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# AN ASSESSMENT OF THE EFFECTIVENESS THAT NILD EDUCATIONAL THERAPY© HAS ON MATH, READING, AND WRITTEN LANGUAGE OUTCOMES FOR MIDDLE SCHOOL STUDENTS WITH ACADEMIC UNDERACHIEVEMENT

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AN ASSESSMENT OF THE EFFECTIVENESS THAT NILD EDUCATIONAL  
THERAPY© HAS ON MATH, READING, AND WRITTEN LANGUAGE OUTCOMES FOR  
MIDDLE SCHOOL STUDENTS WITH ACADEMIC UNDERACHIEVEMENT

By

DAWNMARIE BRITTINGHAM

A doctoral dissertation submitted to the  
College of Education  
in partial fulfillment of the requirements  
for the degree Doctor of Education  
in Organizational Leadership

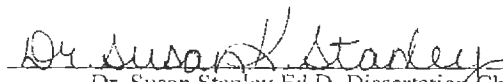
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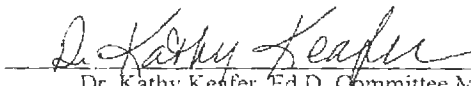
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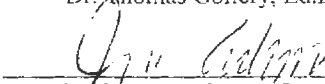
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## DEDICATION

First, I would like to thank my Lord and Savior Jesus Christ. It is through His grace alone that I can follow my calling to work with students who have special needs. He allows me and continues to allow me to follow a specific track, in which He encourages continual growth as a lifelong learner. The track Jesus has set for me includes continually seeking to do His will for my life in order to bring Him honor and glory. Many years ago, the Lord placed the following Bible verse into my heart from the King James Version, 2 Timothy 2:15, “Study to shew thyself approved unto God, a workman that needeth not to be ashamed, rightly dividing the word of truth.”

Second, I would like to thank Poppy, my father. He instilled in me a love of learning and the importance of a strong work ethic. He faithfully supported my endeavors to pursue higher education through undergraduate, graduate, and postgraduate degrees, often encouraging my personal journey. My father’s love, support, and own example of graduate-level accomplishment, significantly contributed to my success as a lifelong learner.

Lastly, I would like to acknowledge my husband, Jeff Brittingham. Jeff became the conduit that my professors utilized to convince me to apply to the doctoral program at SEU. His love and support have sustained me during the most challenging times throughout the doctoral journey.

## ACKNOWLEDGMENTS

Dr. Susan Stanley was one of the most influential individuals in my life, beginning with my master's courses and her role as my graduate advisor. She was the instrument God used to propel me into the SEU doctoral program and a great encourager throughout my graduate and postgraduate journeys. She specifically encouraged me to go deeper and to strive to learn as much as I could as a lifelong learner. Dr. Stanley's tutelage instilled a desire to diversify as a learner into organizational leadership, while still developing deeper roots in my field of Educational Therapy.

During my doctoral journey, many individuals offered me much prayer and support. First, Tamra VanDorn, the Headmaster of Suffolk Christian Academy, was an influential individual in my life, one of my dearest friends, and provided me a place to do doctoral work late into the night. Second, Betsy Dickson and Christy Cole two of the most amazing NILD ETs faithfully supported and prayed for me were also a big support during my doctoral process. Next, my cohort sisters Sauyna Talley, Amanda Blount, and Shena Kiper blessed me beyond measure with their friendship and support throughout this journey. My family also played an integral part in encouraging me throughout my doctoral process, as well as being the support network that continually told me to press on and not give up. Finally, yet importantly, I would like to thank all the women in my church life group, and colleagues from Suffolk Christian Academy, who faithfully prayed me through this incredible journey.

As a final point, I would like to recognize the National Institute for Learning

Development (NILD), which is an innovative organization on the leading edge of cognitively robust interventions for students struggling with academic underachievement. The researcher is grateful for the archival data contributions that were essential to the oeuvre found in this study. NILD Educational Therapy (ET) is equipping the current generation's NILD Educational Therapists (ETs) with robust cognitive techniques, and we are seeing a vast improvement in the academic underachievement of Educational Therapy (ET) students....so much so that the transcendence, which occurs, is leading ET students to the target area of embracing independence as learners, along with developing a deep love for life-long learning.

**“Parents, teachers, and interventionists need to be informed and equipped with the methods and tools to improve a learner's cognitive abilities rather than focusing on remediation of subject content alone. New concepts of learner’s ability and development are needed.”**

— Carol T. Brown from *Equipping Minds for Christian Education: Learning From Neuroscience for Christian Educators*

## ABSTRACT

In the last forty years, the National Institute of Learning Development (NILD) spent time researching and cultivating the methodologies currently utilized in the cognitive mediation involving students struggling with academic underachievement. Research conducted over the last twenty years bares the efficacy and robustness that cognitive components of NILD provided to academic underachievers. Research focused on student populations enrolled in NILD Educational Therapy© (ET) divulged how NILD ET furnished research-based, cognitive techniques that scaffolded student-learning propensity. In recent years, researchers who studied academically underachieving students focused on the elementary-aged struggling learner population. In this dissertation, the researcher investigated students in the middle-school-aged struggling learner population, with a goal of discovering what influences NILD ET had on their achievement scores in reading, math, and written language. The study results indicated that in the area of reading, math, and written language, that the treatment of NILD ET had a significant effect on the middle school ET student scores. The researcher then reviewed an existing intervention utilized in struggling learner populations and the subsequent results endorsed by experts in the field of education. Compared to the existing intervention outcomes, and considering that most academic institutions deem a  $d = 0.2$  educationally significant, the results from this study are notable.

*Keywords:* academic underachievement, adequate yearly progress, mediated learning experience (MLE), neuroplasticity, NILD educational therapy (ET), NILD educational therapist (ETs), struggling learner, structural cognitive modifiability, Woodcock-Johnson IV

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## I. INTRODUCTION

### **Background of the Study**

The National Institute of Learning Development (NILD) has spent over four decades researching and developing the methodologies currently used in the cognitive mediation for students struggling with academic underachievement (NILD, 2018c). In the last two decades, research explored the effectiveness and robustness that the cognitive components of the NILD intervention strategies provided to struggling learners. Research regarding student populations involved in NILD Educational Therapy© (ET) discovered how NILD ET has provided research-based, cognitive techniques that scaffold student learning (Hopkins, 1996; Hutchison, 1999; Keafer, 2008; Stanley, 2007). The research results uncovered an increase in student achievement and greater independence for students as lifelong learners (Entzminger, 2013; Hopkins, 1996; Hutchison, 1999; Keafer, 2008; Stanley, 2007). In recent years, NILD researchers who studied students with academic underachievement focused mainly on the elementary-aged struggling learner population. In this dissertation, the researcher aimed to investigate learners from a middle-school-aged population who were experiencing academic underachievement, with a goal of ascertaining what influences NILD ET had on their achievement scores in reading, math, and written language.

The purpose of the research study was to investigate how NILD ET influences middle school students with academic underachievement. Specifically, the researcher explored how NILD ET influenced initial achievement test scores through all phases of the study's results. To

do so, the researcher conducted an evaluation research study involving a quasi-experimental, repeated measure design, implementing the Woodcock-Johnson IV Achievement (WJ-IV ACH) instrument. The WJ-IV ACH is an assessment instrument that measures the achievement ability of an individual. “These instruments provide a comprehensive set of individually administered, norm-referenced tests for measuring academic achievement” (Mather and Wendling, 2014, p. 1). Schrank, McGrew, Mather, Wendling, and Dailey (2014) discussed how using the WJ-IV ACH helps to decide and define a report containing academic strengths and weaknesses of individuals. The researcher in the present study gathered the WJ-IV ACH scores and analyzed the pretest and post-test assessment results for increases in NILD ET middle school students’ reading, math, and written language scores.

For the purposes of this study, the researcher presents the following framework for the term of *academic underachievement*. Academic underachievement does not only indicate students who are failing, but it can also describe a student who is a struggling learner not meeting their academic potential. NILD trains Educational Therapists (ETs) to interpret cognitive and achievement results for struggling with academic underachievement (NILD, 2015c). The criteria for pinpointing a student as an academic underachiever is the student’s scores within the WJ-IV ACH, specifically when the scores indicate a 10-15 point or greater difference between indices (NILD, 2015d). The term academic underachievement describes a student’s achievement ability scores, specifically; the phrase addresses the range of the scores between the student’s lowest score and their highest scores. An academic underachiever often has more than one low area in the academic indices found in his or her WJ-IV ACH results (NILD, 2015d). Ren and Crick (2012) conducted a study that addressed the definition of academic underachievement. In their study, they defined academic underachievement as “unfulfilled potential or a discrepancy

between ability and performance” (Ren & Crick, 2013, p. 236). A student experiencing academic underachievement frequently struggles to achieve his/her potential as independent learner because the low scores in academic aptitudes negatively influences the student’s capacity to grow and develop as a learner.

Currently, NILD ET is an intervention program that implements individualized cognitive strategies to help students with academic underachievement develop useful tools for learning. The NILD website (2018a) detailed how the NILD ET program provides intervention in four key areas: cognition, perception, emotion, and academics. These four areas of student deficiency are targeted intentionally by ET intervention. According to Webster’s online dictionary, cognition details aspects of the student’s “cognitive mental process” (Webster, 2019a). The concept of cognition is expanded when students can effectively apply metacognition (thinking about one’s thinking) to concepts of analysis, contemplation, cultivation of sense and meaning, recollection, and evaluation (NILD, 2018a, 2018c, 2018e). Webster’s online dictionary defines perception as “observation; a quick, acute, and intuitive cognition, and a capacity for comprehension” (Webster, 2019b). Perception involves the way one collects and processes information by using the five senses. “Perception permeates every aspect of the educational process” (Ficksman & Adelizzi, 2010, p. 5). Emotions are defined in Webster’s online dictionary as “the affective aspect of consciousness” (Webster’s, 2019). Emotions detail the way one feels about self and others and includes one’s approach to life. Finally, in the area of academics, students must acquire effective strategies that promote their abilities to learn effectively and become independent learners (NILD, 2018a, 2018c). For this process to happen, students must secure the competencies of efficient abilities in cognition. According to NILD (2018a, 2018e) ET is unique in its approach to provide struggling learners the cognitive scaffolding needed to find success.

## **Background of the Study**

As the researcher began to explore the theoretical foundation of this study, the importance of describing the research relevance, and the detailing of NILD history became essential. NILD has a rich history that began in the 1960s. In its inception, two women, Grace Mutzabaugh and Debra Zimmerman, forged a path that changed how individuals perceive students with exceptionalities (Ficksman & Adelizzi, 2010) .

In *A Work of His Grace* (1999), Grace Mutzabaugh discussed how, in 1982, she began her work towards developing the NILD program. Mutzabaugh's formal undergraduate training took place in two different colleges. Mutzabaugh eventually earned her master's degree from the McGuffey School of Reading at the University of Virginia. However, Mutzabaugh continued to grapple with students who were bright, yet they could not find success and were not on the path to becoming independent learners (Mutzabaugh, 1999).

While Mutzabaugh planned to become a missionary nurse and then changed course to receive a master's degree in reading, Deborah Zimmerman studied in the medical field as a student nurse. Similar to Mutzabaugh, Zimmerman followed a path that eventually led her to earn a bachelor's degree in English education. However, Zimmerman decided to endeavor into graduate studies that would further her field knowledge, earning a master's degree in special education. Zimmerman went on to complete doctoral coursework in reading as she worked to cultivate an effective intervention for the students she encountered with reading deficits (Mutzabaugh, 1999).

Zimmerman began an in-depth search of research that targeted reading deficits and effective intervention methods that would provide mediation for students with reading difficulties. Mutzabaugh (1999) detailed how Zimmerman first discovered Dr. Samuel Orton's

research while visiting both the Children's Hospital and Massachusetts General Hospital in Boston. Additionally, Zimmerman pursued similar research developed by Orton and his colleague Anna Gillingham in her quest for an effective intervention program (Ferrer, Shaywitz, Holahan, Marchione, & Shaywitz, 2010; Henry, 1998; Rose & Zirkel, 2007).

Two additional researchers, Dr. Archie Silver and Dr. Rosa Hagin, completed research that Zimmerman incorporated into research based approaches, adding to the depth of knowledge in areas associated with academic underachievement in reading. The research of Silver and Hagin (1960, 1975) altered the interventions used in targeting student deficits. The methods implemented contained advanced cognitive methods, robust with techniques known for strengthening the cognitive foundations of students struggling to learn how to read (Silver, Hagin, and Beecher, 1978; Silver, Hagin, & Hersh, 1967).

The research work of Orton and Gillingham, as well as that of Silver and Hagin (1967), made great strides to how students with academic underachievement were mediated using NILD ET. Contributions from the fields of education, special education, psychology, and neurology brought about methodologies, approaches, and pedagogy that have greatly shaped NILD ET. Contributions from the fields of education, special education, psychology, and neurology brought about methodologies, approaches, and pedagogy that have significantly shaped NILD ET. Various individuals engaging in cutting edge research contributed to the foundational works that brought about what is now NILD Therapy© as well as the development of the core techniques found in current NILD ET.

Research from forerunners in developmental psychology and cognitive modifiability, such as Lev Vygotsky, Jean Piaget, and Reuven Feuerstein, also had their research utilized by NILD, which positively impacted NILD Educational Therapy©. Vygotsky's research provided



effective frameworks and constructs, and Educational Therapists (ETs) implement Vygotsky's methods to mediate learning and to cultivate robust metacognitive strategies for students with academic underachievement (Kozulin & Presseisen, 1995; NILD, 2015c). The concept of the zone of proximal development (ZPD) was a theory conceived by Vygotsky, stemming from his research in the area of child development. "The zone represents the gap between present performance levels and the levels of learning that may be obtained when the student is paired with more knowledgeable others, such as adults or more capable peers" (Mather, Goldstein, Brooks, Richards, & Schoenfield, 2008, p. 336). The results of Vygotsky's research supported his underlying belief regarding the effectiveness of mediated learning for the child.

Piaget similarly provided rich contributions to the field of developmental psychology, and his work had an important influence on NILD ET. Specifically, Piagetian theory asserted the importance of the developmental stages in cognitive growth, underscoring the significance of ETs balancing out therapeutic intervention with appropriate developmental readiness (Flavell, 1996). The knowledge of Piagetian theory allows ETs to see their ET students' current level of function, as assessed by the WISC-V and WJ-IV ACH, and to plan appropriately for technique intervention based on the discrepancies found in the testing results (NILD, 2015c).

Piagetian theory also contributed to NILD ET foundational ideas in mediating the learner using a framework called the S-O-R (stimulus, organism, response) (Piaget & Inhelder, 1969). The S-O-R approach details how the mediation of an individual occurs, which is one of the essential components involved in ET. The ET techniques promote cognitive development in the weakness in cognition by providing the stimulus (ET technique) to the organism (ET student) and through seeking to promote the response (the desired outcome of gain in student cognitive function).

Feuerstein's contribution had a potent impact on NILD ET. Feuerstein was distinctive in the scholarly and notable consortium to which he associated with as a theorist. "Feuerstein is unique in belonging both to the group of contemporary intelligence theorists and to the group of historically distinguished theorists of intellectual development" (Sternberg, 2014, p. 10). Feuerstein (1979, 1980) added to Vygotsky's work and extended the concept of ZPD into a mediated learning experience (MLE). Feuerstein introduced concepts that included structural cognitive modifiability and MLE; he worked diligently to pursue in-depth study of each. Feuerstein built upon Piaget's method of S-O-R, which depicted the organism directly working with a stimulus and then responding. Mentis, Dunn-Bernstein, and Mentis (2008) detailed how Feuerstein's new formula for mediated learning, S-H-O-H-R, introduced the element H as the mediator. The MLE approach is a foundational component of NILD ET and the approach derives concepts of intentionality, reciprocity, meaning, competence, self-regulation, and transcendence (NILD, 2015c). Through the implementation of the MLE S-H-O-H-R approach, ETs seek to mediate the learner's abilities within their weak cognitive function(s), which are identified in WISC-V and WJ-IV ACH profile reports.

Current research has continued to demonstrate how cognitive interventions alter cognition for struggling learners (Berlucchi, 2011; Brown, 2016; Bryan, 2018; Kozulin and Presseisen, 1995; Lebeer, 2014, 2016; Tzuriel, 2013). Researchers previously believed that the brain was unmalleable after a certain developmental timeframe, which contrasts current studies on cognitive modifiability. Researchers at the forefront of brain-based learning stated that neuroplasticity allows the brain to develop new neuropathways, and redirected these pathways (Berlucchi, 2011; Feuerstein, Miller, Rand, & Jensen, 1981; Kleim, 2011). Berlucchi (2011) discussed how the concept of neuroplasticity has helped researchers unveil the ways that neural

network activities are altered. Lebeer (2014) showed that, when new neuropathway development occurred, the development assisted with the connectivity between hemispheres and thorough cognitive areas throughout the brain.

Recent research similarly showed inaccuracies in what researchers believed two decades ago about the brain and how it functions (Berlucchi, 2011; Brown, 2016; Feuerstein, Miller, Hoffman, et al., 1981; Kleim, 2011; Lebeer, 2014, 2016; Oakes, 2017; Tan, 2003; Tzuriel, 2013, 2014). Although much of the evidence found in Feuerstein (1979), Feuerstein, Miller, Rand, and Jensen, (1981), and Feuerstein et al. (1981) was largely anecdotal, Feuerstein had strong theoretical constructs decades before other researchers produced evidence of being able to promote effective cognitive changes. “Current neuroscientific evidence has proven that Feuerstein with his bold hypotheses of modifiability and mediated learning was 50 years ahead of his time” (Lebeer, 2014, p. 71). Newer technologies, which include magnetic resonance imaging (MRI) scans, positron emission tomography (PET) scan, computerized axial tomography (CAT) scans, and electroencephalogram (EEG), have shown that the brain is moldable longer than scientists previously believed possible (Feuerstein, 2008; Lebeer, 2016).

Along with advances in cognitive research in the area of neuroplasticity, the idea of cognitive modifiability experienced revival and notoriety. Theoretical concepts from Piaget and Vygotsky merged with several current researchers’ conceptual frameworks stating that the brain is indeed modifiable and malleable, and thus can be both structurally and functionally changed (Berlucchi, 2011; Lebeer, 2014, 2016). “The first program to increase intellectual performance with learners with neurodevelopmental learning disorders was developed more than 50 years ago by Reuven Feuerstein, clinical and cognitive psychologist” (Brown, 2016, p. 151). Piaget’s S-O-R and mediated learning; Vygotsky’s ZPD; and Feuerstein’s theory and concepts of MLE,

cognitive modifiability, and S-H-O-H-R model are all frameworks that NILD ET incorporated to develop the effective intervention strategies compiled in the 24 techniques that comprise NILD ET.

NILD ET implements five core techniques that effectively target deficit cognitive areas: rhythmic writing, buzzer, *Blue Book*, dictation and copy, and math block. The five core techniques are foundational methodologies used for students whose ability/achievement scores indicate a discrepancy. NILD has 24 different cognitive techniques, techniques which are individualized to provide cognitively stimulating interventions that meet the needs of each NILD ET student (NILD, 2018e). The NILD organization holds that a student achievement incongruity (one standard deviation below the mean  $SD = 1$ ) is the standard NILD ETs should use to determine placement into the intervention. When a substantial gap ( $SD=1$ ) arises, ETs know the struggling learner would most likely benefit from the rigor of NILD ET (NILD, 2015c).

NILD ETs are trained using the NILD level I, II, and III manuals. The manuals contain each of the 24 techniques ETs use to provide struggling learners with the cognitive techniques used to mediate their specific cognitive deficits. The NILD ET techniques are infused with the developmental psychology frameworks from Vygotsky, Piaget, and Feuerstein which create a strong foundation for the overall intervention (NILD, 2015c). Moreover, research studies from individuals such as Drs. Silver and Hagin, along with Dr. Orton and Anna Gillingham contain foundational concepts that are utilized by NILD along with well-developed theories (ZPD, S-O-R, and MLE) to propel NILD ET forward in effective development of cognitively rich techniques.

The current body of research has illuminated the compelling attributes of why NILD ET is operative as an intervention. Several dedicated NILD ETs helped mold their generation of NILD ET practices. The ETs that have greatly contributed to the body of research of NILD include Dr. Kathy Hopkins (1996), Dr. Susan Hutchinson (1999), Dr. Susan Stanley (2007), Dr. Kathy Keafer (2007), and Dr. Lori Entzminger (2013).

In 1996, Hopkins wrote her dissertation on the topic of the effect of interactive language in the stimulation of cognitive functioning for students with learning disabilities. Hopkins found that the experimental group in her study (students receiving NILD ET) showed a higher performance (10 point increase) in general and in verbal cognitive processing over the students in the control group.

In 1999, Hutchinson studied the impact that therapy talk had on NILD ET student achievement outcomes and sought to unveil the “common discourse structures or strategies in therapy talk” (p. 9). She explored the practice of ET by evaluating the discourse of ETs and their students. The NILD ET toolbox contains 24 techniques, from which Hutchinson chose three specific techniques: buzzer, math block, and dictation and copy. Hutchinson also developed a five-step dialogue frame and four discourse strategies that included principles of mediated learning and scaffolded instruction as part of her research study. Hutchinson’s study results indicated that “therapy talk” contained two important structures: IRE and Graesser’s five-step dialogue, “both of these structures represent therapy talk that is efficient and effective” (Hutchinson, 2015, p. 107).

In 2006, Stanley conducted a research study regarding elementary students with reading deficits and the impact that *RX for Discovery Reading*© had on their reading test scores. In her study, Stanley investigated the areas of phonological processing, decoding, and fluency using

pre- and post-test scores from the KTEA-II, GORT, and DIBELS, which are instruments used in the assessment phase of NILD's intervention methodology. The *Rx for Discovery Reading*© program also provides comprehensive instruction in phonetic analysis, syllabication, and spelling rule application (NILD, 2015e). In Stanley's study, the outcomes validated that *Rx for Discovery Reading*© intervention helped mediate students with a reading deficit becoming readers that are more proficient.

In 2008, Keafer conducted research on the impact that NILD ET had on ET students with learning difficulties. Keafer collected data from 39 students with initial test scores containing below average achievement in reading or written language skills who were currently enrolled in the NILD program. "Students received 120 individual sessions of 80 minutes over two academic years with a certified NILD educational therapist. Students increased their skills in reading by 8.5 standard score points or 2.5 grade levels" (Keafer, 2008, p. 1). Reading comprehension appeared to be the single skill most impacted by the intervention. Students in middle school improved reading comprehension almost four grade levels.

In 2013, Entzminger examined the impact that NILD ET had on reading comprehension for elementary and middle school students with learning disabilities who received three consecutive years of NILD Educational Therapy (ET). The participants were assessed using the Passage Comprehension Standard Scores found in the Woodcock-Johnson Tests of Achievement III (WJ-III) (2000 norms). "The study found that while there was no statistically significant difference in the 11.0- to the 11.11-year-old group, there was growth in standard scores and the resulting percentile rank in this age group" (Entzminger, 2013, p. 6).

The current body of research continues to illuminate the compelling attributes of the efficacy of NILD ET. Encouraging results testify to the cogent changes ET students experienced

which are reflected in the research studies of several dedicated, NILD-trained therapists who helped mold the current generation of NILD ETs. Each of the previously mentioned researchers added to the body of evidence, concerning the positive outcomes that NILD ET provides students. The mounting statistical data provided solid evidence that the academic areas were affected positively by NILD ET intervention. As each researcher added to the body of evidence, the validity and reliability of NILD's ET program was evidenced by the positive outcomes that NILD ET provides ET students.

### **Problem/Purpose Statement**

The purpose of this study was to analyze the academic progress that NILD ET promoted in middle school students with academic underachievement. The researcher accomplished the study's objective by comparing WJ-IV (ACH) pretest scores from initial student testing to the annual testing scores across the three phases of the study. The researcher sought to track ET student progress across several areas specifically, reading, math, and written language achievement scores of middle school students struggling with academic underachievement.

### **Significance of the Study**

This study was developed to demonstrate that middle school students struggling with academic underachievement, involved in NILD ET, showed progress in their annual WJ-IV ACH scores. The determining factors utilized the middle school NILD ET student's initial pre-therapy testing, in comparison to the scores throughout the three phases of WJ-IV ACH post-test scores. The study's intrinsic importance surrounded the need for additional studies to add to a mounting body of evidence revealing the positive impact that NILD ET has on achievement test scores of middle school students who received the intervention of NILD ET. The researcher endeavored to show how NILD ET positively influenced annual achievement scores, which then

added to the mounting body of evidence revealing the effectiveness associated with the robust and cognitively based techniques implemented in NILD ET.

## **Overview of Methodology**

### **Methodology**

In this study, the quantitative methodology chosen is a quasi-experimental, repeated measure design. “A quasi-experimental design is one that follows the general procedures of experimental research, without the use of a control group or without random assignment” (Joyner, Rouse, & Glatthorn, 2013, p. 75). The dependent variables consisted of pre-scores on the WJ-IV ACH with subsequent post-test scores. The independent variable was the amount of NILD ET received. The treatment variable assessed in this study was NILD ET. The study consisted of a convenience sample of middle school students identified with academic underachievement who were enrolled in NILD ET. NILD archival data from 2015 of students’ scores from their initial testing battery were used as the baseline for this study. The baseline scores and subsequent yearly post-tests for 2016 and 2017 were compiled, processed, and analyzed to assess for adequate yearly progress (grade/age progress measured) in the areas of reading, math, and written language. The statistical information contained mean score comparisons and a *t*-test of dependent means was used to evaluation of statistically significant pre- to post-test scores. The effect size was measured by Cohen's *d*. The treatment portion of the research arose from the NILD ET program’s techniques, in which the students in this study are participants.

### **Research Questions**

The researcher believed that middle school students struggling with academic underachievement who exhibit below average reading, math, and written language WJ-IV ACH



pre-scores would show progress in their yearly post-test scores when provided the intervention of NILD ET.

**Question 1.** When using the initial WJ-IV ACH baseline scores from NILD ET middle school-aged study participants struggling with learning difficulties in reading achievement pre-test scores, do the study participants demonstrate adequate annual progress in their overall total reading yearly post-test achievement scores?

**Question 2.** When using the initial WJ-IV ACH baseline scores from NILD ET middle school-aged study participants struggling with learning difficulties in math achievement pre-test scores, do the participants demonstrate adequate annual progress in their overall total math yearly post-test achievement scores?

**Question 3.** When using the initial WJ-IV ACH baseline scores from NILD ET middle school-aged study participants struggling with learning difficulties in written language achievement pre-test scores, do the participants demonstrate adequate annual progress in their overall total written language yearly post-test achievement scores?

**Question 4.** Considering the three academic subject areas of reading, mathematics and written language assessed over the three phases of the study, in which subject area was the greatest degree of the treatment effect of NILD ET manifested for middle school-aged study participants?

### **Research Hypotheses**

The researcher believed there was a relationship between the initial WJ-IV scores for middle school students struggling with academic underachievement and the resulting increase in yearly spring testing scores due to the specific prescription of NILD ET. The dependent

variables consisted of pre-scores on the WJ-IV ACH, and the independent variable involved the amount of NILD ET received.

**Hypothesis 1.** There is no difference between the mean pre-test and post-test WJ-IV ACH scores in reading for middle school students who participated in NILD ET.

**Hypothesis 2.** There is no difference between the mean pre-test and post-test WJ-IV ACH scores in math for middle school students who participated in NILD ET.

**Hypothesis 3.** There is no difference between the mean pre-test and post-test WJ-IV ACH scores in written language for middle school students who participated in NILD ET.

**Hypothesis 4.** There is no difference in the three academic subject areas of reading, mathematics, and written language assessed over the three phases of the study, in which subject area was the greatest degree of the treatment effect of NILD ET manifested for middle school-aged study participants.

### **Analysis**

The research design for this study consisted of a quasi-experimental, repeated measure design. The dependent variables consisted of the pre-scores from the WJ-IV ACH test with consequent post-test scores. The independent variable equaled the amount of NILD ET received. The study involved middle school students struggling with academic underachievement, who were enrolled in NILD ET. Archival data utilized came from pre-test scores of ET students' WJ-IV ACH beginning in 2015. The scores were part of the ET students' initial testing battery and became the baseline data in the study. Next, the researcher compiled and analyzed scores from subsequent WJ-IV ACH yearly post-testing in 2016 and 2017 to track yearly progress in the areas of reading, math, and written language. The treatment variable assessed is NILD ET.

### **Preliminary Data Analysis**

Prior to the analysis of the research questions posed in the study, the researcher conducted preliminary analyses. Specifically, the researcher ensured internal consistency (reliability) of participant response and essential demographic information.

Internal reliability of participant performance across the study's three phases was assessed using Cronbach's alpha ( $\alpha$ ). The statistical significance of  $\alpha$  was evaluated through the application of an  $F$ -test.  $F$  values of  $p < .05$  were considered statistically significant.

Essential demographic information was analyzed using descriptive statistical techniques.

Frequency counts ( $n$ ) and percentages (%) were utilized for illustrative purposes.

The study's research questions were addressed broadly using a variety of descriptive and inferential statistical techniques. Frequency counts ( $n$ ), measures of central tendency (mean scores) and variability (standard deviation) represented the primary descriptive statistical techniques used in the five research questions.

### **Analyses by Research Question**

In Research Questions One through Four, a repeated measures ANOVA was used to assess the statistical significance of participant performance across the three phases of the study. Pillai's trace ( $V$ ) was interpreted for the assessment of multivariate statistical significance of the study's treatment variable (NILD ET). The alpha level of  $p < .05$  represented the threshold for statistical significance of finding. Cohen's  $d$  was used to assess the magnitude of effect (effect size) across study phases. Cohen's parameters of interpretation of effect sizes were employed for comparative purposes.

In the second portion of Research Questions, One through Three, the  $t$ -test of dependent means was used to assess the statistical significance of the difference in mean scores between study phase comparisons. The alpha level of  $p < .05$  will represent the threshold for statistical

significance of finding. The assumptions of normality of data arrays were assessed using the Shapiro-Wilk test. Values of  $p > .05$  will be indicative of the assumption of data normality having been satisfied. Cohen's  $d$  was used to assess the magnitude of effect (effect size). Cohen's parameters of interpretation of effect sizes were employed for comparative purposes.

### **Limitations**

The limitations that affected this research study include several areas. First, the type of education that each of the students has experienced may be different and cannot be controlled. The NILD ET hours each student experienced in a school year may differ as well. Some students may participate in a full NILD ET model, which is two 80-minute sessions weekly, and other students may only participate in half-time, which is two 45-minute sessions a week.

Another factor may be whether each ET student experienced the same intensity in each NILD ET session. Finally, a limitation involving the level of NILD ETs' experience (Level I, II, III certification) that each student encounters because the NILD ETs level of certification and years of experience play an important part in how a student progresses. Akin to the NILD ETs' years of experience, NILD ETs' educational background could also be a potentially limiting factor. This limitation involved whether they held a bachelor's or master's degree in the field of education (General Education, Special Education), or if they had any classroom teaching experience, either in the field of Special Education or out of field.

### **Definition of Key Terms**

**academic underachievement:** The challenges that struggling learners experience in areas of cognition and academic achievement.

**adequate annual progress:** The term designates the amount of progress an ET student should make from one annual testing to the following annual testing.

**mediated learning experience (MLE):** “A planned, intentional, and active process that focuses, interprets, elaborates, and generalizes the learner’s direct experience with the world” (Feuerstein, Falik, & Feuerstein, 2013, p. 3).

**Neuroplasticity:** “The capacity of the human brain to be modified in its structure and function by external stimulation” (Feuerstein et al., 2013, p. 2).

**NILD Educational Therapy (ET):** NILD describes their program this way: “NILD educational therapy is a true therapy in that it aims the intervention just above the student’s current level of functioning and raises expectations for performance, which creates the framework to foster that growth” (NILD, 2018e).

**NILD Educational Therapists (ETs):** educators specifically trained in the methodology and techniques found in NILD ET.

**struggling learner:** an individual who has difficulty with learning due to a cognitive deficit.

**structural cognitive modifiability:** “A human being’s cognitive development is generated by Mediated Learning Experience (MLE), gradually accumulated during life by cultural transmission from parents, teachers or other significant people in a child’s life” (Lebeer, 2014, p. 52).

**Woodcock-Johnson IV (WJ-IV) Achievement (ACH):** an achievement instrument used to assess an individual’s achievement in subject level information. The WJ-IV ACH is a nationally normed instrument, which provides high levels of both reliability and validity in its evaluation of achievement in all sections and subsections of the instrument. Schrank, McGrew, Mather, Wendling, and Dailey (2014) detailed reliability through the internal consistency of the test using the split-half method. The tests with subtests and cluster reliabilities implemented the weighted composites of Mosier’s (1943) formula. Schrank et al. (2014) utilized an internal structure based

on multidimensional scaling methodology that uses factor-analytic methods along with cluster analysis.

### **Summary**

The study put forth involved compiling research from data collected on middle school students with academic underachievement who participate in NILD ET. The researcher analyzed the WJ-IV ACH pretest scores and compared the initial scores to the annual WJ-IV ACH yearly post-test scores to track the progress of therapy ET students with below average math, reading, and written language scores. The data collection for this study is archival data from the NILD database, with the baseline beginning in 2015, to include data collected in 2016 and 2017. The research method utilized was a quasi-experimental, repeated measure design. The dependent variables involved the pre-scores from the 2015 WJ-IV ACH test with subsequent WJ-IV ACH post-test scores from 2016 and 2017. The independent variable encompassed the hours of NILD ET received. The significance to this study emphasizes that, although other researchers have explored, observed, and reported positive increases in the achievement abilities of struggling learners enrolled in NILD ET, no other researcher has specifically targeted the middle school population. Specifically, this research is unique because it investigates the effect on middle school students who are enrolled in NILD ET, focusing on how the students' baselines, initial WJ-IV ACH scores in reading, maths, and written language, were influenced over a three-year period.

## II. REVIEW OF LITERATURE

In the endeavor towards a comprehensive literature review of the crucial components surrounding the history behind National Institute for Learning Development (NILD) Educational Therapy (ET), several areas of consideration emerged. First, the researcher sought to have a greater understanding of the specific individuals (Grace Mutzabaugh, Deborah Zimmerman, Dr. Archie Silverman, Dr. Rosa Hagin, Dr. Samuel Orton, and Anna Gillingham) responsible for the early research contributions and foundational conceptual frameworks of the current NILD organization's educational therapy techniques. Second, the researcher provided a brief exposure to the psychological theorists and theories behind the cognitive components woven into the NILD techniques. In light of the contributions of individuals such as Lev Vygotsky, Jean Piaget, and Reuven Feuerstein to their field of developmental psychology, the importance of presenting the frameworks espoused by these men became clear, as the researcher delved into the foundational perspectives and theories found in NILD techniques. The influence of collective contributions of Vygotsky, Piaget, and Feuerstein in shaping the NILD organization's foundational techniques is noteworthy. Next, the researcher provided an introduction and explanation into the five core NILD ET techniques, which include rhythmic writing, buzzer, *Blue Book*, dictation and copy, and math block. "The NILD model of educational therapy consists of one-to-one intervention for students with diagnosed learning disabilities...students diagnosed learning disabilities...students are given weekly two 80 minute sessions of intensive,

individualized cognitive stimulation” (Mutzabaugh, 1999, p. 7). The following section provides a laconic overview of the required components and training needed for NILD Educational Therapists (ETs) to effectively work with ET students. Finally, in the last section, the researcher provided a brief overview of five research studies from 1996 to 2013, explaining the different influences that NILD ET had on educational therapy students. Each of the researchers’ perspectives added support to the mounting body of research defining the competencies of NILD Educational Therapy©.

### **NILD History and Foundation**

NILD has a rich history that began in the 1960s with the work of Grace Mutzabaugh and Debra Zimmerman, who forged a path that would inevitably change how some of the perceptions of students with exceptionalities occurred. Grace Mutzabaugh, in her book *A Work of His Grace*, detailed how in 1982 she began work towards developing the NILD program. Mutzabaugh’s educational background eventually culminated into her official training as an educator. After a season of wrestling with what the Lord would have her do, she surrendered to His will for her life with an additional request, “P.S., Lord if you would let me be a teacher, it would be so nice” (Mutzabaugh, 1999, p. 18). However, God would spend years forging His will for her life before He answered her request. God’s glorious plan came to fruition while Mutzabaugh spent time preparing to accomplish kingdom work.

Mutzabaugh attended two colleges, a prestigious missionary theological school and then later the Philadelphia College of Bible (PCB); however, the mission field would not be where God’s plan for her life would unfold. Next, Mutzabaugh enrolled in Elizabethtown College, in 1954, to gain an undergraduate degree in Bible and English. Shortly after her graduation, Mutzabaugh reflected on her appeal 12 years prior where she requested God to allow her to



teach; God finally brought her to her vocation of choice. Mutzabaugh taught in an elementary classroom from 1956 to 1960, gaining substantial experience and growing deeper in her relationship with the Lord. God used every job and life experience to that point to prepare Mutzabaugh for the vocation and calling He had for her life. In 1960, Mutzabaugh accepted a classroom teaching position at Norfolk Christian School. During this time, Mutzabaugh would go on to earn her master's degree from the McGuffey School of Reading at the University of Virginia. The remedial reading degree that Mutzabaugh earned provided her with specific skill sets for targeting students who were struggling readers. However, Mutzabaugh could not understand why students who appeared to be bright found success elusive and lacked the skills sets found in independent learners (Mutzabaugh, 1999).

Meanwhile, Zimmerman was on a course of study as a student nurse and a Bible scholar, which led to her completion of a Bachelor of Science in English education. She went on to receive a master's degree in special education, due to her ever-increasing experience with students who struggled to read proficiently (Mutzabaugh, 1999). Through her scholarly focus in special education, Zimmerman developed a keen knowledge base in interventions for individuals dealing with learning difficulties. Zimmerman passionately believed in the research done by the individuals who had mentored her and shaped her beliefs about students with special needs.

She dared to disagree with the educational theories of the time concerning both target age and method of teaching this population. She knew the God who created the brain, and she knew that this Creator God had given her the wisdom and knowledge to develop a program based on stimulation techniques that she first learned from Drs. Silver and Hagin (Mutzabaugh, 1999, p. 49).

Zimmerman's passion for her nursing vocation would present her with an opportunity to put her knowledge to practice. Early on, Zimmerman cared for a young woman who had a neurological disease. The care Zimmerman provided the young woman laid the foundation for the calling God would fulfill, which encompassed students who had learning disabilities. "Unbeknownst to her, God was preparing Deborah to find a solution for the problems of students with learning disabilities" (Mutzabaugh, 1999, p. 30).

Zimmerman followed a course of study at Eastern Baptist University that equipped her with the Biblical knowledge to navigate future secular courses in other higher education institutions. After gaining a Bachelor of Science in English education from New York University, Zimmerman enrolled at Columbia University Teachers College and pursued a master's degree in special education. Zimmerman began work with students who struggled in reading; however, she concluded that the reading remediation had not improved academic ability (Mutzabaugh, 1999). Zimmerman's quest to provide effectual interventions for struggling learners led her back to Columbia University, where she completed doctoral coursework in reading.

Zimmerman began searching for a program that would provide a more effective intervention model for the struggling reader population she had encountered. While visiting both the Children's Hospital and Massachusetts General Hospital in Boston, Zimmerman discovered Dr. Samuel Orton's research (Mutzabaugh, 1999). As she continued to search for an effective intervention program, Zimmerman relied on what she had learned and pursued the research developed by Dr. Orton and Anna Gillingham. "Zimmerman's methods were based on the work of Silver and Hagin, Wechsler, Orton, Gillingham, and others" (Ficksman & Adelizzi, 2010, p. 55).

From her mentors Silver, Hagin, and Wechsler, Zimmerman acquired a distinct understanding of how to discern deficient cognitive areas through the use of the Wechsler Intelligence Scales (WISC), Wechsler's evaluation instrument. The three researchers allowed Zimmerman to participate in their discussions, which helped her develop her intervention tools, along with incorporating the feedback of additional researchers (Mutzabaugh, 1999). "Deborah began to formulate a therapy program for students with learning disabilities that integrated Miss Gillingham's remedial reading techniques with intense auditory, perceptual and motor stimulation" (Mutzabaugh, 1999, p. 34). Zimmerman began training Mutzabaugh in the beginning techniques, which later expanded to the 24 techniques currently used by NILD Educational Therapists (ETs). During this time, Zimmerman labored alongside Mutzabaugh in a partnership that developed the foundational erudition modules of NILD ET techniques.

### **Orton and Gillingham**

The research conducted by Samuel Orton and Anna Gillingham aligned well with the knowledge base and life experiences of Mutzabaugh and Zimmerman. Orton and Gillingham researched methods to stimulate greater therapeutic efficacy for students who struggled with a reading disorder called Dyslexia (Lyon, Shaywitz, & Shaywitz, 2003; NILD, 2018d; Ritchey & Goeke, 2006; Rose & Zirkel, 2007). Orton's background included training as a neuropsychiatrist and pathologist who concentrated research on difficulties that learners had with reading deficits and frequently comprised concomitant problems in language processing abilities.

Anna Gillingham, a colleague of Orton, gained recognition as being exceptional in her field. According to the Orton-Gillingham society, "Anna was a gifted educator and psychologist with a superb mastery of language. Working with Dr. Orton, she trained teachers and compiled and published instructional materials" (Ahearn, 2018b, p. 1). Gillingham provided a rigorous

process and expectations related to the development of reading deficit interventions in the field for which she worked and actively researched. She was known for upholding, and insisting upon, high professional and research standards in all that she agreed to oversee (Rawson, 1974). “For a woman of her day, she was the archetype of the true investigator and innovator” (Rawson, 1974, p. 51).

Orton and Gillingham first crossed paths professionally at the New York Neurological Institute where Orton worked as a neuropathologist, commissioned to conduct a research project on specific language deficits. Orton also taught courses at Columbia University (CU) in neurology and neuropathology for the CU College of Physicians and Surgeons (Henry, 1998; Orton, Gillingham, & Stillman, 2014). While working together on research dealing with reading difficulties and specific language deficits, Orton employed Gillingham to help him in the development of a technique to mediate reading difficulties. “Orton had requested that Gillingham organize the instruction to conform to his neurological hypotheses. Orton gave Anna Gillingham the principles of organization; she took the ball and ran with it” (Henry, 1998, p. 9).

The research that Orton and Gillingham undertook eventually led to the development of a new approach for students struggling with reading difficulties. The Orton Academy stated that “Orton-Gillingham is an instructional approach intended primarily for use with individuals who have difficulty with reading, spelling, and writing of the sort associated with dyslexia” (Ahearn, 2018a, p. 1). According to the Orton Academy, Orton and Gillingham’s research led to the creation of the Orton-Gillingham approach, which was developed for instructing students with reading deficits. “The Orton-Gillingham Approach is most associated with a one-on-one teacher-student instructional model” (Ahearn, 2018a, p. 1).

Orton and Gillingham collaborated to construct an effective reading instrument for students experiencing a reading deficit. The instrument employed mediated learning for students who struggled to learn how to read due to the reversal of letters and numbers or complete reversal of words (Bisplinghoff, 2015; Henry, 1998; Ritchey & Goeke, 2006). The reading instrument developed by Orton and Gillingham in the Orton-Gillingham approach was the basis for NILD ET's *Blue Book Method*. "Current research in written language instruction validates many of the principles established by Orton and his colleagues almost three-quarters of a century ago, regarding a phonetic basis for reading instruction within a structured, sequential, multisensory model" (Henry, 1998, p. 21).

Corroborating Orton and Gillingham's theories and discoveries, Stanley (2007) completed research using an NILD reading remediation program called *Rx for Discovery Reading*®. The program utilizes components of the Orton-Gillingham method that targeted student deficit areas associated with phonological processing, phonics, fluency, vocabulary, and comprehension growth (NILD, 2015e). During the study conducted by Stanley (2007), the *Rx for Discovery Reading*® program targeted specific students with reading difficulties and provided a systematized, progressive, multisensory approach using effective components found in NILD ET materials. The materials included *The Blue Book*, *Teacher Reference Sheets*, *Sounds of Speech*, moveable alphabet, sounds of reading, and *The Blue Book* game called KEYWO (NILD, 2015e; Stanley, 2007). *The Blue Book* is constructed from the methodologies and approaches developed by the Orton-Gillingham approach of multi-sensory teaching according to research from the last two decades, and appears to be an effective intervention for use with students with reading deficits (Henry, 1998; Ring et al., 2017; Ritchey & Goeke, 2006; Rose & Zirkel, 2007).

## **Silver and Hagin**

Other individuals in the fields of psychology also focused research in areas of education and reading. Dr. Archie Silver's and Dr. Rosa Hagin's research provided useful cognitive frameworks for NILD ET to incorporate into foundational therapy concepts and added depth to the knowledge base of many NILD ET techniques. Silver, a psychologist at New York's Bellevue Hospital, and Hagin, a clinical psychologist at the same hospital, worked with Wechsler during the time that Wechsler developed the Wechsler Intelligence Scales (Ficksman & Adelizzi, 2010). Silver's and Hagin's research results specifically targeted the learning deficits of students with reading disabilities (Silver & Hagin, 1960, 1975; Silver et al., 1967).

Silver and Hagin (1967) contributed pivotal research concerning students who showed academic underachievement in reading. Drs. Silver and Hagin believed that the intervention needed to prevent reading failure contained a neurobiological factor that necessitated specific perceptual training with intermodal and verbal techniques in order to prescriptively avoid failure in areas of reading and language (Silver et al., 1967). The research of Silver and Hagin altered how student deficits were targeted, because it supported the use of advance cognitive methods and robust techniques that are known for strengthening the cognitive foundations for students who struggled to learn how to read (Ficksman & Adelizzi, 2010; NILD, 2018db).

The group of techniques that Silver and Hagin developed, Search and Teach, is yet another approach used by NILD for the early intervention of younger students ("Shoestring Press, LLC - Search and Teach Background," 2018; Silver & Hagin, 2018). Silver and Hagin spent many years in research and observation to create the instruments used in the Search and Teach program ("Shoestring Press, LLC - Search and Teach Background," 2018; "Shoestring Press, LLC - Search and Teach Background," 2018; "Shoestring Press, LLC - Search and Teach

Validation,” 2018; Silver et al., 1967). More recently, in 2009, Dr. John Clements completed his dissertation titled *The Influence of the Search and Teach Early Intervention Program on Reading Achievement* that validated Silver and Hagin’s original Search and Teacher research results. “This study found that the Search Scan was effective in identifying a group of students who demonstrated persistent difficulty in the acquisition of reading skills and persistent reading difficulties” (Clements, 2009, p. 7).

Gillingham, Orton, Silver, and Hagin were embedded in research that added to their fields of interest and expertise. The two groups of researchers traversed similar areas related to mediating the academic underachievement of struggling student learners (Ficksman & Adelizzi, 2010). The input each researcher provided influenced areas in education, special education, psychology, and neurology. The impact of their research brought about methodologies, approaches, and pedagogies that ultimately shaped NILD ET. The dual researching pairs, each on the cutting-edges of their fields provided the foundational footers that wrought the preliminary conceptual frameworks now known as NILD ET. The foundational frameworks were further developed into effective, cognitively rich techniques used to mediate the learning process of academic underachievers. According to the NILD organization, “NILD has a unique intervention program for struggling learners. This intervention is language-based educational therapy targeting areas of weakness in processing, memory, attention, oral and written language, reading, spelling and math” (NILD, 2018a, para. 1). The research, methods, and programs led to the construction of the core techniques presently established in NILD ET.

Research completed by Silver and Hagin in reading remediation, as well as research completed by Orton and Gillingham, contributed to NILD ET ® techniques (Ficksman & Adelizzi, 2010). The impactful research helped promote the development of effective

implementation of the cognitive intervention framework found in NILD ET techniques (Dwyer, 2015; Ritchey & Goeke, 2006). The NILD ET program has positively influenced learners who have difficulties with achievement in subjects such as reading, math, and written language. As a result, the NILD organization believes that “NILD therapy students become competent, confident learners. They gain mastery over their cognitive vulnerabilities and hone their cognitive strengths for success in the classroom and life” (NILD, 2018e, para. 3).

### **Theorists and Theories behind NILD Techniques**

Pioneers in the field of developmental psychology and cognitive modifiability, such as Lev Vygotsky, Jean Piaget, and Reuven Feuerstein, have paved the way for the field of NILD Educational Therapy®. Vygotsky’s contribution revolved around a concept entitled Zone of Proximal Development (ZPD) (Vygotskiĭ & Cole, 1934). Piaget’s input provided a model that explored learning with three factors: stimulus (S), organism (O), and response (R), which would undergo expansion by Reuven Feuerstein (Piaget, 1968). Feuerstein’s framework added to Piaget’s S-O-R to introduce the human mediator factor (H), S-H-O-H-R that led to his development of a learning approach called the Mediated Learning Experience (MLE) (Feuerstein, 2003). The interactive aspects of the 24 techniques implemented in NILD ET arose from the work and research of the three theorists appraised in this review. In the next sections, the researcher will further investigate each of the theorist’s backgrounds and the theories they contributed.

#### **Vygotsky’s Contribution**

“Vygotsky, a Russian psychologist, believed the learning process was not a solitary exploration by the child of the environment; rather, it was a process of appropriation by the child of the methods of actions existent in a given culture” (Kozulin & Presseisen, 1995, p. 67).



Vygotsky's research provided effective frameworks and constructs; ETs implement Vygotsky's conceptual framework to mediate learning and cultivate strong metacognitive strategies for students with academic underachievement (NILD, 2015c).

The Zone of Proximal Development (ZPD) theory originated from research in the area of child development and was formulated by Vygotsky to explain how a child's cognitive development influences their current learning capabilities (Mather et al., 2008). "The zone represents the gap between present performance levels and the levels of learning that may be obtained when the student is paired with more knowledgeable others, such as adults or more capable peers" (Vygotskiĭ & Cole, 1934, p. 86). In his seminal work, *Mind in Society*, Vygotsky (1934) wrote his famous declaration: "Every function in the child's cultural development appears twice; first, on the social level, and later on the individual level; first between people (*interpsychological*), and then inside the child (*intrapsychological*)" (p. 57). Vygotsky's statement revealed an overarching belief of how effective mediated learning was accomplished for the child.

The concept of ZPD was discussed in Vygotsky's *Mind in Society*, where he dedicated a chapter of the book to delineating the ZPD theory. "The notion of ZPD has not only paved the way for dynamic assessment but has also helped to turn cognitive development into one of the objectives embedded into almost every one of the national curricula" (Kozulin, 2015, p. 327). Vygotsky believed that the ZPD framework allowed educators and psychologists to develop a learning perspective of a student's current development and maturity. He also believed the ZPD framework demarcated where the student should be moving both developmentally and maturationally (Guseva & Solomonovich, 2017; Kozulin, 2015; Vygotskiĭ & Cole, 1934). "The notion of a zone of proximal development enables us to propound a new formula, namely that

the only ‘good learning’ is that which is in advance development” (Vygotskiĭ & Cole, 1934, p. 89). Vygotsky’s theory of ZPD presented the idea of a child’s current level of dynamic function, and their potential future function, depicted in a numerical range. The range or ZPD allots for both current performances and the student’s possible maturation prospect (Vygotskiĭ & Cole, 1934).

Evaluation of the child’s ZPD allows one to imagine his or her thinking as it will appear two to three years later. In this sense, ZPD is related to the task of exploring children’s mental development or cognitive modifiability, rather than immediate learning potential. (Kozulin, 2011, p. 174)

The concept of ZPD is utilized in research by Feuerstein (1979, 1980), where Feuerstein later added to Vygotsky’s work and extended the concept of ZPD into a Mediated Learning Experience (MLE). MLE is a conceptual framework interwoven in the implementation of the techniques used during NILD ET, which will be discussed later. In the next section, the researcher explores how Piagetian theory fits into the instructional theories and practices implemented during NILD ET.

### **Piaget’s Contributions**

The theoretical constructs of Piaget were consummate to the school of psychological thought held by peers in his field of study and expertise. “Jean Piaget, by the scope, depth, and importance of his work, is undoubtedly the major figure of twentieth-century psychology” (Barrouillet, 2015, p. 1). Piaget imparted powerful constructs in the scholarly sphere of developmental psychology; his contributions had a tremendous influence on NILD ET. “Piaget’s role in cognitive development...created and shaped a new field of inquiry” (Flavell, 1996, p. 200).

Chiland (2016) distinguished Piaget's work as unique in three ways: "the development of thinking in children, also called psychopathology, observation of his own children, and the construction known as the operative theory" (p. 481). Each theoretical portion profoundly contributed to Piaget's stage theory of child development. Flavell (1996) detailed the Piagetian stage in three distinctive ways. The first stage details Piaget's qualitative mindset of the toddler. The next stage included the more quantitative and rational thought process of the elementary student. The final stage involved the nonconcrete and metacognitive thought processes of teenagers that, although not completely precise, secured current understanding of how children of different age groups conceptually process information (Flavell, 1996). The stages of development theory that Piaget espoused contributed towards the advancement of certain areas behind the thought and theory found in NILD ET. Piagetian theory specifically exposed the importance of developmental stages in cognitive growth. The understanding of developmental stages theory is an essential concept that ETs consider while planning ET intervention, which ensures appropriate developmental readiness for ET students (Flavell, 1996; NILD, 2015d).

Piaget's stages of development in concrete operations and formal operations dictate when learners are ready to develop in areas such as perceptual reasoning, working memory, fluid reasoning, processing speed, visual-motor, visual-spatial, auditory processing, and auditory discrimination (Ghazi & Ullah, 2016; Iran-Nejad, 1995; Lourenço, 2012; McLeod, 2018). The developmental stage theory establishes guidelines of where the ET student should be developmentally that can be compared with his/her actual evaluated cognitive aptitude. The knowledge surrounding Piagetian theory supports ETs in discovering their ET student's current level of function as assessed by the WISC-V and WJ-IV ACH, and appropriately formulate

technique mediation substantiated by the incongruities discovered in the initial evaluation scores (NILD, 2015c).

Piaget's theoretical contributions also included the conceptual basis of mediating the learner using a framework called the S-O-R (stimulus, organism, response). S-O-R, a beginning construct and fundamental component associated with the ET technique approach, is a methodology describing how the mediation of an individual occurs. ET techniques encourage development in metacognition of deficit regions of the brain by delivering a stimulus (ET technique) to the organism (ET student), thus endeavors to gain an effective response (the desired outcome of gain in student cognitive function). In the next section, the researcher will delineate how Dr. Reuven Feuerstein provided additional components to the S-O-R approach to help build further cognitive gains.

### **Feuerstein's Contributions**

Feuerstein introduced aphorisms, such as cognitive modifiability and Mediated Learning Experience (MLE), and worked diligently to explore and pursue an in-depth study in each. Feuerstein was distinctive for his time, due in part to the psychological and intellectual school of thought to which he adhered. "Feuerstein is unique in belonging both to the group of contemporary intelligence theorists and to the group of historically distinguished theorists of intellectual development" (Sternberg, 2014, p. 10). Feuerstein (2008) stated that the hardware of the brain could go through regeneration or structural cognitive modifiability. Feuerstein's prolific research and experience led him to develop the approach found in MLE. The theoretical frameworks found in Piaget's S-O-R and stage theory of child developmental, along with Vygotsky's ZPD theory, buttressed the methodologies found in Feuerstein's concepts of cognitive modifiability and MLE.

According to Feuerstein, MLE broadened an individual's ability to create new modalities of cognitive and intellectual functions that were previously nonexistent (Feuerstein, 1979, 2003, 2008; Feuerstein, et al., 1981). MLE is an approach, credited entirely to Feuerstein, which became of interest during the 1950s. Feuerstein's work in MLE was "developed to explain individuals' different propensities for learning" (Mentis, Dunn-Bernstein, & Mentis, 2008, p. vii). MLE is an interactive, unique mode of collaboration between the mediator (e.g., parent, teacher, or peer) and the learner. The MLE model (S-H-O-H-R) includes several components comprised of the stimuli (S), the organism (O), the response (R), and the human factor (H).

In a situation of mediated learning, the organism (O) being directly exposed to a stimulus (S) reacts and responds (R) with skill and completeness only after the characteristics of the stimulus have been sorted out, classified, differentiated, shaped, and adapted, and organized by a mature human mediator (H). (Feuerstein, Feuerstein, & Falik, 2010, p. 32)

Feuerstein added to Piaget's method of S-O-R, which depicts the organism directly working with a stimulus and then responding. Mentis et al. (2008) discussed Feuerstein's new formula for mediated learning, S-H-O-H-R, which introduced the element H as the mediator (Brown, 2016; Mentis et al., 2008; Todor, 2013b; Tzuriel, 2013). "The mediator becomes interposed between the learning organism and the world of stimuli to interpret, guide, and give meaning to the stimuli" (Mentis et al., 2008, p. 10). Tzuriel (2014) further discussed the concept of the H having an elasticity: "it expands (i.e., mediation is enhanced) or shrinks (i.e., withdrawal of mediation) as a function of the child's level of understanding, task difficulty, and situational conditions that determine the effectiveness of learning" (Tzuriel, 2014, p. 18). Tzuriel (2014) went on to discuss how the MLE methodology over time brings about the change in the

perception, skill sets, conceptual processes, and stratagems that eventually lead to students developing greater propensities towards independence as learners.

**The MLE approach in NILD ET.** Feuerstein reflected on the S-H-O-H-R framework when he constructed his seminal approach known as mediated learning experience (MLE). Feuerstein's MLE framework provided a distinctively unique model which implemented the principles of intentionality, reciprocity, meaning, competence, self-regulation, and transcendence to provide targeted frequency and intensity, aiding in the modification of deficit cognitive areas (Feuerstein, 2006, 2008; Feuerstein et al., 2010; Todor, 2013b). Feuerstein et al. (1981) ruminated over the research implications of the MLE approach intervention used in the study of cognitive modifiability in adolescents. The researchers concluded that "taken as a whole; the data appear to support the general conclusion that low-functioning adolescents benefit from intervention and that meaningful cognitive changes are possible beyond the early years of life" (Feuerstein, et al., 1981, p. 286). The MLE approach is also greatly influenced by the theory of cognitive modifiability (Feuerstein, 1990). "Cognitive modifiability is defined as the individual's propensity to learn from new experiences and to learn opportunities and to change one's own cognitive structures" (Tzuriel, 2014, p. 17). Tzuriel (2014) went on to detail the similarities between MLE and Vygotsky's ZPD, internalization, and scaffolding as an MLE conceptual partner. "MLE also enhances the learning potential of the student, creating capacities reminiscent of Vygotsky's (1986) zone of proximal development" (Kozulin & Presseisen, 1995, p. 72).

The MLE approach is one of the foundational components in NILD ET. Through the implementation of the MLE and S-H-O-H-R approach, ETs seek to mediate the learner's abilities within the ET student's weak cognitive function(s), as identified in the ET student's WISC-V

and WJ-IV ACH found in their psychological profile report (NILD, 2015d). The MLE approach derives concepts of intentionality, reciprocity, meaning, competence, self-regulation, and transcendence. During the mediated learning process that occurs in ET, the student is engaged using the MLE approaches to stimulate an ET student's weaker cognitive functions (NILD, 2015c; Tan, 2003; Todor, 2013b; Tzuriel, 2013).

Intentionality incorporates deficit skills practice into multiple NILD core techniques. "Intentionality occurs when the mediator deliberately guides the interaction in a chosen direction by selecting, framing, and interpreting specific stimuli" (Mentis et al., 2008, p. 13). Intentionality is the means purposed by the mediator to establish the learner's intensive mental exertion towards a specific stimulus (Chua, Tan, & Chng, 2017; Tan, 2003; Todor, 2013b). "The mediator implements intentionality when guiding interaction toward a goal, selecting, organizing, and interpreting certain stimuli" (Todor, 2013b, p. 2). However, intentionality itself is not sufficient and requires collaboration with reciprocity to mediate the cognition of an ET student effectively. "Interchange between intentionality and reciprocity in the MLE process, with the mediator, interposed between the mediatee and the stimuli, helps make the mediatee's experiences meaningful" (Chua et al., 2017, p. 182).

Reciprocity is the next component in MLE that ETs seek to cultivate in the ET student during sessions. The mediator (ET) helps the ET student remain engaged and active, rather than passive in the ET technique process (Mentis et al., 2008; Todor, 2013a; Tzuriel, 2013, 2014). "Reciprocity thus occurs when the mediatee responds and indicates that he or she is receptive to and involved in the learning process" (Chua et al., 2017, p. 182). The ETs model and implement metacognitive strategies so that ET students learn to shoulder the burden of thinking through reciprocal exchange of ideas and thoughts (NILD, 2015c; Todor, 2013b; Tzuriel, 2013).

Meaning is an MLE concept that infuses value and relevance to the ET techniques that ET students practice with the guidance of ETs, by introducing the how and why of the techniques. NILD ET utilizes meaning to promote excitement for learning, the importance of the learning experience, and the increased control of the ET student's thinking (NILD, 2015c; Todor, 2013b; Tzuriel, 2013). "The mediation of meaning occurs when the mediator conveys the significance and purpose of an activity" (Mentis et al., 2008, p. 21). The mediator successfully establishes meaning by displaying genuine interest, engaging in discussions of learner engagement, and cultivating an understanding of the activities. As a result, the learner is prompted to acquire greater cognitive abilities (Mentis et al., 2008; Tan, 2003; Todor, 2013b). "Mediation of meaning nurtures an intrinsic motivation in students to learn, and learn how to learn, think, reason, and ask beyond the content of the topic and becoming independent learners" (Chua et al., 2017, p. 182).

Competence involves ETs helping ET students cultivate confidence in their abilities as learners and shining a light on the magnitude of the ET students' successes. The development of competence by ETs in the ET students helps inculcate an authentic, optimistic belief in the ET students' abilities to succeed, an enthusiasm to try, and perseverance as a learner (NILD, 2015c; Todor, 2013b; Tzuriel, 2013). "Mediation of competence occurs when the mediator helps the learner develop the self-confidence to engage successfully in a given act" (Mentis et al., 2008, p. 36). During the process of competence building, the learner constructs strong mental models, positive perspective of self, excellent motivational concepts, and strategies that support perseverance in their abilities as a learner (Mentis et al., 2008; Tzuriel, 2013, 2014).

Self-regulation in MLE reflects an ET student's ability to ascertain and adjust behaviors that are not productive. ETs mediate their ET students in self-regulatory choices by modeling



and instilling that ET students are responsible for their learning. ET students are guided to review their thinking using metacognitive strategies. The ET student then is asked to analyze the ineffective behaviors and to then adapt the behavior to be a productive instrument in their ET toolbox (NILD, 2015c; Todor, 2013b; Tzuriel, 2013). “Mediation of self-regulation and control of behaviors occurs when the mediator intervenes in order to make the learner conscious of the need to self-monitor and adjust behavior” (Mentis et al., 2008, p. 45).

Finally, the MLE approach utilizes the concept of transcendence, in which ETs model to how to take the skill sets developed in NILD ET and bridge the mediated cognitive abilities to new situations. “The mediator goes beyond – transcends – the here-and-now of, e.g., a rehabilitation session in a therapist’s room, to connect present to past experiences, to different situations and possible future relevance” (Lebeer, 2016, p. 22). ETs strive for ET students to transcend the metacognitive strategies that brought ET students success in other areas of the life, such as home, school, and extracurricular activities. “Transcendence addresses the mediatee’s need to understand, reflect, and make connections between his and her current experience with the previous ones” (Chua et al., 2017, p. 183). The mediation of transcendence encourages ET students to generalize their successful NILD ET technique accomplishments into new situations (Chua et al., 2017; NILD, 2015c; Tan, 2003; Todor, 2013b; Tzuriel, 2013).

**Neuroplasticity in NILD ET.** For many decades, researchers believed that the brain was unmalleable after a particular developmental timeframe, which is in stark contrast to the findings evidenced in current research (Berlucchi, 2011; Lebeer, 2014; Pegoretti, 2012; Tzuriel, 2014). Experts in the fields of psychology and neurology have long debated the concept pertaining to the brain’s malleability after a specific developmental timeframe.

Malleability refers to our brain's broad capacity to change as a result of general long-term experiences that are happening to it. Malleability could explain, for example, the brain changing with exposure to stress, repeated trauma, or even nutrition. As a generalization, malleability means the ability to change over a longer period of time and with greater passivity than with other types of change. (Jensen, 2008, p. 85)

Historically, the predominant viewpoint of brain structure and function suggested that the brain remained constant or static for the duration of a person's lifespan (Jensen, 2005). Research in the last decade has revealed a different truth about how change can occur in the brain's structures and functions. According to Feuerstein, "developments in the brain sciences over the last decade have confirmed the human modifiability is both neurophysiological and cognitive, in an interlocking and reciprocal relationship" (Feuerstein et al., 2013, p. 1).

The concept of neuroplasticity supports the malleability of the brain through discernable neuronal physical and connectivity transformations. The structural and cognitive changes are considered a by-product of the outside stimulus that the brain encounters (Lillard & Erisir, 2011). "At the neuronal network level, analysis of neuroplasticity has been aimed at discovering changes in network activities that may account for both short-term and long-term adaptive changes in behavior, with special attention to specific phenomena of learning and memory" (Berlucchi, 2011, p. 566). Research that has come to the forefront of brain-based learning states that neuroplasticity provides an understanding that the brain continues to develop new neuropathways and redirect existing pathways (Berlucchi, 2011; Bryan, 2018; Pegoretti, 2012). "The revelation that physical changes in the brain can and do occur across the lifespan provides a biological basis supporting the use of high quality, effective cognitive training programs" (Bryan, 2018, p. 2).

Berlucchi (2011) completed research specifically pertaining to information involving the neuronal level. He postulated an analysis of neuroplasticity to explain how neural network activities are altered. The study analyzed the impact on the neuronal level when changes occurred in short- and long-term memory through the implementation of adaptive behaviors. Research revealed that, as new neuropathways developed, there was an increase in the links created between cerebral hemispheres which influence multiple cognitive areas with the brain (Berlucchi, 2011; Bryan, 2018; Kleim, 2011; Lillard and Erisir, 2011; Tovar-Moll and Lent, 2016b; Tracy and Osipowicz, 2011).

Looking at in vivo images of synapse formations in case of plasticity, one gets more the impression of the brain as a megalopolis: this is also a large complex whole consisting of many sub-entities, it is constantly moving, adapting, looking for better solutions and organization. (Lebeer, 2014, p. 64)

In conjunction with theoretical concepts from Piaget and Vygotsky, current research emerged to validate the conceptual frameworks and reveal how brain functions showed evidence of the plasticity. According to Kleim (2011), neuroplasticity encompasses four areas: the structural and functional neuron abilities, the birth of neurons during development; recovery post-brain injury; and vicissitudes in behavior detected during learning.

Neuroplasticity refers to use-dependent cortical reorganization—changes that result from what the organism in question does. This process occurs when the brain changes as a response to specific experiences. When we learn to tie our shoe, ride a bike, speak a language, play a sport, build a boat, type, or play an instrument, the brain will change. It is a measurable and often significant remapping of the brain's topological real estate. In a way, it's like urban sprawl—land once used for farming is sold, and now it is used for

housing. This is a revolutionary concept, it says not just that the brain changes from experience, but that it ‘buys, sells, and homesteads neural real estate’ based on what you actually do on a daily basis. (Jensen, 2008, p. 86)

The research validated neuroplasticity, supporting the idea that the brain is modifiable and malleable as well as structurally and functionally influenced by cognitively based intervention (Berlucchi, 2011; Lebeer, 2014; Tovar-Moll and Lent, 2016b). Recent research continues to corroborate that theories and frameworks held two decades ago about the brain are no longer accurate. A new unpublished study focused on the impact that strengthening cognition leads to structural alterations of the brain.

Indeed, research focused on brain plasticity, and its implications for executive function and cognition has exploded in recent years in the field of neuroscience, cognitive psychology, and education, with mounting evidence that exercises designed to strengthen cognition correlate with physical changes in the brain. (Bryan, 2018, p. 2)

The studies on neuroplasticity confirmed what Feuerstein believed and espoused long before anyone else in his field dared to consider the concept of cognitive modifiability. Decades before other researchers grasped there was evidence indicating the possibility of an effective cognitive change intervention model, Feuerstein envisioned a strong theoretical construct involving cognitive modifiability. “Current neuroscientific evidence has proven that Feuerstein with his bold hypotheses of modifiability and mediated learning was 50 years ahead of his time” (Lebeer, 2014, p. 71). Pioneering technologies, such as magnetic resonance imaging (MRI) scans, positron emission tomography (PET) scan, computerized axial tomography (CAT) scans, and electroencephalogram (EEG), have produced evidence that the brain is structurally and

cognitively capable of change long after what researchers previously believed (Feuerstein, 2008; Lebeer, 2016; Sousa, 2011; Tovar-Moll and Lent, 2016b).

Welcomed advances in non-invasive methods of imaging used in neurophysiological investigations (fMRI, TMS, etc.) make it clear that cognitive and behavioral modifiability are accompanied by, and in many cases create, structural and functional changes in both neurophysiology and neuroplasticity (Feuerstein, 2008, pp. 1–2).

In connection with the developments in cognitive exploration related to neuroplasticity, the notion of cognitive modifiability experienced resurgence and notoriety (Jensen, 2005). In combination with theoretical concepts from Piaget and Vygotsky, a merging of current researchers' conceptual frameworks surfaced, indicating that the brain is indeed modifiable and malleable, and that changes in the brain manifest both structurally and functionally (Berlucchi, 2011; Lebeer, 2014, 2016).

It is now increasingly recognized that the brain is not a static structure and is, in fact, a modifiable system that changes its physical and functional architecture in response to its complex interactions with its internal processes and the environment (Tan & Seng, 2008, p. ix).

Feuerstein, because of his personal experience in clinical settings, strongly endorsed the concept that cognitive modifiability was not only possible, but that, by using the strategies he developed in the Mediated Learning Experience (MLE), structural and functional changes were imaginable. “The first program to increase intellectual performance with learners with neurodevelopmental learning disorders was developed more than 50 years ago by Reuven Feuerstein, clinical and cognitive psychologist” (Brown, 2016, p. 151). Feuerstein (2008) discussed the concept of “structural cognitive modifiability as the ability to create modalities of

mental and cognitive functions not previously present in the individual's repertoire" (p. 2), and he believed the application of his theories and methodologies impacted the structures and functions of the brain (Medimond, 2013).

Modern-day burgeoning innovations in neuroscience have continued to support and validate Feuerstein's model of cognitive malleability, structural cognitive modifiability (SCM), which gives sustainable hope for the modifiability of students with academic underachievement to learn, find academic success, and effect a journey towards lifelong learning (Brown, 2016; Feuerstein, 1990). "Today the discoveries on neuroscience confirm and support Feuerstein's theory known as structural cognitive modifiability (SCM) that presents an optimistic view of the learner and one's propensity to be modified" (Brown, 2016, pp. 153–154).

The NILD organization suggests that NILD ET techniques involve concepts of scaffolded learning, mediated learning, and effective intervention strategies, which attest to the robust approaches that NILD ET employ (NILD, 2015c). The frameworks that influence NILD ET are part of the 24 techniques used in NILD ET and include Piaget's S-O-R, Vygotsky's ZPD, and Feuerstein's MLE/cognitive modifiability/S-H-O-H-R module. The frameworks are part of what ETs use to develop operative mediation stratagems in developing individualized programs for ET students (NILD, 2015c). In the next section, the researcher details the five core techniques used by NILD ETs to mediate student cognition and scaffold learning for opportunities during NILD ET sessions.

### **NILD Core Techniques**

NILD has 24 different cognitive techniques, which are tailor-made to provide cognitively stimulating interventions that meet the needs of each NILD ET student (NILD, 2018e). NILD ET implements five core techniques, which include rhythmic writing, buzzer, *Blue Book*,

dictation and copy, as well as math block. The five core techniques provide foundational approaches used for students with ability/achievement scores that denote a discrepancy. A discrepancy is defined by NILD's testing section in the Level I, II, and III manuals as the difference shown between a student's achievement scores in tests or subtests in which a 15-point gap in achievement is evident. The difference alternately is expressed as one standard deviation above or below the mean (NILD, 2015c; Schrank, McGrew, Mather, Wendling, & Dailey, 2014; Wechsler, 2014). The student's achievement incongruity is specifically what each NILD Educational Therapist (ETs) is trained to identify when determining placement into the intervention for a student experiencing academic underachievement, with the understanding that he or she would benefit from the rigor of NILD ET (NILD, 2015d).

NILD ETs are trained to follow the goals and objectives found in the NILD level I, II, and III manuals. The manuals encompass each of the 24 techniques ETs utilize to provide academic underachievers with the cognitive techniques essential to mediate the ET student's particular area of struggle. Each of the three manuals (Level I, II, III) provide ETs instructions on how to present the techniques, along with the goals and objectives that ET students need to master. The NILD website details how the manuals provide a framework for ETs to follow in assisting their ET student to grow in areas of weak cognitive abilities (NILD, 2018b).

The NILD Level I Manual (2015) provides elements of the rhythmic writing (RW) technique by detailing the outlining and drawing of several motifs on a chalkboard while articulating counts and motions. RW is purported to boost visual-motor abilities that promote improved handwriting, attention, and the execution of intermodal activities. RW is a core technique because it targets the ET student's cognitive functions purposefully to mediate

outcomes, which are evidenced by effective restraint in impulsivity and visual transport (NILD, 2015c).

Buzzer uses words constructed letter by letter, using Morse Code and a buzzer. The student determines the orthographic configurations that symbolize explicit phonemes. Words are examined for multiple meanings, parts of speech, morphemic components, synonyms, antonyms, and derivatives. Sentences are constructed, and various applications of the word are exhibited. Buzzer is a core technique because it targets the ET student's cognitive functions mediating the outcomes which are evidenced effective expressive verbal tools, precision, and accuracy, along with restraint of impulsivity (NILD, 2015c).

Another technique implemented is the *Blue Book* method, which employs systematic phonics instruction using keywords that signify the different sound-symbol associations for the phonemes found in the English language.

The original methodology for remediating reading deficits within the NILD program used the *Blue Book* method (Dwyer, 2000), which provides systematic synthetic phonics instruction using keywords that represent the various sound-symbol associations for the phonemes of the English language. (Keafer, 2008, p. 13)

The technique demonstrates how to utilize phoneme manipulation of orthographic patterns by memorizing and practicing dictation associated with the skills of encoding, fluency, and decoding (Dwyer, 2015). *Blue Book* is a core technique because it targets the ET student's cognitive functions mediating the outcomes to evidence effective expressive verbal tools, along with precision and accuracy (NILD, 2015c). "The *Blue Book* method (Dwyer, 2015) continues to be central to remediating reading deficits in the NILD program" (Keafer, 2008, p. 14).



The dictation and copy technique uses a paragraph from any suitably rated source. “Suitably rated source” includes reading materials that are on the ET student’s independent reading level. The ETs dictate two sentences, one at a time, which the ET student transcribes and then confirms for precise word arrangement and spelling. Spelling inaccuracies are addressed by the application of methods that utilize learned spelling rules. Finally, the determination of the main idea occurs, and then the remaining paragraphs are concluded by creating a unique summation sentence. Dictation and copy is a core technique because it targets the ET student’s cognitive functions mediating the outcomes to evidence effective expressive verbal tools, precision, and accuracy, along with visual transport (NILD, 2015c).

Finally, the NILD Level I manual (2015) includes the technique of math block. The techniques utilize math-based activities, communicated orally, in which a student could solve using mental math, use of manipulatives, or utilizing the chalkboard, drawing pictures and additional customary math procedures. Math activities might involve place value, multiples, count-bys, word problems, numerical progressions (which may involve integers), negative numbers, fractions, time, money, and measurement. Math block is a core technique because it targets the ET student’s cognitive functions mediating the outcomes to evidence effective expressive verbal tools, along with precision and accuracy, as well as a restraint of impulsivity (NILD, 2015c).

### **ET Training**

ETs must complete rigorous training in multiple discipline areas, such as developmental psychology theory, cognitive mediation techniques, and formal assessment procedures and protocols.

To become an NILD educational therapist, an individual must have at least a bachelor's degree in education or a related field. There are three levels of training, each being a four-hour graduate level course, completed over a total of three to five years. During that time period, experience is gained implementing NILD Educational Therapy® with a minimum of 100 student contact hours annually. (Stanley, 2007, p. 87)

After the completion of Stanley's dissertation, NILD changed some requisites for certification for the level II and III to require therapists to have a minimum of 200 contact hours. NILD also changed from four graduate credit hours to three graduate credit hours, which are awarded upon completion of each of the three levels of certification (NILD, 2018b).

ETs, complete extensive training in Levels I, II, and III, with one of the areas of training teaching the ETs how to review and interpret score results found in testing instruments such as the WISC-V and the WJ-IV ACH. During this extensive training, ETs are drilled in interpreting testing terms such as percentile rankings, standard scores, and stanines. These terms refer to scores found within the evaluation instruments and represent an ET student's current level of performance (NILD, 2015d). "Initial testing assesses strengths and deficits in perceptual and cognitive processing as well as current academic skills. From this information, recommendations are made for the appropriate educational intervention" (NILD, 2015a, p. II-2). ETs are also trained to implement techniques that are supported using the theoretical constructs located in the foundational frameworks of Vygotsky, Piaget, and Feuerstein. "NILD Educational Therapy embraces the methodology of Feuerstein's MLE and instructs its participants at Levels II and III in its principles of interactive communication as tools for instruction" (Keafer, 2008, p. 35). ETs implement concepts that help scaffold and mediate interactions with ET students through the development of questioning techniques. The questioning techniques are formed

through Socratic Questioning and utilize the different levels found in Bloom's Taxonomy. The questioning encourages higher-level thinking skills, which may aid in the ET student's deeper development of the MLE components associated with reciprocity and transcendence. "Training for NILD educational therapists included the use of Bloom's Taxonomy to advance reading comprehension of short passages. Educational therapists were expected to prepare questions that elicited responses requiring analysis, synthesis, or evaluation of the information read" (Keafer, 2008, p. 31).

### **Recent NILD Research**

The most recent NILD research elucidated persuasive evidence of the effectiveness of NILD ET. Five NILD ETs who have published studies over the last decade or more contributed research to guide the next generation of NILD ET. The ETs chosen for review in this study have contributed significantly to the body of research of NILD. The included researchers are Dr. Kathy Hopkins, Dr. Susan Hutchinson, Dr. Susan Stanley, Dr. Kathy Keafer, and Dr. Lori Entzminger.

In 1996, Hopkins conducted a quantitative research study with a quasi-experimental nonequivalent control group design to determine the effect of interactive language in the stimulation of cognitive functioning for students with learning disabilities. Hopkins's study investigated pretest and post-test scores associated with NILD ET for students with Learning Disabilities (LD). The study included a treatment group of 72 participants and a separate control group of 17 participants. The study questions examined the interactive effects of five core techniques that integrated precise and accurate oral language construction.

This study will investigate and test the validity of an intervention program for students with LD. Specifically, the interactive effects of five core instructional techniques that

incorporate precise and accurate oral language production will be examined. The proposed integrative model will be measured through test score differences on pre- and posttest measures. (Hopkins, 1996, p. 6)

Hopkins found that the experimental group in her study, students receiving NILD ET, exhibited a higher performance in their standard scores (10 point increase) in general and verbal cognitive processing over the students in the control group (Hopkins, 1996). The resulting scores for research question one from the WRAT –R spelling indicated a “significant time effect of  $p = .000$  and a significant group by time interaction of  $p = .001$ ” (Hopkins, 1996, p. 116). The resulting scores from research question two from the WRAT-R reading indicated a “significant time effect of  $p = .011$  and a significant group by time interaction of  $p = .007$ ” (Hopkins, 1996, p. 118). The resulting scores from research question three from the WRAT-R math indicated a “significant time effect of  $p = .002$ ” (Hopkins, 1996, p. 120). “Students in the experimental group significantly outperformed students in the control group on general and verbal cognitive processing as measured by the DTLA-2” (Hopkins, 1996, p. 139). Hopkins also went on to delineate the interconnectedness of how the interactive language component of NILD ET, based on the conceptual frameworks of Piaget, Vygotsky, and Feuerstein, positively influenced the students in her study.

The interrelatedness of thought and language, the creation of the zone of proximal development, the belief in the plasticity of intelligence, and the recognized importance of a human mediator of learning all contribute to the design of techniques used in the NILD program. (Hopkins, 1996, p. 75)

In 1999, Hutchison stated that her qualitative research study sought to unveil the “common discourse structures or strategies in therapy talk” (p. 9). Hutchinson (1999) explored

the practice of ET by evaluating the discourse of ETs and their students. “The study looked specifically at the forms and functions of discourse structures and strategies in therapy talk” (Hutchison, 1999, p. 2).

The NILD ET toolbox contains 24 techniques, in which Dr. Hutchinson chose three specific techniques: buzzer, math block, and dictation and copy. The three ET techniques selected assessed the utilization of interactive language. Four seasoned ETs and the ET students they mediated agreed to participate in three taped sessions during one school year. The student participants for the study included four ET students, one for each of the ETs participating in the study. Hutchinson’s study involved thirty-six portions of the sessions to include twelve for each of the three core techniques. The researcher transcribed and scrutinized the research for aspects of discourse structures and strategies associated with therapy talk (Hutchison, 1999). Two distinct questions were investigated during Hutchinson’s study. Hutchinson (1999) created two inquiries with several follow up questions for each. Hutchinson explored the following questions:

1. Is there a predictable structure to therapy talk? If so what does the structure look like and how does it function?
2. Are there recurrent strategies occurring in therapy talk? If so, what form do these strategies take and what function do they serve? Are they specific to particular techniques or are they more broadly based across therapy talk ( pp. 9–10)?

Hutchinson (1999) detailed the importance of the theories and theorists that NILD ascribes to, such as Feuerstein’s MLE and Vygotsky’s scaffolded learning and ZPD are strongly evident in her study. She specifically focused on the effectiveness of a learning technique called scaffolding, which NILD utilizes in sessions with ET students. “Scaffolding is an effective tool,

implemented often by educational therapists, to work in the student's zone of proximal development” (Hutchison, 1999, p. 71).

Hutchinson (1999) developed a five-step dialogue frame and four discourse strategies that included principles of mediated learning and scaffolded instruction. “The study also offers an application of discourse analysis for the use by education therapists or other practitioners who work in an individualized education setting and seeking to improve their own practice through an analysis of their discourse” (Hutchison, 1999, pp. 1–2). The discourse analysis was the tool implemented to assist in the evaluation of therapy, specifically, “it was decided to analyze therapy talk by looking for discourse structures and discourse strategies including questions, intonation, repetitions, and pauses” (Hutchison, 1999, p. 106). Each of the discourse tools had a specific part in the assessment of “therapy talk.” The discourse tool of questioning brought forth a key concept. According to Hutchinson (1999), “it appeared that an analysis of a therapy session would allow a therapist to determine the numbers and kinds of questions being asked and answered and based in the analysis, plan appropriate high-level questions for future sessions” (Hutchison, 1999, p. 109). The discourse tool of intonation disclosed several focal areas for both ETs and ET students. Rising and falling inflections, louder and softer voice levels, and patterning or mimicking of phrases were central points when evaluating intonation. “Students often raised their voices to show frustration....changes in a speakers inflection or voice level were often observed to indicate success or encouragement” (Hutchison, 1999, p. 110). The discourse tool of repetition indicated that repeating questions lead to two outcomes. “The analysis of therapy talk revealed repetitions that facilitated conversion as well as those that blocked or halted communication” (Hutchison, 1999, p. 110). The discourse tool of pauses manifested that the

usage of effective pausing was occurring. The combination of the four discourse tools assisted Hutchison in assessing the impact of therapy talk on the participants in her study.

The analysis of therapy talk showed that these four therapists do wait for their students to process and respond. Most of the pauses seemed to be cognitive in nature; judging from the subsequent response or answer, the student or therapist was thinking and processing information. (Hutchison, 1999, p. 111)

In 2007, Stanley implemented an experimental study to investigate the areas of phonological processing, decoding, and fluency using pre- and post-test scores from the KTEA-II, GORT, and DIBELS. *Rx for Discovery Reading*© is a program that provides an explicit and systematic small-group reading intervention. The program was developed using several NILD techniques, with *Blue Book* being the foundation. The techniques utilized in the *Rx for Discovery Reading*® are based on the same theorists and theoretical constructs as NILD ET. Stanley (2007) detailed the importance of Vygotsky's ZPD and Feuerstein's MLE as foundational concepts that are implemented in the *Rx for Discovery Reading*®. In her research study, Stanley (2007) stated how the aspects of ZPD and MLE are infused into the *Rx for Discovery Reading*® program.

Each educational therapist established rapport with the small group of students to be able to have continual reciprocity in each session. Through intentional planning, the mediators moved the students through the process systematically, providing meaningful interaction while connecting the learning experience to the students' educational needs. (Stanley, 2007, p. 86)

The *Rx for Discovery Reading*® program instruction includes activities for phonological processing, phonics, fluency, vocabulary, and comprehension development. *Rx for Discovery*

*Reading*© program provides comprehensive instruction in phonetic analysis, syllabication, and spelling rule application (NILD, 2015e). Stanley (2007) proposed the following question to be investigated and answered during the course of her study: "What is the effect of the *Rx for Discovery Reading*® program on the reading abilities of second, third, fourth, and fifth graders who were below grade level in reading" (Stanley, 2007, p. 16)? The Stanley (2007) study utilized a mean standard score comparison for the mean pre-and post-test scores for the *KTEA-II* and *GORT*, as well as, paired sample *t*-test to assess the data.

Stanley (2007) studied whether *Rx for Discovery Reading*© increased the mean standard scores in the three areas (Stanley, 2007). "Using a small-group format, twenty-nine students who were not on grade level in reading according to the most recent annual achievement test were involved in the intervention for fifty forty-five minute sessions over one school year" (Stanley, 2007, p. 1). Eight NILD educational therapists, from a variety of locations in the United States and Canada, participated in the *Rx for Discovery Reading*© program research. "At the conclusion of the study, students participating in the *Rx for Discovery Reading*© program had significantly higher post-test standard scores than the pre-test standard scores in the reading abilities of phonological processing, decoding and fluency" (Stanley, 2007, p. 1). Hypothesis #1 yielded results that in phonological processing, the *t*-test indicated a significant value of  $p = .000$ . Hypothesis #2 capitulated that the subtests *KTEA-II* and *GORT* results indicated a significant value of  $p = .001$ . Hypothesis #3 generated results the *GORT* subtests of decoding fluency, word fluency and fluency scores that indicated significant values of  $p = .000$ ,  $.003$ , and  $.006$ . The outcomes demonstrated that *Rx for Discovery Reading*© intervention might help mediate students with a reading deficit becoming readers that are more proficient.



In 2008, Keafer collected data from initial test scores containing below average achievement in reading or written language skills from 39 students who were enrolled in the NILD program (Keafer, 2008). Students received 120 individual sessions of 80 minutes over two academic years with a certified NILD educational therapist. Keafer (2008) created four research questions as the basis for the research she conducted. The questions created include the following:

1. Does NILD Educational Therapy help students who are below average in reading and written language achievement improve their reading and written language skills?
2. How do students enrolled in NILD Educational Therapy with ability-achievement discrepancies (underachievers) whose achievement is below average in reading and written language skills differ in the improvement of reading and written language skills from students whose achievement is also below average but who do not display ability-achievement?
3. Do students enrolled in elementary grades whose achievement is below average in reading and written language skills respond to NILD Educational Therapy differently from students enrolled in middle school whose achievement is also below average in reading and written language skills?
4. On which specific reading and written language skills as measured by five subtests on the WJ III ACH (Spelling, Writing Samples, Word Identification, Word Attack, Reading Fluency, and Passage Comprehension) do students with below-average achievement make the most progress as a result of NILD Educational Therapy?

(Keafer, 2008, pp. 20–21)

The use of descriptive statistics (i.e., means, standard deviation) was utilized to assess the data. The first research question was answered using a repeat measures ANOVA. The remaining questions two through four utilized a repeat measures multivariate analysis.

In research question one, for both reading and written language results; the corresponding statistically significant values indicated a  $p < .01$ . “Students increased their skills in reading by 8.5 standard score points or 2.5-grade levels” (Keafer, 2008, p. 1). Research question two indicated that the low-achiever group and underachiever group had no significant contrast between groups in the area of reading indicated in the  $p = .263$ . However, “each of the groups independently demonstrated a significant linear effect with mean standard scores generally increasing over time” (Keafer, 2008, p. 64). The score increase for underachievers and low achievers was indicted by  $p < .01$ . In research question two, for the area of written language, there were no significant differences in the low achiever and underachiever groups as indicated by  $p = .987$ . “The findings suggested that similar gains in overall skills in written language were made by both groups and that the intervention was equally effective for each group” (Keafer, 2008, p. 66). In research question three, the sample was divided into elementary and middle school grade levels, and assessments were conducted in the subject areas of reading and written language to determine which age group made the most progress. Both the elementary and middles school participants made the most progress year as indicated by (Elementary:  $p = .007 < .01$ ; Middle School:  $p = .004 < .01$ ) (Keafer, 2008). Keafer stated, “Although scores also increased in the second year, the differences between the end of first-year scores and end of second-year scores were not considered significant for either group” (Keafer, 2008, p. 68). Written language indicated a similar result to reading for both elementary and middle school participants.

Results suggested that similar gains in overall skills in written language were made by both groups and that the intervention was similarly effective for each grade level group. Each of the groups demonstrated a significant linear effect with mean standard scores seeming to increase over time (elementary:  $F(1,22) = 10.20, p = .004 < .01$ , partial  $\eta^2 = .32$ , middle school:  $F(1,15) = 13.00, p = .003 < .01$ , partial  $\eta^2 = .46$ ). (Keafer, 2008, p. 69)

In research question four, the effect size results for each area were as follow: decoding  $p = .000$ , reading fluency  $p = .002$ , reading comprehension  $p = .002$ , spelling  $p = .000$ , writing sentences  $p = .000$ . “Considering the large effect sizes found for each subtest, it appeared that the skills of decoding (LWI), reading fluency (RF), reading comprehension (PC), spelling (SP), and writing sentences (WS) are all positively impacted by NILD Educational Therapy” (Keafer, 2008, p. 74). Keafer concluded that the participants involved in her study benefitted from the inventions found inside the cognitive techniques of NILD ET (Keafer, 2008). “Most important to the future of NILD programs, however, is the opportunity to establish effectiveness in a widespread, controlled study that includes random sampling and greater diversity among participating students with deficiencies in reading and written expression” (Keafer, 2008, p. 1).

Finally, in 2013, Entzminger conducted a research study that involved participants who received three consecutive years of NILD Educational Therapy (ET). The study used a pre-post-NILD Educational Therapy design. Entzminger’s study included 32 students. The participants were assessed using the Passage Comprehension Standard Scores found in the Woodcock-Johnson Tests of Achievement III (WJ-III) (2000 norms) (Entzminger, 2013). Entzminger’s study included three questions clarifying the research parameters of her study. Question one inquired if LD students enrolled in three years of NILD Therapy intervention beginning at ages 8.0 to 8.11 increased their standard scores. The resulting scores indicated a statistical difference

between the mean pre- and post-test scores for Group A represented by  $p = .037$ . The researcher used a  $t$ -test of dependent means, which revealed a significant difference in the pre-test and post-test scores for the 8.0 to 8.11 year old students following three years of NILD Educational Therapy. Question two inquired if LD students who enrolled in three years of NILD Therapy intervention beginning at 11.0 to 11.11 increased their standard scores during the following three years of NILD ET. The resulting scores indicated no statistical differences between the mean pre- and post-test mean scores for Group B represented by  $p = .072$ . “The study also found that while there was no statistically significant difference in the 11.0 to the 11.11 year old group, there was growth in standard scores and the resulting percentile rank in this age group” (Entzminger, 2013, p. vi). Question three compared whether students ages 8.0 to 8.11 or the students’ ages 11.0 to 11.11 exhibited significant increases in mean growth standard scores on the Passage Comprehension subtest (Entzminger, 2013). Entzminger (2013) reported that “the result of the  $t$ -test of independent means does not show a statistically significant difference between the eight year old group and 11-year-old group when comparing the pretest results to the post-test results” (p.76). The overall results of Entzminger’s study specified that the participants in Group A experienced statistically significant results in the pre-and post-test mean scores associated to the standard scores derived from the Passage Comprehension scores of the WWJ-III ACH.

### **Summary**

The extensive examination of the history leading to NILD’s existence as a program and organization were reviewed through inspection of the founders, theorists, and the disclosure of early researchers. The researcher also illuminated areas that included ET training structure, the delineation of the five core NILD techniques, and recent research. The research exposed

compelling aspects for NILD ET effectiveness. The mounting statistical data from research completed on NILD ET revealed positive academic trends due to NILD ET intervention, which contributed to an increase in the NILD student's academic progression. Research results testified to the change ET students experienced, due in part to the dedicated NILD ETs whose research contributed to equipping the next generation of NILD ETs. The researchers added to the body of evidence, providing greater validity and reliability of NILD's ET program and revealing the positive outcomes that NILD ET provided ET students. The studies each contained statistical data, which reported the positive impact that NILD ET treatment contributed thereby increasing NILD student's cognitive and academic abilities.

In the course of this literature review, many areas of exploration, investigation, and discussion occurred. Areas of review included NILD history and foundation, theorists and theory behind the construction of NILD core techniques, and finally the recent NILD research conducted by individuals who continue to have a stake in the methodology and promise of NILD ET. The areas reviewed contributed towards the current NILD ET research outcomes, which revealed that NILD ET students with academic underachievement benefitted from ET intervention.

After reflecting intently on the history behind the dedicated individuals who studied, investigated, researched, developed, and implemented the strategies behind NILD ET, the researcher believed a better understanding has emerged. Along with the importance of NILD history comes the pivotal foundational research works of researchers like Silver, Hagin, Orton, and Gillingham that were heavily utilized in the cognitive intervention framework that Zimmerman developed within the 24 techniques of NILD ET.

The review of literature considered the theorists and theories, which are foundational to the NILD ET techniques, and explored each extensively. The three theorists, Vygotsky, Piaget, and Feuerstein, contributed a panoply of theories and methodologies that helped facilitate the underpinning of what is currently implemented in NILD ET. The contributions from developmental psychology theorists through the conceptual frameworks, along with corresponding research in the models of ZPD, S-O-R, developmental stages, S-H-O-H-R, structural cognitive modifiability, and MLE, have influenced formulation and employment of NILD ET.

The NILD five core techniques of rhythmic writing, buzzer, *Blue Book*, dictation, and copy, as well as math block, were discussed in the course of this literature review. Each of the five techniques was detailed as were the goals and objectives for the five core techniques' mastery criterion according to the NILD Level I manual.

Current research studies ranging from 1996–2013 revealed how effective NILD ET intervention has been for ET students. Hopkin's, Hutchison's, Stanley's, Keafer's, and Entzminger's research studies all revealed and confirmed what the NILD organization has repeatedly shared and instructed. NILD ET effectively and consistently mediated the cognition of NILD ET students. The studies demonstrated what NILD's founders and contributing researches believed to be true about the intensive mediation of the brain's weak cognitive areas. The founders and most recent researchers believed that NILD ET provided the intensity and frequency that enacts change in the brain through the promotion of neuroplasticity, which stimulates positive progression of learner cognition.

A review of the NILD history, research, methodologies, and techniques helped provide a contextual understanding of how NILD ET influenced NILD ET middle school students'

achievement scores in reading, math, and written language. The goal of this section of the researcher's study was to cultivate a literature review that would provide the reader with the essential background information, research approach, technique review, and current NILD research to clarify and frame a point of reference for potential outcomes. In the next chapter, the researcher will present the methodology behind the research design, and the surrounding components that comprise the different parts of the research methodology.

### III. METHODOLOGY

#### **Introduction**

The purpose of this study was to analyze the academic progress that NILD ET promoted in middle school students with academic underachievement. The researcher accomplished the study results by comparing WJ-IV (ACH) pre-test scores from initial student testing to the annual testing scores across three years of post-test scores. Furthermore, this study followed ET student growth across three areas. The research study focused on reading, math, and written language achievement scores of academically under-achieving middle school ET students.

#### **Brief Literature Review**

Research in the last decade involving researchers such as Hopkins, Hutchinson, Stanley, Keafer, and Entzminger demonstrates the effectiveness of NILD intervention in areas of reading and math (Entzminger, 2013; Hopkins, 1996; Hutchison, 1999; Keafer, 2008; Stanley, 2007). Hopkins's investigated pretest and post-test scores associated with NILD ET students diagnosed with Learning Disabilities (LD). The experimental group, which received NILD ET, exhibited higher performance in their standard over the students in the control group. Hopkins also went on to describe the interconnectedness found in the interactive language component of NILD ET, founded on the conceptual frameworks of Piaget, Vygotsky, and Feuerstein influenced the outcomes of students in her study.

Hutchison's study involved thirty-six portions of the sessions to include twelve for each of the three core techniques. The researcher transcribed and scrutinized the research for aspects of discourse structures and strategies associated with therapy talk (Hutchison, 1999). Two distinct questions were investigated during the course of Hutchinson's study. Hutchinson (1999) created two inquires with several follow up questions for each. Hutchison identified and



assessed each of discourse strategies to include questions, intonation, repetitions, and pauses; additionally, the study results indicated the robust nature of the four discourse strategies. Each of the discourse tools had a specific part in the assessment of “therapy talk”. “The study looked specifically at the forms and functions of discourse structures and strategies in therapy talk” (Hutchison, 1999, p. 2).

Stanley (2007) instituted an experimental study and examined the areas of phonological processing, decoding, and fluency using pre- and post-test scores from the KTEA-II, GORT, and DIBELS. Stanley utilized an NILD developed program named Rx for Discovery Reading®. The program provides an explicit and systematic small-group reading intervention. The Rx for Discovery Reading® program instruction includes activities for phonological processing, phonics, fluency, vocabulary, and comprehension development. The study outcomes confirmed that Rx for Discovery Reading® intervention helped mediate participants who has a reading deficit become more proficient readers.

In 2008, Keafer amassed data from initial test scores containing below average achievement in reading or written language skills pertaining to 39 students enrolled in the NILD program (Keafer, 2008). Student groups considered low-achievers and under-achievers from both elementary and middle school age groups, demonstrated increases in both reading and written language at the conclusion of the intervention. Elementary and middle school students presented comparable increases in abilities. Reading comprehension appeared to be the single skill most impacted by the intervention. The reading comprehension of low-achievers increased by 2.3-grade levels and under-achievers gained 3.5-grade levels. Students in middle school improved reading comprehension almost 4-grade levels (Keafer, 2008).

Entzminger 2013 presented a research study that involved participants that received three consecutive years of NILD Educational Therapy (ET). The study implemented a pre-post-NILD Educational Therapy design and included 32 students. The comprehensive findings of Entzminger's study detailed that the participants in Group A experienced statistically significant results in the pre-and post-test mean scores concomitant to the WWJ-III ACH standard scores resulting from the Passage Comprehension subtest section of reading.

The research of these innovative individuals has advanced the cause of NILD ET as a viable and effective course of intervention for students struggling with academic underachievement. Hopkin's, Hutchison's, Stanley's, Keafer's, and Entzminger's studies indicated and confirmed the foundational pillars that the NILD organization repeatedly shared and instructed. The studies provided credence to concepts and methodologies, which NILD's founders and contributing researchers believed to be true about the intensive mediation of the brain's weak cognitive areas.

### **Description of Methodology**

The study's design and methodology are broadly quantitative and more specifically quasi-experimental, using a repeated measures approach. "A quasi-experimental design is one that follows the general procedures of experimental research, without the use of a control group or without random assignment" (Joyner, Rouse, & Glatthorn, 2013, p. 75). The dependent variables were identified as participant post-test scores on the Woodcock Johnson-IV Achievement (WJ-IV ACH). The independent treatment variable was NILD ET students received.

## **Sample/Sample Selection**

The study's sample was non-probability by definition and convenience by a specific method. The study's sample section focused on middle school-aged students (primarily ages 11 through 13) who were identified as having learning difficulties and were enrolled in NILD ET represented the focus of the study's sample selection. NILD archival data from years 2015-2017 depicting students' scores from their initial testing battery as a baseline for the research. The baseline scores and subsequent yearly post testing for 2015, 2016, and 2017 underwent a compilation process and then analysis for adequate yearly progress in the areas of reading, math, and written language.

In the area of reading, 39 of the 40 original middle school aged participants were identified for study purposes. In the area of mathematics and written language, a total of 40 middle school aged participants were identified for study purposes. Study inclusion was contingent upon middle school aged students who participated in all three phases of the study (Baseline, Phase I, and Phase II).

## **Instrumentation/Procedures**

Archival data were utilized from pre-test scores of ET students' WJ-IV ACH beginning in 2015. The WJ-IV ACH authors utilized an empirical research design to create the assessment instrument's components. Along with being able to evaluate a multitude of experimental effects based on the internal criterion measures of the tests and subtests, Mather and Wendling (2014) reported the WJ-IV ACH has unlimited research possibilities, stating, "Additionally, the wide range allows longitudinal or cohort research data to be gathered using same set tests and test content. The wide range and breadth of coverage are important advantages underlying its use for research at all age levels" (Mather & Wendling, 2014, p. 9).

WJ IV normative data are based on a single sample that was administered the cognitive, oral language, and achievement tests. The national standardization included 7,000 individuals ranging in age from 2 to 90 years, including college and university undergraduate and graduate students. The demographics and community characteristics closely match those of the general U.S. population. (Mather & Wendling, 2014, p. 1)

The scores are part of the ET students' initial testing battery from 2015 and are represented as the baseline data in the study. Next, scores from subsequent WJ-IV ACH yearly post testing in 2016 and 2017 were compiled and analyzed to track yearly progress in the areas of reading, math, and written language. The treatment variable examined for effect in the study was NILD ET.

### **Validation**

**Reliability.** According to Gay, Mills, & Airasian (2012), reliability is the extent of how consistently or dependably a testing instrument performs. The Woodcock-Johnson IV is an instrument of high caliber and longevity. The WJ-IV is especially noted for its reliability.

Internal consistency reliabilities for untimed tests and dichotomously scored items were estimated with the split-half method, whereas tests with subtests and cluster reliabilities were estimated with Mosier's (1943) formula for unweighted composites. Reliability for speeded tests was estimated using the test-retest method with a 1-day retest interval, and correlations were corrected for range restriction. Median reliability coefficients were uniformly high: 38 of 39 were .80 or higher, and 17 were .90 or higher. Test-retest correlations for speeded tests were mostly in the .80 to .90 range. Cluster scores include two or more tests and as such produce higher reliability estimates as predicted by true score theory. (Schrack et al., 2014, p. 21)

**Validity.** According to Gay et al. (2012), validity refers to how well a test measures what it is testing, which leads to effective score interpretation. The research community well acknowledges the validity of the Woodcock-Johnson.

Consistent with the Standards for Educational and Psychological Testing (AERA, APA, and NCME, 1999, 2014), evidence for validity was structured around areas of test content, response processes, internal structure, and relations with other variables. The content of the WJ IV ACH and WJ IV OL also included content specified in federal legislation. Some evidence for validity was based on developmental changes across the lifespan through the use of cross-sectionally derived trends that paralleled expected developmental growth curves. Validity based on internal structure utilized multidimensional scaling, the more traditional factor-analytic methods (exploratory factor analysis [EFA] and confirmatory factor analysis [CFA]), and cluster analysis. (Schrack et al., 2014, pp. 21–22)

## **Data Analysis**

Prior to the analysis of research questions posed in the study, preliminary analyses were conducted. Specifically, internal consistency (reliability) of participant response and essential demographic information were addressed analytically. The study's formally stated research questions were addressed broadly using a variety of descriptive and inferential statistical techniques. Frequency counts ( $n$ ), measures of central tendency (mean scores) and variability (standard deviation) represented the primary descriptive statistical techniques used in the study's four research questions. Internal reliability of participant performance across the study's three phases was assessed using Cronbach's alpha ( $\alpha$ ). The statistical significance of  $\alpha$  was evaluated through the application of an  $F$ -test.  $F$  values of  $p < .05$  were considered statistically significant.

Essential demographic information was analyzed using descriptive statistical techniques. Specifically, frequency counts ( $n$ ) and percentages (%) were utilized for illustrative purposes.

**Data Analysis by Research Question.** In Research Questions One through Four, a repeated measures ANOVA was used to assess the statistical significance of participant performance across the three phases of the study. Pillai's trace ( $V$ ) was interpreted for the assessment of multivariate statistical significance of the study's treatment variable (NILD Therapy). The alpha level of  $p < .05$  represented the threshold for statistical significance of finding. Cohen's  $d$  was used to assess the magnitude of effect (effect size) across study phases. Cohen's parameters of interpretation of effect sizes were employed for comparative purposes and qualitative interpretative purposes.

In Research Question Four, descriptive statistical techniques were used to assess the statistical significance of the difference in means scores between study phase comparisons. The alpha level of  $p < .05$  represented the threshold for statistical significance of finding. Values of  $p > .05$  were indicative of the assumption of data normality having been satisfied. Cohen's  $d$  was used to assess the magnitude of effect (effect size). Cohen's parameter of interpretation of effect sizes was employed for comparative and qualitative interpretative purposes. The assumptions of normality of data arrays were assessed using the Shapiro-Wilk test.

### **Summary**

After having thoroughly discussed the methodology on the researcher's study by reviewing the purpose statement, brief literature review, the study design, components of validation, and a beginning view of the analysis of the data, the research now turns towards the next section of the study. The study's purpose was to examine the academic progress that NILD ET stimulated in middle school students with academic underachievement. In the last decade,

research involving individuals such as Hopkins, Hutchinson, Stanley, Keafer, and Entzminger demonstrated the efficacy of NILD intervention in areas of reading and math.

The study's design and methodology are quantitative and more explicitly quasi-experimental, using a repeated measures approach. The study's sample section concentrated on middle school-aged students (11 through 13) identified as having learning difficulties who were enrolled in NILD ET. Archival data were utilized from pre-test scores of ET students' WJ-IV ACH beginning in 2015 through 2017. Preceding to the analysis of research questions presented in the study, preliminary analyses were performed. Particularly, internal consistency (reliability) of participant response and necessary demographic data were addressed analytically. In Research Questions One through Four, a repeated measures ANOVA was applied to evaluate the statistical significance of participant performance through the three phases of the study. In Research Question Four, descriptive statistical techniques were implemented to evaluate the statistical significance of the difference in means scores between study phase comparisons. In the next chapter, the researcher will discuss in detail the results of the study by reviewing the Research Questions One through Four and analyzing the statistical significance of the data set's results.

## IV. RESULTS

### **Introduction**

The purpose of this study was to analyze the academic progress that NILD ET promoted in middle school students with academic underachievement. The study was conducted in three distinct phases: Baseline (Phase I: pre-test; no NILD Therapy); Phase II (one year of NILD Therapy); and Phase III (two consecutive years of NILD Therapy). The academic achievement areas addressed in the study were reading, mathematics, and written language. Assessment of academic achievement within the three respective subject areas was achieved using standardized instrumentation.

### **Methods of Data Collection**

The study's research design was considered a quasi-experimental, within-subjects, repeated measures design featuring one pre-test and two post-test study conditions. Descriptive and inferential statistical techniques (univariate; multivariate) were utilized to address both preliminary analyses and analyses related to the study's four formally stated research questions. The study's data consisted of archival data sets collected from the NILD yearly assessment database used to compile data for research purposes. The study's analytics, interpretation, and reporting of findings were conducted using IBM's Statistical Package for the Social Sciences (SPSS), version 25.

In advance of the formal address of the study's stated research questions, preliminary analyses were conducted. Specifically, findings related to missing data and internal consistency



of participant performance (reliability) were reported. Regarding missing data for middle school-aged study participants, the study's data set was intact across all three study phases and consisted of 39 total participants. In the area of reading, 38 of the 39 participants completed all three phases of the study; and in the area of mathematics and written language, all 39 participants completed the study's three phases. The internal consistency of participant performance within and across all three academic subject areas addressed in the study was considered very high ( $\alpha \geq .80$ ).

Table 1 provides a summary of findings for the internal consistency of participant performance (reliability) within respective academic achievement areas and across academic achievement areas (composite).

Table 1

*Internal Reliability of Participant Performance across Study Phases by Academic Subject Area*

Subject Area	<i>A</i>
Reading	.93***
Mathematics	.96***
Written Language	.89***
Composite Achievement	.94***

\*\*\* $p \leq .001$

### **Analyses/Findings by Research Question**

**Research question 1: When using the initial WJ-IV ACH baseline scores from NILD ET middle school-aged study participants struggling with learning difficulties in reading achievement pre-test scores, do the study participants demonstrate adequate**

**annual progress in their overall total reading yearly post-test achievement scores?** Using the repeated measures ANOVA test statistic, the overall treatment effect of NILD Educational Therapy upon middle school-aged study participants' achievement in the area of reading was found to be statistically significant ( $V = 0.23$ ;  $p = .009$ ). Moreover, the magnitude of the treatment effect of  $d = 1.09$  is considered to be large ( $d \geq .80$ ).

Table 2 lists a summary of findings for the treatment effect of NILD Educational Therapy upon study participant achievement in the academic area of reading.

Table 2

*Impact of NILD Educational Therapy upon Study Participant Overall Reading Achievement*

Phase	N	Mean	SD	<i>df</i>	<i>F</i>	<i>d</i>
Baseline (I)	39	93.50	11.54	2, 36	5.37**	1.09 <sup>b</sup>
Phase II	39	97.06	10.64			
Phase III	39	97.24	9.88			

\*\* $p = .009$     <sup>b</sup> Large Effect Size ( $d \geq .80$ )

***Null hypothesis ( $H_0$  '): Study Participants receiving NILD Educational Therapy in the area of reading will not manifest statistically significant achievement gains across all three phases of the study.*** In light of the statistically significant finding ( $p = .009$ ) across all three phases of the study for study participants in the area of reading, the null hypothesis ( $H_0$  1) for Research Question One was rejected.

**Research question 2: When using the initial WJ-IV ACH baseline scores from NILD ET middle-school aged study participants struggling with learning difficulties in math achievement pre-test scores, do the participants demonstrate adequate annual**

**progress in their overall total math yearly post-test achievement scores?** Using the repeated measures ANOVA test statistic, the overall treatment effect of NILD Educational Therapy upon middle school-aged study participants' achievement in the area of mathematics was found to be statistically significant ( $V = 0.31$ ;  $p = .001$ ). Moreover, the magnitude of the treatment effect of  $d = 1.34$  is considered to be very large ( $d \geq 1.30$ ).

Table 3 provides a summary of findings for the treatment effect of NILD Educational Therapy upon study participant achievement in the academic area of mathematics.

Table 3

*Impact of NILD Educational Therapy upon Study Participant Overall Mathematics Achievement*

Phase	n	Mean	SD	df	F	d
Baseline (I)	40	89.77	11.54	2, 37	8.34***	1.34 <sup>a</sup>
Phase II	40	94.38	10.64			
Phase III	40	93.23	9.88			

\*\*\* $p = .001$     <sup>a</sup> Very Large Effect Size ( $d \geq 1.30$ )

***Null hypothesis ( $H_0$ ): Study Participants receiving NILD Educational Therapy in the area of mathematics will not manifest statistically significant achievement gains across all three phases of the study.*** In light of the statistically significant finding ( $p = .001$ ) across all three phases of the study for study participants in the area of mathematics, the null hypothesis ( $H_0$ ) for Research Question Two was rejected.

**Research question 3: When using the initial WJ-IV ACH baseline scores from NILD ET middle-school aged study participants struggling with learning difficulties in written language achievement pre-test scores, do the participants demonstrate adequate**

**annual progress in their overall total written language yearly post-test achievement scores?**

Using the repeated measures ANOVA test statistic, the overall treatment effect of NILD

Educational Therapy upon participants' achievement in the area of written language was found to be statistically significant ( $V = 0.43$ ;  $p < .001$ ). Moreover, the magnitude of the treatment effect of  $d = 1.74$  is considered to be large ( $d \geq 1.30$ ).

Table 4 shows a summary of findings for the treatment effect of NILD Educational Therapy upon study participants' achievement in the academic area of written language.

Table 4

*Impact of NILD Educational Therapy upon Study Participant Overall Written Language Achievement*

Phase	n	Mean	SD	<i>df</i>	<i>F</i>	<i>d</i>
Baseline (I)	40	89.92	12.00	2, 37	14.06***	1.74 <sup>a</sup>
Phase II	40	95.03	12.00			
Phase III	40	97.97	10.94			

\*\*\* $p < .001$     <sup>a</sup> Very Large Effect Size ( $d \geq 1.30$ )

***Null hypothesis ( $H_0^3$ ): Study Participants receiving NILD Educational Therapy in the area of written language will not manifest statistically significant achievement gains across all three phases of the study.*** In light of the statistically significant finding ( $p < .001$ ) across all three phases of the study for study participants in the area of written language, the null hypothesis ( $H_0^3$ ) for research question three was rejected.

**Research question 4: Considering the three academic subject areas of reading, mathematics and written language assessed over the three phases of the study, in which subject area was the greatest degree of the treatment effect of NILD Educational Therapy**

**manifested for middle school-aged study participants?** The effect sizes for all three academic subject areas from the baseline measure through the first year of NILD Educational Therapy are considered small, approaching moderate, with the single greatest magnitude of treatment effect manifested in the area of reading ( $d = .34$ ). The effect sizes for middle school-aged students participating in all three phases (baseline through year two) are considered large (reading) and very large (mathematics; written language).

The single greatest magnitude of treatment effect for NILD Therapy from the baseline phase through the second year was manifested in the area of written language ( $d = 1.74$ ). Table 5 shows a complete summary of effect sizes' comparisons by academic subject area and study phase.

Table 5

*Effect Size Comparison by Academic Subject and Study Phase*

Subject Area	n	Effect Size ( $d$ )	N	Effect Size ( $d$ )
		Baseline to Year 1		Across All Phases
Reading	65	0.34	39	1.09 <sup>b</sup>
Mathematics	64	0.31	40	1.34 <sup>a</sup>
Written Language	65	0.24	40	1.74 <sup>a</sup>

<sup>a</sup> Very Large Effect Size ( $d \geq 1.30$ )    <sup>b</sup> Large Effect Size ( $d \geq .80$ )

***Alternative research hypothesis ( $H_a 4$ ):*** NILD Educational Therapy will exert the greatest treatment effect across all study phases in the academic subject area of reading. In light of the superior treatment effect of NILD Educational Therapy for the academic subject area of written language ( $d = 1.74$ ), the alternate research hypothesis ( $H_a 4$ ) is rejected.

Additionally, one additional comparison was conducted to illustrate the total effect that the NILD Therapy exerted upon on the mean increase across the three subject areas from Phase I to Phase III. The mean increase across subject levels reflected significant results in reading and math with a mean increase of 3.82 in reading and a 2.98 in math, indicating a statistically significant value of  $p = .009$ . However, written language reflected the greatest mean increase of 7.85, representing a statistically significant level of  $p \leq .001$ .

Table 6

*Comparison by Academic Subject (Total Effect)*

Academic Achievement Area	n	Mean Increase Phase I-Phase III	df	F	d
Reading	39	3.82	2, 37	5.37**	1.09 <sup>b</sup>
Mathematics	40	2.98	2, 38	8.34***	1.34 <sup>a</sup>
Written language	40	7.85	2, 38	14.06***	1.74 <sup>a</sup>

\*\* $p = .009$     \*\*\* $p \leq .001$     <sup>a</sup> Very Large Effect Size ( $d \geq 1.30$ )    <sup>b</sup> Large Effect Size ( $d \geq .80$ )

### Discussion of Results

The results of the study revealed that in the areas of reading, math, and written language, NILD ET had a significant impact on the scores for the middle school ET student dataset analyzed from 2015-2017. The overall reading scores were indicated a  $p = .009$ , which is indicative of a large effect size ( $d \geq .80$ ). The overall math scores were also statistically significant  $p = .001$ , indicative of a very large effect size ( $d \geq 1.30$ ). Finally, similar to the math results, the overall written language were statistically significant  $p = .001$ , indicative of a very large effect size ( $d \geq 1.30$ ). Additionally, table 6 contained the mean increases for reading, math,

and written language over the three phases of the study in which written language manifested the greatest mean increase.

A strength in the dataset of this study is that the dataset stayed intact over the 2015-2017 period, which provided strong reliability and validity for the outcomes within and across the three academic areas explored in this study ( $\alpha \geq .80$ ). The results verified that the internal consistency of the measurement instrument (WJ-IV) and that participant performance was accurate, meaning that resulting scores are both reliable and valid to a very high degree. The internal reliability of the WJ-IV provided excellent alpha results in each of the three academic areas researched. In all three subject areas, the internal reliability reveals a Cronbach's alpha ( $\alpha$ ) of .93, math had an  $\alpha$  of .96, and written language had  $\alpha$  of .89. When the scores were converted to a  $p$ -value, the results in all three academic areas were statistically significant  $p \leq .001$ . Another important factor in this discussion involves the high reliability and validity of the measurement instrument itself, the WJ-IV, which has a .90 reliability factor adding to the strength of the outcomes in this research study. In the next section, the researcher will address each of the research questions proposed and provide an analysis of each question using the resulting  $p$ -value scores, as well as subsequent Cohen's  $d$  scores that related to effect sizes.

## V. DISCUSSION

### **Summary Statement of Problem**

The purpose of this study was to investigate the effectiveness of NILD ET on middle school students who are enrolled in ET and who have experienced academic underachievement in the areas of reading, math, and/or written language. The phrase *academic underachievement* designates a student's achievement ability; particularly the expression refers to the range of the standard and percentile rankings scores involving the student's lowest and highest scores. Study participants were involved in NILD ET intervention because of the scores in their initial WJ-IV ACH testing results, which indicated the ET students were academic underachievers. In reviewing the participants' pre-therapy mean score, and then comparing the post-therapy mean score, the researcher tracked the underachieving participants' academic progress through all phases of the study. The instrument used to measure the students' academic progress was the Woodcock-Johnson IV (WJ-IV) through a study design that consisted of a pre-test, post-test one, and post-test two, or a pre-Baseline, Phase I, and Phase II framework. The archival data collected for this study came from the NILD database for the years 2015-2017. The sample population for this study consisted of a convenience sample of middle school students enrolled in NILD ET from 2015 -2017. The sample size by subject area contained an overall total of 40 participants across all three phases of the study. Reading had 39 participants, math had 40 participants, and written language had all 40 participants. The intact data set provided strong efficacy for the purposes for this study.





## **Review of Methodology**

The study's design and methodology were broadly quantitative and more specifically quasi-experimental, using a repeated measures approach. "A quasi-experimental design is one that follows the general procedures of experimental research, without the use of a control group or without random assignment" (Joyner, Rouse, & Glatthorn, 2013, p. 75).

The dependent variables were identified as participant post-test-scores on the Woodcock Johnson-IV Achievement (WJ-IV ACH). The study consisted of a convenience sample of middle school students identified with academic underachievement enrolled in NILD ET. NILD archival data, beginning in 2015, utilized students' scores from their initial testing battery as a baseline for the research. The baseline scores for 2015 and subsequent yearly post-test scores for 2016 and 2017 were compiled. Next, the scores were analyzed for adequate yearly progress in the areas of reading, math, and written language. The treatment portion of the research consisted of the NILD ET program's techniques, in which the students in this study are participants.

## **Discussion by Research Question**

**Research Question 1: Do the study participants (NILD ET middle school-aged students identified as having academic underachievement, because of below average reading achievement pre-test scores) demonstrate adequate annual progress in their overall total reading scores across all phases of the study?**

The analysis of the middle school students enrolled in NILD ETs overall reading score across all three phases of the study indicated a statistically significant finding ( $p = .009$ ), and so the null hypothesis was rejected. Specifically, the results support the positive impact NILD ET exerted upon the participants' reading achievement. Students experienced a positive impact in their reading aptitude, indicating growth in their reading abilities across all the three phases of

this study. The treatment effect of NILD ET was considered “large” ( $d \geq .80$ ). According to Gay et al. (2012), “effect size is a numerical way of expressing, the strength or magnitude of a reported relation, be it casual or not” (p. 101). Gay et al. (2012) stipulated that, “an effect size in the eighties indicates a powerful treatment” (p. 101). The overall reading scores from the middle school students involved in this study fall within the range that researchers consider statistically significant.

Findings for this study are remarkable in comparison to other contemporary reading intervention approaches. The current research available about secondary student reading achievement is scarce and does not paint a promising picture of impactful interventions and strategies of secondary students (Vaughn & Fletcher, 2012). In a study done by Vaughn and Fletcher (2012), where the researchers reviewed a previous research study, Vaughn et al. (2010), in which data collected over multiple years and found it difficult to report positive research results for the secondary student population having trouble in academic underachievement in reading scores. “We recently conducted an intervention for secondary students with reading disabilities who had been provided a 50-min reading intervention for two years. These students, after two years of intervention, continued to demonstrate significantly low performance in reading” (Vaughn & Fletcher, 2012, p. 252). In the study Vaughn et al. (2010) where results were reviewed, the researchers provided further information about an even more intensive intervention during the third year of the intervention study, which instituted a 4:1 or 2:1 ratio in 50 min sessions, with only negligible improvements.

It is noteworthy that interventions focused specifically on secondary students demonstrating a low response to typically effective reading interventions have not been conducted. However, although evidence from research-generated measures indicated that

vocabulary instruction for older readers was beneficial, gains in standardized measures have not been documented. (Vaughn & Fletcher, 2012, p. 245)

Vaughn and Fletcher (2012) study additionally discussed a summary reported by Vaughn et al. (2009) “In all cases, the effects were small (0.07–0.29)” (p. 952). In contrast to the Vaughn et al. (2009) and Vaughn and Fletcher (2012) studies, the research in this study presents reading score results that indicated the treatment of NILD ET led to middle school ET students making significant gains in reading ( $p = .009$ ) and having a large effect size of ( $d \geq .80$ ). Although this researcher cannot be certain about the reasons that this current study’s resulting reading scores and subsequent positive effect sizes are significant, one possibility may be that the strategies, methodologies, techniques, and cognitively robust qualities found in NILD ET effectively targeted the deficits areas associated with a student’s ability to read.

Another possible reason for the current study’s increased reading scores is that NILD ET provides cognitively intensive, individualized intervention strategies. Several studies discussed the possibility that a more individualized approach might be the solution for targeting reading deficits in secondary student learners (Vaughn, Cirino, et al., 2010; Vaughn & Fletcher, 2012). A study conducted by researchers from the University of Kansas speculated that, “implementation is a process that might be better attained if the essential components are individually implemented with a high degree of fidelity in limited settings scaling up across all grade levels or content” (Prewett et al., 2012, p. 146). Another study, validated Prewett (2012) et al.’s study’s endorsement by saying, “understanding the relative effects of individualized interventions may be particularly important with older students since a more clinical approach to responding to student learning needs may be necessary to address the range of reading problems represented in older students” (Vaughn & Fletcher, 2012, p. 250). In an earlier study by Vaughn

et al., (2010), the study authors spoke of several approaches on how to mediate reading difficulty in secondary student learners and presented the idea of individualized intervention as a viable option.

Findings from this study suggest that educators consider models for response to intervention for older students that provide even more intensive interventions by increasing time or reducing group size. It may be that more intensive intervention requires very small groups or one-on-one instruction to realize the gains needed.

Furthermore, it is reasonable to think that interventions that are more individualized and responsive to students' needs and less standardized might be associated with improved outcomes. (Vaughn, Wanzek, et al., 2010, p. 955)

The recommendation from both Prewett et al., (2012) and Vaughn et al. (2010) is a strong element present in NILD ET, and could explain why the findings in the study regarding reading are considered statistically significant findings.

**Research Question 2: Do the study participants (NILD ET middle school-aged students identified as having academic underachievement, because of below average math achievement pre-test scores) demonstrate adequate annual progress in their overall total math scores across all phases of the study?**

The analysis of overall math scores for middle school students enrolled in NILD ET, through all three phases of the study, indicated a statistically significant finding ( $p = .001$ ), and so the null hypothesis was rejected. The results reveal that the students in this data set experienced an increase in their overall math scores from the pre-test in 2015 through the final post-test in 2017. The students experienced a positive impact in their aptitude to effectively apply math concepts, understand math procedures, and correctly answer math problems, showing

growth in their abilities to do math over the three phases of this study. The effect size, as measured by Cohen's  $d$ , was found to be very large ( $d \geq 1.30$ ), indicating a "powerful treatment" (Gay et al., 2012, p. 101). The effect size for the math scores relates the magnitude to which the student's abilities were impacted and were elevated through all three phases of the study. The overall increase in math scores and associated effect sizes from the middle school students involved in this study fall within the range that researchers consider as statistically significant.

Again, findings for this study are remarkable in comparison to other contemporary math intervention approaches. The contemporary research available about secondary student math achievement is scarce and lacks assurance involving other inventions effort to provide students operational mediations and stratagems for mathematical skill acquisitions. In a study that reviewed four previous studies on math difficulty, the authors Fuchs, Fuchs, and Compton (2012) discussed the impressive results from the Woodcock-Johnson III (WJ-III) in a specific study completed by Fuchs et al. (2005). The Fuchs et al. (2005) study provided effect sizes from the WJ-III math subsections in Calculation 0.66 and Applied Problem subset 1.27. When combined and averaged, these ES scores exerted a mean effect score of approximately 0.80 for the combined mathematics achievement component. Fuchs et al. (2012) additionally discussed Fuchs et al.'s (2005) previous finding that "Improvement for the tutored students exceeded not only that of the control group peers ( $ES=0.57$ ) but also that of not-at-risk classmates ( $ES = 0.61$ )" (Fuchs et al., 2012, p. 259). Although their effect sizes (ES) are considered by researchers in education and entities such as What Works Clearinghouse to be small to medium effect sizes, it would be far more impressive and promising if their research showed results that exhibited effect sizes in the large and very large range (Fuchs et al., 2012).

**Research Question 3: Do the study participants (NILD ET middle school aged students identified as having academic underachievement, because of below average written language achievement pre-test scores) demonstrate adequate annual progress in their overall total written language scores across all phases of the study?**

The analysis of the middle school students enrolled in NILD ET overall written language score through all three phases of the study indicated a statistically significant finding ( $p = .001$ ), and so the null hypothesis was rejected. The results reveal that the students in this data set experienced an increase in their overall written language scores from the pre-test in 2015 through the final post-test in 2017. The students experienced a positive impact on their aptitude to be effective in their application of written language concepts. The students had a greater understanding in applying effectual components of writing into the writing sample, due to an increase in the areas of sentence writing, mechanics, and grammatical application, which exhibited growth related to competencies of written language over the three phases of this study. The effect size, as measured by Cohen's  $d$ , was very large ( $d \geq 1.30$ ), demonstrating a "powerful treatment" (Gay et al., 2012, p. 101). The effect size associated with the written language scores communicates the magnitude in which the student's abilities were impacted and elevated through all three phases of the study. The overall written language scores from the middle school students involved in this study fall within the range that researchers consider as statistically significant.

To this point, the researcher engaged in discussions surrounding the reading and math study results. The study results in the areas of reading and math are noteworthy results, considering their statistically significant effect sizes due to NILD ET treatment. However, as the researcher explored the written language data, it was evident, that NILD ET treatment had its

most significant impact on participants' written language scores. The discussion to enter into now relates to the powerful effect of NILD ET's cognitively robust interventions on the WJ-IV written language scores of middle school students receiving NILD ET. In examining Response to Intervention, one of the current intervention models used in the field of education, it appears this study's results have surpassed studies related to middle school students receiving RtI intervention for written language.

In 2012, Jim Wright collaborated with the Intervention Central organization and put together a workshop to help educators provide effective writing intervention. Specifically, Wright focused pulling from a study published by Graham and Perin (2007). Graham and Perin (2007) completed a report through the Carnegie Corporation that addressed the middle school literacy crisis and put forth eleven elements of effective adolescent writing instruction. In the Graham and Perin (2007) study, the researchers measured student outcomes in 11 areas: writing strategies, summarization, collaborative writing, specific product goals, word processing, sentence combining, prewriting, inquiry activities, process writing approach, the study of models, and writing for content learning. Wright (2012) extracted the most impactful effect sizes associated with middle schoolers struggling with written language proficiency and reported the findings. Upon review of the Graham and Perin (2007) study, Wright (2012) took the relevant study effect sizes for use in a professional development PowerPoint he developed for the Intervention Center Organization. For comparison purposes, the researcher reported assessment results from similar written language studies, only four of the eleven areas assessed in the Graham and Perin (2007) were utilized comparatively. Wright (2012) reported that the following four areas of written language had statistical significance writing process (Effect Size = 0.82), summarizing (Effect Size = 0.82), goal-setting (Effect Size = 0.70), and sentence



combining (Effect Size = 0.50). According to Graham and Perin (2007) and Wright (2012), RtI intervention strategies on a Tier 2 level were the reason that the effect sizes improved. Although these are impressive results for the study's treatment, they only fall into the large and not the very large effect size. The current researcher's results yielded a very large effect size for analogous written language section over a three-phase research period. In two previous research studies, Hopkins (1996) and Hutchison (1999) put forth results discussing the impact of NILD ET on the dialectal elements. The language elements woven into the NILD ET individual techniques apply the effective strategy of Mediated Learning Experience (MLE), which promotes cognitive modifiability in students struggling with academic underachievement in written linguistic skill areas.

**Research Question 4: Which subject area was the greatest degree of the treatment effect of NILD ET manifested for middle school-aged study participants in subject areas of reading, mathematics and written language evaluated across all three phases of the study?**

The analysis of the middle school students' scores through all three phases of the study indicated that all phases resulted in statistically significant effect sizes in reading ( $d = 1.09$ ), math ( $d = 1.34$ ), and written language ( $d = 1.74$ ), and so the hypothesis that reading would manifest the greatest gains was rejected. The researcher's initial hypothesis stated that reading scores would exhibit the greatest gains over all phases of the research; however, as the research data results indicate, written language showed the most impressive impact. The baseline academic areas (reading, math, and written language) scores collected in 2015 associated reading with an effect size of  $d \geq 0.34$ , math with an effect size of  $d \geq 0.31$ , and written language with an effect size of  $d \geq 0.24$ ; all exhibiting minimal (small) statistically significant effect sizes. However, when all areas were tracked throughout all phases of the study, reading revealed an

effect size of  $d \geq 1.09$ , which is considered a large effect size. Math reveals an effect size  $d \geq 1.34$ , which is considered a very large effect size. Nevertheless, most notable was written language with an effect size of  $d \geq 1.74$ , which, again, is considered a very large effect size.

Although the researcher cannot be certain about why NILD ET students' scores in written language increased, the researcher speculates that one reason students experienced the greatest impact in their written language aptitude was the interactive language and "therapy talk" involved in NILD ET. Hopkins (1996) and Hutchison (1999) each advocated for linguistic components that substantiated and influenced the intervention strategies utilized in NILD ET. Hopkins (1996) conducted a study that endorsed the effectiveness of interactive language and positive ET student outcomes due to intentionally mediated techniques paired with the ETs' ability to weave Feuerstein's concepts of cognitive modifiability and Mediated Learning Experience (MLE). Hutchison (1999) also presented a robust study on the positive impact that effective "therapy talk" had on the ET students. Hutchinson (1999) tracked the progress of NILD ET students by collecting data on the influence of NILD ET techniques which contain MLE-infused cognitively rich language components and then measured the overall progress of NILD ET students.

The research results indicated that students had a greater understanding of how to apply effectual components of writing into the writing sample. The change was credited to an increase in the overall areas impacting written language, thus influencing growth related to competencies of written language over the three phases of this study. The effect size, measured using Cohen's  $d$  to assess the magnitude, was very large ( $d \geq 1.30$ ). As with the previous results in reading and math, Gay et al. (2012) stipulated that "an effect size in the eighties indicates a powerful treatment" (p. 101). The effect size associated with all three academic areas communicates the

magnitude in which the student's abilities were impacted. However, the very large effect size associated in all three phases of the study in written language was especially impressive and encouraging to the researcher of this study. The overall written language scores from the middle school students involved in this study fall within the range that researchers consider statistically significant.

A second possibility involves the researcher's professional opinion that the linguistic components and intentionally rich methodologies in NILD ET are the reason behind study participants' statistically significant increase in their scores and in the effect size attributed to the three-phase study framework. Even though the researcher cannot be certain why the written language component of academic achievement demonstrated the greatest impact, the researcher does affirm that NILD ET techniques played a substantial part. The researcher asserts that the NILD ET techniques infused with components of MLE were part of the cognitive ingredients that helped the participants experience significant academic progression through all phases of the study. The *p*-scores and effect size of Cohen's *d* emphasize that the results were conclusive and comprehensive. Therefore, the researcher contends that NILD ET middle school students identified for intervention with underachievement in the academic area of written language would notably benefit from the techniques NILD uses to target written language deficits.

Finally, a third reason the researcher endorses the research results is that of the intensity and frequency by which NILD ET is delivered as part of the intervention process. NILD ET techniques infused with components that target written language skill sets were the mechanisms that exercised and moved cognition. The cognitive changes directly influenced the increase found in overall scores for NILD ET students in the area of written language. NILD ET has both strong components of oral and auditory rich strategies that help strengthen weak cognitive areas,

by building an NILD ET student's cognitively weak written language skills. NILD ET techniques are best accomplished when the NILD ETs intentionally implement cognitive methodologies through the use of scaffolding approaches and MLE. The implementation of the techniques assists ET students in developing effective learning approaches that work well with their learning styles. In developing and applying effective learning strategies, NILD ET students begin to chart courses toward becoming successful lifelong learners.

### **Summary of Results**

In reflecting on the outcomes, involving both the achievement results and effect sizes associated with these achievement results, it is incumbent upon this researcher to discuss the unusual nature of the research these results. When reviewing the research results of a current intervention, which is endorsed by experts in the field of education, the Fuchs et al. (2012) study results are unusual because most academic institutions consider an ES of 0.20 educationally significant when it comes to research studies. "To put ES in the context of educational research, the What Works Clearinghouse generally considers an ES of 0.2 to be small but educationally meaningful" (Fuchs et al., 2012, p. 258). However, when considering the intervention and its overall effectiveness, many researchers question the model's strength as an effective research approach. Particularly problematic is the lack of positive results for the research in effective implementation of the intervention for the middle school learner population. According to Vaughn and Fletcher (2012), current research an effective intervention for reading difficulties is dismal. "We recently conducted an intervention for secondary students with reading disabilities who had been provided a 50-min reading intervention for two years. These students, after two years of intervention, continued to demonstrate significantly low performance on reading" (Vaughn & Fletcher, 2012, p. 252). Current interventions in mathematics for middle school

students experiencing academic underachievement not only indicate a low impact, but also lack the research base to espouse any promising results. “The research base that does exist.....is almost exclusively focused on the elementary level” (Bouck & Cosby, 2017, p. 240). Fuchs et al. (2012) explained that any research that does exist about current math intervention reveals four areas of concern. The areas include “lack of universal response, variability rates of unresponsiveness, post-tutoring mathematics achievement gap, and questions about transfer across components of the mathematics curriculums” (Fuchs et al., 2012, pp. 264–266). In the area of written language, there is even less of a research base concerning middle schoolers experiencing academic underachievement. “Overall, there is a limited literature base.....in middle school literacy classrooms, and the need for further research is extensive” (Ciullo et al., 2016, p. 45). The researcher stipulates that, based on the research results current finding show limited effectiveness for reading, math, and written language intervention. Particularly, current intervention model’s impending short lifespan is more evident when compared to the results from the research found in previous studies and in this study, which surround the effectiveness of NILD ET.

### **Study Limitations**

The limitations that affected this research study include several areas. First, the type of education that each participant has experienced may vary and cannot be controlled. The study was not controlled for whether a student attended public school, private school, or was homeschooled.

The NILD ET hours each student experienced in a school year may differ as well. Some students may participate in a full NILD ET model, which is two 80-minute sessions weekly, and other students may only participate in half-time, which is two 45-minute sessions a week.

Another factor may be whether each ET student experienced the same intensity in each NILD ET session. The data set did not provide a category on session intensity, which could indicate how much a student was challenged cognitively in order to promote deficit area engagement, cognitive increase, and growth towards effective strategy development.

Additionally, the current study did not have a control group, which would add further credence to the findings of the study. According to Gay et al. (2012), a control group is “a group of participants in a research study who either receive a different treatment than the experimental group or are treated as usual” (p. 624). When constructing effective research studies, experimental research needs to be designed with a way to compare how well the treatment did or did not work based on the control group’s results. “Experimental studies in education often suffer from a failure to make the treatments substantially different from each other. It is important to operationalize the variables in such a way that the difference between groups is clear” (Gay et al., 2012, p. 252). The current study is lacking a control group that could provide additional evidence of the overall impact that NILD ET is a powerful intervention program, providing cognitive fortification for middle school students struggling with academic underachievement.

The researcher also took into consideration limitations involving the type of school that each participant attended. The research did not account for variations in schooling environment (public, private, Christian or homeschooling) which could potentially influence and affect the students’ learning experience and academic assessment gains. The study results would be strengthened if the researcher could definitively state that there was a difference or there was no difference between student outcomes based on their learning environments.

Demographics also represent an area of limitation that the researcher contemplated for this study. The geographic area where the student lives and attends school, along with their socioeconomic status, could influence achievement outcomes and effect sizes of this study. The education field has widely researched students with learning difficulties and concluded that students from poor socioeconomic statuses encounter higher amounts of over-identification as academic underachievers than other demographics (Kincaid & Sullivan, 2017). The results are due, in part, to a lack of consistent exposure to high quality instruction in their learning experiences. In contrast, students from affluent socioeconomic statuses tend to have greater educational opportunities and experiences, due to the advantages available to them in the learning environments they attend.

Finally, a limitation involving the level of NILD ETs' experience (Level I, II, III certification) that each student encounters because the NILD ETs level of certification and years of experience plays an important part in how students progress. Akin to the NILD ETs' years of experience, NILD ETs' educational background could also be a potentially limiting factor, which involves whether they hold a bachelors or masters in the field of education (General Education, Special Education), or if they have had any classroom teaching experience, either in the field of Special Education or out of field.

### **Implications for Professional Practice**

In light of the research results from this study, the researcher would like to offer the following ideas for consideration in the area of future professional practice. First, with the understanding that the study revealed the overall effectiveness of NILD ET on middle school ET students, the researcher endorses that the ETs' hard work of mediating ET students through NILD ET techniques produced academic dividends. Second, the effective delivery of the

treatment was associated with NILD ET techniques that contributed to the progression of the NILD ET student's academic progression through all phases of this study. As an organization, NILD should continue holding a high standard in training and evaluation practices of the NILD ETs certified through the NILD ET program. Based on the overall results of this study, the researcher stipulates that, on some level, the effective treatment of the NILD ET techniques played a large part in the resulting academic scores and effect sizes. Finally, it is incumbent on the NILD organization to find ways to make NILD ET treatment available to the greater public as a whole. The continued influence of the NILD organization and trained ETs (especially ETs that are professionally certified educational therapists), particularly in partnerships with both public and private institutions, will provide further opportunities for NILD ET treatment interventions in areas such as private practice, public schools, Christian schools, and homeschool education models.

The study employed a rigorous research design, enhanced data collection, and a strong analysis of data approach. The function of the research designs, data gathering, and data evaluation procedures represented an essential element of professional practice in ascertaining the effectiveness of the NILD ET intervention. Educational practitioners would benefit from investigating and considering the treatment approaches found in NILD ET, due in part to the significant outcomes and potential intervention possibilities for middle school students struggling with academic underachievement.

### **Recommendations for Future Research**

In reflecting on recommendations for future research having to do with the treatment of NILD ET on middle school students experiencing academic underachievement, the idea of collecting specific data about the NILD ETs that work with NILD ET students would be useful



in determining how different components of NILD impact assessment outcomes. Future research could potentially split research groups by level of therapist certification and track student progress into multiple phases to see if the level of NILD ETs certifications has an impact on overall achievement results.

One area that future research studies could investigate could be if the NILD ET session time plays a part in influencing the NILD ET student's assessment outcomes. Are there significant differences in progress between students in half-time (45 minutes) versus full-time (80 minutes) overall the course of a study? Another area that researchers could investigate involves the delineation between academic area clusters, i.e. (reading) report results in letter-word identification, spelling, word attack, and comprehension, (math) report results in calculations, applied problems, and (written language) writing samples.

Additionally, future studies should have a control group that either receives or does not receive the treatment of NILD ET during the study as it is conducted. A control group will provide greater reliability and validity when analyzing data sets. The addition of a control group would help delineate that the treatment of NILD ET on study participants positively affected the scores and effects sizes for only the group that received treatment; while, at the same time, indicating that the control group lacked the same progress because of the absence of the treatment NILD ET.

Other areas to consider are data collections occurred, collection process, and the components. As NILD continues to hone its research collection practices to reflect research categories that were missing in this dataset, research possibilities will broaden. Further in-depth research could be possible with the inclusion of missing data sets that may reveal how multiple areas of NILD ET impact the overall progression of ET students. A few of the categories that

should be added in future research studies include demographics (socioeconomic status, ethnic background, community affiliation) and the type of school students attend public, private, Christian, Montessori, classical education, or homeschooling. The learning environment that NILD ET middle school students are involved in does influence academic outcomes and should be considered in the future for effective data collection practices. In considering the educational practices of NILD ET students and the implications for future professional practice, researchers constructing future studies should account for influences in achievement outcomes such as current teaching practices that might be positively impacting research data results.

In considering recommendations for future research, the researcher would recommend the implementation of a second measurement instrument to collect cognitive measures concurrently. The Wechsler Intelligence Scale for Children, Fifth Edition (WISC-V), would provide the cognitive component to pair with the Woodcock-Johnson Tests of Achievement, Fourth Edition, (WJ IV-ACH) the academic progression to provide a complete assessment of NILD ET student progress. The components of both the cognitive and achievement measures more accurately provide an overall picture of a student struggling with academic underachievement, by tracking cognitive potential and academic achievement through the use of educational and psychological assessment tools acknowledged as the gold standard in each area of evaluation. Both instruments have decades of research that establish each tool with superb measures of validity and reliability.

## **Conclusion**

This study is the culmination of the researcher's treatise, which delineated results of participants who are NILD ET students in middle school struggling with academic

underachievement in the areas of reading, math, and written language. The study results conclusively established that NILD ET worked well for the participants. Scores and effect sizes in all three academic areas reviewed were promising, and, when compared against a current educational intervention, RtI, the current study's measures were impressive and considered as significant findings for educational research. The researcher hopes that future studies will follow the recommendations put forth, will continue seeking to show the effectiveness of NILD ET in larger sample sizes, and will utilize control groups to help firm up previous studies' limitations.

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