016 and 2016-2017 periods. Therefore, the study's applicability to other time periods was further limited.

Furthermore, potential sources of bias, such as selection bias and the Hawthorne effect, could have influenced the outcomes. Selection bias may arise if there are systematic differences between the two cohorts of students beyond just participation in the Fundations program. For instance, if the cohort that participated in Fundations had a higher proportion of students with supportive home environments or access to additional educational resources, this could bias the results in favor of the Fundations program. Additionally, the Hawthorne effect could influence the outcomes, as students who know they are part of an intervention group may be more motivated to perform well on assessments, leading to inflated scores. To mitigate these biases, researchers should use randomized controlled trials or rigorous matching techniques to ensure equivalence between the comparison groups and minimize the influence of extraneous variables.

Additionally, the study may have been subjected to a potential regression threat, where students may have adopted alternative ways to improve their scores beyond the study's scope. This possibility could have enhanced the scores on words correct, accuracy, and retell subtests, attributing the positive impact solely to the students' independent efforts rather than the study variables.

Finally, to ensure an accurate interpretation of the study's results, it is essential to consider and control all relevant covariates, including motivation, self-concept, and autonomy support, that could impact students' reading achievement. Motivation plays a crucial role in reading performance (Toste et al., 2020). Students intrinsically motivated to learn and engage in literacy activities may demonstrate higher reading scores than those without motivation. Barber and Klauda (2020) and Toste et al. (2020) suggested that motivation is positively associated with reading achievement. Therefore, controlling for differences in student motivation between the two cohorts would help ensure that any differences in reading scores are not solely attributable to variations in motivation levels.

Similarly, self-concept could impact reading outcomes. Ma et al. (2022) emphasized the importance of self-concept in reading achievement. Therefore, controlling for differences in self-concept between the two cohorts would help isolate the effects of the Fundations program on reading scores.

Autonomy support, referring to the extent to which students perceive their learning environment as supportive of their autonomy and independence, is also relevant to consider as a covariate (Ma et al.). An autonomy-supportive environment fosters intrinsic motivation and engagement associated with reading outcomes. Ma et al. found

that autonomy support positively predicted students' reading achievement. Therefore, controlling for differences in autonomy support between the two cohorts would help ensure that any observed differences in reading scores are not confounded by variations in the degree of autonomy support experienced by the students. By including motivation, self-support, and autonomy support as covariates in the analysis, researchers can account for individual differences that may influence reading outcomes and provide a nuanced understanding of the effectiveness of the Fundations program.

Recommendations

Recommendations Based on the Findings

The study's results indicate that participation in the Fundations program is statistically associated with higher scores in words correct, accuracy, and retell scores on the DIBELS assessment. The study's theoretical framework aligns with these findings. However, the between-subjects ANOVAs did not reveal significant differences in participation in any of the individual variables. These suggestions provide limited evidence for the effectiveness of the Fundations program. To ensure accuracy in future studies, researchers should control for covariates. Controlling for covariates helps to isolate the genuine association between the independent and dependent variables by accounting for their potential effects on the dependent variable.

Recommendations Based on the Discovered Limitations

The study has some limitations to its external validity. The study cannot be generalized to other districts due to the sample being limited to students enrolled in kindergarten during the 2015-2016 and 2016-2017 school years at a single district in a

suburban area in the Northeastern United States (Leedy & Ormrod, 2016). Future researchers should consider including samples from other districts, given the focus on one school district, to increase the generalizability of the findings.

The study has threats to its internal validity. Selection bias is a potential issue in the study, whereby there may be a difference between students actively participating in words correct, accuracy, and retell subtests and those who abstained from engaging with these subtests (Cooper & Schindler, 2014). Additionally, students may seek other means of improving their scores on the words correct, accuracy, and retell measures, which could result in a regression threat (Vaishnavi & Kuechler, 2015). Future researchers should aim to control for selection bias and regression effects to address the study's internal validity threats. This control will increase the study's internal validity and strengthen the conclusions drawn from the research.

Implications

Positive Social Change

The study focusing on the effect of the Fundations curriculum on students' reading skills has the potential to create positive social change at various levels. The program may improve reading skills individually, leading to increased self-confidence and academic achievement among students. This achievement may positively affect their educational journeys and set them toward promising future opportunities. Furthermore, parents of students in the program may witness their children's improved reading abilities, leading to increased engagement in their child's education. This engagement may also reduce stress and frustration related to their child's academic performance.

Additionally, siblings may benefit indirectly from a positive educational environment at home, contributing to a more supportive and harmonious family atmosphere.

Schools implementing the Fundations program may experience improved overall literacy rates among their students, which could enhance the school's reputation and attract more students and resources. Teachers involved in the program may feel a sense of accomplishment and job satisfaction, leading to improved teaching practices and retention rates. At a societal/policy level, the study's findings may influence educational policy at the district or state level. Policymakers may consider expanding the adoption of effective reading programs like Fundations to improve school literacy rates. Increasing students' literacy skills can have long-term economic benefits for society, leading to a more literate workforce that can increase productivity and create employment opportunities, reducing the financial burden of illiteracy.

Additionally, implementing successful reading programs like Fundations can help address achievement gaps in education, promoting equity and social justice. It is important to note that the potential impact for positive social change should be within the study's boundaries and not extrapolated beyond what the research supports. The study's findings should be communicated effectively to relevant stakeholders, and further research and evaluation may be needed to ensure the sustainability and scalability of the Fundations program's impact on social change.

Theoretical Implications

Understanding how students learn and retain information at their developmental ages is crucial for educators to deliver effective instruction. This instruction is where the

theoretical framework of orthographic mapping, a concept developed by Ehri in the 1980s**,** comes in - it describes how students store sight words in long-term memory as a distinct group of letters so they can be recognized instantly. Research has shown that receiving proper instruction and intervention in kindergarten can improve reading ability throughout their education, reducing the likelihood of reading struggles later on.

As the study focused on the impact of the supplemental phonics program Fundations on students' reading scores, it was most appropriate to use orthographic mapping. The results of the study showed that participation in the Fundations program was statistically significant in improving scores in words correct, accuracy, and retell scores on the DIBELS assessment. This result implies that the Fundations program is effective and aligns with the concept of orthographic mapping. Understanding how students learn and retain information is crucial for effective instruction. Orthographic mapping provides insight into this process, and the study on the impact of the Fundations program shows its effectiveness in improving reading scores, which aligns with the concept of orthographic mapping.

Methodological Implications

The study aimed to assess the effectiveness of Fundations, a supplemental phonics program, in improving and maintaining students' reading scores by addressing reading gaps in phonics, decoding, and comprehension. I used the quasi-experimental design to achieve this goal over two school years (Cooper & Schindler, 2014; Leedy & Ormrod, 2016). The quasi-experimental design was suitable for answering the research questions and examining the research objectives, as it provided reliable and valid results (Vaishnavi

& Kuechler, 2015). The study's findings suggest that the quasi-experimental design was appropriate for evaluating the effectiveness of Fundations in meeting its intended goals.

Recommendations for Practice

Educators can use the study's insights to assess and enhance their reading instruction methods, particularly in the areas of words correct, accuracy, and retell subtests on the DIBELS assessment. The study allows educators to make informed decisions about their teaching strategies, facilitating significant improvements in their students' reading abilities. Here are some recommendations based on the study:

- Educators can comprehensively evaluate the effect of the Fundations curriculum on specific DIBELS assessment subtests. Specifically, educators can assess how participation in the program affects students' performance in words correct, accuracy, and retell scores.
- The study can guide educators in selecting appropriate indicators and metrics to monitor and support student progress effectively. By identifying which aspects of the program contribute most significantly to improvements in words correct, accuracy, and retell scores, educators can tailor their instruction to address specific areas of need.
- The study's results empower educators to enhance their students' reading abilities by integrating practical elements from the curriculum into their teaching strategies.
- Educators can use the study as a basis for professional development initiatives. Sharing the study's insights with colleagues and engaging in collaborative

discussions can promote a collective effort to implement evidence-based practices.

Conclusion

The study evaluated the effectiveness of the supplemental phonics program Fundations in improving and maintaining students' reading scores by reducing gaps in phonics, decoding, and comprehension. The results were promising as the students who participated in the Fundations program demonstrated a statistically significant improvement in words correct, accuracy, and retell scores on the DIBELS assessment. Statistical data further supported these findings, F (3, 251) = 4.254, p =.006; Wilk's Λ = 0.952, partial $\eta 2$ = .048. The study's results align with existing literature that underscores reading supplemental programs boosting reading achievement. The study's theoretical framework relied on orthographic mapping; a concept developed by Ehri in the 1980s. As the research focused on the impact of Fundations on students' reading scores, orthographic mapping was the most suitable approach.

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Appendix A: Data Use Agreement

DATA USE AGREEMENT

The Data Use Agreement ("Agreement"), effective as of September 25, 2023 ("Effective Date"), is entered into by and between Jeremy Pichany ("Data Recipient") and Mr. Brian Durkin ("Data Provider"). The purpose of this Agreement is to provide Data Recipient with access to a Data Set for use in research in accord with the HIPAA and FERPA

Regulations.

1. Definitions. Unless otherwise specified in this Agreement, all capitalized terms used in this Agreement not otherwise defined have the meaning established for purposes of the "HIPAA Regulations" codified at Title 45 parts 160 through 164 of the United States Code of Federal Regulations, as amended from time to time.
2. Preparation of the data set. Data Provider shall prepare and furnish to Data Recipient a data set in accord with any applicable HIPAA or FERPA Regulations.

No direct identifiers such as names may be included in the Data Set. The researcher will also not name the organization in the doctoral project report that is published in Proquest.

Responsibilities of Data Recipient. Data Recipient agrees to:

A Use of disclose the data set only as permitted by this agreement or as required by law;

B Use appropriate safeguards to prevent use or disclosure of the data set other than as permitted by this Agreement or required by law

C Report to Data Provider any use or disclosure of the data set of which it becomes aware that is not permitted by this Agreement required by law;

D Require any of its subcontractors or agents that receive or have access to the data set to agree to the same restrictions and conditions of the use and/or disclosure of the data set that to Data Recipient under this Agreement; and

E No use the information in the data set to identify or contact the individuals who are data subjects.

3 Permitted Uses of Disclosures of the data set. Data Recipient may use and/or disclose the data set for its research activities only

4 Term and Termination.

A Term. The term of this Agreement shall commence as of the Effective Date and shall continue for so long as Data

Recipient retains the data set, unless sooner terminated as set forth in this Agreement.

B Termination by Data Recipient. Data Provider may terminate this agreement at any time by providing thirty (30) days prior written notice to Data Recipient.

C Termination by Data Provider. Data P rovider may terminate this agreement at any time by providing thirty (30) days prior written notice to Data Recipient.

D For Breach. Data Provider shall provide written notice to Data Recipient within ten (10) days of any determination that Data Recipient has breached a material term of this Agreement. Data Provider shall afford Data Recipient an opportunity to cure said alleged material breach upon mutually agreeable terms. Failure to agree on mutually agreeable terms for cure within thirty (30) days shall be grounds for the immediate termination of this Agreement by Data Provider.

E Effect of Termination. Sections 1, 4, 5, 6(e), and 7 of this Agreement shall survive any termination of this Agreement under subsections c or d.

5. Miscellaneous.

A. Change in Law. The parties agree to negotiate in good faith to amend this Agreement to comport with changes in federal law that materially alter either or both parties' obligations under this Agreement. Provided however, that if the parties are unable to agree to mutually acceptable amendment(s) by the compliance date of the change in applicable law or regulations, either Party may terminate this Agreement as provided in section.

B. Construction of Terms. The terms of this Agreement shall be construed to give effect to applicable federal interpretative guidance regarding the HIPAA Regulations.

C. No Third Party Beneficiaries. Nothing in this Agreement shall be confer upon any person other than the parties and their respective successors or assigns, any rights, remedies, obligations, or liabilities whatsoever.

D. Counterparts. This Agreement may be executed in one or more counterparts, each of which shall be deemed an original, but all of which together shall constitute one and the same instrument.

E. Headings. The headings and other captions in this Agreement are for convenience and reference only and shall not be used in interpreting, construing or enforcing any of the provisions of this Agreement.

IN WITNESS WHEREOF, each of the undersigned has caused this Agreement to be duly executed in its name and on its behalf

Superintendent of Schools:

'rovider

l:

lame: Brian Dvetin

itle: Superintendent

Data Recipient:

cipient

me: Jeremy Pichany

le: Director of Special Education

Appendix B: Bar Graphs

Figure B1

Gender

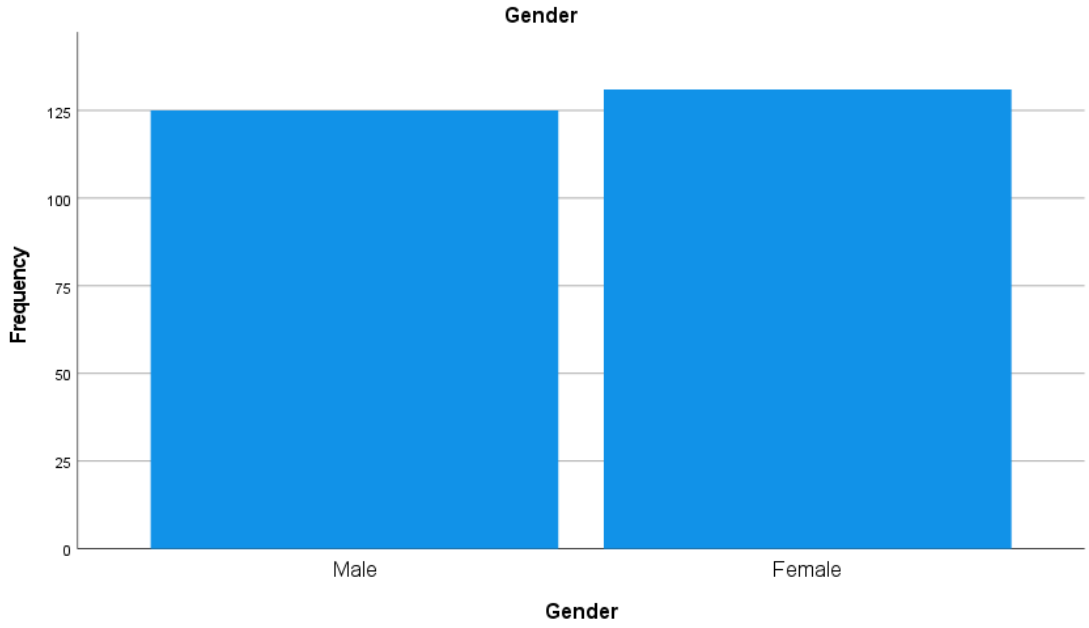
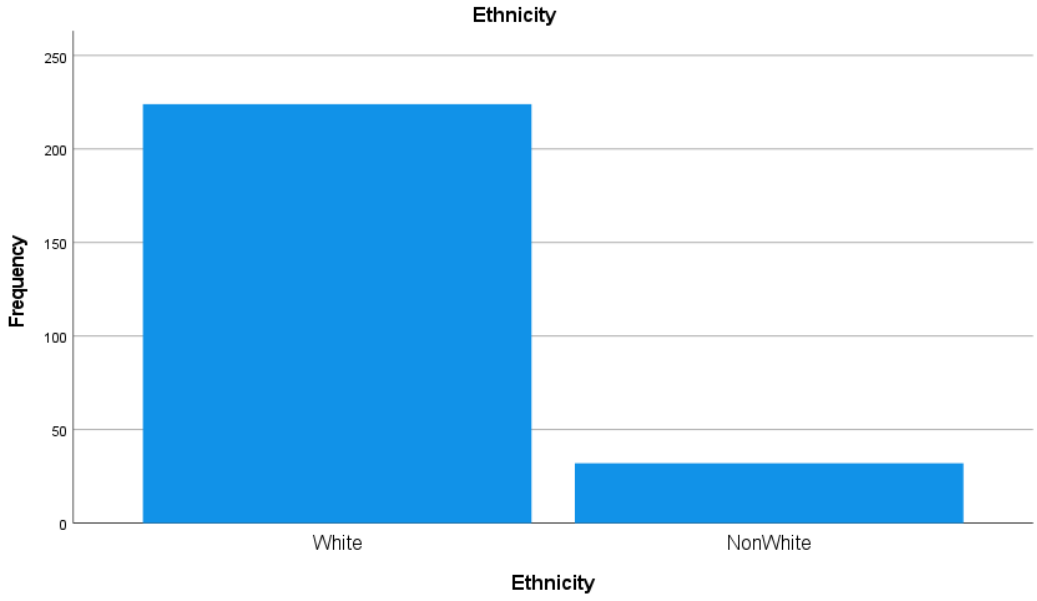


Figure B2

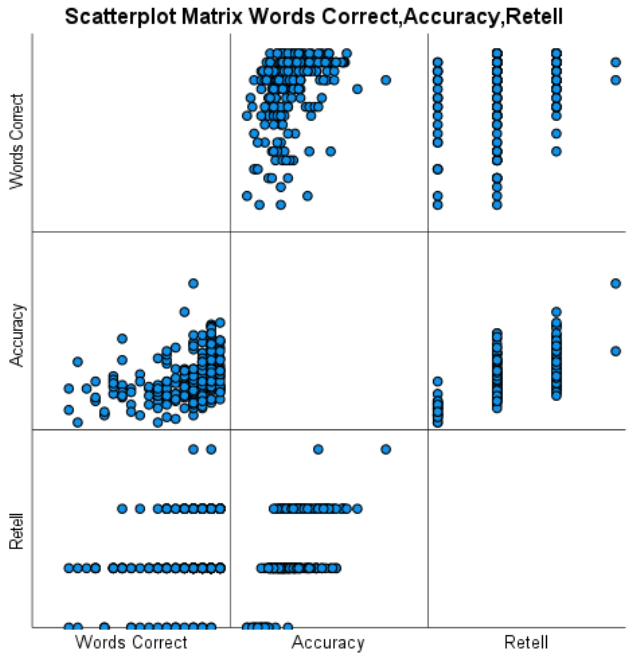
Ethnicity



Appendix C: Scatterplot

Figure C1

Scatterplot Matrix Words Correct, Accuracy, Retell



Appendix D: Normal Q-Q Plots

Figure D1

Normal Q-Q Plot of Words Correct

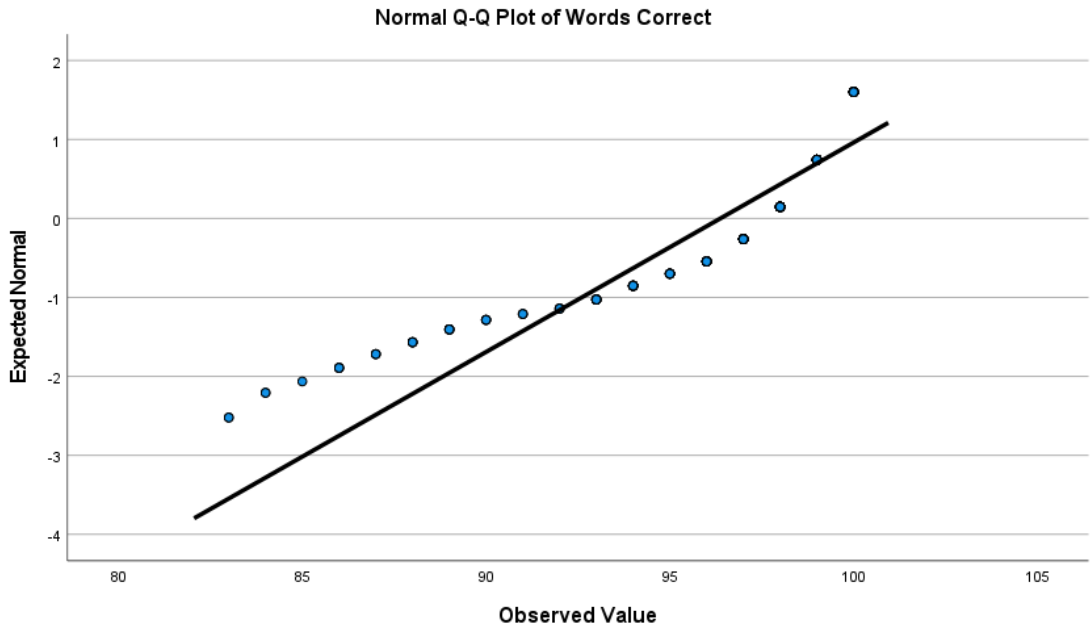


Figure D2

Normal Q-Q Plot of Accuracy

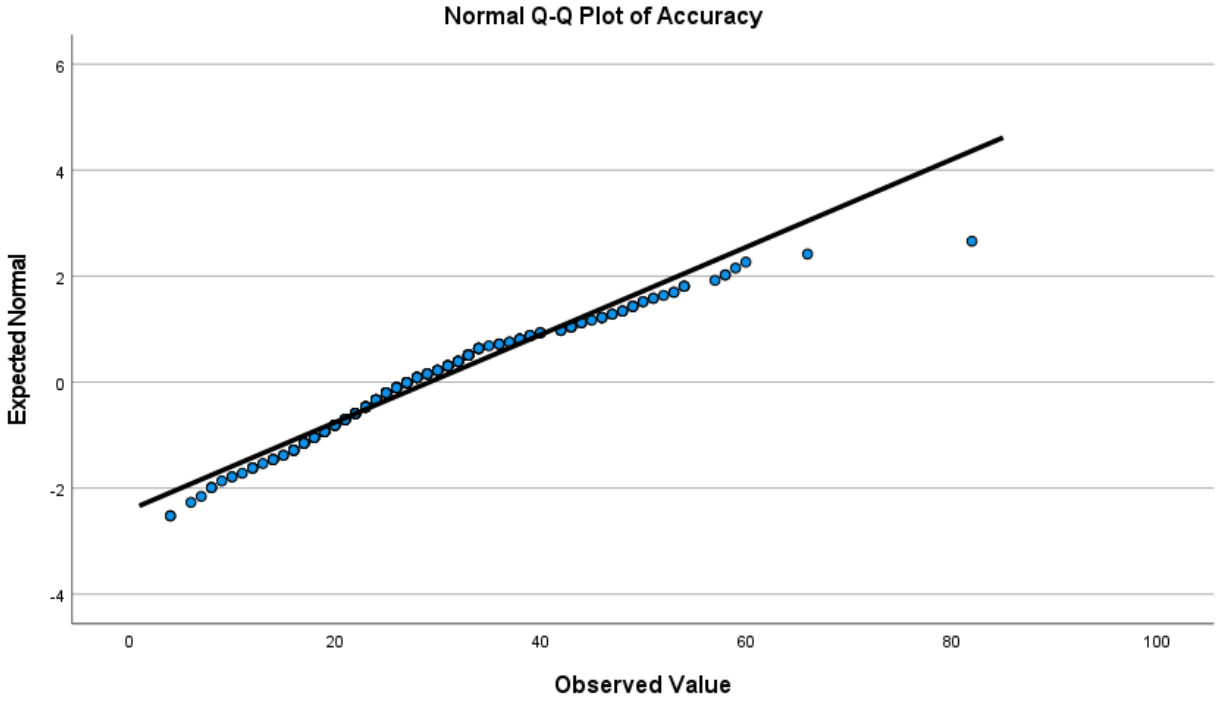


Figure D3

Normal Q-Q Plot of Retell