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Closing the Achievement Gap in Mathematics for Students With Learning Disabilities Utilizing the Resource Room as an Intervention

by
Esta Brownstein

An Applied Dissertation Submitted to the
Abraham S. Fischler College of Education
in Partial Fulfillment of the Requirements
for the Degree of Doctor of Education

Nova Southeastern University
2016

Approval Page

This applied dissertation was submitted by Esta Brownstein under the direction of the persons listed below. It was submitted to the Abraham S. Fischer College of Education and approved in partial fulfillment of the requirements for the degree of Doctor of Education at Nova Southeastern University.

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Statement of Original Work

I declare the following:

I have read the Code of Student Conduct and Academic Responsibility as described in the *Student Handbook* of Nova Southeastern University. This applied dissertation represents my original work, except where I have acknowledged the ideas, words, or material of other authors.

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Esta Brownstein
Name

September 2, 2016
Date

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From the beginning of my doctorate journey, my brother Irv has been my staunchest supporter. He has urged me on through times of discouragement and celebrated small victories as major accomplishments. I am not sure I would have gotten through those tough times without him. My dissertation is dedicated to him with my utmost gratitude.

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Abstract

Closing the Achievement Gap in Mathematics for Students With Learning Disabilities Utilizing the Resource Room as an Intervention. Esta Brownstein, 2016: Applied Dissertation, Nova Southeastern University, Abraham S. Fischler College of Education. Keywords: Resource Room, special education, intervention, learning disabilities, mathematics achievement

Students with learning disabilities are placed in general education classrooms in increasing numbers. Many of these students receive additional services in Resource Room programs taught by a special education teacher. The intent of this study was to determine if students with disabilities, who were struggling in mathematics, increased achievement utilizing Resource Room instruction as an intervention. Students in the study were in 3rd, 4th, and 5th grades and performed at least one grade level below expectations for that grade in mathematics. All of the students had a specific learning disability. This study investigated the correlation, if any, between the amounts of time spent in the Resource Room and the number of students concurrently in the Resource Room with an increase in mathematics achievement. The achievement gap for students with disabilities remains steady and continues to foster much debate in the education community. Most of the research into this achievement gap has been directed at students with difficulties in reading; less interest has been shown into research for students with difficulties in mathematics. Mathematics is an important part of daily life, and the basic logic inherent in mathematics crosses over into other academic areas. Various interventions are used in elementary schools to assist students with learning disabilities who struggle in mathematics. However, the interventions have not been sufficiently studied to determine the effectiveness on achievement. This study serves as a catalyst for the study of Resource Room instruction as an intervention for students with disabilities and examines the resulting mathematics achievement.

Table of Contents

Page

Chapter 1: Introduction ... 1
The Research Problem ... 2
Background and Justification ... 3
Deficiencies in the Evidence ... 5
Audience ... 6
Definition of Terms ... 7
Geographic Profile ... 8
Organizational Profile ... 9
Purpose of the Study ... 9

Chapter 2: Literature Review ... 10
Development and Learning ... 10
Behaviorism ... 11
Cognitive Psychology ... 11
Constructivism ... 11
Social Constructivism ... 11
Social Learning Theory ... 12
Conditions of Learning ... 12
Teaching Mathematics ... 12
Changes in the Field of Education ... 12
Specific Learning Disability (SLD) ... 13
Specific Learning Disability (SLD) and No Child Left Behind (NCLB) Act ... 16
Response to Intervention (RTI) ... 18
The Success of Response to Intervention (RTI) ... 21
Learning Disabilities (LDs) and Least Restrictive Environment (LRE)/ Inclusion ... 23
Resource Room/Pullout Instruction ... 24
Mathematics Instruction/Interventions ... 27
Research Questions ... 29

Chapter 3: Methodology ... 31
Participants ... 31
Instruments ... 33
Procedures ... 34
Limitations ... 37

Chapter 4: Results ... 39

Chapter 5: Discussion ... 48
Results of the Resource Room as an Intervention ... 48
Results of Research Question 1 ... 49
Results of Research Question 2 ... 49
Student/Instruction Disparity ... 51
Limitations ... 54

Implications for Future Research 55
Conclusion 56

References 58

Appendices
A Participant Demographics 70
B Student Attendance Record 73
C Student Sticker Chart 79
D Pre- and Postassessments by Goal 81
E Statistical Results of Groups and Total Number of Participants 84

Tables
1 Pearson Product-Moment Correlations by Group 41
2 Correlations for Group 1 Between Preassessment and Postassessment of Goals 43
3 Correlations for Group 2 Between Preassessment and Postassessment of Goals 44
4 Correlations for Group 3 Between Preassessment and Postassessment of Goals 44
5 Correlations for All Participants' Goals Between Preassessment and Postassessment 45
6 Results of *t* Tests for Each Group 46
7 Paired-Samples Test 47
8 Participant Minutes in Attendance and Effect on Mathematics Achievement (Goals) 50
9 Participants and Average Number of Students Concurrently in the Resource Room and Mathematics Achievement 52

Chapter 1: Introduction

The problem is that students with disabilities (SWDs) have had persistent low achievement in mathematics in elementary school when compared to nondisabled peers. The National Assessment of Educational Progress (NAEP) defined *basic achievement* as partial mastery of fundamental skills (U.S. Department of Education [USDOE], 2015). According to Fuchs et al. (2015), students without disabilities (SWODs) scoring at or above basic in math for the years 2009, 2011, and 2013 were 76%, 77%, and 78%, respectively. In comparison, SWD for those same years scored 33%, 33%, and 31%.

Ceulemans et al. (2014) suggested that mathematical learning disabilities (MLDs) in children have serious educational consequences and, in the adult world, numbers and mathematics are an inherent part of life, but this area has received less attention than it deserves. According to Geary (2011), poorly developed mathematical skills have direr consequences on individuals than those associated with poor reading skills. Further, without early intervention, children at risk for long-term difficulties in math will likely have lifelong struggles in the workplace and in dealing with the day-to-day struggles of modern life.

Fuchs, Fuchs, and Compton (2012) studied math difficulties in SWDs. Results indicated that mathematics, more than reading, related to more elements of the school curriculum, both in the same grade and across grade levels, which created a potential for further complications.

In 2015, Fuchs et al. emphasized the achievement gap between SLDs and nondisabled counterparts remained both steady and severe. Watson and Gable (2012) stated that MLDs are a persistent and severe problem and that research on MLDs remains in its infancy.

According to Al-Makahleh (2011), although there has been an influx of research into instructional strategies directed at improving academic achievement for children with learning disabilities (LDs), the studies predominantly focused on reading, language, and writing, giving little concern to mathematics. Research by Fuchs et al. (2012) also indicated that MLDs have received much less emphasis than reading LDs. Additionally, as evidenced by Bryant and Bryant (2008), mathematics is an underdeveloped research topic:

> Development and application of mathematical competence is a critical educational goal for all students, including those with learning disabilities (LD). Yet, research on understanding mathematics disabilities and how they affect learning has lagged behind comparable work in reading disabilities. Likewise, when compared to the well-established research base in early reading difficulties, far less attention has been paid to early difficulties in mathematics and the identification of mathematics disability. (p. 3)

The Research Problem

Mathematics achievement in elementary school children, as well as the persistent low achievement of SWDs in mathematics, are crucial areas of study with widespread implications and require further investigation (Re, Pedron, Tressoldi, & Lucangeli, 2014). The No Child Left Behind (NCLB) Act of 2001, with regulations issued in 2006, required states, districts, and schools to report annual achievement test scores for SWDs separately as a subgroup, as well as within the aggregate reporting (Schulte & Stevens, 2015). This requirement was in response to concerns in relation to the persistent low achievement of this subgroup of students.

Aron and Loprest (2012) suggested research must address both ends of the education spectrum: the implementation of specific education services, as well as the impact on improving achievement, before measuring the efficacy of such services. Given the mathematics difficulties demonstrated by students with LDs, prevention and intervention are critical components to include as part of instructional delivery (Bryant & Bryant, 2008).

Bryant, Bryant, and Hammill (2000) identified various math difficulties as having difficulty with word problems, having difficulty with the language of math, failing to verify answers, not recalling number facts automatically, taking a long time to complete calculations, making borrowing errors (regrouping, renaming), counting on fingers, reaching unreasonable answers, calculating poorly when the order of digit presentation is altered, ordering and spacing numbers inaccurately in multiplication and division, misaligning vertical numbers in columns, disregarding decimals, not copying numbers accurately, exhibiting left-right disorientation of numbers, reversing numbers in problems, starting the calculation in the wrong place, and not recognizing operation signs (+, -, x, ÷).

Background and Justification

Legislation over the past 15 years has had a dramatic effect on the education of children with disabilities. Multiple reauthorizations of Public Law 94-142 (Education of All Handicapped Children's Act of 1975 [EAHCA]) delineated the requirements of special education and related services for eligible children and youth aged 3-21 (Keogh, 2007). Eligible children and youth are, as defined in *The Condition of Education* (USDOE, 2015), those identified by a team of professionals as having a disability that adversely affects academic performance and being in need of special education and related services.

The 2004 reauthorization of the Individuals with Disabilities Education Act (IDEA) further required that SWDs be educated in the least restrictive environment (LRE). The application of this mandate in practice has been particularly controversial for students with LDs (McLeskey, Landers, Hoppey, & Williamson, 2011). Fuchs et al. (2015) argued that schools misinterpret the access mandate to mean that SWDs are required to receive instruction along nondisabled peers. The goal of this is ostensibly to ensure exposure to the same high standards for both groups of students. Compliance monitoring with IDEA through data collection activities began in 1976 (USDOE, 2015).

As suggested by Zigmond, Kloo, and Volonino (2009), the move to addressing a LRE included the what, where, and how students with disabilities are educated. What is more, the what, where, and how that education is provided has raised questions of whether current special education practices fulfilled the promises of PL 94-142 (Zigmond et al., 2009). Further, the original writers of the legislation never intended for the law to force all children with disabilities to be educated in the general education classroom; rather, the intent was to serve moderately and severely disabled children in the public schools with services previously denied.

In 2014, the National Center for Education Statistics (NCES, Kena et al., 2014) published data reflecting the number of children and youth, aged 3-21, receiving special education services to be 6.4 million for the school year 2012-2013, or 13% of total public school enrollment. Of those students, approximately 2.3 million, or 36%, had specific learning difficulties (SLDs), a higher percentage than for any other type of disability.

Students with LDs have been increasingly included in general education classes and subject to the same standard assessments as SWODs. McLeskey et al. (2011) reported that, between 1990 and 2008, an increase of more than 1 million students in the

United States with LDs were educated in the general education setting. In 2009, the percentage of students with LDs spending 80% or more of the school day inside the general education class was 63.3%, in 2010 the number increased to 65.2%, and in 2011 the number further increased to 66.2% (Aud et al., 2013). A decrease of approximately 424,000 students was also noted in Resource Room instruction; the increase of time spent in the general education class has shown to be inversely proportional to the amount of time spent in Resource Room instruction (McLeskey et al., 2011).

Deficiencies in the Evidence

Regardless of the increasing number of SWDs being educated in the general education classroom, and the correlating persistent gaps between SWDs and SWODs in mathematics achievement, "these gaps have been studied infrequently despite the implications of such inquiry for understanding learning differences and informing appropriately differentiated instruction and intervention" (Stevens, Schulte, Elliott, Nese, & Tindal 2014, p. 57).

Questions remain as to how to teach mathematics to students with a SLD or a MLD in order for them to reach the required annual progress, such as adequate yearly progress (AYP) mandated by federal legislation (Fletcher & Vaughn, 2009). There are few scientifically validated treatment programs to address the mathematical cognition deficits of children with a mathematical learning disability (Geary, 2011).

The National Center for Educational Statistics (NCES) 2013 Mathematics Assessment Report Card for the state of Florida revealed that only 22% of students with LDs in fourth grade achieved at or above proficient level in the NAEP assessments compared to 44% of SWODs. The U.S. average for fourth-grade students indicated 18% of SWDs and 45% of SWODs met the same levels.

Elliott, Kurz, Tindal, Stevens, and Yel (2013) in Research Brief 14 for the National Center on Assessment and Accountability for Special Education [NCAASE], indicated that although the proportion of SWDs who spend 80% or more in general education classrooms has increased substantially, achievement outcomes for those students have remained far below desirable levels. Further, the assumption that all students learning in the general education classroom have an equal opportunity to learn, such as what they are expected to know and what they will be tested on, is flawed by lack of testing. Stevens et al. (2014) agreed there continues to be substantial achievement gaps in mathematics between SWD and SWOD.

Educators understand that an intervention may produce excellent student performance gains in controlled research settings yet fail to offer practical advantages in the classrooms (Reed et al., 2014). Some interventions may be too difficult to implement and require too much time, money, or other scarce resources. These challenges limit the ability of teachers and administrators to adopt, implement, and maintain many interventions.

Audience

Educational researchers have indicated that lifelong opportunities associated with a math disability form a major barrier to school and later career success (Navarro, Aragon, Aguilar, & Howell, 2013). Educators and administrators would be interested in an intervention that could be useful in planning instruction and transition activities for students. Schools and school districts are responsible for meeting the demands of AYP for all subgroups of students, including SWDs. Legislators and regulators preparing for the next reauthorization of IDEA should investigate all avenues of educational opportunities for SWDs and the effects of inclusion without the appropriate interventions.

Definition of Terms

For the purpose of this applied dissertation, the researcher used the following definitions.

Adequate yearly progress (AYP). This term refers to an individual state's measure of yearly progress toward achieving state academic standards. AYP is the minimum level of improvement that states, school districts, and schools must achieve each year (USDOE, 2009).

Inclusion. This term refers to the process of including students with disabilities of all degrees in general education classes. Those students are provided with necessary supplementary aids and services in order to assist them with the curriculum (National Center on Educational Restructuring and Inclusion, 1994).

Individualized education plan (IEP). According to Etscheidt and Curran (2010), **t**his term refers to "a statement of the special education and related services and supplementary aids and services, based on peer-reviewed research to the extent practicable, to be provided to the child" (p. 138).

Informal assessments. This term refers is sometimes referred to as criterion-referenced measures or performance-based measures and used to inform instruction (William, 2011).

Least restrictive environment (LRE). To the maximum extent appropriate, children with disabilities, including children in public or private institutions or other care facilities, are educated with children who are not disabled, and special classes, separate schooling, or other removal of children with disabilities from the regular educational environment occurs only when the nature or severity of the disability is such that education in regular classes with the use of supplementary aids and services cannot be achieved satisfactorily (McLeskey, Landers, Hoppey, & Williamson, 2011).

Resource room. A separate classroom used for additional instruction; in research, the terms pullout instruction and Resource Room instruction are used interchangeably (Leinhardt & Pallay, 1982). For the purpose of this study, both pullout instruction and Resource Room instruction will be known as Resource Room instruction.

Resource room placement. The Office of Special Education Programs (OSEP) defined this term as those in which students with disabilities receive special education and related services outside the regular classroom for 21%-60% of the school day (Zigmond et al., 2009).

Scientifically based research. This term refers to that accepted by a peer-reviewed journal or approved by a panel of independent experts through a comparably rigorous, objective, and scientific review (Etscheidt & Curran, 2010).

Supplementary aids and services. Turnbull, Stowe, and Huerta (2007) defined this term as follows: “Aids, services, and other supports that are provided in regular education classes or other education-related services to enable children with disabilities to be educated with nondisabled students to the maximum extent appropriate in accordance with Section 1412(a)(5)” (p. 41).

Geographic Profile

The city in which the school for the study was located was an urban area in southern Florida with land area of approximately 11.6 square miles and a population as of 2014 of approximately 64,000 (U.S. Census Bureau, 2015). Founded in 1963, the median household estimated income as of 2014 was $43,250 with 11.4% of persons below the poverty level and an unemployment rate of 11.6 %. More than 36% of children aged 5+ lived in a home where a language other than English was spoken.

Organizational Profile

The school in which the study took place was a Title 1 elementary school that served students from prekindergarten through fifth grade with 1,100+ students enrolled for the school year 2015-2016. The average elementary school in Florida had approximately 618 enrolled students so the subject school was a very large elementary school. A demographic breakdown of the students revealed a distribution of 34% African American, 30% Hispanic, 25% Caucasian, and the remaining 11% distributed among Asian, American Indian, a combination of two races, and Pacific Islanders. Approximately 76% of the students were entitled to free or reduced-price lunches.

Purpose of the Study

The purpose of this study was to determine the effectiveness of a specific intervention, Resource Room Instruction, aimed at reducing the achievement gap for SWDs in mathematics. The study examined the achievement of SWDs in mathematics before and after the utilization of Resource Room Instruction as an intervention when used in addition to the core mathematics instruction received in the general education classroom.

Chapter 2: Literature Review

The purpose of this chapter is fourfold. The first is to clarify the definition of SLDs, including the confusion caused by recent changes in regulations, and the resulting impact on research associated with academic achievement for students with SLDs, as well as the impact on special education. Second, this chapter reviews the literature on educational opportunities and limitations in mathematics for students in elementary school with SLDs. Third, this chapter addresses the need for further research on the success of various interventions utilized in the schools to assist students with SLDs to improve achievement in the area of mathematics and, specific to this research, the use of Resource Room Instruction as that intervention. Researchers who have studied mathematics and students with SLDs have offered opinions that further research is required and that much of current research is insufficient or flawed. An area of contention among researchers and special educators lies within the concept of inclusion: how it is defined; how it is handled within schools; what the legislation and regulations deem inclusion to be; and how it affects the student population at large and, specifically, students with SLDs. This is the fourth area of research discussed through the literature.

Development and Learning

Various theories have been proposed and studied over the years concerning the relationship between learning and development in children, especially in the area of mathematics. However, research has not confirmed one theory over another as the most effective for teaching SWDs (Fuchs et al., 2012). Learning, as defined by the United Nations Educational Scientific and Cultural Organization (2015), is a “process that brings together personal and environmental experiences and influences for acquiring, enriching or modifying one’s knowledge, skills, values, attitudes, behavior and world views” (Most

Influential Theories section, para. 1). Among the major theories of learning are behaviorist theories, cognitive psychology, constructivism, social constructivism, social learning theory, and conditions of learning.

Behaviorism

Behaviorism, currently known as behavior analysis (Schlinger, 2008), refers to learning as an active process of acquiring knowledge (Boghossian, 2006). Further, behaviorism focuses on outwardly observable stimuli and the responses that follow. B. F. Skinner maintained that behavior is a subject matter in its own right, an interaction between an organism and its environment (Moore, 2011).

Cognitive Psychology

Cognitive psychologists worked to discover the connections among the various aspects of learning, for example, how information was processed, how knowledge was stored, and how individual differences and learner preferences manifested in the learner's knowledge (Hoy, Davis, & Anderman, 2013).

Constructivism

Constructivists focused on the way children developed knowledge from the experiences provided by the environment (Raymond, 2000). The most notable researcher in the area of constructivism was Piaget. Piaget developed the theory that learning develops in stages according to a learner's maturation, and the learner self-regulates the learning (Raymond, 2000).

Social Constructivism

Vygotsky was a constructivist who expanded on Piaget's theory. Vygotsky developed the social constructivist theory that held "learning occurs when teachers and others guide the learner in developing new understandings" (Raymond, 2000, p. 176).

Further, Vygotsky developed the concept of the zone of proximal development that indicated the range of learning achievable by students when involved with competent others in meaningful activities, such as the distance between "what children can do by themselves and the next learning that they can be helped to achieve with competent assistance" (Raymond, 2000, p. 176).

Social Learning Theory

Bandura developed social learning theory, also known as social cognitive theory. Bandura (1971) posited that learning came from observing others' behavior, attitudes, and outcomes of those behaviors, such as observation, imitation, and modeling.

Conditions of Learning

Gagne (1985) introduced the conditions of learning theory as a leveled form of learning; each different type of learning required different types of instruction. Further, Gagne suggested that learning tasks for intellectual skills needed to be organized in a hierarchy according to complexity.

The current study acknowledges that each of the learning theories detailed above has a place in teaching mathematics to SWDs in the Resource Room. Students within each group come with different abilities, varying disabilities, and individual needs. Therefore, students have personal learning styles and respond to diverse methods of teaching. It remains up to the instructor to match the most efficient style of teaching to the learner's style of learning.

Teaching Mathematics

Learning theories and the practical applications of same in the classroom have created controversy within the field of education. The National Council of Teachers of Mathematics (NCTM, 2009) acknowledged there is no accepted universal method for teaching math fluency.

Standards-based reform curricula in mathematics, used in most classrooms after the reauthorization of IDEA in 2004, are fashioned after the standards issued by the NCTM (Sayeski & Paulsen, 2010). However, legislative and regulatory policy statements at both state and federal levels suggested the standards-based reform pertained to all students, at a time when classrooms became more diverse and included more SWDs (Jitendra et al., 2005). The standards were designed to hold all students to high, rigorous standards with the aim to have students both college and career ready; moreover, SWDs may have difficulty accessing the content standard at grade level because they lack the foundational skills needed to interact with the material at a higher level of cognitive complexity (Morgan et al., 2013).

Changes in the Field of Education

The landscape of the field of education, and in particular special education, has changed dramatically over the past 2 decades. Through legislation, regulations, court decisions, state laws, research, school district decisions, parent input, and educational professional organizations, the entire history of special education "can be told in terms of one steady trend that can be described as progressive inclusion" (McLeskey et al., 2010). Within this trend is the disturbing statistic that there remains a persistent low achievement in academic proficiency for SWDs and, in particular, students with LDs.

Specific Learning Disability (SLD)

As defined by the American Psychiatric Association (2013),

> A Specific Learning Disorder is diagnosed through a clinical review of the individual's developmental, medical, educational, and family history, reports of test scores and teacher observations, and response to academic interventions. The

> diagnosis requires persistent difficulties in reading, writing, arithmetic, of mathematical reasoning skills during formal years of schooling. Symptoms may include inaccurate or slow and effortful reading, poor written expression that lacks clarity, difficulties remembering number facts, or inaccurate mathematical reasoning.
>
> Current academic skills must be well below the average range of scores in culturally and linguistically appropriate tests of reading, writing, or mathematics. The individual's difficulties must not be better explained by developmental, neurological, sensory (vision or hearing), or motor disorders and must significantly interfere with academic achievement, occupational performance, or activities of daily living. (Characteristics of Specific section, para. 1-2)

Prior to the reauthorization of IDEA in 2004 (with regulations issued in 2006), a SLD was defined strictly based on a severe discrepancy between ability and academic achievement (Gresham & Vellutino, 2010). Students qualified for services under the eligibility of SLD only if a standardized assessment revealed average or higher intelligence and a standardized measure of achievement revealed a significant discrepancy (usually two standard deviations) between the two assessments.

Embedded in the reauthorization of IDEA in 2004, known as the Individuals with Disabilities Education Improvement Act (IDEIA), was an alternative method for identifying students with LDs (Fuchs & Vaughn, 2012). The expanded definition included the option of a process that determines if the child responds to scientific, research-based intervention, most commonly known as response to intervention (RTI) (Zumeta, Zirkel, & Danielson, 2014). Etscheidt (2012) suggested that the implementation of RTI was in response to political pressure to decrease the number of students in special education. Zirkel (2013) indicated that the numbers and percentages of SWDs are cloudy due to changes in eligibility classifications, such as less students identified as SLD, but more identified as Other Health Impaired or Autism Spectrum Disorder.

Further, in 2013, the American Psychiatric Association (2013b) issued the fifth edition of the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-5). Clinicians and researchers use this manual to diagnose and classify mental disorders. The DSM-5 renewed definitions of LD and SLD, the design of which, according to Cavendish (2013), was to align with the revised IDEIA.

The DSM-IV, the previous manual (American Psychiatric Association, 2000), defined LDs within three categories: specific reading disorder, specific math disorder, and disorders of written expression. Cavendish (2013) further identified the new definition of SLD as shown in the DSM-5; the three categories are combined under one umbrella, SLD, with one of three levels of severity, mild, moderate, or severe. The evaluation of an individual for a diagnosis of SLD includes four diagnostic criteria:

1. A persistent difficulty learning academic skills for at least 6 months despite intervention targeting the areas of difficulty (e.g., RTI).

2. The affected academic skills are substantially below expectations given the individual’s age and result in impaired functioning in school, at work, and in activities of daily living.

3. Diagnosis of SLD may not be until the onset of school years, although it may be readily apparent in early years.

4. Academic and learning difficulties occur in the absence of intellectual disabilities or other specific impairments.

These changes in the law and the DSM have created some confusion in the review of literature and the identification of the definition of SLD utilized by the researchers. Therefore, although the review of literature may contain references to a MLD, Dyscalculia, or other specific forms of LD, literature that is more recent refers to those as a SLD, thus the confusion.

Specific Learning Disability (SLD) and No Child Left Behind (NCLB) Act

NCLB set annual achievement targets referred to as AYP. Further, AYP goals required students in all subgroups to reach 100% proficiency in reading and mathematics by 2013-2014, states had to test 95% of students in each subgroup and report each subgroup separately. Each school and student subgroup was to meet an identical minimal level of proficiency as identified by the state, the "annual measurable objective" (NCLB Act, 2001). The consequences for failing to make AYP are serious and include sanctions against the school, school district, or state. According to Eckes and Swando (2009),

> The failure of the special education subgroup to make AYP occurs mainly because the subgroup is expected to maintain the exact same proficiency levels as their general education peers—a standard that has proved to [*sic*] problematic because special education students often start out with lower average test scores than general education students. (p. 2481)

Eckes and Swanson (2009) studied three states, California, Florida, and Texas, to examine how SWDs performed in public schools on AYP. In California, schools with less than 50 SWDs did not have to report the results of the subgroup's testing. In each year from 2001-2002 through 2005-2006, the differences in the number of schools making AYP with and without special education subgroups were statistically significant ($p = .001$). In 2005-2006, schools containing special education subgroups were 71.8% less likely to make AYP compared to schools that did not contain special education subgroups with all other subgroups being equal. In Texas, as in California, schools with less than 50 SWDs did not have to report the results of the subgroup's testing. For the years 2003-2004 through 2005-2006, the differences between schools with and without special education subgroups making AYP were statistically significant (p = .001). In 2005-2006, 31.7% of schools failed to make AYP solely on the performance of the special education subgroup.

In Florida, schools with less than 30 SWDs did not have to report the results of the subgroup's testing. Florida had a much larger percentage of schools (85.6%) with special education subgroups compared to either of the other two states, most likely due to the difference in size of the subgroups reported. Results indicated that the size differential accounted for Florida reporting a higher percentage of SWDs reaching AYP. In 2004-2005, schools with a special education subgroup performed better than schools without a special education subgroup. However, when eliminating the schools with 30-49 special education students, the positive patterns for special education subgroups were not there (Eckes & Swanson, 2009).

It is clear that this subgroup of students, SWDs, has had ongoing challenges in meeting the standards set for all students by federal and state laws. For example, the NAEP (2015) reported national achievement levels in mathematics for the years 1996 through 2015 for fourth-grade students with and without disabilities. For the years 2009, 2011, 2013, and 2015, students identified with a disability scored in "below basic" proficiency, respectively: 41%, 45%, 45%, and 45%; students identified as not having a disability scored 15%, 14%, 14%, and 14%. For those same years, students identified with a disability scored 59%, 55%, 55%, and 55%; students identified as not having a disability scored 85%, 86%, 86%, and 86% in "at or above basic" proficiency. The NAEP defined basic achievement as partial mastery of fundamental skills.

According to Schulte and Stevens (2015), the 2013 results indicated a difference of almost a full standard deviation between SWDs and SWODs achievement in mathematics. This ongoing achievement gap was one of the factors that formed the basis for development of the RTI initiative as mandated by IDEIA. Further, the data showed that there has been no significant increase in proficiency for either group of students since 2011.

Response to Intervention (RTI)

IDEIA included a mandate concerning RTI, defined by the National Joint Committee on Learning Disabilities (NJCLD, 2005) as an approach to remedial intervention. This approach includes the generation of data to inform instruction, as well as to identify students who may be in need of special education and related services. Further, the NJCLD identified the core concepts of an RTI approach, to include the application of scientific, research-based interventions in general education; measurement of a student's response to those interventions; and the use of RTI data to inform instruction.

In 2004, the NJCLD formed a roundtable of 14 professional organizations involved with the education of children with LDs. The consensus of the roundtable was that data from an RTI process should include the following:

1. High-quality, research-based instruction and behavioral supports in general education.

2. Scientific, research-based interventions focused specifically on individual student difficulties and delivered with appropriate intensity.

3. Use of a collaborative approach by school staff for development,

implementation, and monitoring of the intervention process.

4. Data-based documentation reflecting continuous monitoring of student performance and progress during interventions.

5. Documentation of parent involvement throughout the process.

6. Documentation that the timelines described in the federal legislation §300.532-300.533 are adhered to unless extended by mutual written agreement of the child's parents and a team of qualified professionals as described in §300.540.

7. Systematic assessment and documentation that the interventions used were implemented with fidelity. (Background section, para. 3)

According to Richards, Pavri, Golez, Canges, and Murphy (2007), there is no one specific method for implementation of RTI. Typically, there are three tiers of RTI. Tier 1 includes the core curriculum all students receive, along with assessments given usually three times a year to identify those students who are not meeting grade-level standards with the core curriculum, possibly 20-30% of students. Fuchs, Fuchs, and Stecker (2010) described the model of RTI from the NRCLD. This model included screening at the beginning of the school year by the classroom teacher to identify those students who were "potentially at risk for school failure" (p. 302). Monitoring of those students was for a period of 5 to 8 weeks during which time the teacher instruction was evidence-based and general to the entire class. Children who did not respond to this instruction, such as did not meet grade-level benchmarks, moved to Tier 2.

The NRCLD model further described Tier 2 instruction as giving students additional tutoring in small groups by an adult using a standard protocol. According to Fuchs et al. (2010), there are many protocols for reading, fewer for math, and none for the other content areas (e.g., history, civics, foreign languages, etc.). Tier 2 instruction continues for a minimum of 8 to 10 weeks, 4 days a week, for a minimum of 30 minutes a session. Progress monitoring for all students in Tier 2 was on a regular basis. Progress monitoring uses the data to inform instruction for specific students and to gauge whether the student is responding to the intervention. Students who respond to Tier 2 instruction return to classroom instruction; those who do not respond receive a referral to a multidisciplinary team for a case-by-case evaluation. The team then determines whether the student should continue with Tier 2 interventions or move to Tier 3 interventions. Tier 2 and Tier 3 interventions often use Resource Room instruction.

Tier 3 interventions are intensive for the 2-5% of students who do not respond to Tiers 1 and 2. Typically, Tier 3 interventions include groups of up to three students for a time frame of up to 60 minutes per day, 3 to 5 days a week, and may or may not include special education services depending on the school district's policy.

According to Fletcher et al. (2014), agreement across methods for identifying students through the RTI method is often poor. Further, although there are many methods for making these decisions, different methods often lead to different decisions for individual children, partly because different measures operationalize inadequate response. Zumeta et al. (2014) agreed that implementation of RTI has engendered considerable uncertainty regarding how to best determine eligibility for special education services within the SLD category.

McKenna, Flower, and Ciullo (2014) studied various methods of measuring the fidelity of intervention implementation. McKenna et al. defined *fidelity* as the degree to which an intervention practice is provided to students as intended and consists of two components: fidelity to structure (adherence to a behavioral or academic intervention's component parts) and fidelity to processes (refers to the quality of instruction). Although teachers must use evidence-based practices (EBP) for improving performance of all students, variability across teachers in the implementation of these practices may limit or negate potential benefits.

Factors that may negatively affect teachers' use of EBPs, according to McKenna et al. (2014), include the complexity of the intervention or practice, access to materials and resources necessary to implement the program, differences between the way practitioners perceive the intervention to be effective and its actual effectiveness, and the characteristics of the person delivering the intervention (such as skill and motivation). Further, due to the current demands on educators' time and other school-based issues, many of the teachers will require ongoing support to implement the interventions with fidelity.

As previously noted, student progress needs to be monitored in order to measure the effectiveness of the interventions, especially in the current climate of accountability. Jitendra, Dupuis, and Zaslofsky (2014) deemed progress monitoring as an essential component of an RTI framework to identify students with mathematics difficulty and for guiding instruction. One progress-monitoring tool studied was the curriculum-based measure. Progress-monitoring procedures entail teachers assessing students' academic performance on a regular basis, usually weekly or monthly (Fuchs, 2007). It can provide meaningful information about student proficiency and data for teachers to evaluate the effectiveness of instruction and make decisions about instructional practices to improve student learning.

The Success of Response to Intervention (RTI)

Fuchs, Fuchs, and Vaughn (2014) stated, "Many Students with disabilities are performing abysmally in America's schools" (p. 13), and suggested that students who have not benefited from RTI's first 2 tiers of instruction require intensive intervention. Further, students with learning problems show significantly better outcomes in small groups or one-to-one instruction, and size of the group and duration of instruction are important factors to consider. Fuchs et al. (2014) described databased instruction as a program of "informed trial and error" (p. 17) with program development informed by progress-monitoring data that quantify the student's response to the instructional changes in order to modify the program as needed. Further, in discussing students who do not respond to Tiers 1 and 2 RTI, Fuchs et al. (2014) said to ask two questions of the Tier 3 interventions: "Is the size of the group suitable for specialized instruction and practice with feedback, considering the expertise of the teacher and the severity of the students' learning problems?" and "Is the duration of the instruction adequate?" (p. 15).

In 2014, Vaughn, Zumeta, Wanzek, Cook, and Klingner suggested that the core of special education for students with LDs at the more intensive levels of RTI remains appropriate instruction, consisting of intensive, individualized interventions provided in small groups or one-to-one instruction provided by special education teachers. In considering the appropriateness of the interventions for students with LDs, the questions of "Is the intervention provided for a sufficient duration and intensity to allow for success?" and "Is the intervention provided in groups that are small enough to maximize learning, provide adequate opportunities for students to respond with feedback, and allow teachers to individualize instruction to meet students' needs?" (Vaughn et al., 2014, p. 91) should be asked, among others, to determine if the interventions are being implemented in a manner that maximizes engaged instructional time for students with LD.

Learning Disabilities (LDs) and Least Restrictive Environment (LRE)/Inclusion

Rueda, Gallego, and Moll (2000) noted that according to IDEA, "States must provide a free, appropriate education to qualified students, to the maximum extent possible a child with disabilities must be educated in the least restrictive environment, and education is to be individualized and appropriate to the child's needs" (p. 70). Further, IDEIA (2004) defined the *LRE principle* operationally in terms of a continuum of alternate placements. In other words, LRE is an ordered sequence of placements that varies according to the degree of restrictiveness, often from the most restrictive to the least restrictive (Taylor, 2004). According to Yell, Shriner, and Katsiyannis (2006), neither the law nor the regulations delineate how school districts are to determine the LREs. In addition, a number of court cases issued rulings through the U.S. Courts of Appeals in the Third, Fifth, Ninth, and 11th Districts. The results of those litigations revealed that IDEA does not compel the placement of all SWDs in the regular education classroom but, rather, fully supports the continuum of placements (Simpson, Rose, & Bakken, 2015). The continuum of placements, according to Yell et al., includes institutional or hospital placement as the most restrictive and the general education classroom as the least restrictive. Further, LRE is identified as the most appropriate placement for the student, such as a place in the school where the IEP can be implemented, a flexible arrangement to meet the child's individual needs, and can range from a separate classroom or school all day or part of the day to all-day placement in a general education classroom with appropriate supportive services.

Statistics from the OSEP (2013) revealed that SWDs are included in regular education classrooms at a higher percentage each year since the inception of LRE. According to Zigmond et al. (2009), OSEP defined *regular class placement* as "one in which students with disabilities receive special education and related services outside the regular class for 0%-20% of the school day" (p. 191). In 2009, the definition of student placement in special education settings changed to reflect the amount of time the student spent in general education settings, such as "educated in the general education classroom for 80% or more of the school day" (McLeskey et al., 2010, p. 2). Causton-Theoharis and Theoharis (2008) stated that inclusion is not about moving some students from special education settings to general education settings; inclusion is not a place, it is a way of thinking. Causton-Theoharis and Theoharis further contended that those in favor of inclusion have placed too much emphasis on the place the education occurs and not enough on educational outcomes of the students and the quality of instruction provided to them.

According to the USDOE (2015), for the school year 2013-2014, more than 68% of students aged 6-21 who served under IDEA with LDs were in the general education classroom at least 80% of the day, compared to 67.0% for the school year 2012-2013, 65.2% for the school year 2010-2011, and 63.3% for the school year 2009-2010.

Resource Room/Pullout Instruction

According to Idol (2006),

> The Resource Room approach is any setting in the school to which students come to receive specific instruction on a regularly scheduled basis, while receiving the majority of their education elsewhere (usually in a general school program). Therefore, Resource Rooms are not part-time special education classes where students with handicaps are integrated with peers only for lunch, gym, or art. They also are not consultative programs where students remain full-time in a general classroom setting and where modifications are made in instruction.

Neither are they study halls, discipline or detention centers, or crisis rooms. (p. 78)

In light of the legislation and regulations advocating inclusion as the best alternative for achievement success, some researchers continue to advocate for some SWDs to be educated in self-contained, or resource-room settings, at least on a part-time basis. Kaufman, Landrum, Mock, Sayeski, and Sayeski (2005) argued that the expectation all teachers can teach all students within a general education setting has a lack of widespread empirical evidence. Furthermore, Kaufman et al. noted, “The goals of teaching all children well and teaching all children in the same place and at the same time are on a collision course for some students” and “we cannot avoid the ‘train wreck’ of these two goals unless we give up one for the other in some cases” (p. 2).

Simpson et al. (2015) suggested that students who receive content-specific instruction in self-contained settings are facilitated by special education professionals and are designed to provide direct, individualized instruction to support the student’s academic goals. Further, students cannot obtain specialized services in the general education classroom, such as smaller class sizes, more individualized support, curricular variations and modifications, and classroom management. Simpson et al. emphasized,

> Self-contained settings have advantages for certain students: Some students with significant academic deficits, including SLD, require individualized instruction outside of the general education classroom; the functionality of the self-contained class is to support the individual needs of the student by providing direct and intensive instruction in an identified instruction area to build the academic or functional skills of an individual with disabilities. Within these settings, interventions can include, but are not limited to individualized instruction,

> modified curriculum, differentiated instruction, alternative methods of presentation and response, and/or direct behavioral support. The ultimate goal of self-contained settings is to bridge a student's achievement gap, and reintroduce them into the general education environment. (p. 83)

McLeskey and Waldron (2011) reviewed fully inclusive educational programs for elementary school students to examine effectiveness as opposed to programs that combined inclusion with pullout services. The two central issues examined were the amount of time spent outside the regular classroom and the outcome on student achievement. Results indicated the key to increased student achievement was the quality of teacher instruction, not the setting. However, students received the most desirable results when additional intensive instruction in small groups, with more instructional time in a pullout situation, combined with high-quality instruction within the general education classroom.

Mononen and Aunio (2014) conducted a study of a mathematics intervention for low-performing second-grade students in Finland to show the benefits of special education teachers providing intensified instruction in a pullout environment utilizing a specific intervention program. The intervention included small groups with explicit teaching focused on practicing number-word sequence skills, counting skills, and conceptual place value knowledge in the 1-1000 range, in addition to typical core mathematics instruction of three to four, 45-minute lessons per week. Participants were 88 second-grade Finnish students from four classes in schools located in southern Finland and divided into three groups. Sessions were 35-45 minutes each in 12 sessions. Although there were some math gains noted in the results, other math abilities decreased due to what was implied as lack of practice. Mononen and Aunio indicated there is a need for further research to identify successful mathematics interventions.

Mathematics Instruction/Interventions

In Jordan, Al-Makahleh (2011) studied the effect of direct instruction (DI), a tenet of behaviorism, on mathematics achievement for students with LDs in fourth and fifth grades. DI identifies skills specifically and explicitly teaches them step-by-step. It involves measuring student performance directly, setting goals accurately, analyzing the instructional task and arranging elements sequentially and systematically, allocating sufficient time for task learning, providing feedback regarding student performance, having the student practice the task, and providing the student with sample problem solving forms while supporting students at all times on their learning. Participants in the study consisted of 60 fourth- and fifth-grade students from six school districts in a metropolitan area in Jordan assigned randomly to the experimental or control group. The students in the control group were taught using traditional methods; the experimental group were taught using the DI method. The study lasted 6 months. Results indicated a statistically significant difference in the mean scores of mathematics achievement between the pretest and the posttest for the experimental group (pretest $M = 16.80$; posttest $M = 40.73$) over the control group (pretest $M = 15.93$; posttest $M = 22.70$).

In 2009, the NCTM published a report on research in mathematics education and indicated, “Scientific research and appropriately organized and vetted professional knowledge are both crucial for the improvement of mathematics teaching and learning” (p. 224). Ottmar, Decker, Cameron, Curby, and Rimm-Kaufman (2014) studied the quality of teacher instruction and exposure to mathematics instruction as predictors of 657 fifth-grade students’ mathematical achievement. Exposure to mathematics was defined in terms of length of time for mathematics-related instruction and measured as the number of intervals in which students were exposed to mathematics instruction over 10-minute intervals as described in the measurement of classroom quality. Results of the study indicated that greater exposure to mathematics instruction contributed to higher achievement on the Calculations Subtest. More exposure to mathematics instruction compensated for low-quality instruction. As in calculations, applied problems scores were also positively affected by increased exposure to mathematics instruction.

Dennis (2015) investigated the effects of Tier 2 and Tier 3 interventions for second graders with math difficulties in two related studies. The first study centered on effects of a Tier 2 intervention for students who had inadequate responses to the core mathematics curriculum. The second study centered on the effects of a Tier 3 intervention on the mathematics performance of students with inadequate responses to the Tier 2 intervention. Participants included second graders ($N = 9$) in an elementary school in a metropolitan area in the northeastern United States. Those students who scored the lowest of 44 students identified in the lowest 25% on the probe administered at the beginning of the school year participated. In Study 1, teachers taught 40 lessons over a 10-week period, providing lessons daily for 20 minutes a day 4 days a week. Of the nine participants, six moved from low performance to average following the Tier 2 intervention. Three participants moved from very low performance to low performance. Those three participants then moved to Study 2, the Tier 3 intervention. Tier 3 interventions included one-on-one instruction provided for 35 minutes daily. At the end of the Tier 3 intervention, all three of the participants were performing at the average level.

Bryant et al. (2014) also studied second graders classified in first grade as having persistent low achievement in mathematics from three elementary schools having similar demographics in a suburban school district in central Texas. Twelve participants received Tier 2 interventions, 4 days a week, for 20-minute sessions over 23 weeks in grouping arrangements of 1:5 but continued to face difficulties. All 12 participants at each school were introduced to a Tier 3 intervention for a duration of 30 minutes a day, 5 days a week, for 10 weeks in grouping arrangements of 1:2 or 1:3 in a pullout setting in addition to core mathematics instruction. Games reinforced previously taught concepts during this intervention on the last day of each week. Results showed a positive effect in all three groups with immediate increases at the beginning of the interventions, steady rises throughout the intervention, and maintained following cessation of the intervention.

In 2014, Swanson, Orosco, and Lussier investigated the role of strategy instruction on solution accuracy in word problem solving for 193 third-grade children in a southern California school. The children included 73 with a mathematical disability and 120 without a mathematical disability. Placement of children was either in a control group or in one of four treatment conditions: verbal strategies (e.g., underline the question sentence.), visual-spatial strategies (e.g., using a diagram), verbal plus visual-spatial, and materials-only. All students received DI for approximately five minutes prior to the administration of the condition, 10 minutes of guided practice, and 10 additional minutes of independent practice. Results showed that children with a mathematical disability performed better with verbal plus visual or the materials-only conditions than the control group of children without a mathematical disability. Further dissemination of the data revealed those conditions that relied less on children's working memory were more successful for children with a mathematical disability.

Research Questions

The study examined the relationship between Resource Room instruction and mathematics achievement for selected students with learning disabilities in third through fifth grades. Specifically, the study examined the following research questions:

1. What is the relationship between duration of time spent in Resource Room instruction and mathematics achievement for third-, fourth-, and fifth-grade students with SLDs?

2. What is the relationship between the number of students concurrently in the Resource Room for instruction and mathematics achievement for third-, fourth-, and fifth- grade students with SLDs?

Chapter 3: Methodology

The design of this quantitative study was to examine the use of Resource Room instruction as an intervention in mathematics achievement. The target population was students with SLDs performing at least one level below grade-level expectations in mathematics. Students also received mathematics instruction in general education classrooms. All of the students had IEPs, as identified through IDEA, which included mathematics instruction in a Resource Room setting as a service. Wright and Wright (2012) emphasized the IEP should accurately state the following:

> A statement of the child's present level of academic achievement and functional performance, including . . . a statement of measureable annual goal, including academic and functional goals, designed to . . . meet the child's needs that result from the child's disability to enable the child to be involved in and make progress in the general education curriculum; and meet each of the child's other education needs that result from the child's disability . . . a description of how the child's progress toward the annual goal . . . will be measured and when periodic reports on the progress the child is making toward meeting the annual goals (such as through the use of quarterly or other periodic reports, concurring with the issuance of report cards) will be provided; a statement of the special education and related services and supplementary aids and services . . . to advance appropriately toward attaining the annual goals . . . and the projected date of the beginning of services and modifications . . . and the anticipated frequency, location, and duration of those services and modifications. (pp. 99-100)

Participants

The participants were students with SLDs in third, fourth, and fifth grades in a

Title 1 elementary school who had designated goals in IEPs for mathematics. The students were performing below the respective grade levels in mathematics, however, at varying degrees.

Groups were taught for 30 minutes; the IEP determined the number of minutes per day and the number of days per week. The students attended the group from 60 minutes a week (two sessions of 30 minutes each) through 120 minutes a week (four sessions of 30 minutes each).

Due to scheduling limitations (groups had to be held during times the students' classes were not at lunch or at an elective), there were two separate groups of students; therefore, ability and grade level were no considerations in determining which group students attended. Upon receipt of all necessary signed forms, a demographics chart was included identifying (for each student) Group 1 or Group 2, the grade level of the student, the number of minutes per day/week required by the IEP, the particular days of the week the student was expected to attend the group, and the total number of students designated to be in each group (see Appendix A).

Distribution of parent consent and student assent letters was to all students served for mathematics in the Resource Room by the researcher. The number of signed parent consent and student assent letters received determined the actual sample (i.e., number of participants, ages, grade levels, and ethnicities). At the time of this study, there were 27 students served in the two mathematics groups. Five school days following the first letters sent to participants and parents, the researcher sent a second letter to those who had not responded. Three school days following the second letter, the researcher made phone calls to those who had still not responded. This ensured the most participants possible.

The researcher used the targeted sample of participants to draw the convenience sampling method, a nonprobability method. According to Creswell (2012), nonprobability sampling includes “individuals because they are available, convenient, and represent some characteristic the investigator seeks to study” (p. 145). Further, convenience sampling selects participants because they are willing and available for a study. Creswell added that, although the researcher cannot say with confidence the individuals are representative of the population, the sample can provide useful information for answering questions and hypotheses.

Instruments

Each student had individual IEP measureable mathematics goals based on the student’s needs. The researcher utilized a teacher-made, progress-monitoring tool prepared for each student. The progress-monitoring tool included each annual goal for the student and 11 indicator blocks for each goal, one for each weekly assessment, and the last block to display a 10-week average. The IEP identified the definition of mastery of a goal, generally considered 80% proficiency or a success rate in eight out of 10 trials. Each indicator block had a date and success rate. An average for the 10 trials was identified; this coordinated with one assessment per week with an average of 10 weeks in each report card period. In some cases, mastery was 90% or 100%. These cases usually included goals that were in the student’s previous IEP and not mastered by the student but were within 10-20% of mastery; therefore, the goal was extended for another year and the level of mastery was increased.

Prior to the beginning of the study, each participant received an informal assessment for each specified mathematics goal identified in his or her IEP. Each participant’s achievement measured each specified goal. At the completion of the study, the identical assessments were readministered (to confirm test-retest reliability). According to Creswell (2012), reliability of an instrument means scores from that instrument are stable and consistent. Further, there are five available procedures to examine an instrument's reliability. The test-retest reliability procedure chosen by the researcher to ensure reliability of the instruments used, according to Creswell, "examines the extent to which scores from one sample are stable over time from one test administration to another" (p. 160). In this procedure, participants were administered one version of the instrument two times: for this study, prior to beginning the study, and again at the conclusion of the study.

Procedures

The researcher administered all assessments in the Resource Room. There was no additional time taken from mathematics instruction in the general education classroom in order to complete this study. The researcher used a random number to identify the students and used a generic description for the school (i.e., general characteristics and location). The researcher protected the anonymity of the students at all times. The researcher will keep all data, forms, and instruments utilized in the study in a locked cabinet in the researcher's classroom; information stored in the researcher's computer will be password protected. No other individual will have access to this information. In no way were students harmed by participation in the study.

Instruction was directly related to the mathematics goals indicated on the students' IEPs. The researcher providing the service documented attendance and time in the Resource Room, as well as the number of students in the Resource Room concurrently. This information was identified in a chart showing each student (by number); the day/date of the week; whether the student was supposed to attend that day;

if the student actually attended that day; if the student arrived on time and stayed for the duration of the group, and, if not, the number of minutes actually in attendance; and the total number of students being served during that time (see Appendix B).

Each participant in the study first received individualized informal assessments that related directly to each of the designated IEP Mathematics Goals. Within the Resource Room setting, and based on the identified schedule within the IEP, students received DI designed to teach the specific skills required. In addition, the students played games that related directly to the skills learned, as well as interacted with peers within the Resource Room. Goals were addressed in a logical sequence.

In DI, sometimes referred to as explicit instruction (Pool, Carter, Johnson, & Carter, 2012), instructions are explicitly and sequentially given for the skill to be learned. It identifies specifically what skills need to be learned and focuses on step-by-step procedures, instead of leaving the students to personal experiences (Al-Makahleh, 2011).

Archer and Hughes (2011) described explicit instruction as "a structured, systematic, and effective methodology for teaching academic skills . . . an unambiguous and direct approach to teaching that includes both instructional design and delivery procedures" (p. 1). Further, explicit instruction includes sequencing skills logically, breaking down complex skills into smaller steps, organized and focused lessons, step-by-step demonstrations, examples and nonexamples, guided and supported practice, a high level of student-teacher interaction, monitoring student performance closely, assisting students in organizing the information, and providing distributive (multiple opportunities over time) and cumulative (including previously learned and newly acquired skills) practice (Archer & Hughes, 2011).

Progress monitoring for each student, on each selected mathematical goal, was performed on a weekly basis through informal assessments and samples of student work. The researcher maintained a daily journal on the instruction of each student, along with anecdotal notes on each session.

Student progress monitoring, sometimes called curriculum-based measurement, identifies achievement goals the student must meet by the end of the year, and the teacher then measures the student's academic progress regularly (Safer & Fleischman, 2005). In addition, the teacher is able to compare the efficacy of different forms of instruction and design more effective, individualized instructional programs for problem learners (Stecker, 2007). Further, student progress monitoring has 30 years of research support, and teachers who use this method can build programs that are more effective and increase student achievement. According to Fuchs (2007), progress monitoring is not mastery measurement. In mastery measurement, the teacher determines the sequence of skills in an instructional hierarchy and then develops criterion-referenced tests for those skills. When teachers use progress monitoring to inform their instructional decisions, students achieve better (Fuchs, 2007).

Pool et al. (2012) added that motivators are an important component of DI. Students who are struggling in mathematics achievement have often met with failure. Incorporating tangible (such as stickers and prizes) and intangible (positive feedback and verbal praise) motivators helps students to gain confidence, leading to more motivation to persevere, increasing chances of success.

The researcher (i.e., the instructor) used a tangible reinforcement motivator within the Resource Room. Each student received a Student Sticker Chart and awarded a sticker for each visit to the Resource Room that met the standards posted (see Appendix C). The standards were simple: arrive on time (unless not in the student's control), participate appropriately in the instruction, and treat all with respect. Each student was given a goal based on the number of days assigned per week, designed to reach a total of a 2-week period (e.g., if a student was assigned to attend the group three times a week, then the total stickers needed would be six). Upon reaching the goal, the student was awarded a trip to the "treasure box" filled with small items: toys, puzzles, play jewelry, art supplies, and mechanical pencils. This should have been a powerful motivator. The instructor also had the flexibility to award extra stickers for any reason, such as helping another student or showing internal motivation not previously seen. On occasion, the instructor give out candy to the entire class for outstanding participation. The instructor utilized intangible reinforcements regularly: verbal praise, high-fives, a buzzer that sounded a silly noise, applause, a pat on the back, thumbs up, and so forth. All reinforcements, both tangible and intangible, were for participation and positive attempts at new learning, not for giving correct answers. This promoted student interest, as well as, student willingness to try mathematical concepts without fear of failure.

All information, including documents and student work samples, on the study are in a locked cabinet within the Resource Room, which also serves as the researcher's classroom. Documents and information stored in the researcher's computer are password protected. The study lasted 4 to 6 weeks based on the school calendar and the date of approval of the study.

Limitations

This study included a small sample of students conducted over a short period of time. Due to scheduling restrictions, a random sample could not be obtained; in addition, students could not be randomly assigned to groups. These are major limitations to generalizing the results to the overall population.

Another limitation for future research is the education and experience of the instructor/researcher. For this study, the researcher taught children with disabilities for more than 14 years, has a Master's Degree in Special Education, is a National Board Certified Teacher in Special Education, is a doctoral student with a major emphasis on special education, and formerly was a mathematics teacher. Future studies should be aware of differences in results that may occur due to variance in researcher education and experience.

A threat to external validity was the mathematics instruction the students received in general education classrooms, the amount of time instruction was received, the level of instruction received, and the experience of the general education teacher with teaching SWDs. The researcher had no control over these variables and, therefore, did not factor them into the study results.

The researcher found scant research on the mathematics achievement of SWDs. Further, the researcher was not able to locate other studies that documented Resource Room instruction as an intervention in mathematics achievement for SLDs based on the amount of time in the Resource Room, nor the number of students concurrently in the Resource Room. Therefore, comparisons could not be implied nor confirmed.

Chapter 4: Results

Participants in the study were students with SLDs in third, fourth, and fifth grades (*N* = 17) who were studied over a 6-week period to see if mathematical achievement increased utilizing the Resource Room as an intervention (the dependent variable [DV]). Achievement was measured utilizing teacher-created pre- and postassessments for each mathematics goal for each student. Two independent variables (IV-1, IV-2) were considered in connection with the resulting increase (or nonincrease/decrease) in academic achievement in mathematics: the number of minutes the student spent in the Resource Room and the number of students concurrently in the Resource Room during the time of instruction (see Appendix B).

The original plan for the study was to have two groups of participants. Prior to the inception of the study, the schedule was changed for two reasons: a part-time Resource Room teacher was hired and a number of fourth- and fifth-grade students were transferred to the new roster; this offered a time slot that could be established to accommodate additional students in third grade, thereby increasing the number of groups to three. This study separately assessed each participant, each group, and the total of all participants. The number of mathematics goals differed by student (ranging from one to five goals each) based on the actions of the IEP Committees (total number of goals, *N* = 36). Appendix D indicates the scores for pre- and postassessments for each goal for each student by group, as well as, for the total goals for all participants. The researcher conducted a Pearson product-moment correlation for each group with each IV and the DV. The resulting Pearson product-moment correlation coefficient (denoted by *r*) represented the linear relationship between an IV and a DV. Although *r* did not indicate a causal relationship, *r* does identify if there was a relationship between the two and the relative strength of that relationship. Further, the stronger the association of the two variables, the closer the Pearson correlation coefficient, *r*, would be to either +1 or -1, depending on whether the relationship was positive or negative. A value greater than 0 indicated a positive relationship, which meant that as the value of one variable increased, the value of the other variable increased. A value less than 0 indicated a negative relationship, which meant as the value of one variable increased, the value of the other variable decreased (Huck, 2012).

A Pearson product-moment correlation test, denoted as *p*, also revealed the significance of the correlation. In research, this is known as statistical significance. Statistical significance indicates how likely the results are "probably true" or could be due to chance. If the research showed a correlation was highly significant, that meant it was very probably true. In most research, the significance is determined to be significant at the .05 level, which means there is a 5% chance that the results are due to chance and a 95% chance that the results are true. A significance of .01 indicates there is a 1% chance that the results are due to chance and a 99% chance that the results are true.

The statistical significance numbers reveal how likely the same results would come from testing a larger population from which the sample was drawn. In this study, the numbers of participants in each group was small and chosen by convenience sampling, resulting in what could be sample bias further discussed in Chapter 5.

For each group, the researcher conducted a Pearson product-moment correlation between increased mathematics achievement, the DV, with the number of minutes in attendance in the Resource Room, an IV-1, and separately for increased mathematics achievement and the number of students in the room concurrently, the second IV-2, as shown in Table 1.

Table 1

Pearson Product-Moment Correlations by Group

Group	Pearson's *r*	Significance (2-tailed) (*p*)
Group 1 ($n = 4$)		
IV-1	(-).566	.434
IV-2	(-).007	.993
Group 2 ($n = 7$)		
IV-1	.651	.113
IV-2	(-).451	.310
Group 3 ($n = 6$)		
IV-1	.711	.113
IV-2	(-).700	.122
All participants ($N = 17$)		
IV-1	.633	.006
IV-2	(-).193	.458

Note. DV = dependent variable (increase/decrease of mathematical achievement; IV-1 = independent variable 1 (number of minutes in the Resource Room); IV-2 = independent variable 2 (number of students in the Resource Room concurrently).

As Table 1 indicates, the correlation coefficient, *r,* between the DV and IV-1 for

Group 1 was -.566, indicating a medium negative correlation (i.e., when one variable increased, the other decreased). However, $p = .434$ indicated that there was a 57.6% chance of the results being due to chance. For the DV and IV-2, $r = -.007$ and a significance of .993, again a negative correlation, albeit very small; $p = .993$ indicating the result had a 99.3% chance of being true. This result also indicated almost no correlation between the two variables for this group.

For Group 2, $r = .651$ with a significance of .113 for IV-1. This indicated a positive correlation, with a strong strength of association; $p = .113$ indicated there was an 88.7% chance the results were true. IV-2, $r = -.451$ with $p = .310$ indicated a negative relationship with a medium association; the significance indicated there was a 69.0% chance that the results were true.

Group 3, $r = .711$ with a $p = .113$ for IV-1 indicated a positive correlation, with a strong strength of association; the significance indicated there was an 88.7% chance the results were true. IV-2, $r = -.700$ with a p of .122 indicated a negative correlation, with a strong strength of association; almost the exact opposite of IV-1, with the significance ($p = .122$) indicating there was an 87.8% chance the results were true.

For all participants as a group, $r = .633$ with $p = .006$ for IV-1. This result indicated a positive correlation with a strong strength of association; the significance indicated there was a 99.4% chance the results were true. Further, this indicated the correlation was statistically significant at the .01 level. For IV-2, $r = -.193$, indicating a negative correlation with a small strength of association; $p = .458$ indicated there was an 54.2% chance the results were true.

The researcher also ran Pearson product-moment correlations for pre- and postassessments for the total number of goals for each group and for the total of all groups. Results indicated that for Group 1, *r* = .746, *p* = .05 (2-tailed), reflecting a significant difference at the .05 level for pre- to postassessments, as shown in Table 2.

Table 2

Correlations for Group 1 Between Preassessment and Postassessment of Goals

		Group 1 goals preassessment	Group 1 goals postassessment
Group 1 preassessment	Pearson correlation	1.000	.746*
	Sig. (2-tailed)		.021
	n	9	9
Group 1 postassessment	Pearson correlation	.746*	1.000
	Sig. (2-tailed)	.021	
	n	9	9

Note. Correlation was significant at the 0.05 level (2-tailed).

Table 2 identifies the results of the four students in Group 1, compiled as a group, for the pre- and postassessments of the total for all of the participant's goals (*n* = 9). The resulting *r* of .746 indicated a strong positive correlation with a statistical significant *p* = .021. Without identifying an independent variable other than the intervention itself (the use of the Resource Room for mathematics instruction), there was a 97.8% chance the results were true.

For Group 2, the same test revealed an *r* = .775 with *p* = .002 (see Table 3). This indicated a strong positive relationship for the intervention that was statistically significant at the .01 level, signaling a 99.8% chance the results were true.

Table 4 indicates the results for Group 3. With an *r* = .324 and a *p* = .259, the results indicated a weak correlation that was not statistically significant. Results showed the total number of goals for all three groups (*N* = 36), *r* = .620, *p* = .000. The results indicated a strong positive association between the pre- and postassessments and the intervention of utilization of the Resource Room for mathematics instruction. The significance of .000 indicated there was a 100% chance the results were true.

Table 3

Correlations for Group 2 Between Preassessment and Postassessment of Goals

		Group 2 goals preassessment	Group 2 goals postassessment
Group 2 preassessment	Pearson correlation	1.000	.775
	Sig. (2-tailed)		.002
	n	13	13
Group 2 postassessment	Pearson correlation	.775	1.000
	Sig. (2-tailed)	.002	
	n	13	13

Note. Correlation was significant at the .01 level.

Table 4

Correlations for Group 3 Between Preassessment and Postassessment of Goals

		Group 3 goals preassessment	Group 3 goals postassessment
Group 3 preassessment	Pearson correlation	1.000	.324
	Sig. (2-tailed)		.259
	n	14	14
Group 3 postassessment	Pearson correlation	.324	1
	Sig. (2-tailed)	.259	
	n	14	14

The total number of participants (*N* = 17) included a total number of goals of 36. Table 5 indicates the results for the three groups as one total.

Table 5

Correlations for All Participants' Goals Between Preassessment and Postassessment

		Group 3 goals preassessment	Group 3 goals postassessment
Group 3	Pearson correlation	1.000	.620
preassessment	Sig. (2-tailed)		.000
	n	36	36
Group 3	Pearson correlation	.620	1
postassessment	Sig. (2-tailed)	.000	
	n	36	36

Note. Correlation is significant at the .01 level.

Another test used in research to identify associations between variables is the *t* test. There are several different types of *t* tests; for this study, the appropriate *t* test was the paired-samples *t* test. This test is used when there is one sample and two variables. For this study, the test measured the mathematical achievement of students before and after an intervention. It measured whether the means of the two variables were equal or different and if the difference was statistically significant. In order to determine this, a null hypothesis was developed: H0: $\mu1 = \mu2$, that is, the mean of the preassessment is equal to the mean of the postassessment. The alternate hypothesis was H1: $\mu1 \neq \mu2$; the mean of the preassessment does not equal the mean of the postassessment. A statistically significant *t* test result is one in which a difference between the two groups is determined to be an "actual" difference. Three separate tables reflect the results of each paired-samples *t* test.

The researcher ran paired-samples *t* tests on each group for the preassessment and postassessment scores of each goal, and for the total of all participants, all goals. Results are in Tables 6 and 7.

Table 6

Results of t Tests for Each Group

Pair	Assessment	*M*	*N*	*SD*	Std. error mean
1	Group 1 postassessment	0.7511	9	0.25335	0.08445
	Group 1 preassessment	0.5256	9	0.32373	0.10791
2	Group 2 postassessment	0.2500	13	0.34339	0.09524
	Group 2 preassessment	0.1754	13	0.25039	0.06944
3	Group 3 postassessment	0.6379	14	0.35893	0.09593
	Group 3 preassessment	0.2671	14	0.27775	0.07423
4	All postassessment	0.5261	36	0.38637	0.06439
	All preassessment	0.2986	36	0.30559	0.05093

Note. These are the univariate descriptive statistics for each variable.

In Table 7, the mean is the average difference between the two variables, the standard deviation is the standard deviation of the difference scores, the standard error mean is the standard error (standard deviation) computing both the test statistic and the upper and lower bounds of the confidence interval, *t* is the paired *t* test statistic, *df* is the degrees of freedom for this test, and the *p* (2-tailed) is the *p*-value corresponding to the given test statistic *t*.

From the results shown in Table 7, Group 1 had a significant average difference between the preassessment and the postassessment: $t8 = 3.133$, $p < .05$. Group 2 did not have a significant average difference between assessments: $t12 = 1.236$, $p > .05$. Group 3 had significant average difference between assessments: $t13 = 3.688$, $p <.01$. The total of all participants also had a significant average difference between assessments: $t35 =$

4.398, $p < .01$.

Table 7

Paired-Samples Test

		Paired differences							
					95% CI				
Pair	Assessment	*M*	*SD*	SEM	Lower	Upper	*t*	*df*	*p*
1	Group 1 postassessment Group 1 preassessment	0.22556	0.21599	0.07200	0.05953	0.39158	3.133	8	0.014
2	Group 2 postassessment Group 2 preassessment	0.07462	0.21762	0.06036	-0.05689	0.20612	1.236	12	0.240
3	Group 3 postassessment Group 3 preassessment	0.37071	0.37610	0.10052	0.15356	0.58787	3.688	13	0.003
4	All postassessment All preassessment	0.22750	0.31037	0.05173	0.12249	0.33251	4.398	35	0.000

Note. Significance (*p*) is 2-tailed.

Chapter 5: Discussion

Included in this chapter are an interpretation of the results reported in Chapter 4, a discussion of the results in light of previous research as indicated in Chapter 2, the limitations of the study, and implications for the future as a result of this study. The conclusion will complete the totality of the research study.

Results of the Resource Room as an Intervention

The results of this study offer a unique contribution to the body of research on educating SWDs and mathematics achievement utilizing the intervention of Resource Room instruction. For the total number of participants, $N = 17$, a positive relationship between increased mathematics achievement and both the amount of time spent in the Resource Room and the number of students in the Resource Room concurrently were indicated at a significant level, $p < .01$. This reinforces previous research by Fuchs et al. (2014) that students with learning problems show significantly better outcomes in small groups or one-to-one instruction, and size of the group and duration of instruction are important factors to consider.

As seen in Appendix E, which identifies each participant's increased mathematics achievement on individual goals through pre- and postassessments, there were notable differences within each group and between groups. These differences can be traced back to questions from Vaughn et al. (2014), "Is the intervention provided for a sufficient duration and intensity to allow for success?" and "Is the intervention provided in groups that are small enough to maximize learning, provide adequate opportunities for students to respond with feedback, and allow teachers to individualize instruction to meet students' needs? (p. 91)"

Results of Research Question 1

Research question 1 asked if the amount of time a student spent in the Resource Room affected the student's achievement in mathematics, as indicated through the student's mathematics goals. Most participants who attended instruction regularly for the total time allotted had significant increases in mathematics achievement. Most participants who did not attend regularly or did not attend for the total time allotted had little to no increase and, in some cases actually decreased in mathematics achievement. Table 8 shows the total number of minutes each participant was scheduled for Resource Room instruction, as well as the number of minutes of actual attendance and the resulting increase/decrease/maintenance of mathematics achievement (for students with more than one math goal, the average of the results for all goals is displayed).

Results indicated that, with few exceptions, participants who attended Resource Room instruction on a regular basis showed an increase in mathematics achievement. The exceptions can be explained in several ways. Some students did not actively participate in the instruction; some students were performing at a lower level and the goals set for them were too high; students who had only one goal were able to concentrate on that goal so attendance was not as important a factor; and, of course, the nature of the student affected personal performance.

Results of Research Question 2

Research Question 2 asked if the number of students concurrently in the Resource Room during instruction affected the student's mathematical achievement. The number of students concurrently in the Resource Room during instruction had mixed effects on the resulting increase in mathematics achievement. Some of the results did not reflect the actual effect on particular students.

Table 8

Participant Minutes in Attendance and Effect on Mathematics Achievement (Goals)

Group number	Participant by number	Number of minutes scheduled	Number of minutes in attendance	Percentage attendance	Effect on mathematics achievement (%)
1	10	630	465	74	+17.5
1	1	630	525	86	+30.0
1	11	510	405	79	+14.0
1	2	630	235	37	+40.0
2	12	510	240	47	+12.0
2	3	540	380	70	+36.0
2	16	390	350	90	+35.0
2	4	450	75	17	0
2	13	480	60	13	0
2	5	510	215	42	-2.5
2	6	570	365	64	-15.0
3	7	540	495	92	+65.0
3	14	540	335	62	+7.5
3	8	540	490	91	+55.0
3	15	360	185	51	0
3	9	540	510	94	+20.0
3	17	540	530	98	+31.0

Note. Participants who had more than one mathematics goal had the results averaged for this table.

For example, Group 1, consisting of 3 fourth-grade students and 1 fifth-grade student, was a small group of four. The fifth-grade student was having difficulty accomplishing one particular goal. On one day, the fourth-grade students were on a field trip and the instructor/researcher was able to spend 30 minutes in a 1:1 teaching session with the fifth-grade student. By the end of the session, they accomplished the goal. In another example, in Group 3, consisting of 6 third-grade students (and one additional student in the group who was not a participant), there were two disruptor students, students who often disrupted the group with acting-out behavior. After 2 weeks of varied instruction on one common goal, the students were still inconsistent in accomplishing the goal. On one day, the two disruptors were absent, and the remaining five participants were actively engaged in learning. By the end of that 30-minute session, all five participants had accomplished the goal and maintained the knowledge throughout the study. Table 9 indicates the average number of students in attendance for each participant and the resulting effect on mathematics achievement.

The two highest averages of students in attendance were 6.6 and 6.7 students; the resulting effects on mathematics achievement were 0% and -2.5%, respectively. However, other results were not so indicative of achievement. Certainly, this is only one factor and there need to be more studies conducted in order to determine actual effects on performance.

Student/Instruction Disparity

Gagne (1985) posited that each different type of learning required different types of instruction. Taken a step further, each student comes with diverse background knowledge and abilities. The participants in this study were all at least one level below the same age/grade peers in mathematics; some students were English speakers of other languages, some students had parents who did not speak English, and some students had not been identified as SLD until fourth grade while others had been receiving special education services for several years.

Table 9

Participants and Average Number of Students Concurrently in the Resource Room and Mathematics Achievement

Group number	Participant by number	Average number of students in attendance	Effect on mathematics achievement (%)
1	10	3.4	+17.5
1	1	3.3	+30.0
1	11	3.5	+14.0
1	2	3.5	+40.0
2	12	5.2	+12.0
2	3	4.6	+36.0
2	16	4.6	+35.0
2	4	4.9	0
2	13	4.0	0
2	5	6.7	-2.5
2	6	4.6	-15.0
3	7	5.5	+65.0
3	14	5.9	+7.5
3	8	5.5	+55.0
3	15	6.6	0
3	9	5.4	+20.0
3	17	5.7	+31.0

Note. Participants who had more than one mathematics goal had the results averaged for this table.

The intent of instruction in the Resource Room was to build some of the foundation lacking in the students' current abilities. As Morgan et al. (2013) reflected, SWDs might have difficulty accessing the content standard at grade level because they lack the foundation skills needed to interact with the material at a higher level of cognitive complexity.

All of the participants also received mathematics instruction within general education classrooms. However, there appeared to be significant disparity between general education teachers and the level of instruction provided to the students. Cosier, Causton-Theoharis, and Theoharis (2013) proposed that the use of practices related to successful inclusion for SWDs, such as differentiating instruction and other instructional strategies like universal design for learning and peer modeling, also affected students' academic achievement. According to McKenna et al. (2014), although teachers must use EBPs for improving performance for all students, variability across teachers in the implementation of these practices may limit or negate potential benefits. Further, McKenna et al. argued that there are factors that may negatively affect teachers' use of EBPs, such as the complexity of the intervention or practice, access to materials and resources necessary to implement the program, differences between the way practitioners perceive the intervention to be effective and its actual effectiveness, and the characteristics of the person delivering the intervention. In addition, due to the current demands on educators' time and other school-based issues, many of the teachers will require ongoing support to implement the interventions with fidelity.

Participants were not given standardized assessments nor were they given identical assessments or identical instruction. Each student was given a teacher-made pre- and postassessment for each goal included on individual IEPs. Therefore, students had varying numbers of goals, and measurement of mathematics achievement was strictly on the assessment of those goals. Previous researchers (Al-Makahleh, 2011; Mononen & Aunio, 2014; Swanson et al., 2014) focused on a specific form of intervention rather than individualized goals and achievement of those goals.

Limitations

This study faced many obstacles that may have affected the reliability and validity of the results. The most important limitation was that there was no control group. Due to the circumstances surrounding the study, it was not possible to establish both a control and an experimental group. In addition, the participants were not from a random sample. The sample was convenience sampling. In this study, the general school schedule (i.e., lunch and elective schedules) was set without regard to the scheduling of Resource Room instruction. Schedules for lunch or elective times were not consistent. Therefore, the Resource Room instructor did not have the ability to group students in any fashion other than the one time during the day they were available.

Scheduling often led to conflict between the general education teacher and the Resource Room teacher. By law, the general education teachers had to send students to the Resource Room for instruction if the IEP required it. However, due to the classroom schedule, this often meant the students were missing at least part of the general education math instruction or were consistently missing other instruction, such as language arts or science. Some of the teachers resisted the interruption and often did not send the students. Two of the fifth-grade teachers were team-teaching for the first time during this school year; one teacher taught reading and writing, the other taught math and science. Again, based on the school schedule, there was only one time slot available for those teachers' students to attend Resource Room instruction. It was also the time that the students switched classes (from one teacher to the other) and, according to the general education teachers, that time could not be adjusted. Therefore, all of the students attending from those teachers arrived at least 10 minutes late daily, if at all, thereby losing instructional time, as well as disrupting the group already in session. Although the point of view of the general educators is well placed, the administration of the school is ultimately responsible for creating a schedule that accommodates SWDs and their educational needs. Previous researchers (Bryant et al., 2014; McLeskey & Waldron, 2011; Swanson et al., 2014) studied instructional time in a Resource Room/pullout situation, but none indicated scheduling as an influence or a conflict.

The sample size was small and may not be representative of the overall population of SWDs. In addition, the length of the study, 6 weeks, was relatively short, thereby not allowing additional time to make up for field trips, and so forth. The study during the final weeks of the school year; many general education teachers reduced the amount of time spent on instructional activities, fifth-grade teachers in particular. Students became fixated on graduation, entrance to middle school, and special end of year activities.

Implications for Future Research

Educational researchers should look to determining the effectiveness of the interventions used in the education of SWDs, especially in the area of mathematics. There is a plethora of research on reading, scant research on math. Both reliability and validity of interventions, and the teaching practices for SWDs within the general education classrooms, require in-depth study. Schulte and Stevens (2015) described the results of the Condition of Education as indicating a full standard deviation between SWDs and SWODs in mathematics. This has been an ongoing, persistent, situation reflecting low achievement in academic proficiency for SWDs and, in particular, students with LDs (McLeskey et al., 2010).

More studies are necessary to determine if the use of the Resource Room increases student achievement and what factors are significant toward that achievement. It is also necessary for researchers to study the effective practices of general educators when teaching SWDs. As placement of more and more students are in general education, teachers become even more responsible for differentiating instruction and monitoring the progress of students.

An additional factor to consider for the future is the level of importance given to the success of SWDs academically by the administration of the schools and the school districts. Unless there is a significant change in the direct involvement of these stakeholders in the future success of SWDs, as well as a corresponding increase in funding and staffing, our SWDs are in serious jeopardy. The resulting effect on society will be unquestionably damaging.

Conclusion

The researcher conducted this study in order to learn the effects of particular interventions for SWDs and mathematics achievement. The study of mathematics in general, and for SWD in particular, has received far less attention in educational research than reading. However, there has been documentation on the importance of mathematics in daily life with no resulting effect on the teaching of mathematics to SWDs. There has also been documentation on the persistent low achievement of these students with no resulting effects on legislation, regulations, or funding. Instead, placement of in general education classes without the appropriate aids and services required by IDEIA is on the increase. Although acknowledging that SWDs are performing below level as indicated through IEPs, SWDs continue to be assessed at the same level as SWODs.

It is past time for educational researchers, legislators, and school districts to further study the mathematics education afforded SWDs. Teachers are held accountable for student scores on standardized assessments and paid accordingly. It is human nature for said teachers to spend the most time with the students believed to make the most gains. There must be provision for effective interventions for SWDs in order to close the achievement gap, which has been documented in the Condition of Education (USDOE, 2015) as being at least one full standard deviation below the same age/grade peers. The time is now for action.

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Appendix A

Participant Demographics

Ethnicity Key: AA=African American; H= Hispanic; C = Caucasian

PARTICIPANT DEMOGRAPHICS					
STUDENT	NO. OF GOALS	GENDER	ETHNICITY	GRADE LEVEL	SCHEDULED NO. OF MINUTES PER WEEK
GROUP 1					
10	2	M	H	4	120
1	1	F	AA	4	120
11	4	M	AA	4	90
2	2	F	AA	5	120
TOTAL: 4	9	2F,2M	1H,3AA	4-3;5-1	
GROUP 2					
12	2	M	AA	5	90
3	2	F	H	5	90
16	1	M	C	5	120
4	2	M	C	5	60
13	2	F	AA	5	120
5	2	M	H	5	90
6	2	M	AA	5	120
TOTAL: 7	13	2F,5M	2H,3AA,2C	7-5	
GROUP 3					
7	2	M	H	3	120
14	2	F	H	3	120
8	5	F	H	3	120
15	1	M	C	3	60
9	2	F	AA	3	120

17	2	F	C	3	120
TOTAL: 6	14	4F,2M	3H,1AA,2C	6-3	-

Appendix B

Student Attendance Records

STUDENT ATTENDANCE RECORD

P. 1

GROUP 1 STUDENT ID	DATE: 4/25/16	DATE: 4/26/16	DATE: 4/27/16	DATE: 4/28/16	DATE: 5/2/16	DATE: 5/3/16	DATE: 5/4/16	DATE: 5/5/16	DATE: 5/9/16	DATE: 5/10/16	DATE: 5/11/16	DATE: 5/12/16
10	P	C	P	P	P	P	FT	P	P	N/S	CC	P
1	P	P	P	P	P	P	FT	P	P	P	CC	P
11	P	P	N/A	P	N/A	P	FT	P	N/A	P	CC	P
2	N/S	N/S	P	P	N/S	P	P	N/S	P	N/S	CC	N/S
Total Students Scheduled	4	5	3	5	3	5	4	5	3	5	0	5
Total Students in Attendance	3	2	3	4	2	5	1	3	3	3	0	4

GROUP 2 STUDENT ID	DATE: 4/25/16	DATE: 4/26/16	DATE: 4/27/16	DATE: 4/28/16	DATE: 5/2/16	DATE: 5/3/16	DATE: 5/4/16	DATE: 5/5/16	DATE: 5/9/16	DATE: 5/10/16	DATE: 5/11/16	DATE: 5/12/16
7412	-15	N/A	N/S	N/S	P	P(N/A)	-10	-15	-10	N/A	CC	P
3	N/S	N/A	P	P	N/S	P(N/A)	N/S	N/S	P	N/A	CC	P
16	P	P	P	P	N/S	P	P	P	-10	CC	CC	P
4	N/S	N/A	P	N/A	P	N/A	-5	N/A	-10	N/A	CC	N/A
13	N/S	N/S	N/S	P	N/S	N/S	N/S	N/S	N/S	CC	CC	N/S
5	N/S	N/S	N/S	N/A	N/S	P	N/S	P-15 (N/A)	N/S	CC	CC	N/A
6	N/S	P	P	P	N/S	P	P	-15	P	CC	CC	P

Total Students Scheduled	9	7	9	8	9	7	9	8	9	0	0	8
Total Students in Attendance	4	3	4	4	2	8	5	5	6	0	0	3

STUDENT ATTENDANCE RECORD

GROUP 3 P. 1

STUDENT ID	DATE: 4/25/16	DATE: 4/26/16	DATE: 4/27/16	DATE: 4/28/16	DATE: 5/2/16	DATE: 5/3/16	DATE: 5/4/16	DATE: 5/5/16	DATE: 5/9/16	DATE: 5/10/16	DATE: 5/11/16	DATE: 5/12/16
7	N/S	P	P	P	P	P	CC	P	P	P	CC	P
14	-10	-5	P	P	P	-5	CC	P	P	N/S	CC	P
8	-5	P	P	P	P	P	CC	N/S	-15	P	CC	P
15	N/A	N/S	N/A	P	N/A	-20	N/A	P	P (N/A)	N/S	N/A	P
9	-10	P	P	P	P	-15	CC	P	P	P	CC	P
17	-10	P	P	P	P	P	CC	P	P	P	CC	P
Total Students Scheduled	6	7	6	7	6	7	0	7	6	7	0	7
Total Students in Attendance	4	5	5	7	6	7	0	6	7	5	0	7

KEY: CC= Class Cancelled

P=Present/on time N/A= Student not scheduled for that day FT= Field Trip C=Clinic

N/S= Student did not attend; reason not known -5 ex= Number of minutes student was late arriving

GROUP 1

STUDENT ID	DATE: 5/16/16	DATE: 5/17/16	DATE: 5/18/16	DATE: 5/19/16	DATE: 5/23/16	DATE: 5/24/16	DATE: 5/25/16	DATE: 5/26/16	DATE: 5/31/16	DATE: 6/1/2016	DATE: 6/2/2016
10	P	P	CC	P	-5	N/S	-10	P	P	FT	P
1	P	P	CC	P	-5	N/S	-10	P	P	FT	P
11	N/A	P	CC	P	-5	N/S	-10	P	P	FT	P
2	N/S	N/S	CC	N/S	P	N/S	P	-5	N/S	N/S	N/S
Total Students Scheduled	3	5	0	5	4	5	4	5	5	4	5
Total Students in Attendance	2	4	0	3	4	0	4	4	3	0	3

GROUP 2

STUDENT ID	DATE: 5/16/16	DATE: 5/17/16	DATE: 5/18/16	DATE: 5/19/16	DATE: 5/23/16	DATE: 5/24/16	DATE: 5/25/16	DATE: 5/26/16	DATE: 5/31/16	DATE: 6/1/2016	DATE: 6/2/2016
12	CC	N/A	CC	N/S	-10	-10	-10	N/S	N/S	-10	N/S
3	CC	N/A	CC	P	P	N/A	P	P	P (N/A)	P	-10
16	CC	N/S	CC	P	P	P	P	P	P	P	P
4	CC	N/A	CC	N/A	-10	N/A	-10	N/A	N/A	-10	N/A
13	CC	N/S	CC	N/S	N/S	N/S	N/S	N/S	N/S	N/S	N/S
5	CC	N/S	CC	N/A	N/S	-10	N/S	N/A	N/S	N/S	N/A
6	CC	N/S	CC	P	P	P	N/S	P	P	-10	P
Total Students Scheduled	0	7	0	8	10	8	10	8	8	10	8

Total Students in Attendance	0	0	0	4	6	7	6	3	3	5	3

STUDENT ATTENDANCE RECORD P. 2

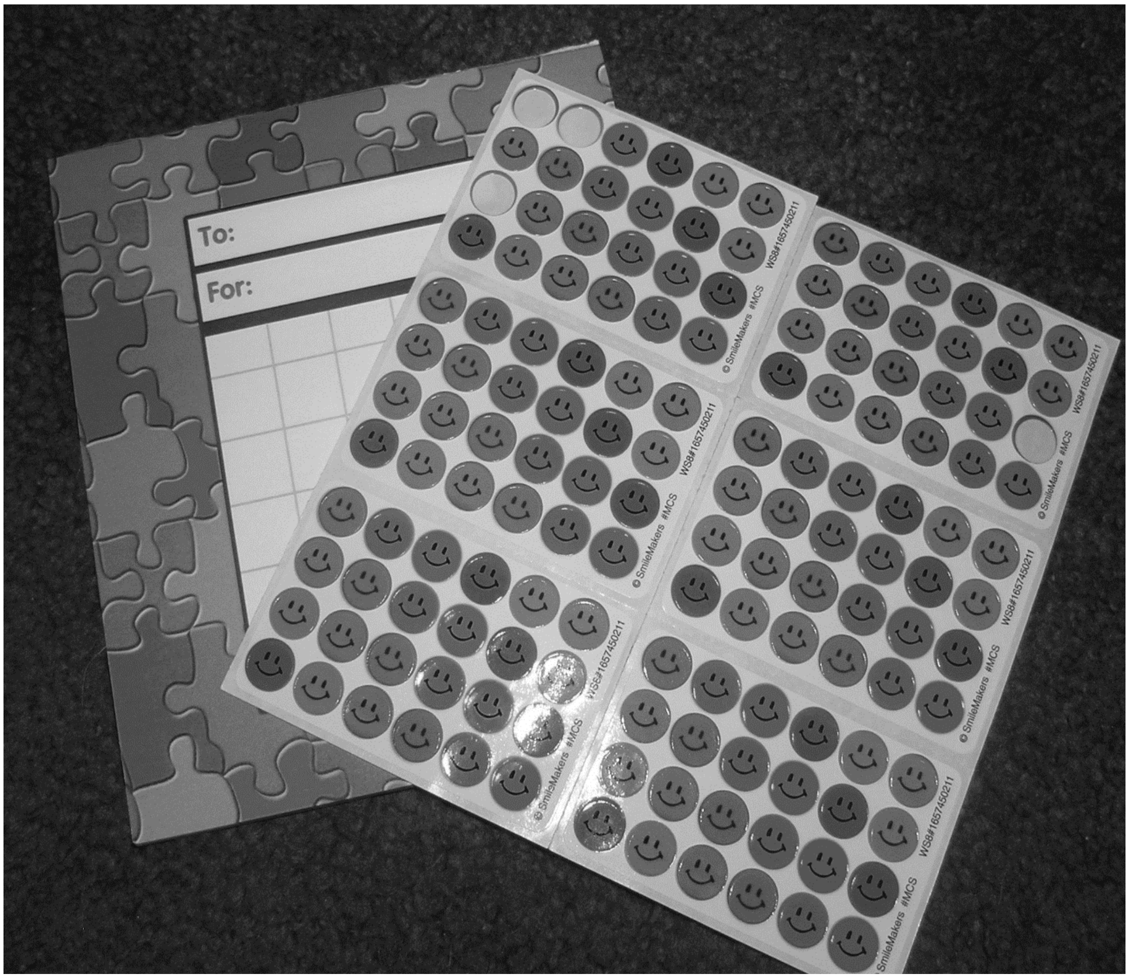
GROUP 3

STUDENT ID	DATE: 5/16/16	DATE: 5/17/16	DATE: 5/18/16	DATE: 5/19/16	DATE: 5/23/16	DATE: 5/24/16	DATE: 5/25/16	DATE: 5/26/16	DATE: 5/31/16	DATE: 6/1/2016	DATE: 6/2/2016
7	CC	P	CC	-10	P	-5	P	P	CC	P	P
14	CC	-5	CC	N/S	P	N/S	N/S	N/S	CC	N/S	P
8	CC	P	CC	P	P	P	P	P	CC	P	P
15	N/A	-5	N/A	N/S	N/A	N/S	N/A	N/S	CC	N/A	P
9	CC	P	CC	P	P	-5	P	P	CC	P	P
17	CC	P	CC	N/S	P	N/S	P	P	CC	P	P
Total Students Scheduled	0	7	0	7	6	7	6	7	0	6	7
Total Students in Attendance	0	6	0	4	6	3	5	5	0	4	6

Appendix C

Student Sticker Chart

Student Sticker Chart



Appendix D

Pre- and Postassessment by Goal

GRP1 PRE	GRP 2 POST	GRP 1 PRE	GRP 2 POST	GRP 3 PRE	GRP 3 POST	ALL- PRE	ALL-POST
80	92	13	15	0	100	0	100
27	50	28	50	20	50	20	50
0	30	0	60	10	20	10	20
33	55	87	100	30	35	30	35
72	90	40	75	80	100	80	100
80	96	10	10	76	100	76	100
96	96	0	0	50	78	50	78
25	100	0	0	0	100	0	100
60	67	0	0	0	100	0	100
		20	15	40	40	40	40
		0	0	0	30	0	30
		0	0	0	10	0	10
		30	0	38	100	38	100
				30	30	30	30
						80	92
						27	50
						0	30
						33	55
						72	90
						80	96
						96	96
						25	100
						60	67
						13	15
						28	50
						0	60
						87	100
						40	75
						10	10
						0	0
						0	0
						0	0
						20	15
						0	0

						0	0
						30	0

Appendix E

Statistical Results of Groups and Total Number of Participants

STATISTICAL RESULTS BY GROUP AND TOTAL PARTICIPANTS

GROUP 1 : Increased Achievement and Number of Minutes: T-Test: Paired Samples

PAIRED SAMPLES STATISTICS

	Mean	*N*	Std. Deviation	Std. Error Mean
INC. ACHIEV.	25.75	4	12.547	6.27
NO. OF MINS.	407.5	4	125	62.5

PAIRED SAMPLES CORRELATIONS

INC. ACHIEV.	N	Correlation	Sig.
NO. OF MINS.	4	-.566	.434

PAIRED SAMPLES TEST- Paired Differences

INC. ACHIEV.	Mean	Std. Deviation	St. Error Mean	95% Confidence Interval of the Lower	95% Confidence Interval of the Upper	t	df	Sig. (2-tailed)
NO. OF MINS.	-381.75	132.50	66.25	-592.59	-170.91	-5.76	3	.010

GROUP 1 : Increased Achievement and Number of Students: T-Test: Paired Samples

PAIRED SAMPLES STATISTICS

	Mean	*N*	Std. Deviation	Std. Error Mean
INC. ACHIEV.	25.75	4	12.547	6.27
NO. OF STDs.	3.43	4	.096	.048

PAIRED SAMPLES CORRELATIONS

INC. ACHIEV. NO. OF STDs.	N	Correlation	Sig.
	4	-.007	.993

PAIRED SAMPLES TEST- Paired Differences

	Mean	Std. Deviation	St. Error Mean	95% Confidence Interval of the Lower	95% Confidence Interval of the Upper	t	df	Sig. (2-tailed)
INC. ACHIEV. NO. OF STDs.	22.33	12.55	6.27	2.359	42.291	3.59	3	.038

GROUP 2 : Increased Achievement and Number of Minutes: T-Test: Paired Samples

PAIRED SAMPLES STATISTICS

	Mean	*N*	Std. Deviation	Std. Error Mean
INC. ACHIEV.	9.43	7	19.622	7.42
NO. OF MINS	240.71	7	133.90	50.61

PAIRED SAMPLES CORRELATIONS

INC. ACHIEV. NO. OF MINS.	N	Correlation	Sig.
	7	.651	.113

PAIRED SAMPLES TEST- Paired Differences

INC. ACHIEV.	Mean	Std. Deviation	St. Error Mean	95% Confidence Interval of the Lower	95% Confidence Interval of the Upper	t	df	Sig. (2-tailed)

NO. OF MINS.	-231.29	122.035	46.13	-344.150	-118.421	-5.014	6	.002

GROUP 2 : Increased Achievement and Number of Students: T-Test: Paired Samples

PAIRED SAMPLES STATISTICS

	Mean	*N*	Std. Deviation	Std. Error Mean
INC. ACHIEV.	9.429	7	19.62	7.412
NO. OF STDs.	4.943	7	.856	.324

PAIRED SAMPLES CORRELATIONS

	N	Correlation	Sig.
INC. ACHIEV. NO. OF STDs.	7	-.451	.310

PAIRED SAMPLES TEST- Paired Differences

	Mean	Std. Deviation	St. Error Mean	95% Confidence Interval of the Lower	95% Confidence Interval of the Upper	t	df	Sig. (2-tailed)
INC. ACHIEV.	4.486	20.023	7.57	-14.03	23.00	.593	6	.575

GROUP 3 : Increased Achievement and Number of Minutes: T-Test: Paired Samples

PAIRED SAMPLES STATISTICS

	Mean	*N*	Std. Deviation	Std. Error Mean
INC. ACHIEV.	29.65	6	25.794	10.53
NO. OF MINS	424.167	6	136.433	55.699

PAIRED SAMPLES CORRELATIONS

INC. ACHIEV.	N	Correlation	Sig.
NO. OF MINS.	6	.711	.113

PAIRED SAMPLES TEST- Paired Differences

INC. ACHIEV.	Mean	Std. Deviation	St. Error Mean	95% Confidence Interval of the Lower	95% Confidence Interval of the Upper	t	df	Sig. (2-tailed)
NO. OF MINS.	-394.52	119.47	48.77	-519.896	269.137	- 8.089	5	.000

GROUP 3 : Increased Achievement and Number of Students: T-Test: Paired Samples

PAIRED SAMPLES STATISTICS

	Mean	*N*	Std. Deviation	Std. Error Mean
INC. ACHIEV.	29.65	6	25.794	10.53
NO. OF STDs.	5.77	6	.446	.182

PAIRED SAMPLES CORRELATIONS

INC. ACHIEV.	N	Correlation	Sig.
NO. OF STDs.	6	-.700	.122

PAIRED SAMPLES TEST- Paired Differences

INC. ACHIEV.	Mean	Std. Deviation	St. Error Mean	95% Confidence Interval of the Lower	95% Confidence Interval of the Upper	t	df	Sig. (2-tailed)
NO. OF STDs.	23.88	26.109	10.66	-3.516	51.283	2.241	5	.075

TOTAL PARTICIPANTS : Increased Achievement and Number of Minutes: T-Test: Paired Samples

PAIRED SAMPLES STATISTICS

	Mean	*N*	Std. Deviation	Std. Error Mean
INC. ACHIEV.	20.406	17	21.766	5.279
NO. OF MINS	344.706	17	153.475	37.223

PAIRED SAMPLES CORRELATIONS

INC. ACHIEV.	N	Correlation	Sig.
NO. OF MINS.	17	.633	.006

PAIRED SAMPLES TEST- Paired Differences

INC. ACHIEV.	Mean	Std. Deviation	St. Error Mean	95% Confidence Interval of the Lower	95% Confidence Interval of the Upper	t	df	Sig. (2-tailed)
NO. OF MINS.	-324.300	140.700	34.12	-396.641	-251.959	-9.503	16	.000

TOTAL PARTICIPANTS : Increased Achievement and Number of Students: T-Test: Paired Samples

PAIRED SAMPLES STATISTICS

	Mean	*N*	Std. Deviation	Std. Error Mean
INC. ACHIEV.	20.406	17	21.766	5.279
NO. OF STDs.	4.877	17	1.079	.262

PAIRED SAMPLES CORRELATIONS

INC. ACHIEV.	N	Correlation	Sig.
NO. OF STDs.	17	-.193	.458

PAIRED SAMPLES TEST- Paired Differences

INC. ACHIEV.	Mean	Std. Deviation	St. Error Mean	95% Confidence Interval of the Lower	95% Confidence Interval of the Upper	t	df	Sig. (2-tailed)
NO. OF STDs.	15.529	21.999	5.334	4.219	26.840	2.911	16	.010