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The Effects of Combining Looping, Cognitively Guided Instruction, and Ethnicity: How They Can Collectively Improve Academic Achievement

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The Effects of Combining Looping, Cognitively Guided Instruction, and Ethnicity: How They Can Collectively Improve Academic Achievement

A dissertation submitted in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy in Curriculum and Instruction

by

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August 2014
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Abstract

The purpose of this quantitative study is to gain an understanding of the powerful instructional potential of combining the practice of looping, Cognitively Guided Instruction (CGI) professional development strategies, and the impact these practices have in addition to ethnicity in elementary education. The study focused on research questions pertaining to student's Measure of Academic Progress (MAP) scores and the implementation of looping, CGI strategies, and how ethnicity impacted student achievement.

This study emphasizes two types of statistical tests to determine how significant CGI and looping practices impacted growth in mathematics on the MAP test for different ethnic groups. A Chi-Square statistic was used not to support that the hypothesis is correct, but rather to determine if there is an association between the different groups from each variable category (e.g., looping, CGI training, and ethnicity). A logistic regression was used to determine the odds ratio (or probability) of the response variable (MAP growth) occurring with a combination of explanatory variables (e.g. looping, CGI training, and ethnicity). The population established in this study was all students in grades K – 5 that were representative of a stable history in the school district. A sample of the population was finalized at 1,103 students, and this number of K – 5 students represented a consistent and stable presence in the school district over the past three years. The results of the statistical analysis suggest CGI is significant with helping students achieve growth in mathematics on the MAP test—especially with Hispanic students.

Acknowledgements

For Dr. Michael Wavering, it was your class of Instructional Theory, and my first doctoral class, that challenged me to look at the practice of looping and the possibilities it would provide for students from elementary to secondary. Thank you for taking me on as a candidate after an uncharacteristic comps defense and post comps experience. I have enjoyed three different classes under your leadership and I cherish the knowledge and wisdom I have gained from your experience as a professor of education.

For Dr. Shannon Dingman, I have enjoyed very much our friendship as we have worked together to bridge a partnership with the University of Arkansas Math and Science programs and the Fayetteville Public School Math and Science programs. As a Professor of Mathematics, you understand the current changes and implications Common Core adds to the K – 12 students and the importance of a student to be college and career ready. Thank you for your support throughout the past three years and I look forward to other opportunities to work with you again in the future.

For Dr. Cynthia Orona, thank you for your efforts to support my research in the area of elementary mathematics, how the Common Core has shifted the mindset of so many educators, and the power of CGI in the lower elementary. As the parent of a child in middle school, you can appreciate the importance of what cognitively demanding tasks in elementary can provide for a middle school student learning mathematics. Thank you for being part of this committee and providing me with materials and insight to further my research.

For Dr. Ryan Walker, my friend and supporter, our families have come to love one another and I will always cherish our friendship and the help you have provided me over the last four years. May God continue to bless your family and your work in educating young minds in the realm of science education.

For Dr. Craig McBride, my friend and copyreader, you have helped me so much in regards to data decisions and organization of parts of this dissertation. I respect you immensely in your work in higher mathematics and statistics and I will always cherish and appreciate your support while helping me finish this process—God bless you friend.

For Dr. Clara Carroll, your leadership and training during my undergraduate degree, your encouragement to begin my Masters and to pursue the rigorous National Board process, and your reassurance that acquiring a doctorate from the University of Arkansas was achievable.

For my friends and colleagues: Dr. Matt Saferite, Dr. Sarah McKenzie, and Matthew Morningstar from the Fayetteville Public School District, Dr. Jeff Hernandez from the Rogers Public School District, Clay Hendrix and Alfred Crosby from the Springdale Public School District. Your encouragement, support, wisdom and guidance have been most valuable—thank you.

Last but certainly not least, I would like to acknowledgement my parents Woody and Linda Wilson and to my father-in-law Nick Hamilton and my mother-in-law Kathy Hamilton for your love and support throughout this journey. I know you all are proud of me and I love you all—thank you.

Dedication

There was never a doubt to whom my dissertation and my achievement of obtaining a doctorate of philosophy would be dedicated, my wife Rachel Wilson. She has been the most consistent person in this family for these past seven years of my work in graduate school and doctoral school. In that time period, she delivered two babies, endured late nights while I was in class or working on assignments, nurtured our children while I have been on speaking engagements, and on many occasions experienced the life of a single mom due to my workload. Thank you doesn't quite say enough for someone who has sacrificed as much as Rachel has for our family. Too many times she accepted a back seat to my studies and job because of school assignments and job duties needing attention. I am so very grateful for her support and understanding. Rachel is my best friend, my hero, and my support to be a better Christian servant in this life. As a result of her love and support, she has helped me become a better husband, father, son, brother, and educator.

Rachel is the epitome of a Christian wife, completely unselfish, and dedicated to doing what is best for our children. She has an unwavering faith and strives to be the best godly wife and mother. I will forever be indebted to her and I vow to work as hard as I can at being a devoted husband and father to her and our children as I have at being devoted to being the best educator I could be. I should ask the University for an Honorary Doctorate for Rachel as well because of all of her dedication in supporting me through this process. Thank you so much to my wife Rachel for the love she showed me; we have wonderful children and I give her the credit. I can only pray when our children marry, they marry someone with her characteristics of patience, faith, love and support.

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CHAPTER 1

INTRODUCTION

Looping, or staying with a group of students for two or more years, is a practice that provides opportunities for teachers to develop relationships with students over time, mentor students, and provide support to assist students toward a successful educational career (Forsten, Grant, Johnson, & Richardson, 1997). In mathematics teaching, the more teachers understand how their students think about math problems and how to solve them, the more learning is individualized. In order to help teachers accomplish this feat, professional development called Cognitively Guided Instruction (CGI) provides teachers with a configuration of how students understand problem solving in mathematics (Carpenter, Empson, Fennema, Franke, & Levi, 1999).

CGI is specific to certain grade levels in elementary education. CGI professional development spans grades K – 2 and Extending Children's Mathematics (ECM) professional development spans grades 3 – 5. The challenge is for teachers to provide opportunities and time in class for students to problem solve, persevere in solving, reason whether the solution makes sense, defend their reasoning to others, model the mathematics in everyday life, use the appropriate tools that will aid in problem solving, be very precise in their work, and look for patterns and regularity as they work towards a solution (Kanold & Larson, 2012; National Council of Teachers of Mathematics [NCTM], 2014; National Governors Association Center for Best Practices & Council of Chief State School Officers [NGA/CCSSO], 2010). Looping and CGI are educational practices have the capacity to impact students in a positive way for the rest of their educational lives. Most importantly, teaching all students regardless of their ethnicity is extremely important in regards to future academic achievement (Barnes et al., 2013; NCTM, 2014). This study examines the practice of looping, employing CGI professional development strategies, and the awareness of different ethnic backgrounds in the classroom. The results of the previous factors will be analyzed to determine the impact made on student achievement in terms of growth in mathematics scores on the Measure of Academic Progress (MAP) test.

Effective teachers who care (Ovalle, 2004), build relationships with students of all ethnic backgrounds, and know more about how their students think when problem solving (Carpenter, Empson, Fennema, Franke, & Levi, 2000) have the potential to prepare all students to continue with education throughout high school (NCTM, 2014). When teachers build relationships and gain trust early in the students' educational career, the probability of students not dropping out in secondary school are very high (Goldberg, 1991; Lincoln, 1998). Therefore the first impression elementary teachers communicate to students early in their mathematics learning is extremely important for future learning (Bransford, Brown, & Cocking, 2000; Connell & Klem, 2004; Lim & Rumberger, 2008).

A. Benefits of the Research

Teachers have found student achievement increases when teachers have looped with their students for multiple years. When students feel safe in their learning environment, have the support of their teacher, and teachers use what they know about their students to make instructional decisions, then students have more potential to grow in their learning. The benefits of looping with students from the teacher perspective is he or she can develop relationships and trust which are prone to continue on throughout the student's educational career; therefore, providing a safe and stable learning environment is extremely important for future success in academia. When students are not provided with sensitivity, stability, and engagement, then academic scores are apt to plunge. The results show students will be troubled by these factors and will potentially drop out of school (Christle, Jolivette, & Nelson, 2007; Connell & Klem, 2004).

Historically, research supports the benefit of looping for students. The practice of looping has existed since the turn of the 20th century (Forsten, Grant, & Richardson, 2000) when the Department of Interior suggested that teachers should move along with their students from year to year. Research encourages teachers to loop in order to provide students with a sense of stability and to build relationships with the students. When students feel comfortable, safe, and a relationship has been established, then the learning potential is significant (Checkley, 1995). Looping has encouraged teachers to increase their accountability with students and families while reducing student absenteeism (Haslinger, Kelly, & O'Lare, 1996). Teachers have also benefited by gaining time in the curriculum (Black, 2000), and providing opportunities for parents to become more involved in the education of their child (Nichols & Nichols, 1998).

Past research indicates students who feel a sense of belonging and feel connected to a stable environment at school are less likely to drop out of school (Christle, Jolivette, & Nelson, 2007). Research regarding the significance of a highly qualified teacher who could work with all students (e.g., struggling and non-struggling students in a class), build relationships with those students, and help them stay focused, persevere through language barriers (Pascopella, 2004), and graduate from high school is absent and extremely sought-after. There is ample research in the realm of looping in elementary and middle school and the benefits of the practice.

Looping teachers do what they do to build relationships with students, help them develop as a student, and provide a stable environment for learning. The research suggests this practice is effective for students long term (Crosby, 1998). However, the research is lacking in regards to how looping may impact whether or not students graduate, are retained, or drop out. Not only does the practice of looping provide teachers with how the students are thinking from year to year, the research about CGI indicates it is very helpful in establishing a configuration for teachers of how to understand the thinking of children in terms of mathematics (Carpenter et al., 2000). The benefits of a student encountering a teacher with CGI training are numerous based on the research (Carpenter, 1989). One benefit is the teacher determines how to approach the teaching and learning of each of their students by simply understanding how the students are thinking in terms of problem solving in mathematics (Carpenter et al., 2000). It is a matter of listening to students and understanding their approach to problem solving. This is not merely having students teach themselves mathematics, but a guided approach via the teacher's understanding of what the student can do with the mathematics. What is critical is how the teacher uses this knowledge of students to plan for instruction (Carpenter, 1989). The professional development of CGI does provide teachers in the elementary grades with a plan of how to increase their Pedagogical Content Knowledge (PCK) toward understanding their student's thinking (Carpenter, 1989).

CGI offers strategies and cognitive problems that allow students to reflect on their work and present their problem solving structure to their classmates. However, this type of professional development tends to diminish at the end of middle school and into the secondary grade levels. Yet, there are programs that have recently been established in terms of professional development for teachers. For teachers of grades 3 – 5, there is professional development on Extending Children's Mathematics (Empson, & Levi, 2011). For teachers of grades 6 – 8 there is Thinking Mathematically (Carpenter, Franke, & Levi, 2003). Both opportunities provide examples of how math discourse in the classroom can indicate how the students are thinking about fractions and algebraic ideas and how to better question them to elicit that dialogue and capitalize on the foundational CGI construct (Carpenter et al., 2003). However, research suggests there is no profound evidence students from CGI classrooms score significantly better on standardized test scores or basic skills tests than students from a non-CGI classroom (Carpenter, et al., 2000). In the era of standardized testing, many teachers are afraid to go deeper into their curriculum because of the "coverage" factor and the punitive effects of students not scoring well on standardized tests (McTighe & Wiggins, 2005).

Does a teacher who is looping with students and implementing CGI strategies with all of his or her students (especially the students from poverty and different ethnicities) show more growth in standardized testing situations? The high-stakes testing equivalent does not seem to be going away anytime soon with conglomerates such as Smarter Balance and Partnership for Assessment and Readiness for College and Careers (PARCC) beginning to distribute assessments by the spring of 2015. If the new assessments can assess skill and understanding, then teachers may find it easier to change their instruction to meet the needs of all students (Baines & Goolsby, 2013).

In order to meet the needs of all students, the CGI teacher who loops would be able to cultivate a student's ability to think deeper, it is potentially likely that scores on the MAP as well as individual academic achievement would increase.

B. Statement of the Problem

This particular study analyzes the research developed about looping in the current educational system, how CGI research can help teachers develop problem solvers, and how the aspects of ethnicity can provide a foundation for best practices in teaching mathematics in the future. This dissertation is timely because of where mathematics education stands presently. The directive for teachers in K – 12 education is to teach standards in a coherent and rigorous manner that improves students toward a readiness for college and career (NGA/CCSSP, 2010; PARCC, 2014). The current state in education encourages educators to take an interest in students, teach for understanding in mathematics, and build coherence in their learning over time (multiple years), and to be conscious of minority and English Language Learners (ELL) (NCTM, 2014).

With the unfolding of the Common Core State Standards, it is important for teachers to plan with others, teach with coherency (understand the progression of standards from one grade level to another), be strong in content, and continually improve pedagogy. They must be able to enrich students who grasp understanding early and scaffold others to ensure understanding in the current grade level of mathematics. Finally, they must invest time into developing relationships with students, and taking an interest in their lives and future education. Currently, the majority of professional development in elementary schools in Arkansas encourages teachers to enroll in yearly professional development studies that are designed to assist teachers on how to better develop an understanding of student thinking in mathematics. The programs of CGI, ECM, and TM (Thinking Mathematically) are professional development programs created for teachers with practices in understanding how a student is progressing in their mathematical thinking (Carpenter et al., 1999; Empson, & Levi, 2011). The current Common Core Initiative encourages teachers to teach for mastery to all students from any background; therefore the growing populations of different ethnic groups will impact how teachers approach teaching for understanding to all students. The prototype teacher our future demands is one who is in continual reflection, frequently enrolled in targeted professional development in mathematics, and continually learning how to meet the needs of students from different ethnic backgrounds by utilizing the best practices to impact all students (Gutiérrez, 2008).

C. Purpose of the Study

The purpose of this study is to determine whether there is a significant difference in growth on the mathematics section of the MAP tests by students who loop with their teacher, have a teacher who is CGI trained, and whether or not ethnicity impacts student achievement.

D. Hypothesis

In this quantitative study, the null hypothesis is there is no significant difference in the mathematical MAP growth of a student in regards to the student's ethnicity, looping with a teacher, or being taught by a CGI trained teacher.

E. Research Questions

The questions stated below are to determine if there is a significant difference between students who loop and have exposure to a CGI trained teacher, and to what degree ethnicity impacts MAP growth:

1. Does looping impact whether or not a student will meet or exceed his or her growth in MAP scores?

2. Does CGI professional development training impact whether a student will meet or exceed his or her growth in MAP scores?
3. Do all six ethnic populations, Hispanic, Asian, Pacific Islander, American Indian, African American, and Caucasian affect whether or not a student will meet or exceed his or her growth in MAP scores?
4. Does a Non-Caucasian background impact a student meeting or exceeding MAP growth in mathematics every year student's MAP scores compared to Caucasian?

The following question is directed specifically to determine if there is an odds ratio that represents the constant effect of an explanatory variable on the likelihood the outcome will occur. The explanatory variables are looping, CGI, and ethnicity and whether or not these variables impact the response variable of MAP growth:

5. Does the combination of the practice of looping, implementation of CGI strategies, and a student's ethnicity impact MAP growth?

F. Limitations

While building relationships and taking interest in the future of secondary students is important, it is equally important to provide elementary students with stability, care, and patience while they are learning. This particular study focuses on students who have looped with a teacher for two years, and the grade levels span from first grade to fifth grade.

Additionally, the study included students of teachers who were CGI trained, and students who looped with the same teacher for two years. The criteria for selection suggests if a teacher is looping (moves to the next grade level with the student) and CGI trained (has ongoing professional development in CGI training), then the determining factor is to observe if students met or exceeded their MAP growth during the looping years. I am somewhat biased in favor of this framework of teaching (looping with students) and learning (applying CGI strategies) because of my theory of instruction and how instruction unfolds in the classroom. Building relationships with students, creating a stable learning environment where risks can happen, and problem solving is at the forefront of my teaching philosophy.

A limitation to this study in regards to looping is one of an undefined measure of how many years a teacher has been looping with students throughout their career. There was no way to determine if a teacher had looped for the first time or if a teacher had been looping several years. Therefore, the number of years of experience looping was not determined.

As a former teacher of mathematics, the key concepts in my theory of instruction involve inquiry-based (student-centered) learning, whole and small group discussions, explicit instruction (teacher-centered), and frequent checks for understanding throughout the learning process. The research from *Extending Children's Mathematics* (Empson, & Levi, 2011) suggests teachers should pose problems in which students can struggle with a partner or individually to solve problems. However, a limitation to this particular study in regards to CGI is the unidentified data that determines how many years of CGI or ECM training the teachers had. The data engineer and the K – 7 math specialist for this particular school district mentioned there is not an organized data base that keeps track of teachers' years of experience in regards to CGI or ECM training. Other limitations in regards to CGI training are as follows: If a teacher receives one year of CGI training, does the teacher have to go back in subsequent years? Did the teacher go back for year two and year three training? These data are not recorded nor is it known if subsequent years are required. Other limitations can be whether or not a teacher is implementing the CGI professional development with fidelity within his or her classroom and how to quantify the data.

A limitation to the study regarding MAP testing is deciding how to break down the output for making or not making growth. This particular data set only includes dichotomous data of making growth or not by Yes or No. However, NWEA does provide a teacher several document reports about every child. The reports help teachers make decisions about flexible grouping for instruction, how to personalize the instruction, link test results to skills, and helps students and teachers determine learning plans and goal setting for the next attempt on the MAP test (Northwest Evaluation Association [NWEA], 2014). Therefore, NWEA does not break down the data into a single dichotomous set to whether a student made growth or not (Yes or No) along with lists of deficiencies. The reports are mutually exclusive, and there is a RIT (Rauch UnIT) range for the teacher and parent to observe to determine if growth has been made or not. In this study, the response variable is whether or not students make growth on the math part of their MAP test, and it is indicated as a response variable that is a dichotomous answer (yes or no).

G. Definition of Terms

Cognitively Guided Instruction (CGI). This is a professional development program that assists in developing the mathematical thinking of teachers, aiding in the incorporation of different strategies that support the thinking of teachers, based on an integrated program of research, and it helps teachers reflect upon their prior knowledge and beliefs about teaching that will directly impact their student's mathematical thinking (Carpenter et. al, 2000).

Common Core State Standards. A new set of national standards were adopted by certain states as a reflection on years of standards based reform. The standards for Mathematics and Language Arts are standards that flow in a progression from Kindergarten to twelfth grade. The National Governors Association and the Council of Chief State School Officers released a set of standards that equip and prepare students for college and career readiness (NGA/CCSSP, 2010).

ELL-LEP. This stands for English Language Learners (ELL) and Limited English Proficiency (LEP). These are students who come from homes that speak a pre-dominant language other than English. Many times these students require a different mode of instruction to meet their needs (Great Schools Partnership, 2013).

FRLP and NSLP. This stands for Free and Reduced Lunch Program, a subgroup aligned with the National School Lunch Program (NSLP). This program provides healthy food and nutritional care to students during the school day (National School Lunch Program [NSLP], n.d).

Looping. This is a practice that spans back before the Great Depression which allows for a teacher to remain with the same group of students for a time period of two or more years (Forsten et al., 1997).

Standards for Mathematical Practice. These standards are practices educators should provide for students to experience and develop as they work through the math or literacy content. The practices originated from the original National Council of Teachers of Mathematics (NCTM, 2014) process standards developed for mathematics education, and the strands of mathematical proficiency detailed in the National Research Council's report *Adding It Up* (NGA/CCSSP, 2010).

MAP. This stands for Measure of Academic Progress. This is the test associated with the NWEA program. The MAP test provides students with a computer adaptive assessment that responds to the student's response to the questions given. The next question for the student adjusts the difficulty level based on the student's response to the previous question. This results in a test that has no ceiling for a student and is completely independent of the student's grade level (NWEA, 2014).

NWEA. This stands for Northwest Evaluation Association which was developed to measure student growth in mathematics and language arts independently of their grade level. (NWEA, 2014).

PARCC. This stands for Partnership for Assessment of Readiness for College and Career and it is a consortium of 18 states working together to develop assessments in English and mathematics to prepare students for college and career (PARCC, 2014).

PCK. This stands for Pedagogical Content Knowledge. Pedagogical knowledge is the teacher's knowledge of understanding of strategies for students to understand the content of "how" to teach a specific subject. Content knowledge is the amount of knowledge a teacher has about a subject. Along these lines is the subject matter knowledge in which the teacher knows "why" something happens or is considered. Curricular knowledge is an understanding of the wide range of programs or standards for the teacher in a particular subject matter for any given grade level. It is the combination of these different types of knowledge that Shulman (1986) claims supports in the development of teachers.

RIT. This is an equal interval scale, helps determine growth over time, an achievement scale, and represents the same meaning no matter the grade or the age of the student. It is also defined as Rauch Unit (Rauch UnIT) (NWEA, 2014).

H. Conclusion

The remainder of this dissertation follows with Chapter 2 which provides information and a review of the literature on the topic of looping, the fundamentals practices and the development of Cognitively Guided Instruction, and the research regarding ethnicity. Chapter 3 provides an explanation of the methodology of the study, a discussion of the design and specific procedure used in conducting this study. Chapter 4 presents the facts and the analysis of the data discovered from statistical tests are discussed in a narrative form using tables and a graph to represent the findings. Chapter 5 provides the reader with the summary, conclusions, further research, recommendations of the study concluded with references and appendices.

CHAPTER 2

LITERATURE REVIEW

American education has progressed dramatically since the one room school house during the 19th century. However, some things have not changed since the time of wooden chairs, slates, and chalk. Students have always been the focus of instruction and the teacher is by far the most important piece in student achievement (Irving, Lindsay, Tanner, & Underdue, 2008; Ovalle, 2004). Fast forward to the 21st century and not much has changed in terms of the teacher being the most important factor in the achievement of students (Irving et al., 2008; Ovalle, 2004). The recent Common Core State Standards (CCSS) initiative insists the teacher be more aware of the progression of standards from Kindergarten to Algebra 2, so teachers understand what concepts have been taught and what the students need in the present to be successful in future classes. This awareness aids in the coherence of the mathematical ideas being taught in today's classrooms, and this awareness keeps the students as the focus of instruction (NCTM, 2014).

A. Looping

In order to understand the progression of the CCSS, teachers need support and professional development in content areas to help diminish learning gaps, gain instructional time with their own students, and meet the needs of students of ethnicity in terms of education gaps (NCTM, 2014; Ornstein, 2010). Many times professional development is expensive for a district, but one program implementation that is free to the school and has a huge upside is the implementation of teachers looping across grade levels with their students for two or more years

(Forsten et al., 1997). This inexpensive benefit to student achievement is a practice in education developed in Europe, but is an element of the foundations of many schools in the United States (Goldberg, 1991; Hitz, Jenlink, & Somers, 2007; Ogletree, 1974) where a teacher begins with a group of students for one year and then continues with the same group of students to the next grade level. This practice can go on for two or more years (O'Neil, 2004; Ovalle, 2004). Other names such as: continuous learning, multi-year teaching, persisting groups, and student and teacher progression are also used to describe looping (Grant, Johnson & Richardson, 1996). The positive results are plentiful and numerous in the elementary and middle school settings (Black, 2000; Crosby, 1998; Franz, Fuller, Hare, Miller, Thompson, & Walker, 2010). The major results from this practice are the trust and development of relationships between student and teacher and the development of a stable learning environment to help drive student learning to a new level of academic success (Jacoby, 1994).

The results of academic success from looping have mostly been derived from elementary and middle school classrooms across the United States. In secondary (junior high and high school), there is little information or data from secondary schools that suggest implementing looping in the school system is significant. There are some rare cases. For example, some teachers in North Carolina will follow their students from 8th grade to high school (Black, 2000) but all in all, the research is scarce at the secondary level. This is perplexing because looping research, authors, and teachers testify looping has generated great success academically for many students, especially socio-economically challenged students and students whose first language is not English (Balfanz & Byrnes, 2006; Haslinger et al., 1996). As discussed, looping provides many opportunities for student achievement to improve in the mathematics classroom. Even though there are a few limitations, looping can develop strong relationships with students, and become key to sustaining and maintaining student achievement.

B. Looping and Relationships

Developing strong relationships among teachers and students is a very important factor in maintaining a successful looping experience that develops trust between the student and the teacher which can lead to student academic achievement (Checkley, 1995; Irving et al., 2008; Jacoby, 1994; O'Neil, 2004). The concept of looping in education and the frequent practice of looping occurs most often in elementary schools and middle schools (Arenz & Rodriguez, 2007; Balfanz & Byrnes, 2006; Black, 2000; Franz et al., 2010; Goldberg, 1991). There are many reasons why elementary schools choose to loop. Young children need consistency in their early academic life, and they need caring and nurturing adults who make children feel safe. This is a crucial time in a student's life when education is fun and students are very receptive. This is also a time when learning to read and reading-to-learn are instrumental in the future of a student (Irving et al., 2008).

In order to establish a safe environment challenging to students, teachers are urged to develop relationships with their students. The one element and key piece, in addition to the teacher, is building and developing strong relationships (Black, 2000; Checkley, 1995; Haslinger et al., 1996; Jacoby, 1994; Ovalle, 2004). The number one factor to success in a student's academic life is not new programs, building size, or technology. The single most important factor in a student's academic career is the effectiveness of the teacher (Irving et al., 2008; Ovalle, 2004). When relationships are established in a looping situation, more time can be devoted to digging deeper into the content in the second year of the loop because the procedures and the time usually spent getting to know one another is already completed in year one (Cramer, Nevin, Salazar, Voigt &, 2008; Jacoby, 1994). According to Hitz, et. al, (2007) "When children form secure relationships with teachers and other caregivers, both social and cognitive competence shows improvement." (p. 81).

Many studies have reported when teachers loop, students who struggle with the language (ELL or LEP), minority students, special education students, at risk students, and students who have an unstable home life associated with poverty benefit more because they see someone taking an interest in their lives. These teachers desire to see students succeed, and desire to build relationships with students first in order to grow the student cognitively (Black, 2000; Brooks & Mazzuchi, 1992; Franz et al., 2010; Haslinger et al., 1996; Irving et al., 2008; Lincoln, 1998; Ovalle, 2004). These students also interact with someone who cares about their education and their well-being throughout the school day. In many cases, students may not receive caring and love in their homes (Goldberg, 1991).

With many students struggling to have support in their educational career, Checkley (1995) points out having different teachers from year to year never really allows relationships to grow. He says, "Where else (but at school) do you keep changing significant people in your life and think it is good." (p. 6). When students change teachers year after year, it is difficult for students and teachers to truly develop a healthy relationship based on trust (Irving et al., 2008). The power of looping can be very supportive to a student who has not had a caring teacher in his or her life before. A teacher who is looping must bring an attitude of being student-centered and a serving attitude who will work with parents for multiple years as well. The majority of the research describes looping in the form of a positive event for students and parents.

Despite the benefit to students, teachers need to be aware that time and effort into teaching students for more than one year requires having to learn two entirely different curriculums and standards for both years. Many schools that have embraced looping have the expectation that the teacher is completely accountable for a child for two years and the teacher will do whatever possible to make sure each student is at school and learning (Haslinger et al., 1996).

For every teacher, who feels passionate about building relationships in order to assist students to become academically successful, there are just as many who are skeptical about the concept and implementation of looping. Research portrays looping teachers to be committed to students (Checkley, 1995). They believe relationships are the key to making curriculum rigorous and relevant to a child, and students are first with content a close second. However, the research reveals there can be discouraging factors to looping if teachers cannot establish a relationship with students during the first year of the loop (Elliott, 1998; Grant et al., 1996). Looping becomes an "all or nothing" attitude. What happens when teachers have attempted all and just cannot make a connection to students? This is when a teacher communicates with the parent and student to develop an alternative course of action with the student transferring to another teacher (Grant et al., 1996). It is not sensible for the teacher and the student to continue in an environment in which tension exists. Therefore, strict looping may not be in the best interest of a particular student or teacher (Forsten et al., 1997).

Looping not only provides teachers with avenues for student achievement, it can also provide relationships which can lead to student achievement. Hattie (2009) determined certain practices in education impact student achievement more than others. He discusses effect size and how it relates to mean values and standard deviation. Sometimes effect sizes are whole numbers which means a teaching practice impacted student achievement by one or more whole standard deviations from the mean. Sometimes the effect size is a decimal such as .6, which means the educational practice impacted student achievement .6 of one standard deviation (Hattie, 2009; Reeves, 2011). Hattie (2009) goes on to describe one practice that affects student achievement is having a strong "student-teacher relationship." The effect size Hattie found for "student-teacher relationships" was an astounding $d = 0.72$. This effect size supports the notion that when teachers loop with students for more than one year, it can deliver a high effect size which can lead to an increase in student achievement (Hattie, 2009; Reeves, 2011).

Looping has been found in smaller populated schools because the student numbers are low and the minimum number of staff must teach different sections of classes (Checkley, 1995). Additional reasons for not building an environment of looping at a school could be teachers find themselves having to learn a whole new curriculum and new standards for that particular grade level. A teacher may need more certification to teach the next year's class or the class that begins the loop (and ultimately not having a teacher who will work with in the previous or next grade level) (Forsten et. al, 1997).

Ultimately, what is desired is to find a teacher who wants to build relationships, build upon a child's strengths, and understand how to work with the child's weaknesses for the next year. What is undesirable is to have a teacher who does not make any effort to connect with students, and feels quite content to pass students on with a "they are not my problem anymore" attitude (Lincoln, 1998).

C. Looping and Instructional Time

A veteran teacher who understands how valuable time is with students, is willing to get to know students, and build relationships with his or her students will have an opportunity to extend the child's learning or understand where to scaffold the child due to the teacher understanding the child's abilities from the previous year. That doesn't mean the second year in the loop will be perfect, or there will not be any challenges, but it does provide wonderful opportunities to fill skill gaps of struggling students and help many get closer to grade level understanding (Arenz & Rodriguez, 2007). Many times teachers spend hours during the beginning of the year (especially in elementary) testing to determine the academic skill level of students in terms of reading and mathematics. PARCC (2014) is developing diagnostic assessments that can help teachers with deterring skill level in math and reading (PARCC, 2014) . In addition, teachers always have to spend time teaching students the routines of the class, how to work in centers with their peers, and even the names of other students.

In order to be effective and go deeper in content, procedures need to be established, implemented and practiced. Sometimes it takes three to four weeks for students to master some of these teacher procedures (which change every year and are different for every teacher). That is quite a bit of time spent replicating what would already be known if a teacher looped with their students to the next grade level (Checkley, 1995; Franz et. al., 2010; Nichols & Nichols, 1998). Looping really is a true "gift of time," (Cassidy & Hegde, 2004). An exciting feature of a teacher who loops is leaving in May knowing in August the whole class can resume learning on the first day school. This happens because the teacher has already acquired background knowledge of strengths and weaknesses from the previous year (Arenz & Rodriguez, 2007).

Much of the research encourages looping in two-year cycles. How interesting it would be if teachers looped for three years. The looping experience would possibly provide a gain of five months of instructional time gained over the traditional set up of moving to a new teacher year after year (Black, 2000; Cistone & Shneyderman, 2004; Crosby, 1998; Ovalle, 2004).

A successful example of looping is the Hawaiian Studies Program (HSP). One of the many successes of students involved in the HSP is that teachers learn how to make learning meaningful and real to them. Teachers work in teams and contextualize the curriculum to become more fun, challenging, and relevant to the lives of the students. When these teachers work with the students in the HSP during the second year of the loop, the teachers said the curriculum becomes easier to learn because the teachers know the interests of the students. This allows for more time integrating the curriculum into the community where learning comes to life (Yamauchi, 2003).

The HSP thrived on meeting the students where they are in their learning by identifying the interests of the students early on. Actually, this is not much different from any devoted teacher in education. Any teacher who wants what is best for students will try his or her best to get to know the students' interests and begin to relate learning to their strengths and support their weaknesses throughout the school year. However, the difference in the (HSP) is the teacher's awareness of the interests of students and knows their strengths and weaknesses from the previous year. This gives a teacher who loops a huge advantage over a teacher who inherits a new class every year (Brooks & Mazzuchi, 1992; Haslinger et al., 1996; Jacoby, 1994; Nichols & Nichols, 1998, Yamauchi, 2003). Knowing exactly what the students learned from the year before and how the concepts were taught is significant in saving time to develop new learning.

Anchor references to learning from the previous year are an advantage while building new learning concepts (Bellis, 1999).

In this era of standardized testing, many teachers feel they can only browse over curriculum and cannot afford to spend the time to go deeper into it. Looping provides the opportunity for teachers to drill down and spend more time with the students to conceptualize their learning and not see school as memorizing for a test (Franz et al., 2010). This extra time can be spent in the curriculum and also in utilizing the student's strengths that were discovered in the first year of the loop (Cramer et al., 2008; Jacoby, 1994). Many teachers are looking for an edge in terms of creating more learning opportunities for students. Moreover, in terms of exploring the advantages of looping, some teachers may shy away from looping because they see it as more work to build expertise in learning a new curriculum for the next year or multiple years if the teacher loops for 2 – 3 years (Grant et al., 1996; Ovalle, 2004). This is a fear for many teachers because it is planning all over again every year, and they believe it may not buy the time looping supporters say it would.

In regards to looping, it is implied in the research that teachers "just do it," but no qualitative research on how teachers plan for and deal with learning a new curriculum or how administrators support the efforts of teachers who loop exists. It would be difficult to focus on establishing relationships when planning and thinking about the new curriculum becomes the focus.

D. Looping and Stable Environments

When thinking about ways to best meet the needs of students, there may be more work for teachers (e.g., learning a new curriculum), but ultimately it is student learning and academic growth that matters most. The more stable, comfortable, and stress free the environment, the more safe students feel (Black, 2000). When comfortable in a learning environment, students sense they can take risks, ask more questions (O'Neil, 2004), and know someone cares about their learning (Hitz et al., 2007). Looping definitely has its advantages and having a teacher from the previous year can help decrease stress and increase familiarity for students who have the same environment again but with different content/concepts/reading levels (Cassidy & Hegde, 2004; Jacoby, 1994;). Teachers have such a huge responsibility to educate their students, especially with all of the different types of learners and behavior issues in one class. Demographically, African American and English Language Learners struggle the most with transitions from new teacher to new teacher year after year (Gay, 2002; Moschkovich, 2013). Many African American students and Hispanic students come from poverty (Charles, 2013) and do not have the stability at home that other ethnic groups have.

Students of poverty regard their teachers as consistent and stable factors in their lives (Goldberg, 1991; Haslinger et al., 1996; Irving et al., 2008). Although the implementation of looping can have a positive effect on students of poverty and can help alleviate achievement gaps among the different races, research indicates African American students desperately need support from their teachers, and it could be the sole factor of student achievement (Battey, 2012; Irving et al., 2008). African American students are very responsive to a learning environment that is caring, stable, and nurturing (Ladson-Billings, 1997). Likewise, Hispanic students who struggle with the English language have an opportunity to practice that new language in an environment that is safe and understanding (Díez-Palomar, Gutiérrez, Simic-Muller, & Turner, 2009; Hitz et al., 2007).

The early years of learning, grades Kindergarten thru fourth grade, are very important in regard to developing and then continuing the love for reading and basic fundamentals of mathematics. In the middle grades, grades 5 – 8, the teacher becomes even more critical in helping with reading to learn so students better learn difficult mathematical concepts. When teachers help students feel more connected and comfortable and have a sense of familiarity, the classroom is brought to life and can become a small community for the child to become a member (Black, 2000). Nelson, Sims, & Voltz (2010) discuss the balance of trying to meet the needs of the academic learner by creating meaning and relevance to the curriculum (Yamauchi, 2003), while also providing the physical, emotional, and social aspects of each student in the classroom.

When students feel safe and they understand how much a teacher cares about them, then that is giant step in creating a stable learning environment (Nelson et al., 2010), and that is when the student understands how much the teacher cares for them as an individual. Many teachers want to save time and not repeat any information, so they want to be sure to place their students in the correct classes than the idea of a teacher building rapport and trust with students (Nichols & Nichols, 1998).

Research suggests students who are influenced by strong and effective teachers for multiple years have success educationally and socially (Cistone & Shneyderman, 2004). However, there is limited research on how students feel about school after a looping environment in which the student was successful and stable. Teachers are like students because all teachers have strengths and weaknesses and different learning capacities. Teachers need support with professional development opportunities to learn from other teachers who are looping. Since looping is not as prominent in schools these days, research does not indicate there is much support for the teacher from the professional development standpoint. This idea has not been mentioned in the research and it is sorely needed.

Not only are there professional development limitations, but looping has its limitations when it comes to some students who are disrupting the stable environment the teacher has created the first year and into the second year. Many of these instances are because new students move in from different schools and are not comfortable with the students (Hitz et al., 2007). Much depends on the new student who joins the looping classroom. Research suggests students do well to make a new student feel welcome into a learning environment or the teacher or could be a transient struggling learner. If students begin the second year of the loop and are continuing to be behavior issues for the other students, then plans should be made to look for an alternate environment (Checkley, 1995; Forsten et al., 1997). Developing relationships and providing a stable environment for learning in the classroom can be vital to reaching a student who is lacking stability in their past educational experiences. Some researchers suggest the familiarity or stability of classroom environments the students have with teachers would create discipline problems due to students becoming too comfortable with the teacher (Bellis, 1999; Ovalle, 2004).

E. Looping and Parental Involvement

Research suggests parental involvement and looping are commonly observed during the elementary years and decrease through middle school, but begins to disappear almost completely as the student progresses to high school. Most of the research in the United States involving looping is found in the elementary grades and then middle school is a close second in terms of the number of research materials, yet found most often in Japan and European schools (Cassidy & Hegde, 2004; Ogletree, 1974). Looping is definitely not the silver bullet to education but if the teacher can sell the parents on the benefits of looping and get the parents and student on board—success will happen with effort from all parties (Franz et al., 2010; Goldberg, 1991).

Teachers and administrators need to be cautious when thinking about implementing looping and where it would be most effective. Parental involvement should always be considered for every classroom. If teachers can keep parents informed of the successes and celebrate those together, more parents would want to support their child's academic path to excellence due to the increased communication between teacher, parent and student (Arenz & Rodriguez, 2007; Cassidy & Hegde, 2004;). In today's era of education, the nuclear family is becoming the minority of households in America. As the number of single parent households continues to increase, looping can provide teachers who are a stable figure in the life of the student and give them love and support (Bellis, 1999; Black, 2000; Checkley, 1995; Haslinger et al., 1996; Jacoby, 1994; Lincoln, 1998; Nelson et al., 2010; Ovalle, 2004). If there is a low sense of parental involvement and a high population of transient students, then looping may not be as effective as noted in research (Bellis, 1999; Franz et al., 2010). Looping should be carefully considered if the idea has never been tried at a school before. This idea is not for everyone and should never be a mandated rule for teachers, parents and students (Arenz & Rodriguez, 2007; Cassidy & Hegde, 2004).

Parents from an elementary school in the Midwest were surveyed by researchers to gain a parental perspective about the practice of looping (Nichols & Nichols, 1998). There was encouraging feedback from the parents of lower socioeconomic status children compared to families from a higher economic background. There is no qualitative data on how parents feel about their teachers in the upper middle schools either. As parental involvement and looping increase occur most often in the elementary schools, it seems both begin to decrease over time when the students move into the higher grades. This inverse variation does not bode well for secondary looping research. There is never talk about students dropping out in elementary and middle grades.

The fact parent involvement decreases is probably due to the fact teachers fail to communicate with parents effectively. Parent's trust is a huge factor in order for teachers to make a difference in the life of the child in regards to attitude toward learning and creating a positive attitude for school (Grant, Johnson & Richardson, 2000). The research from Nichols & Nichols (1998) suggests looping has many advantages, but teachers are the integral piece in determining how effective looping can be at any level. When relationships and trust are nonexistent, communications lines are lost among teacher, parent, and student, and parents are not updated on the successes and needed improvements about their child from teachers (Nichols & Nichols, 1998).

F. Cognitively Guided Instruction

Imagine a classroom setting where a teacher stays with a group of students in grades K – 5, establishes a strong relationship with her students, becomes a trusting adult in the life of each student, creates a stable environment for learning, and keeps consistent communication lines open to parents and guardians by way of newsletters, notes home, and phone calls. Couple the previous description with a core instruction process/structure that relies heavily on what the students are thinking mathematically, and an environment where students are allowed to share their diverse thinking with their peers (Battey, 2012; Boaler, 2002). An observer would see teachers are posing problems of high cognitive demand. Students persevere in solving those problems without the teacher giving direct instruction, and students share their work among their peers. Students talk about mathematics, and teachers are aware of what students are thinking. This is a structure model of teaching found through a research-based professional development program for elementary school mathematics teachers called Cognitively Guided Instruction (CGI) (Carpenter et. al., 2000).

This model of CGI continues to challenge many teachers to become better facilitators of teaching mathematics because Carpenter (1989) writes that teaching is problem solving. Passionate and devoted educators are continually contemplating how to support and challenge all students in the classroom. Teaching is complex and can become problematic quickly. Every student comes to a classroom every year with issues, hurt feelings, opinions, individual learning strategies, support from home, no support at home, fear bullying, hunger, and other human factors resulting from everyday life (Carpenter, Fennema, Peterson, & Carey,1988). If a typical classroom consists of 28 students who come with all these issues, then it takes a teacher who loves children and can problem solve to figure out how to challenge all students; therefore, teaching is problem solving.

The purpose of CGI is to understand more about how a student thinks through problems, the student's ability to work through a problem solving process, how to deal with the common errors students make (Carpenter, Fennema & Franke, 1996), and then the teacher helps develop lessons and other problems based on what the student already knows (Chambers & Lacampagne, 1994). Teachers need to know their students well enough to know what strategies their students have in their minds when it comes to problem solving (Behrend, 2003).

Problem solving is not a concept one teaches, but a process that permeates in the classroom. Problem solving allows for students to practice transferring their knowledge to other topics and time to make sense of the problems at hand, but it only happens if the teacher is willing to create an environment in the classroom where the students have opportunities to discuss, problem solve, and look for patterns in their work (Behrend, 2003; Evans & Jaslow, 2012; Franke & Kazemi, 2001; Russell, 2012). Since the origination of the Common Core State Standards, much discussion is about the idea that students need practice solving non-routine problems that carry a high cognitive demand. Students need opportunities to wrestle with high cognitive demanding problems and be able to discuss and make sense of the problem independently, in a small group, and as a whole group (Franke & Kazemi, 2001; Hwang, McMaken, Porter, & Yang, 2011).

One particular study compared teachers that used high cognitive demanding problems to those teachers that used low cognitive demanding problems. Teachers who pursued National Board Certification presented portfolios containing cognitively demanding problems (Silver, 2010). This study found more than 50% of the teachers who integrated high cognitive demand problems also achieved National Board recognition. The National Board Certification process is intended for teachers to submit their best practices via portfolio observations, so high cognitive demand problems makes sense to be part of the repertoire of an outstanding teacher (Silver, 2010). The National Board Certification process requires teachers to take video of their classes in 30 minutes segments in a small group setting and in a whole group setting of their students problem solving (National Board for Professional Teaching Standards [NBPTS], 2014).

What if the teacher wants evidence learning has occurred in the video? Does it mean a teacher would provide the students with a less demanding task? Probably. It may be speculating, but many teachers may find it difficult to submit a video if the learning has not occurred during that video time frame. The traditional mindset of a teacher is to show that learning occurs during the time of the video. However, many times learning doesn't occur and it may be because the cognitive task is very demanding—that is a very good problem to have. Silver (2010) also describes the research findings from the Trends in International Mathematics and Science Study (TIMSS) and the National Assessment of Educational Progress (NAEP) discussing the typical United States mathematics classroom: "Researchers have found that typical classroom mathematics teaching in the U.S. tends to not use challenging tasks…" (p. 1).

Students need opportunities in class to develop their skills in problem solving and transfer what they have learned from year to year by attacking real-world un-familiar problems (Cobb & Jackson, 2011; Franke & Kazemi, 2001; Hiebert & Stigler, 2004). Research has suggested students come to school with an intuition for problem solving, but lack the procedures and algorithms to fully solve problems (Carpenter et al., 1999).

Carpenter, Empson, Franke, Fennema, & Jacobs (1998) conducted a longitudinal study of students in first grade through third grade in terms of using inverted strategies. Students who used invented strategies at the onset of first grade to problem solve experienced more success in third grade problem solving with non-routine/extension problems. This was contrasted with the students who were in the algorithm group. The research indicates that when teachers allow for students to problem solve by using their own strategies, it can open up a path of discussion that can be helpful for all students (Carpenter, 2000). Then the benefits of CGI would greatly impact all students because it would encourage discussion and articulation of their thinking. This learning environment can provide opportunities for all students to achieve a high level of achievement in mathematics (NCTM, 2014).

Creating an environment where time is given for problem solving promotes students using their own strategies (Hiebert & Stigler, 2004), differentiates the problem to provide entry points for all learners (Holden, 2007), and demonstrates understanding and solving non-routine problems that are high cognitively challenging tasks (Boston & Smith, 2009; Hwang, et al., 2011). Even though there is no professional development for Cognitively Guided Instruction for secondary math classrooms, CGI has been regarded as one of the most influential and prolific professional development efforts in the last 20 years in terms of increasing student achievement (Boston & Smith, 2009; Carpenter et al., 2000). The TIMSS and Program for International Student Assessment (PISA) results suggest the U.S. to consider what other countries are integrating in order to increase level of reasoning, making sense of problems, and transferring what is learned from previous classes (Boston & Smith, 2009). Based on research from TIMSS and PISA (Boston & Smith, 2009) suggests classrooms that incorporate experiences with problem solving of highly cognitive tasks, are more likely to have an increase in student learning. Students become what they are exposed to in class. Therefore, educators are encouraged to challenge their students and expose them to tasks that challenge their cognitive abilities. This will provide students with opportunities to choose problems that allow different entry points of difficulty (Boston & Smith, 2009; Carpenter et al., 2000; Franke & Kazemi, 2001; Phelps, 2012).

Teachers who have experienced professional development with CGI as the focus would say there are wonderful components to uncovering the thinking of students; others would say CGI is not needed for certain demographics of students. Therefore, the limitations and implications of CGI lie in the hands and minds of many educators. CGI professional development in some states limit teachers to how they teach mathematics because of the increase in ELL students in a classroom or a district. Policy makers believe CGI addresses how to fuse language and meaning together with understanding mathematics. However, state policy makers believe teaching mathematics using subject matter vocabulary should be separated from subject matter learning. This will put a damper on teachers in areas of the U.S. who believe in CGI and how it can influence all students. Therefore, law can prohibit and limit the effectiveness of a struggling learner in math due to rules and regulations for students from Latino and ELL backgrounds (Battey, Burke, Guerra, Kang & Kim, 2013).

Some teachers have participated in the professional development, implemented the strategies, and were convinced the structure works; however, many teachers would argue implementation of CGI strategies take too much class time and that practice of skills and lack of fluency is evident in the children's learning (Carpenter et al. 1999). Other CGI studies document it is unclear as to whether or not student understanding of base 10 concepts was developed before students used invented strategies or if it was developed during the learning of standard algorithms. Another question is whether some invented strategies emerge before other strategies. There was a longitudinal study that highlighted students in first and second grade and how they used invented strategies as well as algorithms. Students in the algorithm group did not perform as well as the invented strategy group of students because the assumed ability level in the two groups favored the invented strategy group (Carpenter et al., 1998). Based on outside pressures (e.g. standardized testing) on the teachers in this study, many of the teachers in second and third grade opted to continue to teach algorithms instead of using the invented strategies to develop understanding of procedures in the future (Carpenter et al. 1998). One concern is the ability of elementary students revealing different methods of approaching a problem is dependent upon the content strength of the teacher.

Researchers feel strongly about teachers allowing elementary students to share different methods, but the problem remains when the teacher does not or cannot make the connections from one student to another (Lynch & Starr, 2013). The purpose of allowing students to present their work is to look at the different approaches designed by each child and look for similarities, connections and efficiency, and to allow students to take risks in solving problems.

G. Cognitively Guided Instruction and Student Thinking

There is an advantage in allowing students to take risks and solve problems based on their initial understanding of the problem at hand. The research of Carpenter (1989) discusses CGI as a guiding principle that helps teachers make content, pedagogy, and curriculum decisions based on knowing what the students know and accessing the student's prior knowledge in the math classroom. CGI and the Common Core Mathematical Practices have much in common, but the most common denominator is the core of understanding student thinking (Carpenter et al. 2000; Casa, 2013; Evans & Jaslow, 2012; Warfield, 2001). Not all CGI trained teacher's classrooms will look the same (Carpenter et al. 1999); however, teachers who are not CGI trained in elementary (K – 5) and secondary teachers who do not have a specific CGI training, can implement the 8 Mathematical Practices (NGA/CCSSP, 2010).

The underlying theme of the 8 Mathematical Practices is problem solving and having the students articulate their thinking by constructing arguments, critiquing and justifying their results, looking for patterns, and making sense of their work (NGA/CCSSP, 2010). The big picture for the teacher is to be able to understand the standards and focus across grades levels while making connections across grade levels. This allows for teachers to understand the conceptual and procedural understanding of students and what interventions or enrichments are needed for students (Carpenter et al, 2000; Cobb & Jackson, 2011; Dacey & Polly, 2012). Carpenter (1989) discusses several components of teaching. His belief and philosophy of the teacher and how he or she teaches has a major effect on how students learn in the classroom. Carpenter discussed the research by Shulman (1986) pertaining to importance of PCK. He discusses how the content knowledge, curricular knowledge, and pedagogical knowledge fuse together to help develop the understanding of the learner. Having knowledge of the curriculum will help with the decision making of what instructional practices will be needed (pedagogy).

The pedagogy and the curricular knowledge will build upon the content knowledge of the teacher. Teaching is problem solving (Carpenter, 1989), but knowing your students is part of knowing what pedagogy is needed for the learner and how to achieve this (Dacey & Polly, 2012). Carpenter (1989) reports what the Beginning Teacher Evaluation Study found in regards to student performance. A teacher who knows their students well enough to predict how they would solve a problem were more successful in problem solving as compared to students whose teacher did not know how to predict their method of problem solving. Carpenter sums up his research article with a profound statement about the CGI research development, "Teachers' knowledge of their own students' concepts and abilities and how this knowledge is used to plan for instruction play a central role in this conception of teaching" (Carpenter, 1989, p. 201).

In order for problem solving to occur at any level (K – 12), students need to struggle with a cognitively demanding problem, be able to explore the problem, look for understanding of the problem (independently or collectively), and apply prior knowledge in order to solve problems. Teachers who are implementing what they learn from CGI professional development across many grade levels understand how their students think about mathematics from year to year by looping. They provide students with challenging cognitive tasks that will develop a more confident student who is exposed to productive struggle in mathematics (Boston & Smith, 2009). In order to meet the needs of developing/finding challenging cognitive tasks for students, additional time to plan is needed during the school day so teachers can collaborate and analyze student work and understand how students think (An, 2004). Standardized testing is playing such a large role in funding for schools, teacher effectiveness, and testing that emphasizes "coverage of skills" instead of "conceptual understanding" (Evans & Jaslow, 2012; McTighe & Wiggins, 2005; NCTM, 2014). There are many other factors that impede teachers from creating a classroom environment constructed around the concept of problem solving and student conversations as well as developing fluency in the content at hand. Creating that environment is dependent on the ability for teachers to understand the thinking of their students.

While understanding the thinking of students, posing problems, and discussing those problems takes time away from the upcoming weeks of standardized testing. Teachers know they will be "graded" by the district and state based on the scores of their students in a one day or one week snap-shot of time (McDermott, 2013). Grading is another factor that limits teachers because the world of education has become completely quantitative and has lost the qualitative component of listening to students talk, argue, discuss and prove—which is problem solving in action (Bower, 2013). Students and parents discuss their schooling in terms of test scores and grades. For many students and parents, getting an A is the only reason for going to school; moreover, the love of learning is diminishing and test scores have become the focus for teachers (Bower, 2013). For years teachers only needed to teach skills to students and the end of year state assessment revealed how well the students knew “skills” in a grade level. The states that have adopted the Common Core State standards have either adopted one of two state conglomerates: Smarter Balance or PARCC for statewide assessment. Both are striving to assess students on their ability to solve real-world problems and show how they solved the problem (PARCC, 2014).

Based on what PARCC describes, the test will stress how students can show “how” they think through problems. Understanding how students think through problems is the cornerstone of the professional development group associated with CGI and a component of implementing the Common Core Mathematical Practices (Evans & Jaslow, 2012).

H. Ethnicity and Instructional Strategies

As the new educational standards-based-era of testing conglomerates, PARCC and Smarter Balanced Assessment Consortium begin changing and preparing for new assessments, teachers need to prepare to change their instructional strategies for all students—especially those of poverty and minorities. The research regarding ethnicity and achievement is tied closely to the amount of time spent on instruction and the specific type of instruction for students of different ethnic backgrounds. Teachers must focus on conceptual understanding while teaching students mathematics in the early grades (K – 5). NCTM (2014) has encouraged teachers since 2000 to teach in a manner that promotes conceptual understanding instead of the focus on procedures and calculations. Research suggests more time spent on instruction can have a positive impact on student growth in mathematics among students (Desimone & Long, 2010). Gutiérrez (2008) emphasizes that research should focus less on achievement gaps and more on the effective teaching practices that impact all students. Gutiérrez believes gap analysis doesn't need to disappear completely; rather research needs to look at how to improve learning environments that help students of ethnicity experience success. Finally, she believes educators need to read the research and apply the results in regards to professional development, pedagogy, and more contextualized intervention for all students.

In order to excel and challenge minority students, those particular students need the best and most knowledgeable teachers in terms of Mathematical Knowledge for Teaching (MKT). Research says minority students can learn more with exceptional teachers, and teacher knowledge is directly related to socio-economic status (SES) and minority status (Battey, 2012). If a teacher teaches with problem solving and discussion of mathematical thinking, then higher achievement will occur because the pedagogy is different and more relevant than the traditional way of teaching mathematics. Modeling, asking questions, posing problems, and listening to students propose solutions is very effective with all students, but more importantly it is successful with minority students (Battey, 2012; Moschkovich, 2013). Negative instructional practices are setting a student away from everyone else so that student has less access to learning. Therefore it is imperative that all students need time to struggle with important mathematical concepts. Teachers need to provide students with time to talk and explain their work to one another to justify their reasoning (Battey, 2012). A balance of procedural and conceptual knowledge is necessary along with bringing in contextual examples to classroom instruction. There are four main recommendations that are effective teaching practices which are necessary to impact the learning of ELL students yet would benefit all students and especially minority students. Moschkovich (2013) discusses the following recommendations:

> (1) focus on reasoning and not on accuracy in language, (2) focus on mathematical practices, not single words or vocabulary, (3) recognize the complexity of language in mathematics classrooms and support students in engaging in this complexity, (4) treat every day and home languages as resources, not obstacles. (p. 50 - 51)

Ladson-Billings (1997) discusses the "pedagogy of poverty" as mundane tasks such as assigning seatwork, homework, reviewing for tests, taking tests, and punishing non-compliant students. These are poor instructional strategies for any student and especially for students of poverty and minorities. The instructional strategies that work with students of poverty and minority students start with believing students are capable, setting high expectations for students, being extremely supportive and caring, and treating all students as if they are intellectually exceptional. Teachers must understand all students have talents and can bring something to the table in terms of learning and becoming a productive component to society. Additionally, establishing relationships with students and showing compassion when learning is hard are effective strategies for learning for anyone—especially students from poverty and minorities (Battey, 2012; Ladson-Billings, 1997).

I. Ethnicity and Family Support

As educational reform continues to push more researched based instructional practices in order to impact all students, the 2008 mathematics advisory panel suggests the most important factor and variable related to student achievement is the family. The largest deterrent to educational progress is whether or not the family is supportive of the child in the educational sense because the "ideal" nuclear family from the 20th century is deteriorating fast (Ornstein, 2010). Over 50% of students live with a single parent, and 75% are located in metropolitan cities where math achievement is very low compared to other international schools (Ornstein, 2010). Seventy-seven percent of Hispanic families come from low income families. This creates an achievement gap in both education and income (Hemphill & Vanneman, 2011).

Research reports stunning implications for student achievement related to the African American home (Barton & Coley, 2010). The downward spiral of the nuclear family, the discrepancies of family income, and the changes in family structure all are potential threats to the education and achievement of students in any ethnic group, but especially in the African American community (Barton & Coley, 2010). One huge factor for African Americans is the rise in births outside of marriage and the absence of father figures; both of these impact the income level of families (Barton & Coley, 2010). Low-income impacts the educational opportunities for African American students and it affects the efforts to close the achievement gap between the African American and Caucasian students (Barton & Coley, 2010).

This does not mean families of minority students do not regard education and family to be important. What the research does suggest is more parental involvement and support for the students at home may improve academic achievement for minority students (Lin & Yan, 2005).

Moreover, Lin & Yan (2005) suggest African American parent involvement is motivated by a response to racism and discrimination, but the fact is parent involvement of African American families is much smaller than other ethnicities. In several studies about Hispanic families, many parents of Hispanic students wanted to be involved in their children's education and would help in any way possible (Lin & Yan, 2005). Many Asian families take education seriously and believe it is the only way to move upward in mobility (Lin & Yan, 2005). Asian parents take pride in their parenting when their child is successful in school (Lin & Yan, 2005). Much of the time Hispanic parents are not aware of the different ways to help their children academically and typically remove themselves so not to impede what is going on in the classroom (Lin & Yan, 2005). Other research suggests many parents are influenced by many factors that can deter achievement from minority students. The research regarding Hispanic parent education and the relationship that factor has on the achievement gap has been very stable in recent years (Lin & Yan, 2005). The main factor affecting achievement with minority students is family income (Reardon, 2011). Unfortunately, much of the research on achievement gap ventures into speculation and generalization about factors that influence achievement from teachers, school leaders, and parents (Gutiérrez, 2008). Since many of these studies are one time responses, it doesn't tell us everything in terms of how much family support is provided, or how much income affects the family and its attitudes toward education (Gutiérrez, 2008).

As teachers and researchers grow in maturity and come to understand minority students from poverty, a change of heart toward empathy for students who are disadvantaged in the home is encouraged. Educators and especially researchers must understand that getting to know students and their actions in schools and in society are coupled with understanding how their world functions every day. If we are going to serve all of our students, then we must know our students and gain knowledge about them to support them fully (Barnes et al., 2013).   Many achievement obstacles can be addressed by understanding that many students do not feel adequate in the classroom because they have family members who do not speak the language, they do not have resources or know about financial opportunities to help their children (Pascopella, 2004).

Parental involvement is needed in every school and can be addressed in many ways. For instance, one school developed an afterschool club (Math Club) which devoted time to student interest and was supported extremely well by the family members of the Hispanic students at school (ì-Palomar et al., 2009). This was a non-remedial mathematics opportunity for 20 third through sixth grade students to focus on student choice of interest in mathematics. Other research found minority children who have parents involved in their studies and activities and attend PTO and parent conferences performed better in school than students with parents who were less involved (Díez-Palomar et al., 2009; Lin & Yan, 2005).

J. Ethnicity and Mathematics Achievement

For years researchers have wrestled with “gap analysis” and the continual comparing of Caucasian to Non-Caucasian students on state and national assessments. There is statistical evidence that the achievement gap between Caucasian and Asian compared to Hispanic and African American is huge even though many states have narrowed the achievement gap between Caucasian and Non-Caucasian students (Hemphill & Vanneman, 2011). Other countries spend less on their kids in education and are making higher gains. Why? Research suggests it is the work ethic and motivation of the youth of America (Ornstein, 2010). Students in ethnic groups who may have shown achievement in the past did not show growth under (No Child Left Behind) NCLB (Bowe, Cronin, Kingsbury, & McCall (2005). The goal of NCLB was not to increase but decrease the achievement gap among different ethnicities.

Research indicates schools are not providing enough opportunities for minority students to have access to higher math and physics courses in high school; without these opportunities and support systems for students of ethnicity, the employment opportunities in the future for these students will decrease considerably (NCTM, 2014). There is also a disparity between Caucasian and Non-Caucasian students and the opportunities for STEM. Currently there are fewer than 16% of Non-Caucasian students earning degrees in engineering (NCTM, 2014). Since the population of Non-Caucasian students is rising (over 40% in future years), there must be more opportunities for Non-Caucasian students to excel in this field. Caucasian students will soon become the minority in the United States and will not be able to sustain this career field alone (NCTM, 2014).

With this rise in minority students, Pascopella (2004) indicates 25% to 30% of Hispanic students drop out of school, which is a much higher percentage than African American students. Up to 5.5 million students are in ESL programs, but our schools and teachers are not changing as a whole to combat the dropout rate of young Hispanic students nor are they fighting for opportunities for minority students to be successful in mathematics. Too many times teachers have decided there is something wrong with students and their skills when really there is nothing wrong with them (Barnes et al., 2013). Many times there is nothing wrong with the student; it could solely be a student is struggling with the language (Barnes et al., 2013). Therefore, this study also focused specifically on the Hispanic population and whether or not looping and a CGI trained teacher made an impact on math achievement during the K – 5 grades.

In order to fully reach all students, especially minority students and students of poverty, teachers must look to establish relationships with the students and become familiar with their strengths. Many times teachers look upon students as incapable before the child has an opportunity to prove their capabilities to the teacher (Barnes et al., 2013). There is speculation that the disconnect to learning mathematics for minority students and students of poverty is the inability of or support from teachers to contextualize the math students are learning. Research recommends achievement gains be documented when instruction is relevant to the community of learners and the culture in which students from underrepresented populations derive (Díez-Palomar et al., 2009). Therefore, as educators look to adapt to a new testing system, PARCC, there is an opportunity to revise old practices and look to enhance achievement by literally not leaving children behind in their learning.

K. Conclusions

In conclusion, research suggests student learning takes time and strategies that reveal growth in student learning and are often revealed through longitudinal studies (Carpenter & Moser 1984). Best practices in education are powerful for students if teachers want to build understanding, and comprehend the mathematical thinking of their students. However, it is important to build coherence and connections from year to year, to create a safe environment for learning for all students, build a strong trusting relationship with their students, and more importantly understand the thinking of the students (Cobb & Jackson, 2011; Hitz et al., 2007). In addition, Carpenter (2000) did not mention looping specifically, but revealed something special about how the fundamentals of CGI and the ideal of looping are interwoven in his research report:

> This study also showed that teachers' knowledge of their students' thinking was related to student achievement. Students of teachers who knew more about their students' thinking had higher levels of achievement in problem solving than students of teachers who had less knowledge of their students' thinking. (p. 4).

Carpenter's statement suggests the more the teacher knows about a student, then the more successful a student can be in problem solving and thinking mathematically. Looping can help teachers continue to deepen the thinking and ability levels of students by having more time (multiple years) with students.

In order to accomplish this feat of looping and implementing CGI strategies, research suggests a teacher should embrace the opportunity to loop with their students while incorporating CGI strategies, and incorporating the best practices that impact students of different ethnic backgrounds (Moschkovich, 2013). Teachers can take advantage of the gift of time (Cassidy & Hegde, 2004) and increasing the involvement of parents in the education process. This process of looping is anticipated, expected and successful at many grade levels from K – 8, but it is startling that the research is extremely minimal besides the research of the HSP (Yamauchi, 2003) which at risk students loop with teachers in grades 9 – 10 and then again in grades 11 – 12. The research suggests students, no matter the age, want to be loved, encouraged and challenged in school. Additionally, establishing relationships with students and showing compassion when learning is hard are effective strategies for learning for anyone—especially minority students and students from poverty (Ladson-Billings, 1997).

Education provides students, at their most impressionable time in their academic career, with at least 8 – 12 different teachers with different strengths and inconsistencies. When will this stop? When will educators see that quantity time with a quality teacher can be advantageous to the student over the course of his or her academic career? Checkley (1995) is quoted by saying: "Where else (but school) do you keep changing significant people in your life and think it is good." (p. 6) This chapter presented a review of the literature for the current study of how the powerful practice of looping can strengthen teacher/student relationships, gain instructional time over the course of two or more years, provide students with a safe and stable classroom environment, and can greatly increase involvement of parents. Looping is a powerful practice when implemented alone, but coupled with cognitive strategies and a desire to meet the needs of students of poverty and different ethnicities can provide robust learning opportunities for all students. Chapter 3 will discuss the research design and methodology.

CHAPTER 3

METHODOLOGY

Chapter one and two described the purpose, advantage, benefits, and background of the practice of looping, the advantages of CGI professional development, and aspects into the realm of ethnicity. This chapter presents the research design and methodology used to gather and analyze the data for this particular quantitative study. This chapter describes the approach to the research design, and the procedures on how the data are interpreted. The site selection, the population and sample of participants are discussed and how the sample of students was selected. The data collection procedures discuss how, when and where the data was retrieved and other procedures needed for the data collection process. The data analysis section discusses how the data are reported and displayed, the methods used to analyze the data, and the rationale for using certain techniques as well. Finally, the limitations of the study that cannot be controlled are discussed and how those limitations affected the study.

A. Purpose of the Study

While incorporating best instructional practices for all students into one's daily classroom practice, a teacher provides ample opportunity to develop student achievement. However, the combination of looping, implementing CGI strategies, and a mindset for how students of ethnicity learn can be a catalyst for best practices in teaching mathematics for all students.

B. Research Questions

This particular study was developed to determine the outcomes of teachers looping with their students and to analyze how that practice impacted student achievement in regards to growth in mathematics scores on the MAP test. In addition to the looping practice, teachers who employ the strategies from CGI professional development are capable of impacting student achievement as well. Therefore, the questions stated below authenticate if there is a significant difference between a student who loops with their teacher, are exposed to CGI strategies, and determine to what degree ethnicity impacts the MAP growth of the these students.

The goal in this study is to determine if looping, CGI training or aspects of ethnicity have any impact on whether or not a student meets their growth in MAP scores. Initially, each component is analyzed individually to see if it influences a student's growth or not. The specific research questions investigated for this topic are as follows:

1. Does looping impact whether or not a student will meet or exceed his or her growth in MAP scores?
2. Does CGI professional development training impact whether a student will meet or exceed his or her growth in MAP scores?
3. Do all six ethnic populations, Hispanic, Asian, Pacific Islander, American Indian, African American, and Caucasian affect whether or not a student will meet or exceed his or her growth in MAP scores?
4. Does a Non-Caucasian background impact a student meeting or exceeding MAP growth in mathematics every year student's MAP scores compared to Caucasian?

The subsequent question is directed specifically to determine if there is an association among looping, CGI, and ethnicity and whether or not these associations emerge to impact MAP growth.

5. Does the combination of the practice of looping, implementation of CGI strategies, and a student's ethnicity impact MAP growth?

C. Hypotheses

In this quantitative study, the null hypothesis states there is no significant difference in students meeting their MAP growth in mathematics when a teacher loops with his or her students and has been trained in CGI instructional strategies as compared to a teacher who does not loop or put into practice CGI strategies.

D. Population and Sample of Study

This particular study analyzes a specific population of students in a largely populated school district in Arkansas. The following information is found on a web database developed by the Arkansas Department of Education [ADE] (2014). The particular demographics of the school district in the study during Year 1 (2010 – 2011 academic year) are as follows by percentage of population for Kindergarten – 5th grade: Asian (1.6%), African American (2.2%), Hispanic (44.3%), Native American (.48%), Pacific Islander (11.4%), White (38%), and more than one race (1.8%).

The particular demographics of the school district in the study during Year 2 (2011 – 2012 academic year) are as follows by percentage of population for Kindergarten – 5th grade: Asian (1.65%), African American (2.32%), Hispanic (45.31%), Native American (.49%), Pacific Islander (9.93%), White (38.69%), and more than one race (1.62%).

The particular demographics of the school district in the study in Year 3 (2012 – 2013 academic year) are as follows by percentage of population for grades Kindergarten – 5th grade: Asian (1.57%), African American (2.22%), Hispanic (45.8%), Native American (.51%), Pacific

Islander (10.81%), Caucasian (37.49%), and more than one race (1.6%). The school district, as of Year 2 loop, has about 60% of students in grades K – 5 on free lunch, 10% of student in grades K – 5 on reduced lunch, and about 30% of students in grades K – 5 on paid lunch (ADE, 2014).

The overall student population of this school district in Kindergarten – 5th grades during Year 1 was 9,617, Year 2 was 9,658 students, and during Year 3 was 10,936 students. However, not all of the students have a "stable" history of being present in the school district from Pre-Kindergarten to the present time. Many students are transient and move every other year, and some students move and then move back. Therefore, a subset population of 1,103 students was identified as stable (being a percentage of the entire population). The ethnic breakdown of students in the stable sample is as follows: 14 Asian, 18 African American, 88 Pacific Islander, 708 Hispanic, 8 Native American, and 267 Caucasian students. Being stable translates to a percentage of the entire population that has been consistently present and active in the particular school district for multiple years or since Kindergarten (ADE, 2014). These 1,103 students either had a different teacher for three years or had a teacher who integrated the practice of looping during the first loop or the second loop. There were five students who looped with their teacher for three years of this study. During each academic year observed, all students participated in the NWEA MAP testing in mathematics three times every year (fall, winter, and spring).

In order to really advance students above their grade level range or RIT (Rauch Unit) (NWEA, 2014), teachers need to understand the appropriate level of their students on the RIT range to determine what specific instruction is needed for recurrent growth on the next test.

Hence, this particular school district has 18 teachers practicing looping and who were CGI trained, and there are 171 students who comprise the rosters of these 18 teachers. There are 16 teachers who practice looping and are not CGI trained, and there are 148 students who comprise the rosters of these 16 teachers.

In this study, the sampling unit is the student because the process of this study is to obtain a sample of students from the entire population. The sampling unit was not a random sample from the population; therefore, generalization to other populations around the United States in regards to the benefits of looping and the effects of CGI professional development, and similar ethnic populations is limited. The benefactors of this information would be any school district that is comparable in size, demographics, and poverty level. Other people who would benefit from the research of this study would be administrators and teachers. Building leaders and teachers are continuously searching for practices that promote student achievement, improve standardized test scores, and reveal to the public that their school is meeting the needs of all learners. Looping and CGI are well known practices and professional development programs respectively appointed as solutions for developing student achievement (Carpenter et al. 2000; Wiliam, 2011).

The sampling method for this study is a retrospective case-control study. This type of study looks into past data which has already been gathered to the time the study begun. This study was conducted by reviewing data from an administrative state-wide database, and the reason to conduct this particular type of study is because of the association of measures between looping, CGI, and ethnicity (The National Emergency Medical Services Department for Children Data Analysis Resource Center, 2010).

E. Data Collection and Instrumentation

The data for this study were collected by organizing all of the student data from Arkansas Public School Computer Network (APSCN) based on students who are not highly mobile but who have been long-standing in the district from Kindergarten through 5th grade. The archived data were organized by student ID, ethnicity, gender, the grade in which the student is looping with a teacher, whether or not the student met or exceeded growth, and whether or not the teacher has been trained in CGI professional development.

In order to better control for other possible factors, it is important to select students who have been stable in the school district to help determine if looping and the CGI teacher training are effective. A non-stable group, 10,936 students, has either moved in or has been removed from the district, or moved back to the district after leaving. A non-stable group of students would not provide the study with a reliable resolution in regards to whether or not looping and CGI have an effect on student achievement. The data were collected once the Institutional Review Board (IRB) provided clearance to gather and run the data from the archived data base.

F. Data Analysis

The data from APSCN were sorted by ethnic background, the number of CGI teachers trained or not trained, the number of teachers looping or not looping, and whether the student met their growth on the NWEA MAP testing. The data were reported in several ways: 2 x 2 Contingency Tables for looping and CGI implementation, Frequency Table, SAS reports, and graphical breakdown reports about the different factors mentioned above. Two specific tests were used to analyze the data: Chi-Square and Logistic Regression. The Chi-Square test is a statistical model that reveals if there is an association between the different groups from each variable category based on dichotomous independent variables. The Chi-Square test provided information about whether a significant difference occurred between variables and what categories aid in the significance (McHugh, 2013). The Chi-Square test provided information about the association of the differences observed and which factors may influence more significantly than others (McHugh, 2013). When using the Chi-Square statistic test, one should be aware of assumptions that are necessary to analyze and interpret the data appropriately. The data in each of the cells in this study (looping or not looping, CGI trained or not CGI trained) are represented by frequency numbers and not percentages of students who met or did not meet growth on their MAP test.

Since this study focused on the dichotomous response variable of “yes” or “no” in response to the student meeting MAP growth with a teacher who is utilizing the looping practices, CGI training, and ethnicity, the Logistic Regression test is a statistical model that is appropriate for categorical response variables (dependent variables). This is a strong statistical test because it will predict the probability of a student meeting their MAP growth given their looping, CGI or ethnic status. The Logistic Regression test provided odds ratio probabilities for the relationship between the explanatory variables (independent) and the dichotomous response variable (growth—yes or no). There will be an analysis of how close of an association or correlation there is between the combination of all three components of looping, CGI training, and ethnicity.

G. Conclusion

This particular sample of students is special because it has a high proportion of non-white students, a typical number of CGI trained teachers, and a minimal number of teachers who practice looping. The sample of 1,103 students will be analyzed using two statistical models. The Chi-Square test will be used to determine the degree of significance between a student who loops with their teacher and whether looping with a teacher had a bearing on a student meeting their MAP growth in mathematics. Ethnicity will also be observed to see whether it had influence on MAP growth. In addition, both the Chi-Square and the Logistic Regression will be used to determine if looping and CGI impacted MAP growth on Hispanic students specifically. Finally, the Logistic Regression test will be used to determine if there is an association or correlation between the practice of looping, CGI status, and ethnicity and whether or not the association impacts MAP growth. Chapter 4 will discuss the data results, the synthesize tables of data to answer the research questions, provide probability values to determine if there is a significant difference in the explanatory variable and the effect on MAP growth for students.

CHAPTER 4

DATA RESULTS AND ANALYSIS

In Chapter one, the researcher provided background information about looping, CGI, ethnicity, the benefits of the research, the purpose of the study, the hypotheses, and the research questions that the different tests attempted to quantify student achievement in math. The literature review in Chapter two presented the background and research for this study, which help provide context about what is already known about research in the practices of looping, professional development of CGI, and the impact of ethnicity. Chapter three presented an explanation of the methodology used, the specific statistical tests, the identified sample, the data collection procedures, and the demographic information about the participants in the study.

In this chapter, the researcher discusses the findings that emerged from the data analysis that the Statistical Analysis System (SAS) presented. The purposes of this study are to determine whether there is a significant difference in MAP scores of students when a teacher loops with their students, employs the CGI model, and whether ethnicity directly impacts MAP scores in mathematics. While applying a Chi-Square statistic, an association between the practice of looping and implementing the CGI strategies was sought. Finally I determined if there was an association between all three variables while applying the Chi-Square test to the following: looping, CGI strategies, and ethnicity. Another statistical test, Logistic Regression, was used to determine if there was significance in the response variable (MAP Growth) occurring with a combination of explanatory variables (looping, CGI strategies, and ethnicity). The Logistic Regression predicts the probability of a dichotomous response variable. Since this study is interested in predicting whether or not a student makes MAP growth each year or not, Logistic Regression is appropriate.

Therefore the combination of explanatory variables such as looping, CGI strategies, and ethnicity will be analyzed. Since this particular school district has a high percentage of ELL and Hispanic students, the Chi-Square test and the Logistic Regression test was used to determine if looping and CGI impacted Hispanic students more than other students. The first four questions below are analyzed using the Chi-Square statistic, and Logistic Regression is used to determine the prediction of the fifth question.

1. Does looping impact whether or not a student will meet or exceed his or her growth in MAP scores?
2. Does CGI professional development training impact whether a student will meet or exceed his or her growth in MAP scores?
3. Do all six ethnic populations, Hispanic, Asian, Pacific Islander, American Indian, African American, and Caucasian affect whether or not a student will meet or exceed his or her growth in MAP scores?
4. Does a Non-Caucasian background impact a student meeting or exceeding MAP growth in mathematics every year student's MAP scores compared to Caucasian?
5. Does the combination of the practice of looping, implementation of CGI strategies, and a student's ethnicity impact MAP growth?

A. Description of the Sample Analyzed

The overall student population of this school district for grades Kindergarten – 5th during Year 1 was 9,658 students, and during the Year 2 was 10,036 students. The sample of students from those particular years to be analyzed is 1,103 students with a range of ethnic backgrounds. The 1,103 sample of students were chosen because they had remained in the district continuously from kindergarten through 5th grade.

B. Analyses of Research Questions

There are five main research questions of interest in this study, divided among two statistical tests. The Chi-Square statistic was used to answer the first four questions in determining if an association exists between the different groups from each of the variable categories. The fifth question requires a different statistical test, Logistic Regression, which will determine or predict if an outcome results due to various combinations of explanatory variables with the response variable being MAP growth in mathematics.

Research Question 1

Does looping impact whether or not a student will meet or exceed his or her growth in MAP scores? Research question 1 focuses on Year 1 and Year 2 in terms of whether or not students met or exceeded their MAP growth in math by looping with their teacher. A Chi-Square statistical test helped determine if a student looping with their teacher from Year 1 had any effect on whether or not they made their MAP growth in mathematics at the end of the academic year. In Year 1, 50 students (4.53% of the total students) with a looping teacher met or exceeded their MAP growth in mathematics. The Chi-Square test examining the relationship between all students and the students with a looping teacher who made MAP growth in mathematics was nonsignificant, $\chi^2(1, N = 50) = 0.80, p > 0.05$. There was no significant difference between students who looped in Year 1 and those who did not in terms of making growth in mathematics on their MAP test. In addition, focusing on the Hispanic population, 31

Hispanic students (4.38% of the total students) met or exceeded their MAP growth in mathematics. The Chi-Square test indicated that the relationship between all Hispanic students and Hispanic students with a looping teacher who made MAP growth in mathematics was nonsignificant, $\chi^2(1, N = 31) = 0.95, p > 0.05.$ There was no significant difference between Hispanic students who looped in Year 1 and those who did not in terms of making growth in mathematics on their MAP test.

In Year 2, 149 students (13.5%of the total students) with a looping teacher met or exceeded their MAP growth in mathematics. The Chi-Square test examining the relationship between all students and the students with a looping teacher who made MAP growth in mathematics was also nonsignificant, $\chi^2(1, N = 149) = 1.90, p > 0.05.$ There was no significant difference between students who looped in Year 2 and those who did not in terms of making growth in mathematics on their MAP test. Focusing on the Hispanic population, 97 Hispanic students (13.7% of the total students) met or exceeded their MAP growth in mathematics. The Chi-Square test examining the relationship between all Hispanic students and Hispanic students with a looping teacher was also nonsignificant $\chi^2(1, N = 97) = 0.94, p > 0.05.$ There was no significant difference between Hispanic students who looped in Year 2 and those who did not in terms of making growth in mathematics on their MAP test.

Research Question 2

Does CGI professional development training impact whether a student will meet or exceed his or her growth in MAP scores? A Chi-Square statistical test was used to determine if there was an association between the groups of students who had a teacher who was CGI trained for three different school years (Year 1, Year 2, and Year 3) and whether or not they made MAP growth in math for each year. In Year 1, 289 students and 184 Hispanic students with a CGI trained teacher met or exceeded their MAP growth in mathematics for Year 1. Year 2 was similar with 296 students and 192 Hispanic students with a CGI trained teacher met or exceeded their MAP growth in mathematics. In Year 3 there were fewer students, but similar results, 195 students and 123 Hispanic students with a CGI trained teacher met or exceeded their MAP growth in mathematics that year.

The results of the Chi-Square test for all students that had a CGI trained teacher and made growth in mathematics on the MAP test of Year 1 were significant, but Years 2 and 3 were not significant. The specifics of the test can be seen in Table 1.

Table 1

Chi Square Test of Association for All Students who had a CGI Trained Teacher and the MAP Growth Results for Research Question 2.

Academic Year	*df*	*N*	%	χ^2	*P*
CGI Trained Year 1	1	289	26	9.22	0.002
CGI Trained Year 2	1	296	27	3.34	0.070
CGI Trained Year 3	1	195	18	0.96	0.330

Hispanic students that had a CGI trained teacher and made growth in mathematics on the MAP test was significantly different from Hispanic students that made growth in mathematics on the MAP test but did not have a CGI trained teacher in two of the three years. The results from the Chi-Square test for Hispanic students can be seen in Table 2.

Table 2

Chi Square Test of Association for Hispanic Students who had a CGI Trained Teacher and the MAP Growth Results for Research Question 2.

Academic Year	*df*	*N*	%	χ^2	*P*
CGI Trained Year 1	1	184	26	7.79	0.005
CGI Trained Year 2	1	192	27	3.89	0.050
CGI Trained Year 3	1	123	17	0.34	0.560

As a result of the statistics, teachers with CGI training did make a significant difference on Hispanic student's mathematics growth on the MAP test for two of the three years, Year 1 and Year 2. Table 3, below, summarizes the statistical test used, the variables of significance, the statistic value, and the probability value of the test.

Table 3

Chi-Square Summary Table of Significance for Variables in Year 1 and Year 2.

Variable	Statistical Test	χ^2	*P*
CGI Year 1 (All Students)	Chi-Square	9.23	0.002
CGI Year 2 (All Students)	Chi-Square	3.34	0.050
CGI Year 1 (Hispanic Students)	Chi-Square	7.79	0.005
CGI Year 2 (Hispanic Students)	Chi-Square	3.89	0.050

Research Question 3

Do all six ethnic populations, Hispanic, Asian, Pacific Islander, American Indian, African American, and Caucasian affect whether or not a student will meet or exceed his or her growth in MAP scores? Research question 3 used a Chi-Square statistical test to determine if there was an association between the individual ethnic groups of students and whether or not they met or exceeded growth on the MAP test in mathematics for three different academic school years (Year 1, Year 2, and Year 3). In Year 1, the number of students from each ethnic group making growth was: 8, 6, 29, 295, 3, and 119 for Asian, African American, Pacific Islander, Hispanic, Native American, and Caucasian students respectively. There were a total of 460 students (42% of all students) making growth in mathematics on the MAP test in Year 1. MAP growth in Year 2 was: 10, 9, 57, 429, 4, and 154 for Asian, African American, Pacific Islander, Hispanic, Native American, and Caucasian students respectively. A total of 663 students (60% of the all students) made growth in mathematics on the MAP test in Year 2. In Year 3, a total of 631 students (57% of all students) made growth in mathematics on the MAP test. The breakdown by ethnicity is as follows: 9, 10, 45, 419, 3, and 145 for Asian, African American, Pacific Islander, Hispanic, Native American, and Caucasian students respectively.

The Chi-Square test for Ethnicity and MAP growth for Year 1 was insignificant with $\chi^2(5, N = 460) = 5.62, p > 0.05.$ There was no significant difference in a student making growth in mathematics on their MAP test with Ethnicity as an explanatory variable for Year 1. The Chi-Square test for Ethnicity and MAP growth for Year 2 was also insignificant with $\chi^2(5, N = 663) = 3.38, p > 0.05.$ There was no significant difference in a student making growth in mathematics on their MAP test with Ethnicity as an explanatory variable for Year 2. The Chi-Square test for Ethnicity and MAP growth for Year 3 was also insignificant with $\chi^2(5, N = 661) = 4.94, p > 0.05.$ There was no significant difference in a student making growth in mathematics on their MAP test with Ethnicity as an explanatory variable for Year 3. As a result of the statistics, there was no influence from any of the six different ethnic groups for any of the three years in terms of students meeting or exceeding growth on the mathematics portion of the MAP test.

Research Question 4

Does a Non-Caucasian background impact a student meeting or exceeding MAP growth in mathematics every year student's MAP scores compared to Caucasian? Research question 4 used a Chi-Square statistical test to determine if there was an association between Caucasian and the Non-Caucasian students and whether or not a Caucasian student compared to a Non-Caucasian would meet or exceed growth on the MAP test in mathematics for three different academic school years (Year 1, Year 2, and Year 3).

In Year 1, 119 Caucasian students out of 267 total students (45%) and 341 Non-Caucasian students out of 836 total students (41%) for a total of 460 students (42% of all students) met or exceeded their MAP growth in mathematics. The Chi-Square test examining the relationship between Caucasian and non-Caucasian students making growth in mathematics on the MAP test was nonsignificant, $\chi^2(1, N = 460) = 1.19, p > 0.05.$ There was no significant difference between students making growth in mathematics on their MAP test with Caucasian and Non-Caucasian as an explanatory variable for Year 1.

In Year 2, 154 Caucasian students out of 267 total students (58%) and 509 Non-Caucasian students out of 836 total students (61%) for a total of 663 students (60% of all students) met or exceeded their MAP growth in mathematics. The Chi-Square test examining the relationship between Caucasian and non-Caucasian students making growth in mathematics on the MAP test was nonsignificant, $\chi^2(1, N = 663) = 0.87, p > 0.05.$ There was no significant difference between students making growth in mathematics on their MAP test with Caucasian and Non-Caucasian as an explanatory variable for Year 2.

In Year 3, 145 Caucasian students out of 267 total students (54%) and 486 Non-Caucasian students out of 836 total students (58%) for a total of 631 students (57% of all students) met or exceeded their MAP growth in mathematics. The Chi-Square test examining the relationship between Caucasian and non-Caucasian students making growth in mathematics on the MAP test was nonsignificant, $\chi^2(1, N = 631) = 1.21, p > 0.05$. There was no significant difference between students making growth in mathematics on their MAP test with Caucasian and Non-Caucasian as an explanatory variable for Year 3.

As a result of the statistics, whether a student was Caucasian or Non- Caucasian did not make a significant difference in helping students make growth on the mathematics portion of the MAP test for Year 1, Year 2, or Year 3.

Research Question 5

Does the combination of the practice of looping, implementation of CGI strategies, and a student's ethnicity impact MAP growth? Research question 5 used a Logistic Regression (LR) statistical test to help identify the odds ratio of the response variable (MAP growth) occurring with a combination of three explanatory variables: looping, CGI, and ethnicity. The LR provides an odds ratio that represents the constant effect an explanatory variable has on the likelihood the outcome will occur. The LR predicts if the explanatory variable will be in the dichotomous group of (yes) or (no) in terms of MAP growth in mathematics. Since I am interested in (prediction), and my response variable is a dichotomous nominal variable, then the LR is appropriate (Davis, Koch, Stokes & SAS Institute, 2000; Pedhazur, 1997).

The results of the Logistic Regression test reveals the combination of three explanatory variables: looping, CGI, and Ethnicity for Year 1 can be seen in Table 4. The beta value (B) represents a regression coefficient that is comparable to a linear coefficient that helps in predicting growth. The odds ratio (OR) provides the constant effect an explanatory variable has on the likelihood the outcome will occur. Students in with a CGI trained teacher in Year 1had a regression coefficient of 0.24, which is low predictability for growth. The OR was 1.27 which means that a student in a looping classroom with a CGI trained teacher, was 27% more likely to make growth in mathematics (see Table 4).

Table 4

Predicting MAP Growth with a Combination of Three Explanatory Variables: Looping, CGI, and Ethnicity for Year 1.

Variable: Looping, CGI, and Ethnicity (Ethnicity vs. Caucasian)	B	Standard Error	Odds Ratio	95% C.I.	Wald Statistic	P-value
CGI Year 1	0.24	0.12	1.27	[0.99 – 1.63]	3.79	0.05
Loop Year 1	0.29	0.25	1.33	[0.81 – 2.18]	1.34	0.24
Asian to Caucasian	0.56	0.51	1.84	[0.56 – 6.04]	1.18	0.27
African Am. to Caucasian	-0.39	0.42	0.71	[0.27 – 1.86]	0.84	0.35
Pacific Islander to Caucasian	0.26	0.25	1.37	[0.83 – 2.27]	1.09	0.29
Hispanic to Caucasian	0.07	0.19	1.13	[0.85 – 1.51]	0.16	0.68
Native Am. to Caucasian	-0.46	0.60	0.66	[0.16 – 2.73]	0.58	0.44

Year 2 results are in Table 5 below and reveal a beta value of 0.06 which represents a low regression coefficient for many of the explanatory variables. Asian and Hispanic students have the highest beta values and odds ratios for students involved in Year 2.

Table 5

Predicting MAP Growth with a Combination of Three Explanatory Variables: Looping, CGI, and Ethnicity for Year 2.

Variable: Looping, CGI, and Ethnicity (Ethnicity vs. Caucasian)	B	Standard Error	Odds Ratio	95% C.I.	Wald Statistic	P-value
CGI Year 2	0.06	0.14	1.07	[0.80 – 1.42]	0.22	0.63
Looping Year 2	0.18	0.16	1.19	[0.87 – 1.64]	1.24	0.26
Asian to Caucasian	0.46	0.48	1.59	[0.51 – 4.89]	0.91	0.33
African Am. to Caucasian	0.05	0.42	1.05	[0.40 – 2.76]	0.01	0.89
Pacific Islander to Caucasian	-0.10	0.24	0.90	[0.55 – 1.46]	0.16	0.68
Hispanic to Caucasian	0.21	0.18	1.23	[0.92 – 1.64]	1.28	0.25
Native Am. to Caucasian	-0.64	0.62	0.52	[0.12 – 2.24]	1.06	0.30

In looking at Caucasian and Non-Caucasian students in a looping classroom with a CGI trained teacher in Year 1, a low beta value of 0.24 represents a low regression coefficient for many of the explanatory variables. However, the low OR does not provide a high likelihood growth will occur with ethnic students in Year 1 (see Table 6).

Table 6

Predicting MAP Growth with a Combination of Three Explanatory Variables: Looping, CGI, and Caucasian and Non-Caucasian for Year 1.

Variable: Looping, CGI, and Ethnicity (Non-Caucasian to Caucasian)	B	Standard Error	Odds Ratio	95% C.I.	Wald Statistic	P-value
CGI Year 1	0.24	0.13	1.27	[0.99 – 1.63]	3.65	0.05
Looping Year 1	0.25	0.25	1.29	[0.79 – 2.09]	1.04	0.30
Non-Caucasian to Caucasian	0.07	0.07	1.15	[0.87 – 1.525]	0.98	0.32

In Year 2, the comparison of Caucasian to Non-Caucasian students in a looping classroom with a CGI trained teacher reveals a low beta value of 0.08 which represents a low regression coefficient for many of the explanatory variables. In addition, the OR does not provide a high likelihood growth will occur with ethnic students in Year 2 (see Table 7).

Table 7

Predicting MAP Growth with a Combination of Three Explanatory Variables: Looping, CGI, and Non-Caucasian to Caucasian for Year 2.

Variable: Looping, CGI, and Ethnicity (Non-Caucasian to Caucasian)	B	Standard Error	Odds Ratio	95% C.I.	Wald Statistic	P-value
CGI Year 2	0.08	0.15	1.08	[0.81 – 1.14]	3.65	0.58
Looping Year 2	0.18	0.16	1.20	[0.87 – 1.64]	1.24	0.26
Non-Caucasian to Caucasian	0.08	0.07	1.19	[0.89 – 1.56]	1.42	0.23

When looking at Hispanic students Mathematics MAP Growth in a looping classroom with a CGI trained teacher, a higher beta value of 0.33 was found, representing a higher regression coefficient for many of the explanatory variables. Furthermore, the OR provided a higher likelihood that growth will occur with Hispanic students in a looping classroom with a CGI trained teacher during Year 1 (see Table 8).

Table 8

Predicting MAP Growth for Hispanic Students with a Combination of Looping and Having a CGI Trained Teacher for Year 1.

Variable: Looping and CGI Trained Teacher	B	Standard Error	Odds Ratio	95% C.I.	Wald Statistic	P-value
CGI Trained Year 1	0.33	0.15	1.39	[1.02 – 1.89]	4.34	0.03
Looping Year 1	0.38	0.32	1.47	[0.77 – 2.79]	1.40	0.23

In contrast to the results found in Year 1 for Hispanic students in a looping classroom with a CGI trained teacher, the beta value for Year 2 was low at 0.03 representing a lower regression coefficient for many of the explanatory variables. In the same regard, the OR does not provide a high likelihood growth will occur with Hispanic students in a looping classroom with a CGI trained teacher in Year 2 (see Table 9).

Table 9

Predicting MAP Growth for Hispanic Students with a Combination of Looping and Having a CGI Trained Teacher for Year 2.

Variable: Looping and CGI Trained Teacher	B	Standard Error	Odds Ratio	95% C.I.	Wald Statistic	P-value
CGI Trained Year 2	0.03	0.18	1.03	[0.71 – 1.49]	0.02	0.86
Looping Year 2	0.16	0.20	1.18	[0.78 – 1.77]	0.63	0.42

Table 10 summarizes the statistical test used, the variables of significance, the statistic value, and the probability value of the test. The LR test revealed significance during Year 1 for all students with a CGI trained teacher, as well as with Hispanic students.

Table 10

Logistic Regression Summary Table of Significance for Variables in Year 1.

Variable	Statistical Test	B	Odds Ratio	P
CGI Year 1 (All Students)	Logistic Regression	0.24	1.27	0.05
CGI First Loop (Hispanic Students)	Logistic Regression	0.33	1.39	0.03

C. Conclusion

While comparing the Chi-Square data with research questions 1 – 4 and using the logistic regression model for question 5, there seemed to be very little significance among all of the components combined. The results of the Chi-Square test and the logistic regression analysis suggest Cognitively Guided Instruction was a significant factor for all students making math growth on the MAP test in Year 2. Overall ethnicity was not a factor in making growth, nor did looping impact growth in mathematics during the first and second loop. In regards to Hispanic students, Year 1 and Year 2 was significant for students making growth in mathematics with a CGI trained teacher. Unfortunately, looping was not significant for Hispanic students in making growth in mathematics on the MAP test.

CHAPTER 5

FINDINGS, CONCLUSIONS, AND FUTURE RECOMMENDATIONS

This final chapter discusses the findings, conclusions, and future recommendations for the dissertation. Syntheses and conclusions are drawn from the data found in chapter 4 while addressing the major findings in regards to the literature. This chapter reviews the research problem, the objectives of the study, expands more in terms of the research questions, and mentions the methodology used to conduct the study. Finally, the implications and action toward future recommendations for further research in the future are considered.

A. Overview of the Study

The purpose of this study is to determine whether the practice of looping, implementing strategies from the CGI professional development, and whether the ethnicity of a student has a significant impact on a student's MAP scores in mathematics. The research questions investigate whether looping and a trained CGI teacher has an impact in whether or not a student will meet or exceed his or her growth on the mathematics section of the MAP test. In terms of ethnicity, the problem is to determine if the different ethnic populations impact whether or not a student will meet or exceed his or her growth in MAP scores more than compared to a Caucasian student. Finally, the considerations of whether or not the combination of the factors of looping, implementation of CGI strategies, and ethnicity impact a student's MAP growth in mathematics.

In my attempt to answer the research questions, the design of this particular study was to analyze a specific sample of students in grades K – 5 who have shown indications of progressing through school in a stable environment. A stable environment is defined as being present in the school district from Pre-Kindergarten to the present time. The total number of students in the sample was 1,103. Of that number, students either experienced a different teacher every year or a teacher who looped with them for two years.

The sampling method for this study is a convenience sample which is a retrospective case-control study. This study is conducted by reviewing archived data from an administrative state-wide database. The reason to conduct this particular type of study is to understand more of the potential association of measures between looping, CGI, and ethnicity (NEDARC, 2010). Two types of statistical analyses were used to analyze the archived data: Chi-Square test and a Logistic Regression. The Chi-Square test provided information whether an association between variables was significant and what categorical variables contributed to the significance (McHugh, 2013). The Logistic Regression was used to predict whether a categorical response variable, MAP growth, was achieved based on the explanatory variables of looping, CGI training, and ethnicity.

B. Findings

The findings of the five research questions are based on the data analyzed from the results of the Chi-Square and Logistic Regression analyses.

Discussion of Research Question 1

Does looping impact whether or not a student will meet or exceed his or her growth in MAP scores? Examining the data about looping revealed there was not a significant difference of students meeting or exceeding their MAP growth in mathematics for the first and second loop. The quantitative data doesn't support the fact that looping is beneficial to learning. The Chi-Square statistic suggested the factor of looping did not impact MAP growth in mathematics for all students as well as Hispanic students in regards to great gains. When a teacher builds a relationship with a student, the possibilities of the impact of student achievement increases significantly (Hattie, 2009).

Discussion of Research Question 2

Does CGI professional development training impact whether a student will meet or exceed his or her growth in MAP scores? The results of analyzing the CGI data were very impressive for all students and even more so for Hispanic students. During Year 1 and Year 2, student MAP growth was assisted by having students encounter a teacher who was trained in the professional development of CGI. The CGI trained teacher made a significant impact on student achievement on the MAP test in mathematics in Year 1 and in Year 2. Many research studies show teachers using CGI strategies from the professional development program have increased student achievement in comparison to control groups of teachers not using CGI strategies (Carpenter et al., 2000; Chambers & Lacampagne, 1994).

Discussion of Research Question 3

Do all six ethnic populations, Hispanic, Asian, Pacific Islander, American Indian, African American, and Caucasian impact whether or not a student will meet or exceed his or her growth in MAP scores? The results from the statistics suggest making growth in mathematics on the MAP test is completely independent of the six different ethnic groups. There were six different ethnic groups analyzed and only a few had a higher percentage of students making growth (e.g. Asian, Hispanic, and Caucasian). The six ethnic groups had no impact on MAP growth in mathematics.

<u>Discussion of Research Question 4</u>

Does ethnic background of Non-Caucasian students compared to Caucasian students impact whether a student will meet or exceed MAP growth in mathematics every year? Based on the results of the Chi-Square test for Year 1, Year 2, and Year 3, there was no statistically significant impact on the math scores on the MAP test of students from Non-Caucasian background when compared to Caucasian. It did not matter whether a student was from a Non-Caucasian group compared to the Caucasian group.

<u>Discussion of Research Question 5</u>

Does the combination of the practice of looping, implementation of CGI strategies, and ethnicity impact a student's MAP growth? Based on the results of the Logistic Regression, the combination of looping and ethnicity revealed no prediction of MAP growth in mathematics during the first loop. However, a student having a CGI trained teacher did predict MAP growth during the first loop, and a student with a CGI trained teacher was 27% more likely to make growth during the first loop. The second loop revealed that all combinations of looping, having a CGI trained teacher, and ethnicity compared to Caucasian did not have a significant difference in MAP growth in mathematics.

C. Limitations

Many of the limitations of the study rest on the side of not having enough organized recorded data in regards to looping and numbers of CGI teachers. In gathering the data, there was no specific way to classify how many years a teacher had been looping with students. The teacher could have been looping for two years or could have been looping for several years, so the information was insufficient. This is important information because the more a teacher goes through a looping cycle with students; the better prepared teachers are to handle students, parents, and the content that must be taught (Brooks & Mazzuchi, 1992; Nichols & Nichols, 1998). There is also no way to determine with what fidelity the looping environment was established. Many times teachers loop because they love students and want to develop a strong relationship with the students. Hattie (2009) reports a strong student-teacher relationship has an effect size of (0.72) when describing student achievement.

Although the association between the variables was significant, the Phi coefficient suggests there is a weak relationship between Hispanic students making growth with a CGI trained teacher in Year 1. Finally, the effect size of all students in Year 2 with a CGI trained teacher revealed a weak relationship between all students making growth with a CGI trained teacher in Year 2. Since the looping data was not statistically significant, it is difficult to determine if there really was an implication with the implementation of looping or was it because of the low number of teachers looping with fidelity. That was not a component of focus, but the research suggests looping is extremely supportive to special education teachers because of the special education referral process (Hitz et al., 2007).

Another limitation to this study is the ineffectiveness of the organization of the data denoting the number of years a teacher had received CGI training; specific data were not recorded in this particular school district for public record nor did the data warehouse have it recorded either. This is important information regarding the number of years of training for CGI (since it is for K – 3 teachers). Many instances teachers go to one year of training and never go back due to lack of district funding, the teacher may move, or extenuating circumstances keep the teacher from attending. Some teachers go to all three years of training and then go on to become trainers of teachers. However, the lack of information on the number of years of CGI training does make it difficult to know how effective a teacher would be while implementing the strategies from the professional development workshops. For grades 3 – 5, there is another professional development opportunity and it is called Extending Children's Mathematics (ECM). There is a year 1 and year 2 for training for teachers who are teaching grades 3 – 5, but in this study there is no recorded data on how many years of training for the ECM professional development either.

Another limitation in regards to MAP scores is the type of tests selected for this study. My data set was developed to investigate whether or not the students met or exceeded their growth on the MAP test in mathematics. It is difficult to compare students in the same grade because students start with radically different scores and percentile ranks, and thus comparing their scores at the end of the year does not make sense due to students having different typical growth criteria. Some students may need 5 points to meet their growth, some may need 10 points, and others may need 15 points to make growth. An Analysis of Variance (ANOVA) may not be sufficient with these types of explanatory variables. An ANOVA compares group means and doing so would suggest I have the raw MAP scores and then look at groups (those who looped, versus those who didn't etc.). MAP scores cannot be compared because kids in the same grade and even in the same class may start with radically different scores and thus comparing their scores at the end is not appropriate.

D. Recommendations for Further Research

This study analyzed MAP growth in the content area of mathematics by observing students who have a teacher who loops, is CGI trained, and whether or not ethnicity is a factor in making growth. Additional studies need to focus on different grade levels of K – 3 with only CGI teachers, and grades 3 – 5 with only ECM trained teachers to determine the specific effectiveness of the professional development training. As Common Core assessments from PARCC and Smarter Balance begin to appear in schools and states next year (2014 – 2015), it would be interesting to see if students score increase from year to year due to having teachers who are either CGI or ECM trained.   CGI and ECM professional development conferences instruct teachers how to analyze student thinking in regards to conceptual understanding. Both PARCC and Smarter Balanced assessments are being developed to assess application, reasoning, and procedures (PARCC, 2014). All three components are major areas of focus with a teacher who is learning how to better understand the thinking of their students.

Further studies should include highly effective secondary math teachers and how effective they would be while looping with a group of students in at least two or three years of high school mathematics (e.g. Algebra 1 to Geometry to Algebra 2). The potential impact this would have on special education students, at-risk students, ELL students, and those from low socio-economic status would be remarkable (Cramer et al., 2008; Franz et al., 2010; Hitz et al., 2007).

E. Conclusion

The findings of this quantitative study revealed it is difficult to quantify the impact teachers have on mathematics achievement while looping with their students and whether ethnicity impacts student’s growth on the MAP test. When teachers attend professional development that is aligned with the specific content (e.g. mathematics and CGI), the impact is easier to quantify because the professional development is directly related to the content.

Undoubtedly, I was excited to conduct this study because I anticipated student achievement in mathematics was a given if the following conditions are met: a student loops with a caring and devoted teacher who desires to relate to the student, a teacher who is involved in content specific professional development and then implements strategies with fidelity to all students.

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Appendix A

Springdale School District

March 31, 2014

Office of the Superintendent

To Whom It May Concern,

My name is Matthew Wilson and I am a doctoral student at the University of Arkansas. I am pursuing a Ph.D. in Curriculum and Instruction with the emphasis in math education and my advisor is Dr. Michael Wavering. In order to fulfill my research studies, I am requesting use of archived data in order to evaluate the effectiveness of traditional teaching practices in the classroom. All identifiers from the data will be removed (e.g. teacher names and student names). The data are MAP scores from students from fall of 2010 to spring of 2013. I am requesting student ethnicity, gender, SPED and FRLP status, 504 and migrant status, years teachers looped with their students, and whether or not a teacher was CGI trained.

The title of my study is—THE EFFECTS OF COMBINING LOOPING, COGNITIVELY GUIDED INSTRUCTION, AND ETHNICITY: HOW THEY CAN COLLECTIVELY IMPROVE ACADEMIC ACHIEVEMENT.

My research questions involve the following:

(1) Does looping impact whether or not a student will meet or exceed his/her growth in MAP scores in mathematics?
(2) Does CGI professional development training impact whether a student will meet or exceed his/her growth in MAP scores in mathematics?
(3) Does ethnicity (Hispanic, Asian, Pacific Islander, American Indian, Black, and White) impact whether or not a student will meet or exceed his/her growth in MAP scores in mathematics?
(4) Does the combination of the practice of looping, implementation of CGI strategies, and ethnicity impact a student's MAP growth in mathematics?

Again, I would appreciate the permission of Springdale Public Schools to pursue this study and to access the data needed to help understand how traditional practices influence student achievement.

Sincerely,

Matt Wilson, M.Ed., NBCT
District Math Coach—Fayetteville Public Schools

Appendix B

UNIVERSITY OF ARKANSAS

Office of Research Compliance
Institutional Review Board

April 3, 2014

MEMORANDUM

TO:	Matthew Wilson Michael Wavering
FROM:	Ro Windwalker IRB Coordinator
RE:	New Protocol Approval
IRB Protocol #:	14-04-644
Protocol Title:	*The Effects of Combining Looping, Cognitively Guided Instruction, and Ethnicity: How They Can Collectively Improve Academic Achievement*
Review Type:	☒ EXEMPT ☐ EXPEDITED ☐ FULL IRB
Approved Project Period:	Start Date: 04/03/2014 Expiration Date: 04/02/2015

Your protocol has been approved by the IRB. Protocols are approved for a maximum period of one year. If you wish to continue the project past the approved project period (see above), you must submit a request, using the form *Continuing Review for IRB Approved Projects*, prior to the expiration date. This form is available from the IRB Coordinator or on the Research Compliance website (http://vpred.uark.edu/210.php). As a courtesy, you will be sent a reminder two months in advance of that date. However, failure to receive a reminder does not negate your obligation to make the request in sufficient time for review and approval. Federal regulations prohibit retroactive approval of continuation. Failure to receive approval to continue the project prior to the expiration date will result in Termination of the protocol approval. The IRB Coordinator can give you guidance on submission times.

If you wish to make *any* modifications in the approved protocol, you must seek approval *prior to* implementing those changes. All modifications should be requested in writing (email is acceptable) and must provide sufficient detail to assess the impact of the change.

If you have questions or need any assistance from the IRB, please contact me at 210 Administration Building, 5-2208, or irb@uark.edu.