10-26-2016

Using Culturally Responsive Teaching with Culturally and Linguistically Diverse Students with Specific Learning Disabilities to Increase Performance in Algebra I

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DOI: 10.25148/etd.FIDC001188

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USING CULTURALLY RESPONSIVE TEACHING WITH CULTURALLY AND LINGUISTICALLY DIVERSE STUDENTS WITH SPECIFIC LEARNING DISABILITIES TO INCREASE PERFORMANCE IN ALGEBRA I

A dissertation submitted in partial fulfillment of the

requirements for the degree of

DOCTOR OF EDUCATION

in

EXCEPTIONAL STUDENT EDUCATION

by

Lorena R. Munoz

2016

To: Dean Michael Heithaus
College of Arts, Sciences, and Education

This dissertation, written by Lorena R. Munoz, and entitled Using Culturally Responsive Teaching with Culturally and Linguistically Diverse Students with Specific Learning Disabilities to Increase Performance in Algebra I, having been approved in respect to style and intellectual content, is referred to you for judgment.

We have read this dissertation and recommend that it be approved.

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Date of Defense: October 26, 2016

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DEDICATION

This dissertation is dedicated to my daughters, Kristen and Andrea, and my Gordito, Alex. Throughout this process, you have shown me your love, your unconditional support, your care and most importantly your unselfish ways. To my children, I hope that you always believe that hard work will always be compensated; and to remember to always believe in yourself and to follow your dreams with all your might.

ACKNOWLEDGMENTS

This dissertation could not have been completed without the continuous support and encouragement of my family. Throughout this process, I have learned that you are the motor that drives me to work countless hours at night just to make the time to spend it with you and not miss out our family time. Alex, thank you for your understating and for pick up the slack, for always being there for our beautiful girls and me. I will forever be thankful for your wonderful attentiveness, your super dad skills, your amazing cooking, and that cup of coffee at the perfect time.

I want to thank my major professor, Dr. Elizabeth Cramer for her dedication, professionalism, inspiration, and for believing in me. You have presented me with amazing opportunities to grow as professional and I will always remember them. I want to express a special thank you to all my committee members for your support, your time, and your effort: Dr. Linda Blanton, Dr. Barbara King, Dr. Haiying Long, and Dr. Mary Little.

I am grateful to be part of FIU and more so of project EDUCATE and to have received the support from the rest of the cohort members. I have enjoyed your company and friendship throughout the last five years. I want to thank my partner in crime and in midnight writing sessions, Cindy. You are the only person I can text at the wee hours of the night and get a reply. You hold a special place in my heart and I will always treasure your sincere friendship.

There are so many more FIU members who I have had the opportunity to meet and learn from. Thank you to Dr. Isadore Newman and Dr. Linda Bliss for guiding me throughout the different stages of this dissertation.

ABSTRACT OF THE DISSERTATION

USING CULTURALLY RESPONSIVE TEACHING WITH CULTURALLY AND LINGUISTICALLY DIVERSE STUDENTS WITH SPECIFIC LEARNING DISABILITIES TO INCREASE PERFORMANCE IN ALGEBRA I

by

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As the United States (U.S.) population continues to change and become racially/ethnically, culturally, linguistically, and economically diverse, so does the population in public schools (Institute of Education Sciences, 2010). Additionally, the number of culturally and linguistically diverse (CLD) students has been overrepresented in the subgroup of students with learning disabilities (SLD) (Artiles & Ortiz, 2002; Kalynpur & Harry, 2012; Klingner & Harry, 2014). Therefore, there is a need to adapt the curriculum and pedagogy to teach the growing number of diverse students in public schools. The results of national assessments show that students of color have lagged behind their White counterparts in mathematics achievement over the years (Cortes, Goodman, & Nomi, 2013). Despite the push to remediate this problem, teachers continue to use ineffective teacher-led practices and the achievement gap persists across public schools (Williams, 2011).

The use of cultural responsive teaching (CRT) among CLD students is promising (Santamaria, 2009). However, there is need to investigate the use of these practices in Algebra I courses with CLD students with SLD.

The present 17-week pre-post study compared student achievement in Algebra I courses between two groups of CLD students with SLD (N=63). These groups were (a) 31 students who received CRT (treatment group) by teachers who received CRT training and (b) 32 students who received instruction by teachers who did not receive CRT training (control group). There are significant differences between the treatment and the control group on the CLD students with SLD Algebra I Mid-Year Assessment (MYA) and the students' Mathematics Self-Efficacy scores (MSES). The teachers' level of cultural consciousness had an insignificant covariance on the Algebra I MYA, yet the teachers' observations and their cultural responsive self-assessment had a direct effect on the Algebra I MYA. Additionally, there was not significant interaction between MSES and TCS on the students' Algebra I MYA. The results of the study suggest that the use of CRT is a promising practice to improve CLD students' with SLD Algebra I achievement and perhaps close the math achievement gap.

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ABBREVIATIONS AND ACRONYMS

CLD	Culturally and Linguistically Diverse
CRAS	Culturally Responsive Teaching Guide and Self-Assessment for Educators
CRT	Cultural Responsive Teaching
EOC	End of Course Exam
MSES	Mathematics Self-Efficacy Survey
MYA	Mid-Year Assessment
SLD	Specific Learning Disabilities
TCS	Total Cultural Consciousness Score
TOB	Culturally Responsive Mentoring and Coaching Tool Part 2

CHAPTER I

INTRODUCTION

A great concern exists regarding the standing of the United States (U.S.) as an international leader because U.S. students are not excelling in mathematics (National Mathematics Advisory Panel, 2008). Despite efforts to increase proficiency in mathematics, two large-scale international studies (i.e., the Trends in International Mathematics and Science Study [TIMSS] and the Program for International Student Assessment [PISA]) indicated that the students in the U.S. score below their international counterparts (Gonzales et al., 2008). The concern among educators is pressing as more than half the students in middle schools across the U.S. are not proficient in mathematics. According to the National Center for Educational Statistics, only 33% in 2015 of eighth-grade students were working at or above grade level in mathematics (NCES, 2016). In addition, many culturally and linguistically diverse (CLD) students are performing significantly below their White counterparts in mathematics (Milner, 2013).

The population of the United States (U.S.) population has changed and has become racially/ethnically, culturally, linguistically, and economically diverse; therefore, the population in public schools has changed to mirror these changes (Institute of Education Sciences, 2010). Furthermore, the number of culturally and linguistically diverse (CLD) students has been overrepresented in the subgroup of students with learning disabilities (SLD) (Artiles & Ortiz, 2002; Kalynpur & Harry, 2012; Klingner & Harry, 2014). According to the National

Education Association (NEA, 2002), the subgroups that experience achievement gaps in the U.S. public school students are (a) Black/African-American and Brown/Latino/Hispanic students, (b) English language learners (ELLs), (c) students with disabilities, and (d) students from families with a low social economic status (SES). As part of Every Student Succeeds Act (ESSA) of 2015, states are to report and monitor the academic performance of these subgroups. According to the results on the National Assessment of Educational Progress (NAEP) for eighth-grade students in mathematics the achievement gap score between Black-White students is 30 points, Hispanic-White is 22 points and students with disabilities-without disabilities is 42 points (NAEP, 2013). In Florida, the educational disparities of these subgroups are illustrated by the results of the 2013 NAEP for the eighth-grade mathematics test. According to the National Center for Educational Statistics (NCES, 2013), White, Black, and Hispanic mathematics achievement long trend assessment scores have increased for eighth-grade students; however, the Black-White achievement score gap in mathematics for public school students in eighth-grade was 27 points and the Hispanic-White achievement score gap was 17 points (NAEP, 2013). In addition to performance in standardized testing, the gap that occurs in graduation rates and placement in advanced courses should also be considered as closing these gaps can also decrease the differences between CLD students and White students in mathematics achievement (Milner, 2013). As the population in American schools continues to become increasingly diverse, teachers need to

modify their teaching practices accordingly to support CLD students with disabilities' academic achievement. One solution that has been supported in the literature to close this achievement gap is culturally responsive teaching (CRT; Santamaria, 2009).

Culturally Responsive Teaching as a Theoretical Framework

In 2005, the National Council of Teachers of Mathematics mandated that "… all students need the opportunity to learn challenging mathematics from a well-qualified teacher who will make connections to the background, needs, and cultures of all learners" (p. 1). The present study explores the concept of culturally responsive teaching (Gay, 2000, 2010, 2013) as it provides a practical and powerful theoretical framework to explore practices in Algebra I classrooms that promote equity and access through mathematical knowledge (Moses & Cobb, 2001). Cultural responsive teaching (CRT) incorporates building on students' cultural knowledge and strengths, merging student-centered instructional methods that are appropriate for different cultural learning preferences (Utley, Obiakor, & Bakken, 2011). In the context of K-12 school, culture plays a central role in the learning process, as it is part of the curriculum development, instruction design, interaction, and assessment. Culturally responsive teaching is grounded in Vygotsky's sociocultural theory, which explains how culture is a factor in the learning process. The Vygotsky's theory defines learning as gathering knowledge to be used later for thinking, and it also assumes that the development of a child cannot be isolated from the surrounding

environment (Taylor & Sobel, 2011). Students bring to the classroom their own knowledge and understating of the world around them as they see it through their own cultural lens. However, as they enter the school setting, many times these students are asked to leave their own cultural identity behind and to assimilate into the school culture, which is often the mainstream culture (Sleeter, 2001). Therefore, children who are not from the mainstream culture lack the learning opportunities to participate in rich learning experiences that are responsive to their own culture (Pugach & Seidl, 1998).

Culturally responsive teaching instructional practices include the use of collaboration and cooperation, developing multiple connections between students' home and school, applying intercultural communication, as well as, multicultural resources and materials (Gay, 2002; Ladson-Billings, 1994; Villegas & Lucas, 2002). According to Gay (2013), CRT uses the cultural knowledge, prior experiences, frames of reference, and performance styles of ethnically diverse students to make learning encounters more relevant to and effective for these students. Characteristics of CRT includes: (a) acknowledging the legitimacy of the cultural heritages of different ethnic groups, both as legacies that affect students' dispositions, attitudes, and approaches to learning and as worthy content to be taught in the formal curriculum; (b) building bridges of meaningfulness between home and school experiences as well as between academic abstractions and lived socio-cultural realities; (c) using a wide variety of instructional strategies that are connected to different learning styles; (d)

teaching students to know and praise their own and each other's cultural heritages; and (e) integrating multicultural information, resources, and materials in all the subjects and skills routinely taught in schools. As teachers learn to recognize the diversity in learning among students, they can enhance their teaching practices to increase academic achievement among CLD students and students with disabilities (SWDs; Klingner & Soltero-Gonzalez, 2009). The use of CRT may be a practice that can address the diverse backgrounds of CLD students with SLD and, in turn, provide these students with a rich learning experience that in turn improves their learning outcomes.

Achievement Gap in Mathematics

Students who learn advanced mathematics not only become better problem solvers in mathematics, but are able to use these skills beyond the classroom by evaluating abstract situations more quickly than students who lack mathematical thinking skills (National Council of Teachers of Mathematics [NCTM], 2001). Since the release of the National Report Card of 1990, there has been a concern regarding the performance of students in U.S. schools in the areas of mathematics and science as their achievement was below the level of students in other countries. As result of the report, the NCTM has revised the standards in mathematics in an attempt to increase students' achievement in mathematics and has published the *Principles and Standards for School Mathematics*. These standards focused on real–world problem solving and conceptual understanding (NCTM, 2000). Additionally, the NCTM (2001) listed

six principles to assist and guide teachers in improving the content and delivery of mathematics instruction. The six principles were: equity, curriculum, teaching, learning, assessment, and technology (Poncy, Skinner, & Axtell, 2010).

Despite previous curriculum changes and the push for academic excellence in U.S. schools, the achievement gap continues to exist between CLD students and White students within mathematics classrooms in public schools. The presence of a math achievement gap between CLD students and White students has been clearly documented (Milner, 2013). The gap is particularly large for SWDs. For example, in the State of Florida, the students in the category of SWDs have difficulty meeting proficiency criteria in the areas of mathematics. The gap continued to exist since the results of the Florida State assessments in 2003-2004. Results of the Florida State assessment during the 2011- 2012 academic school year indicate that 59% of the SWDs performed below grade level in mathematics. In Miami-Dade County, where this study was conducted, the statistics are worse than the state average as 61% are below grade level in mathematics. In Miami Dade County, the math achievement gap among eighth graders showed that the average score for Black students was 38% lower than for White students and for Hispanic students, 19% lower than for White students (Blazer, 2013).

Robert Moses, founder of the Algebra Project, refers to mathematics as the gatekeeper for students to higher education institutions, access to secondary school, and therefore, to better paying jobs (Moses & Cobb, 2001). Moses

believes that a student who does not master algebra is comparable to an illiterate person during the industrial revolution. Students who learn higher-level mathematics are more likely to attend college and therefore are more likely to qualify for advancement in the workforce (Moses & Cobb, 2001; Star et al., 2015). Building on Moses's model, researchers report that students who become proficient in mathematics have better opportunities to attend higher education programs after high-school completion and attain economic freedom as their upward mobility in the workforce increases (Balafanz & Bynres, 2006; Ladson-Billings, 1997; Stein et al., 2011; Star et al., 2015). According to Kress (2005) and to Moses and Cobb, knowledge in mathematics helps students develop improved problem solving skills, which in turn opens the doors to a more successful life. Therefore, CRT should be seen as a civil right as well as an educational mandate. These authors emphasized that marginalized students need to demand access to higher level mathematics and technology and the understanding of mathematical concepts as these are critical not only to open the doors but also to their success in higher education institutions. Stein et al. (2011) conducted a review of studies to identify the students who are accessing algebra and the students' outcomes associated with taking an algebra course. They found that although algebra courses are an integral part of a high school curriculum, policies concerning enrollment in algebra should focus on developing opportunities for students to learn and not in just having more students enroll in algebra classes. In a review of 15 studies, Stein et al. (2011) found that

admission to algebra courses in eighth and ninth grade were not the same for all students and despite similar achievement backgrounds Black and Hispanic students were not recommended to enroll in algebra courses. Therefore, these courses had a consistently lower enrollment of Black and Hispanic students.

In an attempt to improve educational outcomes for CLD students, the U.S. Department of Education implemented programs that promote magnet schools, charter schools, and even vouchers for students to elect a school of their choice. These programs implemented by the U.S. Department of Education have been put in place hoping to assist these students attain a worthwhile educational experience. However, not many students participate in these programs and they have not increased math achievement among CLD students (Moses & Cobb, 2001). Moses (2001) refers to these programs as “rescue attempts” (p. 47) because they aim to save only few students. Despite the desire to increase CLD students’ achievement, many teachers continue to use ineffective curriculum, and strategies and the gap continues to exist (Kress, 2005; Ladson-Billings, 1997; Stein et al., 2011). Moses and Cobb (2001) have suggested that instead of targeting a few CLD students, the aim should be to lobby for these polices that can make a difference in schools and encourages more students to take algebra courses early on as part of their middle and high school curriculum. In the case of Florida, as of 2011-2012, students must earn a passing score on the Algebra I End of Course Exam (EOC) in order to meet the Florida State high school graduation requirements (Blazer, 2013).

Studies (e.g., Gutstein, 2003; Hand, 2010; Ladson Billings, 1997) have implemented CRT with students of color and students' academic achievement increased. For example, in a 2-year study, Gutstein (2003) taught mathematics to a group of seventh and eighth graders in a Latino urban middle school in a large Midwestern city. In his study, the researcher challenged his students to solve mathematics problems by learning how to read the world around them and looking at the neighborhood's social justice problems. He encouraged them to use mathematics to find solutions to the problems. In another study, Hand (2011) used reformed mathematics curricula where a high track and lower track classes were observed and recorded. At the end of the study, students' views had shifted from doing problems to viewing mathematics all around them. Therefore, these studies provide evidence that using CRT with minority students to increase mathematics achievement levels can be effective (Moses & Cobb, 2001; Shumate et al, 2012).

Recently, most states and the District of Columbia have adopted the Mathematics Common Core State Standards (CCSS) or a spin-off of these standards (Witzel & Little, 2015). These rigorous grade-level mathematics standards were developed by a state-led coordinated effort in cooperation with the National Governors Association Center for Best Practices and the Council of Chief State School Officers (Achieve, 2011). The CCSS focus on the mathematical knowledge needed for college and careers. These standards include three main shifts in mathematics: (a) focus, which calls for a deeper

foundation on each topic leading to a solid conceptual understanding; (b) coherence, which links concepts progressively in each grade; and (c) rigor, which calls for a command of conceptual understanding, procedural skill and fluency, and application of concepts (Common Core State Standards Initiative, 2014). However, considerations for using CCSS with CLD learners and learners with SLD have not yet been explored. Teacher preparation programs are just beginning to prepare teachers to teach mathematics using the CCSS (Moschkovich, 2012).

Teacher Preparation to Work with Diverse Students

Although the demographics of students in K-12 public school continue to change and become increasingly diverse (Cochran-Smith, 2004; Ford, 2012), the demographics of teachers in K-12 public schools continue to remain static (Utley, Obiakor, & Bakken, 2011; Shealey, McHatton, & Wilson, 2011). As noted in Taylor and Sobel (2011), 75% of all teachers are women and 83% are Non-Hispanic White native-English speakers. The fact that teachers and CLD students do not share cultural background, socio-economic level, and in many cases even the language, increases a disconnect between teachers and students (Cartledge & Kourea, 2008). Some teacher preparation programs have evolved from focusing on coursework and field experiences to include some awareness of social justice and multicultural education. However, these components have been added to the teacher education curricula by either adding a separate course or as an “add-on” course (Taylor & Sobel, 2011, p. 55) and

teachers have reported that they feel that meeting the needs of cultural and linguistically diverse students as the greatest challenge of teaching (MetLife, 2008).

Teachers across the country face many challenges to meet the academic and social needs of CLD students. According to Cartledge and Kourea (2008), teachers as well as other school personnel have to develop a clear understanding of the relationship between culture and social behavior as well as the need to examine students' behavior within a cultural context. These researchers indicate that culturally responsive classrooms need to have: (a) a competent culturally responsive teacher, (b) effective culturally responsive instruction, and (c) culturally appropriate social behaviors. Competent culturally responsive teachers demonstrate awareness of their own culture and other cultures; they realize that views are not universal and cultural norms are not absolute; and they believe that children have the ability to learn. Effective culturally responsive teaching incorporates early and intensive academic interventions, measureable learning objectives, progress monitoring, structured classroom activities in the classroom and communal learning environments.

Statement of the Problem

The changing demographics in the U.S. present challenges to public schools as more CLD students continue to populate school systems (Ukpokodu, 2011). These students exhibit great academic, economic, and social needs. Schools need to intervene effectively to reduce the risk of academic failure, drop

out, and even inappropriate placement of students in special education programs (Cartledge & Kourea, 2008). Students who reach academic success have the opportunity to graduate successfully from high school, attain well-paying jobs, attend institutions of higher learning, and ultimately improve their quality of adult life (Moses & Cobb, 2001; Paul, 2005; Taylor & Sobel, 2011; Ukpokodu, 2011).

According to Griner and Stewart (2012), CLD students struggle to make the same learning connections that students from the dominant culture represented in schools do. This disconnection may be attributed to the lack of student-teacher connection created by a culture divide in many educational communities (Griner & Stewart, 2012). Additionally, students with SLD also struggle to learn basic math concepts and skills, which are necessary to succeed in higher mathematics courses such as Algebra I (Witzel, Riccomini & Schneider, 2008). This struggle, in turn, can prevent them from pursuing postsecondary education (Kortering, deBettencourt, & Braziel, 2005). Despite the push to rectify the disconnect of CLD students and the public school system through the development of school reform efforts (Santamaria, 2009), teachers continue to use teacher-led practices and the achievement gap continues to exist throughout public schools (Moses & Cobb, 2001). “Cultural difference is the single most pervasive difference” (Santamaria, 2009, p. 215). Santamaria stated that this difference continues to exist in most public schools. Additionally, it is well documented how many CLD students have been placed in special education programs due to the failure of the system to recognize the students’ cultural

diversity (Artiles & Ortiz, 2002; Kalynpur & Harry, 2012; Harry & Klingner, 2014; Klingner & Harry, 2006; Pugach & Seidl, 2009; Seidl & Pugach, 1998). Kress (2005) suggested that teachers should look at “all students” (p. 50) as equals and address achievement gaps and math literacy by using effective mathematics pedagogy similar to those used in the Algebra Project. Teachers who understand the interaction among culture, language, and learning by using CRT have the potential to increase CLD students’ academic performance, as it can help teachers meet the needs of all learners (Golnick & Chinn, 2004). Therefore, it is necessary for teachers, parents, school administrators, and policy makers to learn if culturally responsive teaching implementation can help improve performance in Algebra I courses.

Purpose Statement

The purpose of the study was to examine the use of culturally responsive teaching with CLD students with SLD increased performance in Algebra I as measured by the Mid-Year Assessment. The researcher recruited six Algebra I teachers who taught CLD students with SLD. These students received special education services in the general education setting in a high school Algebra I class. The present study took place in Miami-Dade County Public Schools, which is the fourth largest metropolitan school district in the U.S. The teachers were assigned either the control or the treatment group. Three teachers participated in a 17-week period training on how to use CRT, and three teachers did not receive training on how to use CRT. The teachers who were trained were asked to

implement CRT in their Algebra 1 classes; observations were made to observe their fidelity of implementation to the CRT method. This method is described in detail in Chapter 3. At the end of the 17-week period, all six teachers completed the *A Culturally Responsive Teaching Guide and Self-Assessment* to find out if teachers who implemented CRT had a higher CRT teacher self-efficacy score than the teachers who did not receive training in CRT. All students in the control and treatment groups completed a *Mathematics Self-Efficacy Survey* to find out if the students who received CRT had a higher mathematics self-efficacy than the students who did not receive CRT. After the completion of the implementation period, the researcher analyzed the data to find if the use of CRT increased CLD students with SLD's Algebra I academic performance.

Research Questions

The research questions for this study sought to find out if the use of CRT (a) increased academic performance, (b) increased Algebra I self-efficacy of CLD students with SLD in Algebra I courses, and (c) increased self-efficacy of Algebra I teachers who implement CRT. The four research questions for this study are:

1. Will receiving instruction from teachers who have received CRT training enhance the academic performance of CLD students with SLD in Algebra I courses as measured by the *Algebra I Mid-Year Assessment*?
2. Will receiving instruction from teachers who have received CRT training enhance the self-efficacy of CLD students with SLD in Algebra I courses as measured by the *Mathematics Self-Efficacy Survey* (MSES)?

3. After controlling for teachers' level of cultural consciousness, does training in CRT account for a significant amount of variance in predicting students' Algebra 1 performance as measured by the *Algebra I Mid-Year Assessment*, *Culturally Responsive Teaching Guide and Self-Assessment for Educators (CRAS),* and by *Culturally Responsive Mentoring and Coaching Tool Part 2 (TOB)*?
4. Is there an interaction between receiving training in CRT and students' self-efficacy in predicting Algebra I performance of CLD students with SLD's achievement as measured by the *Mathematics Self-Efficacy Survey* (MSES), and the and teachers' total cultural consciousness (TCS)?

Delimitations

For this study, it is important to recognize the following delimitations:

1. This study was delimited to ninth grade CLD students with SLD who were enrolled in Algebra I classes taught by selected teachers.
2. This study was delimited to qualified teachers who (a) taught mathematics in Miami-Dade County school district, (b) held a Florida State 6-9 mathematics certification or a Florida State 6-12 mathematics certification, (c) had taught for at least five years, and (d) had received an effective or highly effective evaluation for at least two consecutive years.
3. Evaluation tool to determine math achievement was the Algebra I Mid-Year Assessment.

4. Evaluation tool to determine students' self-efficacy was the *Mathematics Self-Efficacy Survey*.
5. Evaluation tools to determine selected Algebra I teachers' level of cultural consciousness levels were (a) *A Culturally Responsive Teaching Guide and Self-Assessment for Educators* (CRAS) and by (b) a *Culturally Responsive Mentoring and Coaching Tool Part 2 (TOB)*.

Operational Definitions

The following terms are defined to clarify the meaning of key terms used throughout the present study. These include terms and acronyms used universally in the field of education:

Algebra I

Algebra I class for the purpose of this study is a typical secondary public school whose students are enrolled in ninth grade. As defined by Florida Department of Education, "The fundamental purpose of this course is to formalize and extend the mathematics that students learned in the middle grades. The critical areas, called units, deepen and extend understanding of linear and exponential relationships by contrasting them with each other and by applying linear models to data that exhibit a linear trend, and students engage in methods for analyzing, solving, and using quadratic functions. The Standards for Mathematical Practice apply throughout each course, and, together with the content standards, prescribe that students experience mathematics as a

coherent, useful, and logical subject that makes use of their ability to make sense of problem situations" FLDOE (2014). Algebra I is divided into five units as follows: (a) unit 1 - relationships between quantities and reasoning with equations, (b) unit 2 – linear and exponential relationships, (c) unit 3 - descriptive statistics, (d) unit 4 – expressions and equations, and (e) unit 5 – quadratic functions and modeling.

Culturally Linguistically Diverse (CLD) Students

Students who are diverse from the mainstream as they fall into one of the following three categories: (a) race/ethnicity, (b) socioeconomic status, and (c) language (Grossman & McDonald, 2008). For the purpose of this study, CLD students were identified as students who fall in at least one of the following categories as per their school records (a) non-White students, (b) qualify to receive free or reduced lunch, and (c) speak another language at home other than English.

Culturally Responsive Teaching (CRT)

"Culturally responsive teaching can be defined as using the cultural knowledge, prior experiences, frames of reference, and performance styles of ethnically diverse students to make learning encounters more relevant to and effective for them" (Gay, 2010, p. 31). For the purpose of the present study, CRT concerned to practices implemented by teachers who received CRT training as part of this study.

Race/Ethnicity

As per the NCES definition, these are categories developed in 1997 by the Office of Management and Budget (OMB). Race/ethnicity are used to describe the groups an individual belongs, identifies with, or belongs in the eyes of the community. For example, and individual can choose to identify their ethnicity as Hispanic or Latino or not Hispanic or Latino; the individual can choose their race as: American Indian or Alaskan Native, Asian, Black or African American, Native Hawaiian or Other Pacific Islander, or White. For the purpose of the present study, race/ethnicity will be identified as per the student participants' school records.

Student with Disability (SWD)

A student with a disability is a student who has been evaluated as having mental retardation, a hearing impairment (including deafness), a speech or language impairment, a visual impairment (including blindness), a serious emotional disturbance, an orthopedic impairment, autism, traumatic brain injury, other health impairment, a specific learning disability, deaf-blindness, or multiple disabilities, and who, by reason thereof, needs special education and related services (IDEA, 2004).

For the purpose of this study, SWD will be students who (a) have been identified as having a specific learning disability as per federal and state regulations, and (b) had a current Individualized Education Plan (IEP) for the 2014-2015 academic school year.

Specific Learning Disabilities (SLD)

According to IDEA (2004), (i) General. Specific learning disability means a disorder in one or more of the basic psychological processes involved in understanding or in using spoken or written language that may manifest itself in the imperfect ability to listen, think, speak, read, write, spell, or do mathematical calculations. The term includes such conditions as perceptual disabilities, brain injury, minimal brain dysfunction, dyslexia, and developmental aphasia.

(ii) Disorders not included. Specific learning disability does not apply to students who have learning problems that are primary the result of visual, hearing, or motor disabilities; cognitive disability; emotional disturbance; or environmental, cultural, or economic disadvantage (IDEA, 200420 USC 104, section 602 (30) (A)).

Socioeconomic Status

Socioeconomic status is defined as one's access to financial, social, cultural, and human capital resources. Students in the study identified as having low socioeconomic status (SES) were students eligible for free or reduced meals determined by a sliding scale of the total household and the household size (Food and Nutrition, 2007). For the purpose of my study, socioeconomic status will be identified as per the student participants' school records, students who qualify for free or reduced lunch.

Teachers' level of cultural consciousness

In this study, the researcher will use this term as a measure of how much teachers use CRT in their classroom. To measure teachers' level of cultural consciousness, the researcher used classroom observations as well as a self-assessment. These tools will be discussed in detail in Chapter 3.

CHAPTER II

REVIEW OF THE LITERATURE

Chapter II provides a review of the literature on culturally responsive teaching in mathematics. In the first section, the problem that this study addresses beginning with studies of CLD students is reviewed. In the second section, math studies of CLD students followed by math studies of students with disabilities are explored. The third section reviews the literature on studies related to math studies of CLD students with disabilities. In the final section, teacher preparation programs for teachers serving CLD students are reviewed. Finally, the researcher summarizes the literature reviewed and makes connections to the current investigation.

Studies using Culturally Responsive Teaching with Culturally Linguistically Diverse Students

According to Gay (2000, 2010), Ladson-Billings (1994, 2000), and Ortiz, (2001) CRT should be used among different racial/ethnic groups. However, in order to be effective; teachers need to be competent; must be willing to use a variety of strategies when delivering their lessons; and carry out changes to the curriculum to engage students in their classroom (Stein et al., 2011). Culturally and linguistically diverse students need the support from their teachers, school administrators, and their communities to become successful students. The literature shows that teachers must use strategies that assist students develop their communication skills, their problem solving skills, and the ability to work with

others (e.g., Cartledge & Kourea, 2008; Gutstein et al., 1997; Ladson-Billings, 1997; Richards, Brown, & Forde, 2004).

Daily and Eugene (2013) indicated the great need that exists in the U.S. to increase the non-White population into the science, technology, engineering, and mathematics (STEM) areas to increase CLD students' participation in the workforce. In their study, Daily & Eugene used a computer platform where 16 middle school students from CLD backgrounds (15 students were African American and one was of Asian Pacific Islander descent) developed their own stories. Students explored self-awareness as they responded to different prompts, which served as guided to development of emotional self-awareness and empathy. Through this process, the researchers were able to observe how students developed self-awareness and empathy skills as the participants learned to use the program and worked with each other. After the 6-week program, students reported that in addition to learning how to use the software, the researchers were able to express their ideas in different ways and were able to also understand the other students' perspectives by recognizing the emotions of other people. Additionally, students reported a career interest in different fields, which could help them stayed focused in seeking the appropriate coursework in high school. Using approaches where CLD students have the opportunity to develop interpersonal skills in addition to academic skills are fundamental to their success as this in turn provides them opportunities to explore avenues where they can seek a career path.

Howard and Terry (2011) describe another example that illustrates the success of the use of CRT at the high school level. The UCLA Sunnyside Gaining Early Awareness and Readiness for Undergraduate Programs (GEAR UP) worked with graduate students who provided continuous support to high school students during the 2006-2007 academic school year. Graduate students worked with teachers in the classroom to assist all students and these graduate students were also available for after school tutoring sessions. The commitment from both teachers and graduate students developed a caring and safe environment for these students. At the end of the program, the dropout rate at the school decreased, and the number of students accepted to a four-year college doubled from the previous year. This study shows that when teachers and mentors devote their time and interest in CLD students, the involvement can help increase these students' engagement in school. In a mixed methods study, Sampson and Garrison-Wade (2011) sought to determine if African American students preferred culturally relevant lessons to non-culturally relevant lessons and these lessons related to their lives. The study took place in a large urban high school mixed grade American History class where 33% of the students were African American. The researchers used feedback forms, focus groups, and questionnaires to help them understand the students' responses. Sampson and Garrison-Wade (2011) found that students preferred culturally relevant lessons, because these were engaging and empowering. Students preferred teachers

who participated in school events, accepted their differences, and set high expectations for them.

Klingner and Soltero-Gonzalez (2009) found 12 studies between late 1980's and 2009 in grades K-8 that focused on literacy intervention practices for ELLs and ELLs with SLDs who were struggling with reading. These researchers found that studies that focused on integrating culturally responsive practices and research-based interventions were the most successful at increasing reading skills. Additionally, they found that both ELLs and ELLs with SLD benefited from early and intensive interventions in supportive environments where the teachers built on the students' diversity. For example, De La Colina, Parker, Hasbrouck, and Lara-Alecio (2001) found that the use of Read Naturally led to statistically significant improvement among at-risk elementary school ELLs in reading comprehension and fluency. Bui and Fagan (2013) found similar results when they used an integrated reading comprehension strategy in conjunction with cooperative learning and multicultural literature with 49 CLD fifth grade students. Students in the treatment group moved from a frustrational reading level to above being able to read and comprehend at their instructional reading level. Other studies (e.g., Nag-Arulmani, Reddy, & Buckely, 2003; Vaughn, Mathes, Linan-Thomson, & Francis, 2005) have focused on practices to increase reading comprehension for ELLs at the elementary level and other researchers (Saenz, Fuchs, & Fuchs, 2005) have also focused on practices to increase reading comprehension specifically for ELLs with SLD.

In this section, the researcher discussed how studies that have used CRT to teach CLD students have been successful in increasing the students' academic achievement. These studies showed that CLD students' academic performance increased in reading (Bui & Fagan, 2013; Nag-Arulmani, Reddy, & Buckely, 2003; Vaughn, Mathes, Linan-Thomson, & Francis, 2005), history (Sampson and Garrison-Wade, 2011), academic engagement, and problem solving skills (Cartledge & Kourea, 2008; Gutstein et al., 1997), and that dropout rates decreased (Howard & Terry, 2011).

Math Studies using Culturally Responsive Teaching with Culturally Linguistically Diverse Students

The results of national assessments such as NAEP show that Black and Hispanic students have historically lagged behind their White counterparts in mathematics achievement. Researchers have also noted how CLD students have lagged behind in mathematics achievement. For example, Hemphill, and Vanneman (2011) reported that Hispanic students scored at least 21 points lower than their White counterparts in mathematics achievement assessments in eight grade between 1990 and 2009; additionally, Anick, Carpenter, and Smith (1981) noted how Black students complete about one year less of mathematics than their White peers during their high school years. However, studies as early as the work of Tate (1995) and later Terry (2010) show how when teachers use the students' environment as a framework as in CRT for their learning activities, then their mathematics achievement increases.

Paul (2005) sought to investigate if they way students were grouped in Algebra courses was a key variable to access college. Paul looked at the high school experience of low income, racial/ethnic minority, and immigrant high school students enrolled in five different urban high schools in California. The researcher identified four groups of students: the first group completed Algebra I in eighth grade, the second group completed Algebra I in the ninth grade, and the third group completed Algebra I in two years (ninth and tenth grade); and the fourth group of students were enrolled in both the one and the two-year Algebra I courses. Paul found that students in the first group enrolled in college preparatory science courses. For example, 95% of students who were enrolled in Algebra I during their eight-grade (the first group) enrolled in Biology and only 38% and 23% of the students in the third and fourth groups respectively. The number does drop significantly for students enrolled in Chemistry, which is a pre-requisite course to admission to many competitive higher education institutions. About 87% of the first group enrolled in Chemistry compared to 2% of the fourth group.

To further understand what mathematics education research says about supporting African American students in rigorous mathematics instruction, Jackson and Wilson (2012) conducted a literature review covering studies from 1989 to May 2011. They identified and synthesized 100 documents that focused on teaching and learning mathematics to African-American students. These documents were then categorized into two groups: (a) orientations to teaching

mathematics and instructional practices and (b) students' experiences. Jackson and Wilson found limited studies that focused on the "how" teachers can develop and foster productive relationships to support African American students' participation in rigorous mathematics courses. Additionally, they concluded that if mathematics educators want to improve the learning opportunities for African American students, then the instructional practices needed to be grounded in the experiences of these students.

The No Child Left Behind Act (NCLB) of 2001 asserts as one of its goals, the reduction in the achievement gap between CLD students and their White counterparts (Jackson & Wilson, 2012). Additionally, the ESSA of 2015 requires states to report these students' academic performance and monitor their progress. Despite many efforts, there is little evidence that the gap has closed in the last few decades and only 65% of Black and Hispanics students graduate from high school (Cortes et al., 2013). For example, in the fall of 2003 in Chicago Public Schools, students who were behind in mathematics, upon entering high school, received a double dosage of algebra (two periods of Algebra I instead of one period). This program did not stay in effect for long as the students' failing rate continued to exist (Cortes et al., 2013).

Therefore, improving mathematics achievement among CLD students is crucial. Students who do well in mathematics in high school have the opportunity to enroll in higher education institutions and improve the quality of their adult life (Kress, 2005; Moses & Cobb, 2001; Paul, 2005). Moses began the "Algebra

Project" because he believed that students learning mathematics, such as algebra, was a civil issue right that had the potential to equalize the economic future for minority students. Moses saw algebra as the road to upward mobility (Moses & Cobb, 2001). As today's society the fields of engineering and technology evolve, these fields are of extreme importance as they are directly related to a vast of career opportunities. Therefore, the implications of closing the academic gap in the areas of math and science become essential to the success of CLD students (Cavanagh, 2007, Daily & Eugene, 2013, Williams, 2011). Tate (1995) and Martin (2009) argue that CLD students need to be included in the U.S. economy.

Lipka et al. (2005) studied math in a cultural context. They examined indigenous Alaskan students who lived in American Indian and Alaskan Native communities. Lipka et al. found that for these students, learning by observation was part of an important tradition within their culture and that the expert-novice modeling was reflective of this groups' cultural practice. The participants in this study learned how to build a fishing rack, which is used to dry salmon, while learning how to approach math problem solving skills; thus, the students were engaged in an activity that used everyday knowledge to school based math knowledge. In a similar study, Lipka et al. (2007) use cultural and linguistic activities that engage the students, as they are important in both school and home contexts. By modeling these activities, students learned about geometric relationships as they learn how to cut and fold geometric patterns out of paper.

Students made authentic connection and earned better than average gain score for Yupiaq second language learners. In both studies the researcher used effectively what he knew about the students' culture to bring activities to the class that involved mathematical procedures to solve them. Not only did students' academic performance increase, but their academic engagement also increased. The studies discussed in this section used CRT when teaching mathematics and helped CLD students increase problem solving skills in mathematics.

Algebra Studies of Students with Disabilities

As the need to improve the performance in mathematics of students with SLD remains, many researchers have focused on identifying effective strategies to improve student performance in algebra (e.g., Gersten et al, 2008; Little, 2009; Maccini & Gagnon, 2000; Riccomini & Schneider, 2008; Witzel, Maccini, Mulcahy, & Wilson, 2007). Since the authorization of the NCLB in 2001, and the reauthorization of the Individuals with Disabilities Act (IDEA) of 2004, there has been a greater emphasis on mathematics outcomes of SWDs (Judge & Watson, 2011). Additionally, the ESSA signed by President Obama on December 2015, continues to emphasize students' outcome by asking states to test mathematics in high school and even break out the data into subgroups, such as students in special education and racial minorities. Students with SLD are primarily receiving their education in the general education setting and are expected to master grade level content standards as measured by the state academic assessments (Little, 2009). Furthermore, the concern has increased among teachers, as more

states are requiring students to pass an algebra course in order to obtain their high school diploma (Maccini & Gagnon, 2000). Although there are a substantial number of studies that have focused on mathematics practices for struggling students, most of these studies have focused on initial developmental mathematical concepts such as adding and subtracting rather than advanced knowledge and skills in mathematics (Foegen, 2008). Additionally, as noted by Maccini, Mulcahy, and Wilson (2007) in their literature review, only five articles (22%) of the articles reviewed from 1995 to 2006 focused on teaching algebra to students with SLD.

Impecoven-Lind and Foegen (2010) conducted one of the few studies that sought to identify the areas of difficulty students with SLD experienced in algebra, and to describe evidence-based strategies that can address these students' needs. According to these authors, students with SLD and students who struggle in mathematics experience difficulties in three areas: (a) cognitive process, (b) content foundations, and (c) algebra concepts. Students with SLD often have difficulties in processing information, translating to problems with attention, memory, language, and metacognition, which in turn affects them when solving mathematics problems in algebra that require multi-steps and calculations, as well as generalizing the use of strategies from one situation to another.

Another area in which students with SLD struggle is conceptual understandings. Impecoven-Lind and Foegen (2010) identified three types of knowledge: declarative, procedural, and conceptual. These three interact with

each other when solving advanced mathematics problems. The ability to recall information to solve a problem in a specific situation often affects students with SLD when solving algebra problems especially as the problems become more abstract in nature as these students are likely to have significant difficulty conceptualizing abstract complex problems (Bley & Thornton, 2001; Miles & Forcht, 1995; Witzel, Smith, & Brownell, 2001). This difficulty to recall information to solve a problem is consistent with Hecht, Vagi, and Torgesen's (2007) study on the understanding and computation of fractions. The third area of difficulties is algebra concepts, which has a large range of topics such as graphs, fractions, constitutes the most difficult area and the one where students with SLD make the most errors as they tend to use ineffective strategies. Therefore, many students with SLD start their study of algebra missing many pre-requisite skills such as computation, fluency, procedural and conceptual knowledge. As part of Impecoven-Lind and Foegen's study, the researchers explored interventions for students with SLD enrolled in algebra courses and they found that the literature was very limited. In their article, the researchers described three strategies: (a) class-wide peer tutoring, in which students take turns being the tutor and the tutee, (b) cognitive strategy instruction, which focuses on teaching students specific cognitive and metacognitive process by using visual representations and prompt cards, and (c) explicit inquiry routine, which draws on different models to keep students engaged and active. In a similar study, Strickland and Maccini (2010) explored successful researched-based interventions to teach algebra to

students with learning disabilities. They described four different interventions: (a) explicit instruction, which uses a teacher-directed instruction where the teacher uses advanced organizers, demonstration, guided and cumulative practice, (b) graduated instructional sequence, which uses concrete, semi-concrete and abstract notation, (c) technology, which allows students to learn and practice mathematics, and (d) graphic organizers, which are visual representations used to help organize information and concepts. Witzel, Smith, and Brownell (2001) make similar recommendations as they suggest that teachers should use three principles when introducing algebra concepts: (a) use stories to connect to students' lives, (b) make sure students have mastered pre-requisite skills, and (c) use explicit instruction by using think aloud techniques as teachers model problems.

Witzel, Mercer, and Miller (2003) focused on using a concrete, representational, to abstract (CRA) sequence of instruction with sixth and seventh grade SWDs who were learning to solve equations with one variable. Researchers used a pretest/posttest/follow-up model with a control group and an experimental group. Students in the control group received abstract only traditional methods whereas students receiving CRA first used manipulatives and then moved to using a pictorial representation to aid the process of solving the equations. After successfully mastering these two stages, students solved equations by using abstract notation. Witzel et al. (2003) found that although both groups made gains in the posttest, the treatment group outperformed the

students receiving traditional methods. Their study confirms that the use of manipulatives, which are mostly used in the early years, can also be a useful tool to teach SWDs by adapting to the students' learning style. Scheuermann, Deshler, and Schumaker (2009) also investigated the use of Explicit Inquiry Routine (EIR) when teaching how to solve one variable equation to 14 SWDs enrolled in sixth through eighth grade. Explicit Inquiry Routine incorporates elements of: inquiry, dialog, CRA and explicit instruction. These were implemented in three parts: sequential and explicit content presentation, scaffolding of previous knowledge, and systematic approach of CRA to use illustrations and representations. Scheuermann et al. (2009) found that SWDs were able to solve one-variable equations, transfer their learning into other situations, and retain their learning up to 11 weeks after instruction. In another study, Ives (2007) used direct and strategic instruction in conjunction with graphic organizers to teach a group of sixth through 12th grade SWDs enrolled in a private school setting how to solve linear equations. Using an experimental design, Ives compared the effectiveness of using graphic organizers; he found that the treatment group had a stronger grasp of the conceptual foundations when solving linear equations than their control group.

Using a different approach, Kotering, deBettancourt, and Braziel (2005) sought to find the perspectives of students with SLD on their high school experience. Students were asked which one was their favorite course, the best and worst about their algebra classes experience, and what were their ideas for

helping other students become successful students. Kotering et al., surveyed 46 high school students with SLD in a southeastern high school where 20% of the 2100 students were racial/ethnic minority students. The researchers then compared these survey results to the rest of the school 410 students without disabilities who were also enrolled in Algebra courses. More than half of the students reported that mathematics was their least favorite class as it was difficult to understand and the assignments were too complicated. Students with SLD felt that material and assignments were not interesting and that the teachers did not care. However, students indicated that working in groups was their favorite activity as they found that working with their peers helped them learn. Students with SLD suggested that they feel that to be successful in the class students need more assistance and encouragement from the teacher as well as assistance from other classmates.

Math Studies of Culturally Linguistically Diverse Students with Specific Learning Disabilities

In the previous literature review section, instructional strategies in mathematics that have been successful for students with SLD were reviewed. The instructional needs of CLD students and students with disabilities clearly overlap; however, there is limited research that addresses the integration of instructional academic interventions in mathematics and CRT. Therefore, I address the need current need to study the effectiveness of using CRT to teach Algebra I to CLD students with SLD in this section.

After a thorough systematic review of the literature through Education Databases and Resources that allows the user to search in multiple databases, including, ERIC, ERIC ProQuest, ERIC EBSCOhost, ERIC FirstSearch, Education Full Text, PsycArticles, and PsycINFO. Combinations of the following descriptors: students with learning disabilities, Algebra, CLD, CRT, mathematics, secondary education were used. One article was identified in the literature that speaks about using CRT when teaching mathematics to CLD students with disabilities. Shumate, Campbell-Whatley, and Lo (2012) evaluated the effects of adapting the Sheltered Instruction Observation Protocol (SIOP) model with a culturally responsive teaching approach. The SIOP model includes 30 instructional features for English Language Learners (ELLs) in which the focus is to link the content standards with some language support. Five eighth-grade Latino students who were enrolled in a mathematics resource classroom received a multiple treatment reversal design. The ABACACA design used "A" as the traditional instruction method; "B" as culturally responsive teaching, and "C" as a modification of culturally responsive instruction, which included manipulatives, and hands on activities; these were compared by looking at the participants' gains on their daily pretest and posttest scores. Shumate et al. found that when they used the modified cultural responsive instruction (C), the participants' engagement increased and students attained higher gains. These findings are also supported by the work of Bley and Thorton (2001) as they state that the use of manipulatives, physical representations of the problem, when

teaching mathematics encourages students with SLD to enhance their procedural fluency when solving complex mathematics problems and they need pictorial representation as they struggle with the use of symbolic representation (Witzel, Smith, & Brownell, 2001). However, engaging students in the learning process by making the content examples relevant to their lives has the potential to increase the students' retention as these activities become more meaningful to them (Shumate el at, 2012). Further research is necessary as there is a dearth of literature on mathematics studies that focus on the use of CRT to increase academic achievement among CLD students with SLD.

Preparing Teachers to Meet the Needs of Culturally Linguistically Diverse Students with Specific Learning Disabilities in Inclusive Settings

High quality teachers need to possess content knowledge, pedagogical knowledge, clinical experience and stability (National Association of State Boards of Education, [NASBE], 2002). One of the components of pedagogical knowledge is "having adequate cultural competency to know how to communicate with diverse student populations" (NASBE, 2002, p. 16). However, many teachers lack exposure to diverse communities and are often unprepared to teach students who are different from the White, middle class students (Cochran-Smith & Fries, 2005; Seidl, 2007); which in turn can become unexamined biases addressing diversity in the classroom. Teachers can then develop deficit thinking, low expectations, which can have negative effects on CLD students (Villegas & Lucas, 2002). Instead, Villegas and Lucas state that a cultural responsive

teacher takes into account when developing curriculum as well as, when interacting with the students and their families.

The Technical Assistance Center on Disproportionality (TACD) recommends nine attributes that CRT should consider following the work of Ladson Billings (1994, 1997), Banks and Banks (1997), and Gay (2000, 2002, 2013) among other leaders in the field of CRT. These attributes are: (a) acknowledge students' differences as well as their commonalities; (b) validate students' cultural identities in instructional materials and activities; (c) educate students about the diversity of the world around them; (d) promote equity and mutual respect among students; (e) foster a positively interrelationship among students, their families, the community and school; (f) motivate students to become active participants in their learning; (g) encourage students to think critically, (h) challenge students to strive for excellence as defined by their potential; and (i) assist students in becoming socially and politically conscious. Despite the established need for CRT and the plethora of conceptual literature about how to implement this way of teaching, a dearth of research that focuses on the implementation still exists (Williams Shealey et al., 2011). Some studies (e.g., Herrera, Morales, Holmes, & Dawn Herrera, 2012; Holmes & Herrera, 2009) looked and pre-service teachers' preparation but few have looked at practicing teachers' use of CRT in secondary schools.

Researchers such as Ladson-Billings (1994) and Bonner and Adams (2012) have tried to identify main characteristics of successful teachers of CLD

students. In a case study, Bonner and Adams found that there were four foundational representations characteristics: (a) knowledge about her students and the subject area, (b) communication with students, parents and other community members, (c) relationship/trust, and (d) constant reflection and revision of own practices. In a yearlong descriptive study in the Midwest, McIntyre and Hulan (2013) examined how four elementary school teachers attempted to implement research-based reading instruction and cultural responsive reading instruction. The teachers who implemented the curriculum were selected graduate students who took a course on literacy, learning, and cultural differences where these they received instruction that focused on (a) how to build curriculum from students' interest and backgrounds while developing reading skills such as fluency, vocabulary and comprehension; (b) how to implement collaborative work among students; (c) how to implement and monitor a rigorous curriculum; (d) how to attend and be sensitive to students' language; and (e) how to use instructional conversation with the students. The researchers looked at the teachers' lesson plans, videotaped lesson, teachers' reflection, post-observation interviews and survey, and informal correspondence between teachers and researchers. McIntyre and Hulan found that these elementary teachers were able to instruct elementary school students on how to comprehend text by using research-based strategies and principles for culturally responsive instruction but were not able to blend instruction when teaching phonics. Additionally, teachers lacked the ability to recognize the students' language

interaction differences (e. g., call outs, or lack of participation) in the classroom setting. For example, the researchers stated that some students (e.g., ELL students) did not participate in class discussion as much as their counterparts and African-American students were ignored when calling out. The researchers found that although all four teachers attempted to engage in instructional conversations, they missed opportunities to teach taking into account students' differences. In this descriptive study, McIntyre and Hulan (2013) offer possibilities to merge research-based instruction and culturally responsive instruction in an attempt to help more students become more highly skilled readers.

Using a different approach, Naqvi, McKeough, Thorne and Pfitscher (2013) used dual-language books (DLB) to increase literacy skills among kindergarten students. In their study, the researchers used classic children books were one page was in English and the other page was in the student's home language both versions were read simultaneously. The aim of the study was to identify CRT in DLB in reading classes and to determine if there were linguistic, metalinguistic, and cultural engagement moments within the lessons. After analyzing the transcripts and the videos of Kindergarten teachers in four different schools implementing DLB in their reading classes, they identified that only 35% of the sessions showed evidence of CRT. This low percentage of CRT supported the need to better prepare pre-service teachers and teachers to use CRT in the classrooms.

While most of the literature focuses on implementing CRT to increase reading skills, Hastie, Martin, and Buchanan (2006) sought to examine two White teachers' understanding of their praxis as they implemented a culturally relevant physical education program by teaching an African-American dance to a sixth grade class. Their findings showed how these teachers expanded the understanding of their teaching practices were beyond acting and reflecting, but instead they learned about how the curriculum can impact students. In another study, Culp and Chepyator-Thomson (2011) sought to investigate methods of instruction used by physical education teachers and the possible implication of these practices for CLD students. Teachers in the study reported that they had routines in place, used CRT in their class although they had received little exposure to CRT during their teaching preparation programs. Their findings are in line with previous research by Voltz, Brazil, and Scott (2003) where general education teachers reported their lack of preparation to meet the needs of their diverse students in the classroom. However, in Culp and Chepyator-Thomson's study the teachers reported that after receiving professional development on CRT, they felt better prepared to make changes to their lessons and infuse CRT in their classrooms.

Summary

This literature review started with a summary of studies that outlined the success of increasing academic achievement when using CRT with CLD students. Then, the researcher reviewed successful teaching practices that have

been used with students with SLD. One of the concerns in the literature is that many teachers do not feel prepared to embark on this journey. Despite this need, there were few studies that used CRT when teaching mathematics to CLD students with SLD. The scarcity of research in this area called for the need for further study on the implementation of CRT by trained teachers when teaching mathematics to CLD students with SLD and even more so, Algebra I.

CHAPTER III

METHODS

This study examined the use of CRT with CLD students with SLD to find out if CRT increased academic performance in Algebra 1 courses. The researcher trained a group of teachers to implement CRT with CLD students with SLD to find if this training: (a) increased students' academic performance in Algebra I, (b) increased students' mathematics self-efficacy, and (c) increased cultural consciousness of teachers who implemented CRT. In this chapter, the researcher discusses the methods that were used to examine the research questions of this study. This chapter begins with a review of the research questions, followed by information regarding the research design, population, method of data collection, and instrumentation that was used. The methodology that was used to investigate research questions is explained. The chapter concludes with a summary of the main points addressed in the chapter.

Research Questions and Hypotheses

On the basis of the literature review presented in the previous chapter, the researcher found the need to contribute to the developing knowledge by answering the following research questions:

1. Does receiving instruction from teachers who have received CRT training enhance the academic performance of CLD students with SLD in Algebra I courses as measured by the *Algebra I Mid-Year Assessment*?
2. Does receiving instruction from teachers who have received CRT training

enhance the self-efficacy of CLD students with SLD in Algebra I courses as measured by the *Mathematics Self-Efficacy Survey* (MSES)?

3. After controlling for teachers' level of cultural consciousness, does training in CRT account for a significant amount of variance in predicting students' Algebra 1 performance as measured as measured by the *Algebra I Mid-Year Assessment*, *Culturally Responsive Teaching Guide and Self-Assessment for Educators (CRAS),* and by *Culturally Responsive Mentoring and Coaching Tool Part 2 (TOB)*?

4. Is there an interaction between teachers receiving training in CRT and students' self-efficacy in predicting Algebra I performance of CLD students with SLD's achievement as measured by the *Mathematics Self-Efficacy Survey* (MSES), and teachers' total cultural consciousness (TCS)?

Hypothesis 1. The achievement score will be significantly higher for CLD students with SLD who receive CRT than for CLD students with SLD who do not receive CRT as measured by the *Algebra I Mid-Year Assessment*.

Hypothesis 2. The self-efficacy score will be significantly higher for CLD students with SLD who received CRT than for CLD students with SLD who did not receive CRT as measured by the *Mathematics Self-Efficacy Survey (MSES)*.

Hypothesis 3. Students whose teachers have received CRT training will score higher on the *Algebra I Mid-Year Assessment* than students of teachers who have not received CRT training when controlling for teachers' level of

cultural consciousness as measured as measured by the *Algebra I Mid-Year Assessment*, *Culturally Responsive Teaching Guide and Self-Assessment for Educators (CRAS),* and by *Culturally Responsive Mentoring and Coaching Tool Part 2 (TOB)*.

Hypothesis 4. There is an interaction between teachers receiving CRT training and CLD students with SLD's self-efficacy in predicting Algebra I performance of CLD students with SLD's Algebra I achievement as measured by the *Mathematics Self-Efficacy Survey* (MSES) and the teachers' total cultural consciousness (TCS).

Research Design

This section is made up of two parts. The first part of the section discusses the rationale for the design; in the second part, the components of the design are discussed. I used a control-treatment pre-post study design using a control group and an experimental group. The control-treatment pre-post study design was chosen, as it was not possible to randomly assign students to the groups (Newman & Newman, 1977). In an effort to avoid Type I errors and make fair comparisons, the researcher made an effort to select groups that have as many similarities as possible such as selecting students from schools with similar demographics, students with similar SES, age, and grade point average.

Setting

The research took place in Miami Dade County Public Schools, which is the fourth largest school district in the U.S. and is located in South Florida. The

population of Miami-Dade County is diverse and continues to grow. According to the Miami-Dade County Economic & Demographic Profile 2015, 69.2% of the population is Hispanic, 7.3% is White Non-Hispanic, 21.8% is Black Non-Hispanic, and 1.8% is composed of all other races/ethnicities. Over half of the school age population in Miami-Dade County speaks a language other than English at home (MDCPS, 2016) and about 21% of the students are enrolled in Limited English Proficiency Programs (FLDOE, 2013). Additionally, about 21% of students are students with disabilities and about 20% of students with disabilities have been identifies as having a specific learning disability (MDCPS, 2016). These demographic characteristics can be seen in Table 1.

Table 1

Miami-Dade County Public Schools (MDCPS) Demographics as of August 2015

Race/Ethnicity	Number of Students	Percentage
White (Non-Hispanic)	25,946	7.3%
Black (Non-Hispanic)	77,552	21.8%
Hispanic	246,658	69.2%
Other: Asian/Indian/Mixed	6,324	1.8
Total	356,480	100

For the purpose of this study, the researcher sought access to MDCPS high schools with similar demographics. The researcher attained access to these

schools by communicating with the curriculum assistant principal and then communicating with the teachers with the purpose of recruiting them. Tables 2 3, 4 and 5 show the participating schools demographics. These four tables show the participating schools basic demographics. The percentage breakdown of the students' population based on race/ethnicity is similar among all the participating schools.

Table 2

School One Demographics

Race/Ethnicity	Number of Students	Percentage
White (Non-Hispanic)	348	16.4
Black (Non-Hispanic)	444	20.9
Hispanic	1276	60.1
Other: Asian/Indian/Mixed	55	2.6
Total	2123	100

Table 3

School Two Demographics

Race/Ethnicity	Number of Students	Percentage
White (Non-Hispanic)	140	7.1
Black (Non-Hispanic)	807	41
Hispanic	974	49.5
Other: Asian/Indian/Mixed	47	2.4

Total	1968	100

Table 4

School Three Demographics

Race/Ethnicity	Number of Students	Percentage
White (Non-Hispanic)	411	13.6
Black (Non-Hispanic)	625	20.7
Hispanic	1935	64.1
Other: Asian/Indian/Mixed	48	1.6
Total	3019	100

Table 5

School Four Demographics

Race/Ethnicity	Number of Students	Percentage
White (Non-Hispanic)	647	19.4
Black (Non-Hispanic)	484	14.5
Hispanic	2022	60.6
Other: Asian/Indian/Mixed	183	5.5
Total	3,336	100

Participants

Because of the nature of the research questions, the present study included four groups of participants. The first group of participants in this study

included Algebra I teachers who received CRT training. The second group of participants included Algebra I teachers who did not receive CRT training. The third group of participants was the CLD students with SLD enrolled in classes of the Algebra I teachers who received CRT training and the fourth group of participants was CLD students with SLD enrolled in classes of the Algebra I teachers who did not receive CRT training. The group of student participants were in ninth grade CLD students with SLD enrolled in an Algebra I course taught by one of the participating Algebra I teachers during the 2015-2016 academic school year. The CLD students with SLD who participated in the study were students who: (a) had been identified as having a specific learning disability as per federal and state regulations, and (b) had a current Individualized Education Plan (IEP) for the 2015-2016 academic school year. These students were part of the control or the treatment group as determined by their teacher group. The control group received instruction from Algebra I teachers who did not receive CRT training and the treatment group received instruction from their Algebra I teachers who had received CRT training.

The group of teacher participants (See Table 6) included full-time Algebra I teachers, who taught CLD students with SLD from Miami-Dade County Public Schools. This group of teachers was divided into two subgroups. The first group of teachers consisted of teachers who did not receive CRT training and were the control group. The second group of teachers was trained to use CRT and

implemented CRT in their Algebra I classes for a period of 9 weeks and were the treatment group.

Table 6

Groups Breakdown

School	One		Two		Three		Four		Total Students
	T	S	T	S	T	S	T	S	
Control Group	A	13	E	15			C	4	32
Treatment Group	D	9	F	14	B	8			31
Total	2	22	2	29	1	8	1	4	63

Note. T = Teacher, S = Students

Procedures

Once the dissertation proposal was approved by the dissertation committee, University Graduate School (UGS), Institutional Review Board (IRB), and Miami-Dade County Public Schools Research Review Committee (RRC), Assistant Principals of Curriculum and Instruction of public high schools located in Miami-Dade County were contacted to solicit teachers to participate in the research study. The assistant principals facilitated the name of potential Algebra I teacher participants. The researcher then contacted the potential teachers via e-mail and in some cases via phone to ask teachers to fill out a brief online survey

(See Appendix A) to establish eligibility. After establishing a pool of volunteers, the researcher recruited Algebra I teachers who meet the following criteria: (a) had at least five years of teaching experience, (b) had received a teacher rating of between 89 to 100 on points on the unified summative Instructional Performance Evaluation and Growth System (IPEGS), and (c) taught Algebra I to ninth grade CLD students with SLD in general education classes during the 2015-2016 academic school year. The pool of teachers then completed the Common Beliefs Survey Tool and their scores are reported on Table 7.

To obtain comparable groups, the researcher grouped teachers based on the teachers' years of experience, the students' average passing rate on the Algebra I End of Course Exams for the last two academic school years, and students' Algebra I end of course grade point average for the last two academic school years and the teachers' scores on the Common Beliefs Survey Tool (Table 7). Teachers' years of experience ranged from 6 to 29 years with a mean score of 15 years. The students' grade point average was based on a four-point grading scale. The mean GPA for students in these teachers' classes was a 2.34. The Florida Algebra I EOC scores ranged from levels 1 to 5. A Level 1 score ranged from 325 to 374; a Level 2 ranges from 375 to 398; a passing score Level 3 ranged from 399 to 424; a Level 4 ranged from 425 to 436; and a Level 5 ranged from 437 to 475. The average score for the last two academic years was a 401, which falls within a Level 3. The Common Beliefs Survey' scores can range from 13 to 52. The mean average for the teachers was 21.83. The

composite scores for each question on The Common Beliefs Survey was used as a guide when discussing each of the common beliefs as part of the CRT teacher training sessions.

Table 7

Teachers' Background

	Years of experience	Average GPA	Average EOC	Common Beliefs Score
Teacher A	11	2.40	402	22
Teacher B	15	2.35	399	21
Teacher C	29	2.25	408	23
Teacher D	23	2.20	404	25
Teacher E	8	2.21	399	19
Teacher F	6	2.65	398	21
Means	15	2.34	401.6	21.83

Once all the teachers were identified, they completed an agreement and consent to participate in the research study. The researcher met with each of the teacher participants at their school and they completed the consent form. A total of 6 teachers were recruited for the study and were divided into two comparable groups of three. The first group (group A) became the control group and was composed of three teachers who did not receive CRT training. The second group (group B) became the treatment group and was composed of three teachers who

were trained to use CRT. Teachers in group B received appropriate training on how to use CRT during eight 2-hour sessions. These sessions started 3 weeks before the beginning of the implementation of CRT. The teacher training sessions took place on weeks 1, 2, 3, 5, 8, 10, 13, and 15. For a period of 14 weeks, the students in the experimental group received CRT as implemented by their teachers who received CRT training. The control group continued to receive typical instruction from their teachers (See Appendix B).

The researcher conducted eight training sessions with the treatment group teachers over a period of 17 weeks. This training period overlapped the implementation period. These sessions lasted approximately 2 hours each. During the first teacher training session, the researcher worked with teachers to identify cultural biases in their classrooms and to develop instructional goals for the classroom. The researcher used the Common Beliefs Survey Tool as a guide to help teachers discover their own biases and beliefs. This tool was used and followed as suggested by the guidelines established by the Project of Southern Poverty Law Center (2013). During the second session, the teachers and the researcher continued to discuss their own biases and beliefs and began to examine the curriculum to determine changes to meet the cultural needs in their own classrooms.

One of the key components of using CRT is to getting to know the students as individuals and how they are part of a larger cultural group. Teachers realized that although they thought they knew their students, they possessed

limited knowledge about their students' lives outside the school. During session discussions, teachers became conscious that their knowledge about the students was very limited and in some cases, the teachers knew only the students' first names. In an effort to get to know the students, one teacher for example, assigned students to develop a paper avatar that represented who they were. These paper dolls were then used to decorate one of the classroom walls. The student's personality and cultural background was evident in each paper doll. The students used symbols to represent their likes such as music, sports, hobbies, their home life. Students even added a background image to their paper that showed their home and the rest of the family members. During one of the teacher observations, the researcher was able to identify some of the students by using the paper dolls. As a result of the teachers' effort to get to know the students, one male teacher reported that his students began to show more interest in his lessons and that he noticed that they were more engaged in class discussions by asking questions and raising their hands to share answers or procedures on how they arrived to the solution.

Although there were some similarities in the makeup of the classrooms, the teachers noticed that their groups of students were different and some of the changes to the curriculum would not be the same for all classrooms. For instance, when planning to use locations that students were familiar with, since the schools were not located in the same area of the city, the teachers needed to change the wording around in an attempt for the students were familiar with a given location.

During the third session, the teachers began to reflect on and engage in multiple discussions about the changes taking place in their classrooms. These conversations took about 30 to 40 minutes of each session and then continued to collaborate and develop appropriate culturally responsive curriculum. Another teacher decided to add a “welcome” floor mat to her class to make her classroom more welcoming to her students. The next 4 sessions revolved around the changes in the curriculum and the implementation of CRT. The last training session focused on reflecting on how the changes implemented in the classroom have affected their classroom. Appendix C contains detailed teacher sessions’ agendas.

Teacher observations were made throughout the implementation period to assess teacher fidelity of CRT implementation and included a second observer. The second observer was a teacher, who was not part of the study and was selected by the researcher. The second observer followed the same observation guidelines following a fidelity checklist. Both observers used the same observation tool to make sure they both were in agreement as to how to use the form. To achieve a substantial agreement (0.61 – 0.80) level of inter-reliability accuracy between the researchers, both observed other teachers who were not part of the study until the expected inter-reliability accuracy was attained. Before the observation, the researcher and the second observer discussed the goal of the observation and what the researcher was looking for. An inter-rater reliability analysis using the Kappa statistics was performed to determine consistency

among raters (Koch, 1977). The two raters conducted a total of six observations for both the control and the experimental group and each of the observations focused on a targeted area of CRT (e.g., relevant material, relevant examples, student knowledge), which was only known to the observers. These observations scores were later used to determine the level of teacher cultural consciousness.

At the end of the implementation period, the researcher met with both groups and all teachers completed the Culturally Responsive Teaching Guide and Self-Assessment for Educators the results of this Likert scale self-assessment yield the Culturally Responsive Teaching score (CRAS). The students in both groups completed the Mid-Year Assessment as per the district guidelines and schedule. The Algebra I achievement of all students was compared using the students' scores on the Algebra I Mid-Year Assessment and all students also took part in a survey to measure their self-efficacy in Algebra I. The results from both groups were compared to see if the treatment group scored higher the experimental group and the control group.

Data Collection

In this section, the researcher describes all the procedures used to collect the data. The researcher describes the survey instrument and the procedures used to collect data.

Instruments

Mid-Year Assessment (MYA). For the purpose of this study, "MYA assessments are computer-based, criterion-referenced assessments that

measure the Next Generation Sunshine State Standards for specific courses, as outlined in their course descriptions or the purpose of increasing student achievement and improving college and career readiness" (FLDOE, p iv).

Common Beliefs Survey Tool. This survey was developed by A Project of the Southern Poverty Law Center (Griner & Stewart, 2012). This survey helps identify several beliefs about teaching diverse students that are often expressed by school personnel.

Mathematics Self-Efficacy Survey (MSES). Developed by Nancy Betz and Gail Hackett (1983), this survey measures beliefs regarding ability to perform various math related tasks and behaviors and has been independently validated by Pajares & Kranzler (1997) with coefficient alphas ranging from .72 to .96 (Betz & Hackett, 1993).

Culturally Responsive Mentoring and Coaching Tool Part 2 (TOB). This comprehensive tool was developed to be used in multiple applications. Any of the three parts can be used alone. For the purpose of this study, the researcher used the Part 2 of the Observation Tool (Appendix D). Part 2 of the Observation Tool highlights classroom environment, instruction, and interactions in a Likert scale format (Sobel & Taylor, 2004). The developers of this tool conducted the research to establish reliability and they found that the tool is reliable; however, these results have not been published (personal communication on September, 2016 with Dr. Sobel, one of the tool developers).

A Culturally Responsive Teaching Guide and Self-Assessment for Educators (CRAS). This tool was designed to be used by "people at various levels within the school systems: general education teachers, special education teachers, administration, instructional support staff, parents, family, and related community members of RCELD students" (Griner & Stewart, 2012, p. 602).The CRAS self–assessment tool was developed for school personnel to engage in reflective, culturally responsive practice. It was modified from its original format to a Likert scale format. The researcher contacted Dr. Griner's and obtained her permission to use and modify the tool. Additionally, the developers of the tool have not established reliability.

Quantitative Data Analysis

In the present study, the researcher used a general linear model to conduct an analysis of covariance to test for treatment differences when controlling for teacher differences with the use of person vectors. All of the analyses were conducted with IBM SPSS 22 version. The general linear model was chosen to see if the use of CRT has an effect on students' achievement independent of the teacher's cultural consciousness differences.

The researcher used person vector coding to represent the students' membership to their Algebra I teacher's classroom with the purpose of controlling for the variability of the Algebra I teacher. The person vector coding is a binary code used to avoid inconsistency between the research question and the

appropriate model to test the research questions, which is known as a Type VI Error (Newman, Frass, Newman, & Brown, 2002).

The researcher used descriptive, and inferential statistics. The researcher used the General Linear Model (GLM) with a person vectors to test the study's research hypothesis as this statistical procedure has flexibility and benefits. The researcher used an *F* test to decide if the R^2 of the full and restricted models were significantly different at the alpha of .05 for the directional hypothesis (Newman, Benz, Weis, & McNeil, 1997). The R^2 coefficient allowed the researcher to determine the proportion of the variance of the dependent variable that is accounted for by group membership.

To ensure an adequate statistical power and effect size of the research results, the researcher conducted a prospective power analysis to determine the sample size of students needed for the study (Peng, Long, & Abaci, 2012). According to Hinkle, Wiersma and Jurs (2002), for a research design with two groups, 29 students are needed for each group to have a statistical power of .80 and an effect size of .75 at $\alpha = .50$. Therefore, 58 students in total were needed for this study. A total of 63 students were recruited to participate in the study.

After completing the CRT intervention phase, to find if the mean achievement score was statistically higher for CLD students with SLD who received CRT than those who did not receive CRT, the Mid-Year Assessment was gathered for students in both control and treatment groups. The researcher tested the Full Model and the Restricted Model when controlling for differences in

teacher's cultural consciousness. Each student was coded according to his or her teacher group membership. The researcher used the scores on the Algebra I Mid-Year Assessment as the dependent variable. Using the R^2, the researcher ran an *F* test to find significant differences between the means of students' scores on the Algebra I MYA by teacher group membership and answer if the use of CRT can account for a higher mean achievement score (McNeil, Newman, & Fraas, 2012).

Then, to determine if there was a statistically higher self-efficacy score for self-efficacy of CLD students with SLD who received CRT as compared to CLD students with SLD who did not experience CRT, the researcher used person vectors to identify the membership of each student to his or her Algebra I teacher. The researcher conducted one-way analysis of variance and used the scores from the *MSES* as the dependent variable and the Algebra I MYA scores as the independent variable.

To answer the third question and find if there is a significant amount of variance in predicting students' performance when controlling for Algebra I teachers' level of cultural consciousness, the researcher used the same steps but used *CRAS* as the covariates. The researcher tallied the teachers' responses on the *CRAS* and obtained a *CRAS* score. To obtain the TOB score, the researcher tallied the number of times each behavior was observed over during the observation period (30 minutes each time) and then summed these scores. To answer the fourth question, the researcher conducted a two-way factorial

ANOVA to test the main effect of each independent variable. To test the interaction between students' self-efficacy as measured by *MSES* and the effectiveness of CRT training as measured by their total level of cultural consciousness, the researcher used as the independent variables the *MSES*, the teachers' total level of cultural consciousness score (TCS), and the CLD students with SLD's Algebra I MYA score. To obtain the TCS, the researcher used the sum of the TOB score and the CRAS scores. The results of this analysis are reported in Chapter 4.

Summary

This chapter began by reviewing the problem and purpose of this study and establishing the research questions. The researcher then described in detail the research design of this study and the reasons for choosing a control-treatment pre-post study. As this study sought to find if there was a significant statistical difference in Algebra I performance between CLD students with SLD who received CRT and those who did not, the researcher had a control group and an experimental group. After selecting the teachers in the experimental group, the researcher trained these teachers to implement CRT in their Algebra I classes. The researchers then explained the procedures for collecting the data and provided an explanation of the statistical procedures that were used to analyze the data in order to answer the research questions.

CHAPTER IV

RESULTS

This study examined the use of CRT with CLD students with SLD to find out if it increased academic performance in Algebra I courses. In this chapter, the researcher presents the findings of the study. The researcher begins with presenting the research questions and hypotheses, and then presents the results of the data.

Research Questions

As outlined in the previous chapter, the researcher sought to answer the developing knowledge by answering the following research questions:

1. Does receiving instruction from teachers who have received CRT training enhance the academic performance of CLD students with SLD in Algebra I courses as measured by the *Algebra I Mid-Year Assessment*?
2. Does receiving instruction from teachers who have received CRT training enhance the self-efficacy of CLD students with SLD in Algebra I courses as measured by the *Mathematics Self-Efficacy Survey* (MSES)?
3. After controlling for teachers' level of cultural consciousness, does training in CRT account for a significant amount of variance in predicting students' Algebra 1 performance as measured as measured by the *Algebra I Mid-Year Assessment*, *Culturally Responsive Teaching Guide and Self-Assessment for Educators* (CRAS), and by *Culturally Responsive Mentoring and Coaching Tool Part 2 (TOB)*?

4. Is there an interaction between receiving training in CRT and students' self-efficacy in predicting Algebra I performance of CLD students with SLD's achievement as measured by the *Mathematics Self-Efficacy Survey* (MSES), and the teachers' total cultural consciousness (TCS)?

Hypotheses

Hypothesis 1. The achievement score will be significantly higher for CLD students with SLD who receive CRT than for CLD students with SLD who do not receive CRT as measured by the *Algebra I Mid-Year Assessment*.

Hypothesis 2. The self-efficacy score will be significantly higher for CLD students with SLD who received CRT than for CLD students with SLD who did not receive CRT as measured by the *MSES*.

Hypothesis 3. Students whose teachers have received CRT training will score higher on the *Algebra I Mid-Year Assessment* than students of teachers who have not received CRT training when controlling for teachers' level of cultural consciousness as measured as measured by the *Algebra I Mid-Year Assessment*, CRAS*,* and by *Culturally Responsive Mentoring and Coaching Tool Part 2 (TOB)*.

Hypothesis 4. There is an interaction between receiving CRT training and CLD students with SLD's self-efficacy in predicting Algebra I performance of CLD students with SLD's Algebra I achievement as measured by the *MSES* and the teachers' total cultural consciousness (TCS).

Test of Hypotheses

Before testing the hypotheses, the researcher conducted an inter-rater reliability analysis between the two observers. The inter-rater reliability analysis was done using the Intraclass Correlations (ICC) and the coefficients were .91. This suggests that the two observers had a strong consistency when conducting teacher observations. These teacher observations were done by using the *Culturally Responsive Mentoring and Coaching Tool Part 2 (TOB) and* were later used to determine part of the teachers' culturally responsive consciousness. To obtain the combined TOB score, the researcher found the average between the teacher observation scores of each of the raters for each of the Algebra I teachers.

Additionally, in this study, the researcher us ed Cronbach's alpha to find the reliability coefficients for the MSES, which were .99. This result suggests that the instrument was found to be highly reliable.

Hypothesis #1: The achievement score will be significantly higher for CLD students with SLD who received CRT than for CLD students with SLD who did not receive CRT as measured by the Algebra I Mid-Year Assessment.

The descriptive statistics associated with CLD students with SLD's MYA scores across the control group and the treatment group are reported in Table 8. It can be seen that control group had a lower numerical mean (M = 31.5) and treatment group two had a higher numerical mean (M = 44.7).

Table 8

Means and Standard Deviations on Algebra I Mid-Year Assessment (MYA)

Group	*M*	*SD*	*n*
Control	31.5	7.8	32
Treatment	44.7	9.7	31
Total	37.9	10.9	63

The assumption of homogeneity of variances was tested and it was satisfied based on the Levene's *F* test, $F(1,61) = .68$, $p = .413$ (see Table 9).

Table 9

Levene's Test of Equality of Error Variances: Mid-Year Assessment

F	df1	df2	Sig.
.678	1	61	.413

A one-way analysis of variance (ANOVA) was conducted to evaluate the students' Algebra I MYA scores differences between the treatment and control group. The independent variable was the fixed factor group (control group and treatment group). The dependent variable was the students' Algebra I MYA scores. As noted in Table 10, differences were found between groups at $\alpha = .05$ level of significance, $F(1, 61) = 35.48$, $p < 0.001$. The strength of the relationship, as assessed by partial η^2 was strong, with the group factor accounting for 37% of the variance of the dependent variable. These results

suggest that using CRT to teach Algebra I to CLD students with SLD has a significant effect on their achievement level on the Algebra I MYA. Therefore, it can be said that the first hypothesis was supported.

Table 10

ANOVA: Mid-Year Assessment

Source	df	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	1	2747.19	35.48	$p < 0.001$	.37
Intercept	1	91299.26	1179.24	$p < 0.001$	.95
Group	1	2747.19	35.48	$p < 0.001$	.37
Error	61	77.422			
Total	63				
Corrected Total	62				

Hypothesis #2: The self-efficacy score will be significantly higher for CLD students with SLD who received CRT than for CLD students with SLD who did not receive CRT as measured by the *Mathematics Self-Efficacy Survey (MSES)*.

The descriptive statistics associated with CLD students with SLD's MSES scores across the control group and the treatment group are reported in Table 11. It can be seen that the control group had a lower numerical mean (M = 108.13) and the treatment group had a higher numerical mean (M = 161.26).

Table 11

Descriptive Statistics: Students' Mathematics Self-Efficacy Survey (MSES)

Group	Mean	Std. Deviation	N
Control	108.13	22.93	32
Treatment	161.26	40.57	31
Total	134.27	42.15	63

The assumption of homogeneity of variances was tested and based on the Levene's F test, F (1,61) = 13.9, p < 0.001 (see Table 12).

Table 12

Levene's Test of Equality of Error Variances[a]: Student Mathematics Self-Efficacy Survey (MSES)

F	df1	df2	Sig.
13.901	1	61	p < 0.001

The Levene's test of homogeneity showed that the two groups were significantly different. To further analyze this, the researcher ran an independent

sample test. An independent sample *t*-test (Table 13) was performed to check the significance equal variance assumed via the Levene's F test, F (1, 61) = 13.09, p < 0.001. This shows that even when the significance level was not assumed, the significance level is less than α = .05.

Table 13

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% CI	
		F	*Sig.*	*t*	*df*	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Student MSES	Equal variances assumed	13.9	p < 0.01	-6.43	61	p < 0.01	-53.13	8.27	-69.67	-36.60
	Equal variances not assumed			-6.37	47.08	p < 0.01	-53.13	8.34	-69.91	-36.36

A one-way analysis of variance (ANOVA) was conducted to evaluate the differences between the control group and treatment group and the students' MSES scores. The independent variable was the fixed factor group (control group and treatment group). The dependent variable was the students' MSES scores. The students' MSES score was obtained at the end of the implementation period and it was given to all student participants over the course

of two days. As noted on Table 14, differences were found between groups at α = .05 level of significance, F (1, 61) = 41.28, p < 0.001. The strength of the relationship, as assessed by partial η^2 was strong, with the group factor accounting for 40% of the variance of the dependent variable. These results suggest that as stated on hypothesis 2, CLD students with SLD who received CRT in Algebra I had a higher mathematics self-efficacy score than CLD students with SLD who did not receive CRT in Algebra I. Therefore, it can be said that hypothesis two was supported.

Table 14

ANOVA: Mathematics Self-Efficacy Survey (MSES)

Source	df	Mean Square	*F*	Sig.	Partial Eta Squared
Corrected Model	1	44452.99	41.28	p < 0.01	.40
Intercept	1	1142645.99	1061.17	p < 0.01	.95
Group	1	44452.98	41.28	p < 0.01	.40
Error	61	1076.78			
Total	63				
Corrected Total	62				

Hypothesis #3: Students whose teachers have received CRT training will score higher on the *Algebra I Mid-Year Assessment* than students of teachers who have not received CRT training when controlling for teachers' level of cultural

consciousness as measured by *A Culturally Responsive Teaching Guide and Self-Assessment for Educators (CRAS),* and by *Culturally Responsive Mentoring and Coaching Tool Part 2 (TOB)*.

The descriptive statistics associated with the CLD students with SLD's MYA scores across the control group and the treatment group are reported in Table 10 (same as question 1). It can be seen that group one had a lower numerical mean (*M* = 31.47) and group two had a higher numerical mean (*M* = 44.68). The assumption of homogeneity of variances was tested and it was satisfied based on the Levene's *F* test, *F* (1,61) = .34, *p* = .56 (see Table 15).

Table15

Levene's Test of Equality of Error Variances[a]*:* Mid-Year Assessment (MYA)

F	df1	df2	Sig.
.34	1	61	.56

An ANCOVA was conducted to evaluate the differences between the treatment and control group in the students' MYA scores when controlling for teacher's cultural consciousness by using first the total cultural consciousness score (TCS). These score was obtained by combining the teachers' observations score (TOB) and the teachers' *CRAS* score. The independent variable was the fixed factor group (control group and treatment group). The dependent variable was the students' MYA scores. As noted in Table16, differences were found between groups at α = .05 level of significance, F (1, 61) = 9.98, p = .02. The strength of the relationship, as assessed by partial $\eta 2$ was moderate, with the

group factor accounting for 14% of the variance of the dependent variable. However, TCS was not a significant predictor of the group differences in the Algebra I MYA assessment at a α = .05 level of significance, F (1, 61) = .14, p = .71. The strength of the relationship, as assessed by $\eta 2$ was weak, with the group factor accounting for less than 1% of the variance of the dependent variable. These results suggest that the group had a significant effect on the CLD students' Algebra I MYA but the level of teachers' cultural consciousness did not have a significant effect on the CLD students' Algebra I MYA (see Table 16) Therefore, it is suggested that hypothesis three was not supported.

Table 16

ANCOVA: Teachers' Total Level of Cultural Consciousness Score (TCS)

Source	*df*	*F*	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power[b]
Corrected Model	2	17.56	p < 0.01	.37	35.12	1.00
Intercept	1	2.18	.15	.04	2.18	.31
TCS	1	.14	.71	.00	.14	.07
Group	1	7.45	.01	.11	7.45	.77
Error	60					
Total	63					
Corrected Total	62					

To further understand why there is a difference in the CLD students with SLD's Algebra I MYA scores between the control and the treatment groups, but teachers' level of cultural consciousness as measured by the TOB and CRAS has no effect on the difference, the researcher conducted an ANCOVA. The ANCOVA was to evaluate if TOB or CRAS as a single covariance predicts MYA achievement scores of the CLD students with SLD. First, an ANCOVA was conducted using the MYA achievement score as the dependent variable, group as the fixed factor, and the teachers' CRAS scores as the covariance. As noted on Table 17, CRAS did not have a significant effect on the students' Algebra I MYA a α = .05 level of significance, F (1, 60) = .11, p = .75, even though group is still significant at α = .05, F(1,60) = 12.52, p < 0.001. This result suggests that the CRAS is an insignificant covariance for the CLD students' Algebra I MYA scores.

Table 17

ANCOVA: Culturally Responsive Teaching Guide and Self-Assessment for Educators (CRAS)

Source	*df*	Mean Square	*F*	Sig.
Corrected Model	2	1377.80	17.54	p < 0.01
Intercept	1	588.63	7.49	.008
CRAS	1	8.40	.11	.745
Group	1	983.66	12.52	.001
Error	60	78.57		
Total	63			
Corrected Total	62			

Then a second ANCOVA was conducted using the MYA achievement score as the dependent variable, group as a fixed factor, and the teachers' TOB scores as the covariance. As noted on Table 18, TOB did not have a significant effect on the students' Algebra I MYA a α = .05 level of significance, F (1, 61) = .16, p = .69. This result also suggests that TOB had an insignificant covariance in the CLD students' Algebra I MYA scores.

Table 18

ANCOVA: Culturally Responsive Mentoring and Coaching Tool Part 2 (TOB)

Source	*df*	Mean Square	*F*	Sig.
Corrected Model	2	1379.95	17.58	p < 0.01
Intercept	1	80.23	1.02	.32
TOB	1	12.70	.16	.69
Group	1	345.20	4.40	.04
Error	60	78.50		
Total	63			
Corrected Total	62			

The researcher then conducted a one-way analysis of variance (ANOVA) to evaluate if CRAS has a direct effect on the differences between the groups on the students' MYA scores. The independent variable was the fixed factor teachers' CRAS scores. The dependent variable was the CLD students with SLD's Algebra I MYA scores. As noted on Table 19, differences were found between teachers when looking at their CRAS scores and the CLD students with

SLD's Algebra I MYA scores at α = .05 level of significance, F (1, 61) = 6.63, p<0.001. These results suggest that their CRAS scores are a significant predictor of CLD students with SLD's Algebra I MYA scores.

Table 19
ANOVA: Culturally Responsive Teaching Guide and Self-Assessment for Educators (CRAS)

Source	*df*	Mean Square	*F*	Sig.
Corrected Model	4	586.03	6.63	p < 0.01
Intercept	1	87610.43	991.33	p < 0.01
CRAS	4	586.03	6.63	p < 0.01
Error	58	88.38		
Total	63			
Corrected Total	62			

A second one-way analysis of variance (ANOVA) was then conducted to evaluate if TOB had a direct effect on the differences between the groups on the students' MYA scores. The independent variable was the fixed factor teachers' TOB scores. The dependent variable was the CLD students with SLD's Algebra I MYA scores. As noted in Table 20, differences were found between teachers when looking at their TOB scores and the CLD students with SLD's Algebra I MYA scores at α = .05 level of significance, F (1, 61) = 8.64, p < 0.001. These

results also suggest that teachers' TOB are a significant predictor on CLD students with SLD Algebra I MYA scores.

Table 20

ANOVA: Culturally Responsive Mentoring and Coaching Tool Part 2 (TOB)

Source	*df*	Mean Square	*F*	Sig.
Corrected Model	4	697.34	8.64	$p < 0.01$
Intercept	1	64732.90	802.15	$p < 0.01$
TOB	4	697.34	8.64	$p < 0.01$
Error	58	80.70		
Total	63			
Corrected Total	62			

Hypothesis #4: There is an interaction between receiving CRT training and CLD students with SLD's self-efficacy in predicting Algebra I performance of CLD students with SLD's Algebra I achievement as measured by the *Mathematics Self-Efficacy Survey* (MSES) and teachers' total cultural consciousness (TCS).

A two-way factorial ANOVA was conducted to test the main effects of each independent variable. The independent variables were *Mathematics Self-Efficacy Survey* (MSES) and teachers' total cultural consciousness (TCS) score and the independent variable was the CLD students with SLD's Algebra I MYA score. This test was conducted to find out if there was an interaction between the independent variables, that is, if there is an interaction of the effect of one

independent variable on the dependent variable in the same across all levels of the other independent. As seen in Table 19, the TCS is insignificant at α = .05, F (1, 61) = .80, p = 0.58. For the MSES at α = .05 level of significance, F (1, 61) = .76, p = 0.74. The p-value of the main effects of MSES of .738 suggests that the effect is insignificant. For the interaction of MSES and TCS at α = .05 the level of significance, F (1, 61) = .74, p = 0.69. Therefore, it can be concluded that the interaction is not significant and the effect of MSES and TCS on the students MYA is not the same and hypothesis four was not supported.

Table 21

Two-way Factorial ANOVA: Interaction - Mathematics Self-Efficacy Survey (MSES) and teachers' total cultural consciousness (TCS)

Source	*df*	Mean Square	*F*	Sig.
Corrected Model	54	124.05	1.29	.38
Intercept	1	71644.96	743.34	p < 0.01
TCS	5	77.58	.81	.58
MSES	38	72.86	.76	.74
TCS * MSES	11	70.99	.74	.69
Error	8	96.36		
Total	63			
Corrected Total	62			

Summary

The chapter began with a discussion of the research questions and then the research hypotheses. The researcher conducted a one-way ANCOVA, with a significance set at a α=0.05 to analyze the first three hypotheses of this study. The results of the ANCOVA revealed that using CRT to teach Algebra I to CLD students with SLD had a significant effect on their achievement level on the Algebra I MYA. However, there were no significant differences when covarying for teachers' level of cultural consciousness. Further testing revealed that that teachers' level of cultural consciousness based on both teachers' observations scores and their cultural responsive self-assessment had a direct effect on students' Algebra I achievement. Additionally, a two-way factorial ANOVA was conducted to find if there was an interaction between the students' *MSES* and teachers' TCS score and the independent variable was the CLD students with SLDs' Algebra I MYA score. The results revealed that there was no interaction. These results are discussed in detail in Chapter 5.

CHAPTER V

DISCUSSION AND RECOMMENDATIONS

In this chapter, the researcher presents a discussion of the findings, conclusions, and limitations of the study. The chapter concludes with implications for the field and recommendations for future research.

Discussion of the Results

The aim of this study was to determine if the use of CRT with CLD students with SLD would increase the achievement level in Algebra I when compared to traditional teaching of teachers who did not receive CRT training. Although currently there is limited literature on empirical research that examines the use of CRT to teach mathematics to CLD students with SLD, there is evidence that when using CRT to teach CLD students, academic performance increases (Gay, 2010, Ladson-Billings, 2000; Moses, 2001; Stein el al., 2011; Terry, 2010). Furthermore, Lipka et al., (2005, 2007) indicated how CLD students' academic performance and engagement increased when using of CRT to teach mathematical procedures. Due to the disproportionate representation of CLD students with SLD (Harry & Klingner, 2104) and the increasing number of CLD students with SLD receiving academic instruction in the general education setting (Santamaria, 2009) there is a need to investigate successful teaching practices to increase these students' mathematics academic performance (Maccini, Mulcahy, & Wilson, 2007; Witzel, 2005). Moreover, due to the demand to show proficiency in Algebra I as one of the high school graduation requirements (ESSA,

2015; Maccini & Gagnon, 2000), these students need to meet; there is a need to determine if the use of CRT with CLD students with SLD will increase the level of achievement in Algebra I (Shealey, et al., 2011).

This study sought to examine if the use of CRT with CLD students with SLD increased academic performance in Algebra I courses. Three 9th grade Algebra I teachers who were trained to use CRT were in the treatment group and taught a total of 31 CLD students with SLD who were the student participants; three Algebra I teachers who did not receive CRT training were in the control group and they taught a total of 32 CLD students with SLD. To answer hypothesis 1, the researcher conducted a two-way Analysis of Variance (ANOVA) to analyze the data. The fixed factors were the control and treatment groups and the dependent variable was the CLD students with SLDs' scores on the Algebra I MYA. The present study revealed a significant difference between the treatment group and control group at α = .05 level of significance, $F(1, 61) = 35.48$, $p < 0.001$ in the Algebra I MYA achievement scores. CLD students with SLD whose teachers participated in CRT training achieved higher scores in the Algebra I MYA than CLD students with SLD whose teachers were in the control group and did not participate in the CRT training. As in Gutstein (2003), CLD students whose teachers use CRT when teaching mathematics increased their academic achievement. Similar results were reported by Shumante et al. (2012); in their study five Latino middle school students with SLD showed gains in mathematics achievement when using culturally responsive instruction. Gutstein

(2003), Shumante, et al. (2012) and this study result's supports the idea that CLD students with SLD who receive CRT in Algebra I may increase their academic achievement in Algebra I.

To test hypothesis 2, the researcher also conducted a two-way Analysis of Variance (ANOVA) to analyze the data. The fixed factors were the control and the treatment groups and the dependent variable was the CLD students with SLDs' scores on the *Mathematics Self-Efficacy Survey (MSES).* The data analysis revealed a significant difference between the treatment group and the control group at α = .05 level of significance, $F(1, 61) = 41.28$, $p < 0.001$. CLD students with SLD whose teachers participated in CRT training received higher scores on the *MSES* than those CLD students with SLD in the control group. Therefore, it can be said that using CRT to teach Algebra I to CLD students with SLD is a significant predictor of their Algebra I achievement. Similar findings were reported in a study by Kelley et al., (2015). Kelley and colleagues sought to investigate the relationship between culturally responsive teaching in reading to seventh grade CLD students and their self-efficacy beliefs in reading. Their study found a significant increase in self-efficacy scores when using culturally responsive readings. As Siwatu (2009, 2011) indicates, the use of CRT with CLD students has the potential to increase their self-efficacy in one academic domain and could translate to a higher self-efficacy on other academic domains leading to a higher academic achievement. This is consistent with Hoy et al. (2006) who have indicated that there is relationship between culturally responsive teaching

and self-efficacy beliefs. Similar to the results of this study, Marchant, et al. (2001) found that academic self-efficacy among middle school CLD students was a significant predictor of academic achievement.

Before discussing the results of hypothesis 3, it is important to first review the framework of this study, which is based on the use of CRT to increase Algebra I performance. The use of CRT in the classroom consists of the teacher capitalizing on their students' rich cultural backgrounds to present new information regardless of the academic domain (Gay, 2010; Ladson-Billings, 2000; Nieto,1999). However, due to limited exposure of teachers to diverse communities, many are not prepared to work with students who are not from the White, middle class communities (Cochran-Smith & Fries, 2005; Seidl, 2007). It is important to note that teachers have reported that they lack preparation to work with CLD students as they have received limited preparation on how to meet the needs of diverse children (Voltz, Brazil, & Scott, 2003). However, teachers who do receive training have reported that they feel more comfortable making changes to their lessons to include CRT in their classroom routines (Culp & Chepyator-Thomson, 2011).

As seen in previous studies (Lipka, 2005, 2009), when CLD students are taught mathematics and moreover Algebra as in the Algebra Project (Moses & Cobb, 2001), learning mathematics becomes more meaningful and the CLD students' academic achievement increases. Therefore, it is important to prepare teachers to work with CLD populations and for teachers to learn how to take into

account the students' rich cultural backgrounds and incorporate this into the curriculum (Villegas & Lucas, 2002).

Contrary to the literature and as shown on Table 17, the results of this study show that the Algebra I teachers' level of cultural consciousness did not have a significant effect of CLD students with SLDs' performance on the Algebra I MYA. These results do not support previous studies; it may be said that the teachers' level of cultural consciousness in this study may not have had enough time develop a deeper cultural consciousness level. However as discussed earlier, the results of the research show that there is a significant difference in the CLD students with SLDs' Algebra I MYA scores between the control and the treatment group. Nevertheless, when looking at the TOB or CRAS scores independently, as predictors on the students' Algebra I MYA, the results on Tables 19 and 20 show that both had a direct effect on the students' Algebra I MYA achievement scores.

One may interpret that teachers' self-reporting their cultural consciousness may not be a good measure to show or measure CRT evidence. Naqvi, et al. (2013) found that when they looked for evidence of CRT in mainstream classes, a low percentage of the teachers actually implemented and showed evidence of CRT. Teachers' perception on how to implement CRT and teachers' self-reporting may not be as precise or may not be as accurate as when a third party observer or even the students in the class identify CRT characteristics used in a classroom.

To answer the fourth and last question, the researcher sought to find if there was an interaction between receiving CRT training and CLD students with SLDs' self-efficacy in predicting Algebra I performance of CLD students with SLDs' Algebra I achievement. Contrary to what was expected (Kress, 2005; Moses & Cobb, 2001) the researcher found no significant difference; therefore, it cannot be said that the interaction of CRT training and the CLD students with SLDs' self-efficacy scores are a significant predictor of the students' Algebra I MYA achievement scores. It can be said, however, that although teachers received CRT training, they too might have missed teaching opportunities in their classrooms to address students' differences as McIntyre and Hulan (2013) found in their studies. These researchers examined videos of how teachers implemented the research-based reading instruction and CRT and reading curriculum over a yearlong study and found that although teachers attempted to use CRT in the class and in their lessons, they lacked the ability to recognize some differences in the classroom. It can also be said that perhaps teachers needed more time to digest and reflect on their teaching practices as suggested by Taylor and Sobel (2011).

Limitations

There are several limitations to this study that must be discussed. Although the length of the study was 17 weeks long, it is possible that a longer period of CRT implementation may have generated different test results. Ideally, all teachers who participated in the treatment group received the same training

and implemented the same level of culturally responsive teaching in the classroom. Some teachers may have had more experience using CRT and therefore had an unfair advantage over the teachers who implemented CRT for the first time after completing the training. One can speculate that the limited amount of time for teachers to prepare, to develop, and to reflect on their own CRT practices and teaching materials may have impacted this study's results. As teachers learn to recognize opportunities to use CRT in the classroom, the students' mathematics self-efficacy scores may increase as well as their Algebra I academic performance.

Another limitation to consider is that the researcher was able to report what teachers did in the classroom based on what the teachers did during the observation periods and what teachers self-reported on the CRAS tool. Some teachers in the control group may have implemented culturally responsive teaching similar to those in the treatment group or may perceive their own practices more or even less culturally responsive as they self-reported on the CRAS tool. For example, both groups of teachers demonstrated to use rich print to decorate the classroom that was cultural relevant to the students. The use of a self-reporting tool may have influenced the results of the data analysis as some teachers may have answered the questions in a more favorable or socially desirable way. Students also used a self-reporting tool, *MSES*, which was used to measure their mathematics self-efficacy. The students' responses may or may not be an accurate measure of their self-efficacy as some students may have

answered what they perceived as a desirable answer instead of what they may or may not believe is their true ability.

All CLD students with SLD participants took the Algebra I MYA, however the testing window established by the school district was longer than four weeks long. Therefore, some student participants took the test later than other student participants. Students who took the test at a late date, had more time to prepare for the MYA; this may have skewed the scores on the Algebra I MYA for some of students.

Recommendations for Future Research

The findings of this study have some implications for future research that could extend or confirm the aims of this study. For example, due to the time frame limitations of this study, further long-term studies of the use of CRT to increase CLD students with SLD Algebra I achievement should be conducted. Additional studies focusing on the training in using CRT over an extended period of time with the use of educative mentoring (Feiman-Nemser, 2001) should be considered to investigate if the use of CRT can foster different levels of reflection and the application of CRT with CLD students with SLD. Additionally, the CRT training should be conducted with a larger sample of teachers and mixed methods study should be considered to find the teachers' perceptions on the training itself. Researchers could focus on what makes a successful CRT training and how to develop efficient CRT professional developments for teachers as well as pre-service teachers.

Additionally, future studies should include the documentation of how teachers who are trained to use CRT apply these cultural responsive practices in Algebra I classrooms with CLD students with SLD. It would also be beneficial to the literature to investigate the correlation of CLD students with SLDs' perceptions on how CRT practices are implemented in their Algebra I courses versus what the teachers self-report about the CRT practices as Chung and Dickson (2011) found that the students' perceptions of their teachers' CRT was a strong contributor to academic self-efficacy. While this study looked at students enrolled in ninth grade Algebra I courses, other students are enrolled in Algebra I courses while in other grade levels; therefore, researchers should consider including CLD students with SLD enrolled in Algebra I courses in other grade levels.

While the present study involved teacher preparation to use CRT with CLD students with SLD in Algebra I, Algebra I content specific materials were developed by teachers in the treatment group. Even though the aim of the study was not to create a curriculum framework for teachers to use in the classroom, further empirical researcher on the implementation of this curriculum should be taken into consideration in the aim to close the achievement gap for CLD students with SLD in Algebra I.

Implications for Practice

As Santamaria (2009) claims, the use of CRT when working with CLD students with SLD to increase academic achievement shows potential to close

the math achievement gap. The craft of bringing students' prior knowledge and experiences to the learning experience in order to make the curriculum relevant to the learners has shown significant academic gains (Shumante, 2012; Lipka, et al., 2005; 2007). In this study, teachers in the treatment group were trained in the use of CRT. These teachers were then asked to implement these practices with CLD students with SLD in their Algebra I courses for a period of 17 weeks.

The results of this study show that CLD students with SLD who were in treatment group performed significantly better on the Algebra I Mid-Year Assessment than CLD students with SLD who were in the control group. Additionally, students in the treatment group indicated to have significantly higher mathematics self-efficacy than students in the control group. These results suggest that the use of CRT to close the math achievement gap in Algebra I could be promising.

Although the total teachers' level of cultural consciousness score did not have a significant effect on the students' MYA scores, further data analysis suggested the use of teachers' observations and their self-reported CRT scores were both significant predictors of the CLD students with SLD Algebra I MYA scores. Therefore, researchers should focus on examining what goes on in the classroom through the use of both measures: teachers' observations and teachers' self-reported instruments. Although not reported in this quantitative study, during informal conversations with the teacher participants from the treatment group, teachers felt they benefited from the discussion on using cultural relevant teaching in the classroom as they became more aware and

reflective on their own lessons. These types of discussions should not be limited to schools, but also present in teacher preparation courses.

Summary

In this chapter, the researcher begins by discussing in detail the findings of the study. The researcher also presents the study's limitations, recommendations for future research, and possible implications for the field. The results of this study revealed that use of CRT with CLD students with SLD to increase Algebra I achievement are promising. Therefore, there should be an emphasis on training current teachers to work with CLD students with SLD at the local public schools. It is important to note that for teachers to become cultural responsive, they should be not only exposed to the cultural responsive theory, but they should immerse in deep conversations within their school and communities to learn and understand about their students' culture. Once this takes place, then teachers may perhaps start to effectively implement CRT within their classrooms. Additionally, teacher preparation programs should include CRT to groom pre-service teachers to work with these diverse students.

While in the present study, teachers' level of cultural consciousness had an insignificant covariance on the Algebra I MYA, the teachers' observations and their cultural responsive self-assessment had a direct effect on the results on the CLD students' with SLD Algebra I MYA scores. Therefore, future long-term studies should focus on (a) how Algebra I teachers who have been trained to use CRT are implementing CRT in Algebra I courses, and (b) the correlation between

the teachers' self-assessment and students' perceptions on their teachers' level of cultural consciousness.

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Appendix A

Teacher Survey

1. Name _____
2. Phone: _____
3. Work location _____
4. E-mail _____
5. Highest degree attained _____
6. Teaching assignment for the 2014-2015 academic school year

Periods	Course name	Number of students with learning disabilities
1.	_____	_____
2.	_____	_____
3.	_____	_____
4.	_____	_____
5.	_____	_____
6.	_____	_____

7. Number of years of teaching experience _____
8. Score on IPEGS for the 2013- 2014 academic school year _____
9. Students average GPA during the 2013-2014 school year _____
10. Percent of students passing rate on Algebra EOC for the

2013-2014 school year _____

2012-2013 school year _____

VITA

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1998	B.S., Exceptional Student Education Florida International University
1993-1996	Legal Secretary Law Office of Evan Marks Miami, Florida
1999-2001	ESE Upper Form Teacher The Vanguard School Coconut Grove, Florida
2001-2005	Exceptional Education Teacher Palmetto Middle School Pinecrest, Florida
2005-2009	Special Education Department Chairperson Palmetto Middle School
2006	M.S., Exceptional Student Education Florida International University
2012-2013	Exceptional Education Teacher Palmetto Middle School Pinecrest, Florida
2013	Doctoral Intern Miami Dade College, Exceptional Student Education Miami Florida
2013-2014	Mathematics Teacher Coral Reef Senior High School Miami, Florida
2013-present	Adjunct Lecturer School of Education, Florida International University Miami, Florida

2014-present	Academic Coach School of Education, Florida International University Miami, Florida
2014-present	Mathematics Teacher Coral Reef Senior High School Miami, Florida
2016	Ed.D., Exceptional Student Education Florida International University

PUBLICATIONS AND PRESENTATIONS

Blanton, L. P., Boveda, M., Munoz, L., & Pugach. (2016). The affordances and constraints of special education initial teach licensure policy for teacher preparation. *Teacher Education and Special Education. Advanced online publication* doi:10.1177/0888406416665449

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2015 Bunos, L & Pellegrini-Lafont, C. How Prepared do general education pre-service teachers feel to teach divers learners after completing an introductory course. Annual Conference of the Teacher Education Division, Phoenix, Arizona.

2015 Munoz, L. Using culturally responsive instruction with culturally, linguistically and ability diverse students with disabilities to increase performance in Algebra I. Annual Conference of the Council for Exceptional Children, San Diego, Ca.

2013 Blanton, L.P., Pailokas, K., Boveda, M. & Munoz, L. The Multiple-Structures and Mixed Messages of Initial Teacher Licensure Policy in Special Education: Recommendations to States. Annual Meeting of the American Educational Research Association, San Francisco, Ca.

2012 Pellegrini-Lafont, C. & Munoz, L. The impact of culturally diversity and disability on the decision to drop out of school. Annual Conference of the Council for Exceptional Children, DDEL Division, Denver, Co.