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A Grounded Theory Approach to Use of Differentiated Instruction to Improve Students' Outcomes in Mathematics

Juniace Senecharles Etienne
Walden University

Walden University

COLLEGE OF EDUCATION

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Juniace Senecharles Etienne

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Review Committee
Dr. Edith Jorgensen, Committee Chairperson, Education Faculty
Dr. Theresa McDowell, Committee Member, Education Faculty
Dr. Robert McClure, University Reviewer, Education Faculty

Chief Academic Officer

David Clinefelter, Ph.D.

Walden University
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MA, Nova Southern University, 2007

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Doctoral Study Submitted in Partial Fulfillment

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Abstract

Teachers in a school district in a southeastern state are being challenged to meet the needs of students who have learning disabilities (LDs) and who require an individualized education program with a mathematics goal. The students are in danger of not passing state, district, and classroom mathematics tests, and not all the schools are meeting adequate yearly progress (AYP). Funding from the federal government is denied if a school does not achieve AYP; the school personnel must then complete a school improvement plan. The purpose of this study was to explore which differentiation instructional (DI) practices inclusion teachers were using to promote math academic achievement for underperforming students with LDs in inclusion math classrooms. A grounded theory approach was used to explore inclusion teachers' perceptions on the effectiveness of DI with students with LDs in inclusion math classes. Survey and interview protocols were developed and administered to collect data. Data were open, axial, and selectively coded, and were synthesized into categories and subcategories following emerging themes and patterns. Triangulation, member-checking, and an audit trail were used to validate the findings. A theory of effective instructional practice is presented from the teachers' viewpoint. This study may impact positive social change by identifying instructional practices that allow better access to mathematics for students and thereby has the potential to impact student achievement.

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ProQuest LLC.
789 East Eisenhower Parkway
P.O. Box 1346
Ann Arbor, MI 48106 - 1346

Dedication

This study is dedicated to my deceased brother, Lejeune Bertrant, who at the age of 12, told me never to neglect my education. To my loving husband, Romel, whose patience, kindness, and love laid the foundation upon which I was able to continue the doctoral journey. To my twin daughters, Joyce and Jessica Gayo, who from the moment they were born, have filled my life with joy, fun, happiness, and worth. To my sister Hilda, whose endless encouragement, knowledge, and guidance led me through each step of this journey. To my brother, Wilner, who believed in me and always wanted me to do my best. To my brother, Franklin, whose continuous interest and pride in my achievements empowered me along the way. To Silemond Senecharles and Clerimene Senecharles, who gave me the opportunity to be who I am today. To all of my nieces and nephews who live here and abroad and to all my girlfriends whose frequent phone calls encouraged me all along the doctoral pathway….I thank all of you.

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Section 1: Introduction to the Study

Introduction

American teachers have always been challenged to deliver effective education to their students. In recent years, these challenges have increased with pressure from local and federal administrations to meet performance standards set by the No Child Left Behind (NCLB, 2002) legislation (Education Policy Research Reform Institute, 2006; Silver, Strong, & Perini, 2000). These requirements stipulated that students succeed on their state tests and that teachers and administrators be held accountable if students do not demonstrate gains. Schools that did not show adequate yearly progress (AYP) risked sanctions, such as losing federal funding(NCLB, 2002).

This national problem of accountability was evident in individual districts across the country (Rosas & Campbell, 2010). A school in an urban school district in a southeastern state, for example, provided service to 225students. In Florida, all students were required to take and pass the Florida Comprehensive Assessment Test (FCAT) to graduate from high school with a standard diploma. The FCAT was a "component of Florida's effort to improve the teaching and learning of higher educational standards" (Florida Department of Education [FLDoE], 2008, p. 1). The FCAT was derived from the National Council of Teachers of Mathematics Standards (NCTM), and the Sunshine State Standards (SSS) benchmarks with five components: number sense, measurement, data probability, algebraic, and geometry. The test was administered yearly to students in Grades 3 through10. The goal of the FCAT was to assess students' achievement in the higher order thinking skills represented in SSS benchmarks. Students with learning

disabilities (LDs) comprised approximately 56, or 25%, of the total school population. These 56 students were enrolled in an inclusion mathematics course and were required to take and pass or reach grade standards on the state math test in order for their schools to meet AYP (FLDoE, 2010).

Students with LDs may have had an LD in math and reading. These students often lacked conceptual, procedural, and abstract thinking skills in math (Gersten et al., 2009; Hasselbring, Lott, & Zydney, 2006; Templeton , Neel, & Blood, 2008;Swerling, 2005), and they might have lacked the ability to learn at the same pace as their peers in regular educational math classes (Lambie, & Milson, 2010; Rosas & Campbell, 2010; Woodward & Baxter, 1997; Ysseldyke et al., 2004). Despite these limitations, students with LDs were expected to take and pass state-standardized tests of achievement (FLDoE, 2010; Hasselbring, Goin, & Bransford, 1988; Ysseldyke et al., 2004). Indeed, other state education departments around the country were including students with LDs in standardized tests and holding districts and schools accountable for progress on these measures (FLDoE, 2010; Hasselbring, Goin, & Bransford, 1988; Ysseldyke et al., 2004).

Perhaps not surprisingly, students with LDs tended to score lower than their nondisabled peers on standardized tests, and they also tend to fall behind in their math classes (Hasselbring et al., 1988; Rosas & Campbell, 2010; Wagner, 1995; Ysseldyke et al., 2004). From these findings, it is likely that the demands placed on students with LDs to achieve similar AYP scores as their nondisabled peers may decrease federal funding unless methods of instruction are implemented that will meet the diverse needs of all students. To address this issue, I sought to explore which instructional practices were

being used to meet the needs of diverse at-risk students who were placed in regular mathematics classrooms and which particular practices, such as differentiated instruction (DI) techniques, were effective in promoting at-risk students' achievement from the inclusion teacher's perspective.

Statement of the Problem

The problem that I intended to address is occurring at an urban school district in a southeastern state. Students were progressing in math, but the underperforming students who continue to perform at a Level 1 score needed additional instructional methods for academic achievement in math. The FCAT was scored on a scale that ranges from a low of 100 to a high of 500, and achievement levels ranged from a low of 1 to a high of 5. The school district used a Level 3 as the grade level criterion, meaning that regular education and students with LDs needed to score a Level 3 to meet graduation requirement. Students who scored Level 1 or Level 2 will have to take remedial classes.

The FCAT results of the students in this urban school in a southeastern state have shown improvement over the years (FLDoE, 2010). The first year the school was open, it was graded an F school by the state of Florida; the second year, a D school; and for the subsequent 2 years, an A school. The school had an increased percentage of students who had scored a Level 3 or higher; in addition, the students who scored a Level 1 and a Level 2 increased the following year (2010).

The students were progressing in math, but the FCAT math test scores indicated a lack of consistency across the grade levels over the years. For example, the 2010 FCAT math test scores of the students in Grade 8 were 41%, but in 2008, the scores were 46%.

A similar situation occurred with the math FCAT scores results of students in Grade 7. In 2010, the students scored 25% less than they did in 2009 (13% vs 38%). The FCAT math scores displayed by students in Grade 6 were 26% in 2010 and 75% in 2009; for students in Grade 3, the scores were 54% in 2010 and 71% in 2009 (FLDoE, 2010). Because of the inconsistency in FCAT results, this school did not make AYP in 2010 (Rosas & Campbell, 2010; FLDoE, 2010). The underperforming students who continued to perform at a Level 1 score may need additional instructional methods for academic achievement in math.

Differentiated instruction (DI) has been proven effective when implemented in classrooms with diverse learners (Armstrong, 2002, 2003; Baum, Viens, & Slatin, 2005; Downing & Cornett, 2006; Landrum & Mcduffie, 2010; Lopez & Schroeder, 2008; Nelson, 1999; Steele, 2010; Subban, 2006; Templeton et al., 2008). DI is designed to challenge students at their own ability levels while providing them with support structures that can help them to achieve. Instruction can be differentiated in terms of the content in the lesson, the way that particular content is delivered, or in the ways that student understanding is assessed. Beauchaine (2009) supported the use of DI as a way to help underperforming math students make gains and change their attitude toward learning math. However, researchers (e.g., Armstrong, 2002, 2003; Baum et al., 2005; Lopez & Schroeder, 2008; Nelson, 1999) have suggested that teachers are more inclined to use traditional, whole-class teaching methods during instructional time rather than diverse approaches for a number of reasons, including lack of resources and the amount of time

required to integrate DI into lesson plans (Adlam, 2007; Finley, 2008; Tomlinson & McTighe, 2006).

Researchers have concluded that when DI is implemented based upon different instructional approaches, students' math achievement increases (Armstrong, 2002, 2003; Baum et al., 2005; Kane, Walker, & Schmidt, 2011; Lopez & Schroeder, 2008; Nelson, 1999). According to the NCTM (2000, 2006), math achievement is viewed as an essential life skill. To promote the mathematical achievement of all students, guidelines have been put in place to more effectively teach students, including ways to link the learning of mathematics to practical experiences that are more effective in teaching math skills than the use of rule and formula memorization (NCTM, 2000, 2006; Stone, 2007).

Despite recent research that has shown the efficacy of DI techniques, many math classes with students who have LDs are still being taught with traditional teaching methods. Often teachers do not differentiate their instruction to meet diverse student needs, despite their familiarity with the approach, because of insufficient resources and time (Adlam, 2007; Finley, 2008; Tomlinson & McTighe, 2006). Other researchers have suggested that teachers have problems implementing nontraditional instructional strategies because they were taught in a traditional manner, not from a diverse instructional approach (Armstrong, 2002, 2003; Baum et al., 2005; Lopez & Schroeder, 2008; Nelson, 1999). In other words, teachers interpret innovative strategies through their preexisting perceptions of instruction. I used a grounded theory approach to understand teachers' perceptions of the use and effectiveness of DI with students who have LDs in

inclusion math classes. Results of the study helped to determine the most effective strategies to be adopted into the curriculum to facilitate DI.

Nature of the Study

Grounded theory is an inductive method, that is, a bottom-up approach, in which concepts and relationships between them are derived from data about a phenomenon (Charmaz, 2006; Glaser & Strauss, 1967). The phenomenon of interest in this study was the type of DI practice that occurs with students who have LDs in inclusion math classes. The research site is located in a southeastern state. The initial sample comprised all inclusion mathematics teachers in the school who taught inclusion mathematics classes during the 2009-2010 academic year. Data about their perspectives were gained via a survey (see Appendix A) and interviews. A survey was administered, and an interview was conducted with five the participating teachers. These data were analyzed systematically using grounded theory (Charmaz, 2006; Creswell, 2003; Strauss & Corbin, 1998). Theories regarding effective instructional practices were presented from the teachers' viewpoints. More details are provided in section 3.

Research Questions

The following research question and three subquestions guided the study:

1. What perceptions do teachers who teach math in an inclusion setting have about the use of DI in their inclusive mathematics classes?
    a) What criteria do teachers use to differentiate instruction in an inclusion math class, and why?

b) What are the most and least prevalent methods of differentiating instruction among teachers who teach math in an inclusion setting, and why?

c) What examples are provided by teachers regarding strategies to improve students understanding of mathematics, and why?

Purpose of the Study

The purpose of this study was to explore which DI practices inclusion teachers are using to promote math academic achievement for underperforming students with LDs in inclusion math classrooms. The exploration of how teachers perceive the instructional techniques or the underlying theories on which they base their instruction could relate to their students success . Experiences of teachers who may feel that they are successful in their instructional practices could be used as a model for other inclusion teachers looking to promote the academic math growth of underperforming students with LDs. I sought to explore these instructional practices from the teachers' perspectives.

Conceptual Framework

DI is a research-based teaching method that allows teachers to effectively assist all classroom learners with a diverse range of needs that include differences in developmental levels and different intelligences, abilities, or learning styles (Landrum & Mcduffie, 2010; Tomlinson & McTighe, 2006). DI challenge students at their own ability level while providing them with support structures that can help them achieve. DI can address the underperformance of students with LDs in math (Armstrong, 1999, 2000, 2002, 2003; Baum et al., 1999; Impecoven-Lind & Foegen, 2010). Differentiated

instruction has the capability to allow students with LDs to better understand their general education classroom materials (Beattie, Jordan, & Algozzine, 2006; Friend & Bursuck, 2008) .

Differentiated instruction is characterized as the foundation on which to plan for diverse learners Tomlinson and McTighe (2006). These researchers Tomlinson and McTighe (2006) explained that DI is an instructional tool with a "primary goal of ensuring that teachers focus on processes and procedures that ensure effective learning for varied individuals" (p. 3). According to Berch and Mazzocco (2007)**,** because many students have difficulty learning mathematics, it is critical to differentiate instruction to ensure success for all students. Two possible ways to differentiate are to develop instruction around students' own intelligences or learning styles (Armstrong, 1999, 2000, 2002, 2003; Baum et al., 1999; Gardner, 1983, 1993; Landrum & Mcduffie, 2010). I discussed these theories more fully in the literature review.

Operational Definitions

Differentiated instruction (DI): An instructional tool to help teach students of different abilities, interests, or learning needs understand a concept (Brassell, 2009).

Florida Comprehensive Assessment (FCAT): A part of Florida's overall plan to increase student achievement by implementing higher standards. The FCAT, administered to students in Grades 3 to 11, consisted of criterion-referenced competency tests (CRCTs) in mathematics, reading, science, and writing to measure student progress toward meeting the SSS benchmarks. For example, algebraic and number sense questions assess the knowledge of math (FLDoE, 2008).

Inclusion: Definitions of inclusion range from the placement of special education students in the general classroom for the entire school day to inclusion as an attitude whereby all students are welcomed and have equal access to the curriculum (Friend & Bursuck, 2008).

Individualized education program (IEP): Section 1401.14 of the Individuals with Disabilities Education Act, 2004 (IDEA) defines IEP as a written statement that includes several components. This stud, focuses on the IEP goal to assist students obtain general education curriculum objectives (Siegel, 2005).

Learning disability (LD): Also known as learning disorder or learning difficulty; a disorder in which students display difficulty to learn effectively, caused by unknown factors (National Institute of Neurological Disorders and Stroke, 2010).

Learning style: The preferred way that a student learns and understands a concept (Dunn & Dunn, 2008).

Multiple intelligences (MI): A theory proposed by Gardner (1983) to more accurately define the concept of intelligence. This theory questions whether methods that claim to measure intelligence, or aspects thereof, are valid.

National Council of Teachers of Mathematics (NCTM): Founded in 1920, the NCTM's published standards have been highly influential in the direction of mathematics education in the United States and Canada.

Sunshine State Standards (SSS): Broad statements that describe what a child should know and be able to do at every grade level. The five SSS for numbers sense are the following: (Florida Department of Education [FLDoE], 2010)

Standard 1: The student understands the different ways numbers are represented and used in the real world.

Standard 2: The student understands the number systems.

Standard 3: The student understands the effect of operations on numbers and the relationships among these operations, select appropriate operations, and computes for problem solving.

Standard 4: The students use estimation in problem solving and computation.

Standard 5: The student understands and applies theories related to numbers (FLDoE, 2010)

Student with learning disabilities: IDEA defines a student with LD as a student whose achievement is substantially below what one might expect for that student (LD OnLine, 2008a, 2008b).

Limitations

The sample used in this study did not necessarily facilitate the generalization of the findings and will not be generalized to all inclusion math teachers in Florida and beyond. I conducted this study in an urban school district in a southeastern state with inclusion math teachers. The specific setting was unique, as were the results of this qualitative study using grounded theory. If conducted in another school district, the results would most likely be different because of the uniqueness of every school climate and population.

The qualitative analysis was open-ended and could have various interpretations. I employed specific strategies known for increasing qualitative validity to promote the

validity of the study. By exploring multiple data sources, I triangulated the findings and examined them for common themes. I asked a peer debriefer to review the research and question the findings. Finally, I clearly discussed possible bias to the participant teachers to ensure that the nature of my role was understood (Creswell, 2003). I explained to the participant teachers that I had no authority over their employment and they were not obligated to be part of this research study. My goal is to make a difference for students with LDs who are underperforming an inclusion mathematics class.

Scope and Delimitation

This study is confined to all general education and inclusion teachers teaching inclusion math in an urban county school district in a southeastern state. Although the results guided the outcomes, which will be available to other practitioners and researchers, its direct applicability to all teachers teaching inclusion math in a southeastern state and beyond its borders is limited.

Significance of the Study

This study contributed to the body of knowledge needed to address the problem of raising the mathematical achievement of math students with LDs in an urban school district in a southeastern state. I identified the instructional strategies that inclusion teachers are using with their students who have LDs in their classrooms in order to meet these goals. Outcomes of this research study illustrated that DI is an effective instructional tool that may help LDs students make academic gain in their inclusion mathematics classes. The findings showed that when teachers attend workshops and inservices about DI they learn how to diverse their lesson plans according to their

students' learning styles and intelligences. The outcomes also showed significant results when teachers attend weekly staff meeting to assess students' progress. The participant teachers explained that they were able to discuss DI strategies that were effective and improved DI strategies that were not as successful in their mathematics class.

The research study may be useful to inclusion math teachers because emerging issues and themes will relate these DI strategies to the actual student achievement in their classrooms. The outcomes allowed me to produce a tool for inclusion math teachers in this urban school district in a southeastern state as they begin or continue to differentiate their instruction. Results also may be of benefit to other teachers in this southeastern state for professional application. Understanding why inclusion teachers choose or refuse to incorporate DI in their classrooms can be of significance for administrators as they plan and lead staff development to enhance the learning of students with LDs in mathematics in the future.

This study promoted positive social change by creating knowledge that has the potential to influence access to and acquisition of mathematics, thus allowing students with LDs more equitable participation in school choices, future employment opportunities, and access to higher education (Stinson, 2004). It is crucial to provide students who have LDs with practical access to an effective math education setting. Specific ways of implementing DI in inclusion math classes can allow students with LDs the opportunity to learn math based upon their abilities and learning styles, which may then promote their future success and prepare them to contribute to society.

Transition Statement

Included in section 2 is a review of literature related to the study. An outline of the types of DI and the various instructional theories such as theory of MI, learning styles, and cooperative learning are provided. Additionally, studies that have integrated DI into classroom instruction in relation to promote math academic achievement for underperforming students with LDs are presented in the literature review. The research methodology is presented in section 3. It includes a detailed description of the qualitative grounded theory method research design, the rationale for the research design, role of the researcher, population, sample, treatment, materials, and the data collection process. The findings of the research study are described in section 4. Section 5 identifies the conclusions and provides suggestions for further research.

Section 2: Literature Review

Introduction

Included in this literature review is information about DI and the various instructional theories, methods, and strategies that fall under this umbrella term. Instructional methods explored thorough this literature review include cooperative learning strategies, multiple intelligences theory, learning styles, and inclusion for students with LDs.

Content of the Literature Review

The literature review contains research related to methods used in DI and the ways in which these methodologies may improve the achievement of students with LDs in math class. This section includes an extensive critical review of research on multiple intelligences, learning styles, and cooperative learning strategies. The literature review concludes with a discussion of these theories related to DI.

The peer-reviewed articles gathered for this review were categorized into nine sections: (a) theory of multiple intelligences, (b) learning styles, (c) studies on the integration of multiple intelligences and/or learning styles into classroom instruction, (d) cooperative learning, (e) studies that integrate cooperative learning strategies into instruction, (f) learning styles and how they relate to multiple intelligence theory, (g) DI, multiple intelligence theory, and learning styles, and (h) math curriculum. In addition, I briefly summarized the literature that describes the importance of an effective math curriculum based upon DI.

Search for Literature

I searched several databases, including the Walden University Library, EBSCOhost database, Eric database, Google scholar, and Sage database. During the overall search, I used combinations of the following key concepts: *differentiated instruction*, *cooperative leaning*, *multiple intelligence*, *learning styles*, *mathematics*, *exceptional student education*, and *school accountability*. I also reviewed and analyzed the findings yielded by the databases and grouped the information accordingly. This section concludes with a summary explaining how the vast body of research will guide this study.

Theory of Multiple Intelligences

Gardner (1983, 1993) constructed the theory of multiple intelligences by questioning the adequacy of using only one or two cognitive constructs to describe intelligence. Prior to Gardner's work, the concept of intelligence was viewed as a single concept measured by questions based upon mathematical/logical and verbal/linguistic intelligences, as well as educational, vocational, and personal success (Armstrong, 1999, 2000, 2002, 2003; Baum et al., 1999; Beattie et al., 2006; Berch & Mazzocco, 2007; Friend & Bursuck, 2008; Tomlinson & McTighe, 2006). Several researchers have questioned this notion of unidimensional intelligence (Guilford, 1982; Sternberg, 2004); Carroll (1993) acknowledged that intelligence must reflect diverse capacities or areas to better identify individuality, and more recently, Dunning (2008) agreed that is inappropriate to base all evaluations about a student upon an intelligence score.

Although empirical and theoretical accounts of multifaceted intelligence have grown in recent years, this conceptualization of intelligence is not new. Indeed, it started many years ago Campbell (1997), when philosophers and educators wanted to modify the education system to create a learning environment in which diverse learners could thrive (Abdallah, 2008; Olson, 2009; Silver et al., 2000). Gardner's work was influenced by philosophers such as Plato and Aristotle, such as the belief that students have diverse learning abilities and a form of genius waiting to be discovered Campbell (1997),.

According to the theory of multiple intelligences, individuals have multiple intelligences, some of which are more dominant than others, and that each intelligence has the ability to evolve if exposed to a variety of pertinent experiences. Based upon the connection between experience exposure and intelligence manifestation, it is emphasized to expose students to diverse opportunities to foster stimulation of the brain Gardner (1983) . Multiple intelligences is viewed as an extension of traditional intelligence, attesting that human intelligence can include many capacities relatively independent of one another Gardner (1983). Accordingly, Gardner first defined seven intelligences and later added an eighth intelligence. These forms of intelligence are described next.

Linguistic-Verbal Intelligence

Linguistic-verbal intelligence is the ability to use language and to think in words. Linguistic-verbal learners have the aptitude to use words and language equally effectively orally and in writing (Armstrong, 1999, 2002, 2003; Baum et al., 2005; Gardner, 1983, 1993; Nelson, 1999). Linguistic-verbal learners enjoy writing, speeches, and storytelling activities. Educators who have these types of learners in class can allow them to create

and play word games, read to the class, and share their journal writing. Furthermore, teachers should provide activities for these learners to develop their oration skills. For example, students can write on a specific topic and present their writing, and classmates can serve as reporters to test the orator's knowledge about the topic.

Logical-Mathematical Intelligence

Logical-mathematical intelligence is the ability to engage in inductive and deductive reasoning, use numbers effectively, and categorize. Logical-mathematical learners have the capacity for inductive and deductive thinking and reasoning, have the capacity to manipulate numbers, and can recognize abstract patterns (Armstrong, 1999, 2002, 2003; Baum et al., 2005; Gardner, 1983, 1993; Nelson, 1999). Educators can reinforce their mathematical learners' abilities by offering them activities that focus on numbers and patterns. Teachers can create situations that allow students to examine and analyze charts and graphs for abstract skills. Logical-mathematical students enjoy solving problems. Teachers can create activities that require students to write word problems and challenge their classmates to solve them.

Spatial-Visual Intelligence

Spatial-visual intelligence is the capability to picture objects and measurements and to think in images. Spatial-visual learners are capable of thinking in pictures and performing transformations upon these observations. They like to sketch and participate in mystery games, and they have the aptitude to visualize objects in spatial dimensions to create internal images in pictures (Armstrong, 1999, 2002, 2003; Baum et al., 2005; Gardner, 1983, 1993; Nelson, 1999). Spatial learners visualize and understand art

concepts and appreciate videos, slides, charts, and diagrams when learning. Educators should create activities to engage their students in imagining different components of the learning concept by drawing pictures of what they are learning. This intelligence will reinforce the learners' skills to visualize the ideas by creating images to help them to retain the materials. A math teacher also could use Venn diagrams and charts and provide real-world situations when teaching a topic.

Musical-Rhythmical Intelligence

Musical-rhythmical intelligence is the ability to identify and analyze sounds and patterns. Musical-rhythmical learners like to distinguish pitch and rhythm, and they have the ability to understand and create rhythms and music. They also have an aptitude for recognizing tonal patterns, sounds, rhythms, and beats (Armstrong, 1999, 2002, 2003; Baum et al., 2005; Gardner, 1983, 1993; Nelson, 1999). Many software companies write music to help students to remember math formulas. For example, CDs about fractions, addition, and multiplication are available to students. Teachers can create activities that allow students to compose songs using the steps of the procedure to solve a math problem or any other subject. If teachers allow students to explore their interest in music by creating their own songs, raps, and chants, student interest in learning could increase.

Bodily-Kinesthetic Intelligence

Bodily-kinesthetic intelligence is the capacity to move the body with skill and control. Bodily-kinesthetic learners like to manipulate objects, prefer vigorous activities, and have the intelligence to use their own bodies to learn. They have the ability to control their physical motion (Armstrong, 1999, 2002, 2003; Baum et al., 2005; Gardner, 1983,

1993; Nelson, 1999). Some bodily-kinesthetic learners learn by using their bodies or engaging in hands-on activities to increase retention and understanding. Teachers should create activities that allow students to move around the room to fully grasp an idea or a concept. Student can have an activity that requires them to explore geometric figures outside the classroom or around the school campus.

Interpersonal Intelligence

Interpersonal intelligence is the ability to understand and communicate effectively with others, as well as to understand and interpret behavior. Interpersonal learners have the capacity to perceive, understand, and relate to others' feelings. These students have the ability to communicate well with others (Armstrong, 1999, 2002, 2003; Baum et al., 2005; Gardner, 1983, 1993; Nelson, 1999). Some interpersonal learners thrive when they to talk, discuss, and exchange ideas. These learners also do well in cooperative learning environments, where they can interact with their peers and build relationships. Teachers should implement peer sharing and buddy system activities to allow these students to collaborate to discuss problems and concepts. For example, in math, teachers can form group assignments and have students develop various approaches to conceptualizing and solving math problems.

Intrapersonal Intelligence

Intrapersonal intelligence is an awareness of one's self, goals, and emotions, as well as the ability to use that awareness for personal understanding. Intrapersonal learners use their self-knowledge to understand and reflect upon their emotions, feelings, weaknesses, and strengths. These learners are capable of relating to the inner states of

being and have an understanding of metacognition, the spiritual inner state of being, self-reflection, and awareness (Armstrong, 1999, 2002, 2003; Baum et al., 2005; Gardner, 1983, 1993; Nelson, 1999). These students tend to favor individualized instruction and independent studies that allow self-reflection. Teachers can implement activities that create opportunities for students to make crucial connections in order to help the students learn how to build relationships and develop a sense of belonging.

Naturalistic Intelligence

Naturalistic intelligence involves a sensibility for nature, recognition of plants and people, cultivation of a sense of cause and effect, and an enjoyment of outdoor activities (McCoog, 2010). Naturalistic learners tend to do well in biology classes. Teachers can create activities about nature and the environment to capture students' interest and stimulate their intelligence.

Summary

According to the theory of multiple intelligences, activities related to students' intelligences must be afforded for learning to take place. Students' intelligences establish the way they access and process information; in addition, all students, including students with LDs, possess all of the intelligences to different degrees, and no two individuals have the same intelligence (Gardner, 1993). Gardner explained that some people who have a low IQ may have types of intelligences other than cognitive.

Walters and Gardner (1995) stated:

> Human cognitive competence is better described in terms of a set of abilities, talents or mental skills, which we call "intelligences". All normal individuals

> possess each of these skills to some extent; individuals differ in the degree of skill and in the nature of their combination. (p. 53)

Educators must pay attention to the plethora of ways students exhibit their learning capacity in the classroom, so it is their responsibility to create and implement lessons based upon these unique capacities. The argument is students' intelligence and learning styles can be instrumental in academic achievement (Gardner, 1993).

Learning Styles Theory

In addition to possessing different intelligences, students also exhibit different learning styles. Researchers (Dunn & Dunn, 2008; Klingensmith, 2006; Landrum & Mcduffie, 2010; Pape, 2010) have described learning styles as the preferred ways in which students engage, learn, and understand a concept. Students possess different backgrounds, different abilities, and different challenges; therefore, they learn differently.

Traditional teaching methods such as lecture and note taking (Dunn & Dunn, 2008; Nagel, 2008) cannot always address the needs of different types of learners and their abilities. Heitzmann (2010) suggested that teachers integrate visuals such as charts and graphics into their lectures in an effort to address learning styles. According to Lopez and Schroeder (2008), "Learning styles and special needs are not always addressed in the general lesson plan, yet they are always present in class" (p. 13). DI strategies that accommodate different learning styles have been effective in increasing students' academic achievement (Searson & Dunn, 2001).

The four learning styles discussed the most frequently in the literature are visual, aural, reading/writing, and kinesthetic/tactile, known as the VARK model (Fleming,

2001). Although people learn by combining all four modalities, each person may have a particular strength or weakness in a specific modality. The VARK is a learning styles inventory designed to help students to identify their preferred learning style (Klingensmith, 2006). This instrument was created by Fleming (2001) and contains 13 questions with the goal of providing an indication of students' learning preferences. It is short and simple for teachers to administer and for students to understand. Fleming explained that VARK scopes are clear to understand and have a practical application. Furthermore, Gardner's (1993) theory of multiple intelligences supports some VARK modalities as intelligences. However, the VARK has its own rationale and foundation and is not synonymous with multiple intelligences (Fleming, 2001).

Learning styles develop as students mature, learn, and grow. Once learning styles are identified, they can optimize students' learning ability (Dunn & Dunn, 2008; Fine, 2003; Nolen, 2003; Pape, 2010; Landrum & Mcduffie, 2010; Silver et al., 2000) . Research-based instructional strategies and methods connected to learning styles are constantly being developed for educational use. When teachers use these methods and strategies, students become more motivated and produce better results on content areas and state-required tests (Dunn and Dunn, 2008).

The theory of multiple intelligences and learning styles theory have been utilized and implemented at the elementary school, middle school, and high school level as well as in distance learning scenarios as a way to differentiate instruction and increase achievement across content areas. The following section presents a critical review of studies of this implementation.

Integration of Multiple Intelligences and Learning Styles into Instruction

Researchers have underscored the theoretical and practical implications of integrating multiple intelligences and learning styles into the traditional classroom (Rakap, 2010; Wu & Alrabah, 2009). One foundational work was Campbell and Campbell's (1999) study of the theory of multiple intelligences, which produced a compilation of studies. It was implemented in six diverse school districts across the United States: two elementary schools, two middle schools, and two high schools. The researchers observed and reported on one school in Lexington, Kentucky, where the theory of multiple intelligences was implemented in an effort to improve students' standard scores, which were significantly lower than other schools in their district. Before the theory was implemented, instruction was primarily teacher directed, with mostly verbal instruction. The new approach called for instruction to integrate the theory of multiple intelligences and to be student driven, with all the intelligences embedded into a school wide art program. For example, all the students had piano lab as a class, and primary students wrote and performed an opera annually. The curriculum was considered successful because the scores on a statewide assessment more than doubled in 5 years.

Similarly, another school in Minnesota examined the impact of a program based upon the theory of multiple intelligences on inner-city students. In that school, students learned content through personal intelligences, such as interpersonal and intrapersonal. The curriculum was based upon thematic units in correlation with the theory of multiple intelligences to accommodate students' interests, educators' goals, and the school

district's standards. Campbell and Campbell (1999) gave the following as an example: A theme on invention would allow students to (a) explore a Lego machine kit, (b) experiment with electricity, (c) write journal entries about their results, (d) read biographies of inventors, (e) hypothesize about how appliances function, and (f) take the appliance apart and put it back together. The educators at that school explained that it was just as important to reinforce personal intelligences as it was to reinforce reading and writing. They argued that if students could understand the importance of setting goals and achieving them, they had learned a vital lesson. After a curriculum based upon the theory of multiple intelligences had been in place for 2 years at that school, students began to outperform their peers in other schools in math and reading.

In another instance, Key Learning Community, an urban school district in Indianapolis, reported similar findings after implementing a program based upon the theory of multiple intelligences (Campbell & Campbell, 1999). The educators used a thematic, multiage program that offered equal time to all eight intelligences. The students' classes consisted of English, German, instrumental music, math, science, visual arts, physical education, and geography/history, corresponding to the eight intelligences. The students achieved above-grade level on state and national tests.

In Skyview, a Washington school, scores on the Washington Assessment of Student Learning was higher than the state means on all areas after the implementation of a program based upon the theory of multiple intelligences (Campbell & Campbell, 1999). The researchers stated that the curriculum was based upon multimodal instruction, in which the academic content was led by the relevant intelligences for the lesson. For

example, a lesson about genetics would be led by logical intelligence to explore the probability traits of the genes, and by linguistic and artistic intelligences to write and draw about the effects of genes.

To improve student motivation and achievement, Bednar, Coughlin, Evans, and Sivers (2002) conducted a study with students in Kindergarten and math classes in Grades 3, 4, and 5, where the theory of multiple intelligences was combined with cooperative learning strategies. Preschool screenings, parent and student surveys, previous report card grades, and checklists were collected and used as data to target students with low motivation in mathematics. The intervention consisted of incorporating two or more intelligences into each of the activities that the students did in order for them to learn mathematics facts. For example, in a Grade 3 geometry lesson, interpersonal, intrapersonal, logical-mathematical, linguistic- verbal, and visual-spatial intelligences were targeted by having the students use plain shapes to write an adventure story and share the story with the class. The results showed that student achievement, participation, and motivation increased when students were able to explore different learning styles. The students were more eager to participate because they had a choice of activities, and they also had the opportunity to work collaboratively with peers. The researchers noticed a positive change in students' attitudes toward learning. They concluded that students who were passive learners progressed to emerging learners, and those who were emerging became active learners.

More recently, O'Connell (2009) conducted a case study to investigate the influence of learning styles on the learning of underachieving students in two middle

schools in Northeast Ohio. Students tended to respond better academically when their learning styles aligned with classroom instruction (O'Connell, 2009). The result of the study demonstrated substantial improvement in student outcomes occurring when using student-centered learning.

Traditional pedagogical approaches were compared to instructional approaches based upon the theory of multiple intelligences and learning styles in a study by Hanley, Hermiz, Lagioia-Peddy, and Levine-Albuck (2002). The study involved an intervention based upon the theory of multiple intelligences being implemented in social studies education. The researchers wanted to analyze the effect of linking the theory of multiple intelligences with traditional teaching strategies to instruction based upon learning styles. They compared Grade 5 students who were taught with the theory of multiple intelligences linking to their curriculum and students who used only traditional pedagogy to improve academic achievement and interest in social studies. The results indicated that the students demonstrated increased performance in the areas of multimodel skills, attitude, and behavior. Hanley et al. (2002) observed that one of the benefits of linking the theory of multiple intelligences to learning styles was that the students had the opportunity to experience intelligences that they never experienced. For example, spatial learners had the opportunity to discover their linguistic ability. As a result, the students displayed other interests, strengths, needs, and talents during the study.

Most of the research based upon the theory of multiple intelligences has suggested that the theory of multiple intelligences can be an essential tool in closing achievement gaps in classrooms, regardless of students' grade level, socioeconomic status, and

location. The theory is pervasive, having gained widespread support in school districts across the United States. However, not all studies o the theory of multiple intelligences have reported positive outcomes. Several researchers have reported mixed results when testing the efficacy of learning styles and multiple intelligences on student outcomes. Dean (2007) conducted a case study in an Iowa elementary school using MI theory to compare two Grade 4 math classes. The control group comprised Grade 4 visual-spatial learners who were taught using a traditional textbook approach, whereas the treatment group comprised visual-spatial learners who were taught math using games and manipulatives to accommodate the students' learning styles. Both groups were assessed using the Iowa Test of Basic Skills, and data were collected and analyzed using an independent-measures *t* test.

The results revealed no statistically significant findings; both methods of instruction were equally effective in achievement. Dean (2007) used surveys to determine students' perceptions and attitudes toward learning math through instruction with games and manipulatives compared to learning with traditional methods. The data from the interviews, journal entries, and observation were triangulated. The results suggested that only the treatment group, which used math games, found them to be motivating and helpful in learning difficult math concepts. Dean concluded that the visual-spatial learners taught math with visual-spatial strategies had the potential of matching an appropriate strategy with a particular math concept. Notably, although using instructional techniques based upon the theory of multiple intelligences changed attitudes, it had no effect on achievement.

Similarly, Mitchell (2009) found no connection between learning styles and achievement, but a correlation with student motivation. Mitchell conducted a quasi-experimental study with 89 kindergarten students in 6 kindergarten classrooms at an elementary school, some of whom were taught with their preferred learning styles and some of whom were taught without. ANOVA detected significant differences in motivation to learn, but no significant difference in achievement between the two groups.

Despite these exceptional inconsistencies, the implementation of learning styles theory into instruction has been shown to be beneficial to students with LDs. Brown and Woodward (2006) reported that after the students with math disabilities were given an intervention based upon a multisensory approach, the students tested at grade level and were no longer in need of special education services.

Cooperative Learning Strategies

One way of differentiating instructional methods is to use cooperative groupings in the classroom. Cooperative learning is a research-based teaching strategy in which teachers conduct small-group activities to promote academic achievement (Haydon, Maheady, & Hunter, 2010; Hoon, Chong, & Binti Ngah, 2010; Johnson & Johnson, 2002, 2009; Nagel, 2008; Onwuegbuzie, Collins, & Jiao, 2011; Zipp, 2007). Research has shown that when students have opportunities to work collaboratively with classmates, they learn faster and develop greater retention ability (Gillies, 2008). For example, when students work in a cooperative learning group, they demonstrate higher academic achievement than students who are taught with an individualistic or competitive approach. The growth is especially evident in problem solving, understanding of

concepts, and positive image about learning (Doymus, Simsek, & Karacop, 2009; Eilks, 2005; Gillies, 2006; Hennessy & Evans, 2006; Hoon et al., 2010).

Ismail and Alexander (2005) and V. Wilson (2006) explained that peer tutoring also can positively contribute to learning, especially learning in mathematics. Small-group activities can provide opportunities for students not only to share and learn knowledge and skills but also to voice their opinions and make positive contributions in groups (Coke, 2005; Zimbicki, 2007). Furthermore, communicating and discussing with others is an effective strategy for learning new skills (Chanchalor & Somchitchob, 2007; Eilks, 2005; Fore, Riser, & Boon, 2006; Gillies, 2006; Koci, Doymus, Karacop, & Simeki, 2010). Researchers have concluded that cooperative learning supports teamwork and allows students to share their ideas as they engage in learning.

Another approach to incorporating cooperative learning strategy in the classroom is through peer-assisted learning strategies. According to Kroeger and Kouche (2006), one of the benefits of implementing peer-assisted learning strategies in the mathematics classroom is that they support the use of appropriate social skills in a natural setting. Most students lack the proper social skills to work effectively in groups, so a strategy that fosters these skills and encourages students to learn cooperatively learning is beneficial. Cooperative learning strategies also can provide an outlet for socialization and collaboration (Willis, 2007).

Hennessy and Evans (2006) and Gillies (2008) argued that for learning to occur in cooperative groups, students must be in control of their learning process. The implementation of the cooperative learning strategies approach in an inclusion math

classroom can allow students with LDs to work in groups to learn and explore abstract concepts in math. Cooperative learning strategies can improve progress for students with LDs and have the potential to help them analyze at the abstract level in math. Cooperative learning strategies also can give students with LDs the opportunity to explore and discuss topics with their peers in a hands-on, interactive environment, thus giving them tools to help them improve their math skills in class and on standardized math tests. An inclusion classroom that uses cooperative learning strategies to differentiate instruction based upon the theories of multiple intelligences may support students' disabilities in mastering math skills. However, Whittington and Connors (2005) explained that teachers do not always plan their lessons based upon their students' interests and needs; sometimes, they plan using curriculum standards.

Manning and Lucking (1991) cited the assertions of Johnson and Johnson (2002), as well as Slavin, that unlike other instructional trends, cooperative learning is one of the most researched and utilized teaching practices in education. The aforementioned researchers contributed theoretically and practically to six of the eight cooperative learning models currently in use: (a) learning together, (b) student team achievement divisions (STAD), (c) team game tournaments (TGT), (d) jigsaw, (e) Jigsaw II, (f) team accelerated instruction, (g) cooperative integrated reading and composition (CRC), (h) group investigation, and (i) structured dyad methods. These and other cooperative learning strategies are available to teachers to help them facilitate learning and teamwork in the classroom.

Integration of Cooperative Learning Strategies into Instruction

Another benefit of cooperative learning to DI was illustrated by Dunning (2008), who conducted a study with 107 teachers in five middle schools in Rhode Island. Dunning wanted to know whether there were any differences between teachers' beliefs and instructional practices. She conducted surveys and focus group interviews. The interview questions were developed based upon the survey responses. Dunning explained that "this analysis occurred by giving the participants the opportunity to discuss the beliefs and ideas which are not directly observable by the survey instrument" (2008, p. 120). The results revealed that the teachers continued to hold outdated beliefs about what students need to be successful in school. Eighty percent of the respondents expressed that students are more productive when they work in groups for instruction, and they felt that cooperative learning is an effective tool for peer teaching and for students with special needs. Sixty-nine percent of the participants stated that cooperative learning provides ample opportunities for advanced students to teach other students. Nonetheless, 72% of the teachers did not see a need for DI in the classroom.

It is important to understand students' academic and developmental needs before choosing an instructional strategy. Cline (2007) conducted a quasi-experimental study to examine the impact of Kagan cooperative learning structures on mathematical achievement in a Grade 5 classroom. This study addressed two questions: (a) What impacts do Kagan cooperative learning structures (i.e., rally coach, round table, and time pair share) have on mathematical achievement when used in a Grade 5 classroom? and (b) Is there a significant difference in mathematical achievement between children in a

Kagan cooperative learning classroom and children in a traditional classroom? The results indicated a significant difference between the treatment and comparison groups. Cline (2007) concluded that Kagan cooperative learning structures had significantly impacted the students' achievement.

Niemi's (2009) exploration of cooperative learning went one step further. Niemi argued that cooperative learning strategies can allow students to understand a math concept in ways that are not possible if the lesson is taught in a traditional fashion. The researcher (Niemi's , 2009) considered cooperative learning as "a well-established balance of teaching and learning strategy" (p. 2). He explained that cooperative learning has been proven to be solid and more effective than traditional teaching approaches. The researcher attested that cooperative learning has given teachers a constructive tool to supplement their teaching methods.

In addition, Niemi (2009) performed a quasi-experimental study to compare two cooperative learning models (Jigsaw II and structured dyad) in a middle-level social studies context. The study was designed to determine whether there was a difference between the two models. Niemi argued that cooperative learning is "a necessity, not only for learning sake, but to lay the foundation for valuable collaboration skills that are in demand" (p. 14). The findings showed that the structured dyad cooperative model was more effective than the Jigsaw II model. Niemi concluded that students with higher than average ability had performed better than students with low ability in the structured dyad cooperative model. He claimed that this lack of performance from the low-level students was to the result of a lack of reading comprehension and that the structured dyad

cooperative model required \higher reading comprehension ability than the Jigsaw II did. Niemi demonstrated that although cooperative learning ought to be used in classrooms to raise the academic achievement of diverse learners, the particular nature of the cooperation needs to be based upon the students' ability levels.

Cooperative learning is a well-researched teaching strategy that has many positive implications for pedagogy. Researchers have suggested that cooperative learning can (a) enhance students' academic achievement, (b) improve self-esteem, (c) develop communication skills, (d) increase problem solving, and (e) aid critical thinking (Doymus et al., 2009; Eilks, 2005; Gillies, 2006; Hennessy & Evans, 2006). These claims have not been limited to the traditional K-12 teaching environment. Several studies on the effects of cooperative learning in postsecondary institutions also have reported similar results in student achievement. Chanchalor and Somchitchob's (2007) study and Sweeney, Weaven, and Herington's (2008) research are exemplary studies related to this topic. Chanchalor and Somchitchob conducted a study on the effect of using cooperative learning technology on the instruction management of students from Phranakorn Polytechnic College who were taking a course on basic blouse making. The study examined 32 students from that course in 2005. The researchers used test scores, performance evaluation forms, and observational forms to collect the data. Pre- and posttests were given to the students. Posttest scores were significantly higher than the pretest scores after cooperative learning had been implemented.

Sweeney et al. (2008) conducted a study to examine the relationship between group performance and skill transfer in multicultural environments using cooperative

learning. The researchers had a sample of 107 international and domestic postgraduate and undergraduate marketing students. The researchers found that through cooperative learning, the students developed interpersonal skills, cross-cultural collaboration, and higher level learning. The study revealed that (a) through cooperative learning, transfer of learning took place, and (b) very little differences were recorded between the international and domestic students in the way they responded to cooperative learning.

Queen (2009) performed a quasi-experimental study to evaluate the difference between cooperative learning and traditional teaching strategies on 216 Grade 6 language arts students in north central Georgia. The control group used the traditional method, and the treatment group using cooperative learning. A pre- and posttest based upon a standardized 73-item language arts benchmark was administered and scored to assess the overall impact of instructional techniques. The ANOVA analysis showed that significantly greater gains were made by the cooperative learning group.

Irrespective of the school setting, studies on cooperative learning strategies have continued to report gains in achievement. Colamarino (2008) conducted a study in an urban school district with 10 self-contained emotional support elementary students. The students were divided into two groups of five. Colamarino evaluated the impact of ability grouping related to academic growth with at-risk students. The first group, a homogenous group, comprised students of similar math abilities. The second group, the heterogeneous group, had students with different math abilities. The researcher collected quarterly standardized math assessments and computer-generated math scores. The independent *t*

statistic measure identified significantly greater academic gains for the students who were heterogeneously grouped.

Several researchers have explored the ability of cooperative learning to change students' attitudes toward learning. Wilcox (2008) performed a study to determine whether cooperative learning can improve a reading comprehension program for at-risk Grade 9 students. Wilcox wanted to know which reading strategies could improve student achievement and attitudes toward reading. Twenty-one students participated in the concurrent mixed methods study. The *t* statistic revealed significant reading comprehension improvement in 13 of the 21 students when cooperative learning was integrated into instruction. Wilcox stated that cooperative learning contributed to the improvements made by the students. The researcher , explained that students "learn better, remember and understand more, have more fun, felt valued, listened to, respected, comfortable, and motivated when they work as a team" (Wilcox, 2008, p. 1). These students have significantly benefit from their cooperative learning groups.

Cooperative learning strategies can provide teachers with diverse opportunities to differentiate their instruction in order to meet the academic needs of their student groups. This strategy also can help students with LDs to demonstrate personal ability and oral language ability during instructional time (Haydon, Maheady, & Hunter, 2010; Hoon, Chong, & Binti Ngah, 2010; Johnson & Johnson, 2002, 2009; Nagel, 2008; Onwuegbuzie, Collins, & Jiao, 2011; Zipp, 2007).

DI, Theory of Multiple Intelligences, and Learning Styles

Research has demonstrated that the theory of multiple intelligences (MI) can be applied in the classroom and used to accommodate different learning styles through DI. Their successful implementation calls for teachers to differentiate instruction based upon the intelligences or learning styles with which particular groups of students identify. DI is an instructional tool designed to challenge each student's ability while providing the support structures that can help each student to achieve (Brassell, 2009; Fisher-Doiron & Enrichment, 2009; Huebner, 2010; Ivory, 2007).

Current research has given rise to a number of appropriate instructional approaches and settings that are a best fit for the integration of the theory of multiple intelligences and learning styles. Researchers have identified a range of student populations that have benefited from the practical application of the theory of multiple intelligences and learning styles in the traditional classroom. In order to increase student achievement, teachers ought to differentiate instruction based upon students' personal learning styles, multiple intelligences, or both. Fisher-Doiron and Enrichment (2009) stated:

> It is our strong belief that students will reach higher levels of success in their classrooms and on high-stakes testing if we differentiate and enrich curriculum and instruction, enabling them to think creatively, solve problems, and focus on their strengths and talents. (p. 26)

Beside Fisher-Doiron and Enrichment who esteemed MI potentiality, there are other admirers of MI. Following are examples of such studies and their outcomes. As part of

the dissertation process, Mussen (2007) performed a quasi-experimental study in two Grade 5 classes in a Midwestern elementary school. The study was designed to evaluate whether linking traditional pedagogy with the theory of multiple intelligences to differentiate instruction can improve students' academic achievement and attitudes toward learning science. The results indicated that students preferred to learn in an environment that promoted learning in diverse ways (the theory of multiple intelligences) and subsequently developed more positive attitudes toward learning science that the students who did not receive instruction using the theory of multiple intelligences. Mussen concluded that when teachers work collaboratively to differentiate instruction and create student-centered activities, tremendous academic growth can be expected.

Luster (2008) compared whole-class instruction to DI to determine whether students who were exposed to DI based upon their individual learning styles scored differently on the Georgia CRCT in mathematics (GCRCT) than those that were taught whole class. Independent *t* tests showed statistically significant differences in student achievement levels on the GCRCT between the two groups of students, with the DI group scoring higher.

The implementation of DI could improve student achievement. According to some researchers (McCoog, 2007; Subban, 2006), the theory of multiple intelligences is the most effective when it is implemented through DI. Gault (2009) analyzed the effects of DI on student achievement, as defined through the theory of multiple intelligences, learning styles, and other practices in Grade 3 math classes. The Virginia Standard of Learning math test was used as the achievement measure, and a chi-square statistic was

used to measure the results. The control comprised the 2005 test scores of the Grade 3 students who did not receive DI in their math classes, and the treatment group comprised the 2006 and 2007 classes of Grade 3 math students who received DI in their math classes. Significant differences were identified between the percentage of students who passed the test in the control group and the treatment group.

A mixed methods study was conducted in a middle school located outside the metropolitan area in Georgia by Ivory (2007). The purpose of this study was to explore and to explain the difficulty that the Grade 7 "exceptional learner" math students had on the standardized math test. One of the research questions asked, "How do exceptional learners respond to differentiated instruction?" (Ivory, 2007, p. 8). Pre- and posttests were administered, and interviews were conducted to collect data. The findings revealed that students with disabilities could make gains on standardized math tests if instruction is differentiated.

For any teaching strategy to be successful, it has to be understood and used (Gillies, 2008; Landrum & Mcduffie, 2010). Beauchaine (2009) conducted a qualitative study in North Edison Metropolis with 13 Grades K-3 volunteer teachers. She wanted to examine teacher collaboration and teacher change of instructional style while implementing DI in math. For that study, professional developmental sessions, instead of traditional faculty meetings, were provided to the volunteer teachers on specific math skills. In addition, the teachers attended a bimonthly study group to discuss the strategies used in cases where students were demonstrating academic progress, as well as the

strategies that were not promoting growth, in order to meet the needs of the diverse students.

Beauchaine (2009) conducted pre- and postsurveys, interviews, observations, reflective journals, and field notes. Results displayed an increase in student gains in classes where the teachers used DI in their math lessons. These teachers differentiated their instruction by grouping students according to their learning styles to address their individual learning needs. The results revealed that 86% of the Grade 3 students performed in the proficient or above proficient range after the intervention of DI. The findings also revealed that the teachers were more confident in their students' ability to understand the math concepts in comparison to before the DI intervention. The teachers explained that the collaborative groups were helpful because it allowed them to see and understand what other teachers were doing in their classrooms.

Many schools have benefited from the implementation of DI in their curricula. Holland Elementary School in the Fresno Unified School District was a low-performing school and was unable to meet AYP. After the implementation of DI, the school elevated to a rank of 6 from 10 and met AYP across the board (Cusumano & Mueller, 2007). According to the researchers, in preparation for the intervention, school administrators and staff disaggregated subgroup data, evaluated the standardized test scores, and identified underperforming students. As a result, teachers received professional developmental in-service training based upon the emerging needs of student groups. Through this analysis, school administrators and staff were able to provide specific

instruction in needed areas to the students while the students continued to receive direct instructions with their teachers.

Despite the wealth of DI studies that have provided evidence that DI can increase performance across student populations, only a meager number of teachers are willing to integrate DI and its related theories and strategies into their instruction. DI is not being implemented in the classroom for various reasons. Studies have linked the hesitation or outright rejection of DI by teachers to shortcomings in teacher training and professional development programs (Dee, 2011; Patterson, Connolly, & Ritter, 2009)). Adlam (2007) explained that although DI is a strategy capable of meeting diverse students' needs, it has not been implemented by many educators. She conducted a study to analyze how knowledgeable teachers were about DI, how often they differentiated their lessons, and what factors helped or impeded the implementation of DI. Results indicated that even though many of the teachers in the study were familiar with DI, they did not differentiate instruction because of the lack of resources and (b) the time necessary to plan a lesson.

Similarly, Finley (2008) recognized that teachers lacked the necessary knowledge on ways to implement DI into their planning. The researcher conducted a mixed methods study to examine how student teachers learned about DI strategies while at the university level and how they modeled that instruction in their classes. For qualitative data, the researcher studied a sample of student teachers and their mentors during the field experience semester. Finley used observations, weekly journals, interviews, and videotapes of their lessons. Quantitative data were collected for the same group of student teachers and mentors by conducting a poststudent teaching survey about their knowledge,

attitude, and use of DI. The results indicated that to properly display a transfer model for DI, the following components must be present: (a) mutual instruction in theory and strategies from methods courses, (b) field experience with enough time to practice the strategies, (c) mentor support for the methodology, (d) mentor and preservice teacher coplanning of differentiated lessons, and (e) the use of reflection for professional growth. Finley presented the significant findings to assist student teachers and mentors in making rational decisions concerning the use of DI to enhance the learning experience. The more student teachers implement DI, the more effective the academic achievement outcome with diverse learners can be (Finley, 2008). DI can accentuate the developmental skills that learners of all ability levels and styles need (Kass, 2008).

DI is not limited to K-12 students only; many college students experience its benefits when lessons are differentiated accordingly to the students' learning styles. In return, many college professors proclaim their support for DI by linking it with their syllabi. Al-Salem (2004) conducted a study to explain the practical dimensions of DI in teacher education. The participants in the study were professors from Kansas University known as exemplary teachers because they taught student teachers and they used DI in their classrooms. Interviews were conducted to collect data. The researcher began the study with two questions in mind: (a) What does DI mean to the participants professors? and (b) What does DI look like in practice? Al-Salem wanted the professors to describe what DI meant to them, and how they link DI in their lessons.

Al-Salem (2004) found that the participants defined DI as a modifier to clarify the teaching purpose of the class in relation to the students' academic needs. The professors

further explained that DI is essential because students have different needs, interests, and learning styles. To illustrate the importance of DI, the participant professors provided a clear and flexible syllabus as an example, such as outlined in their lectures in the syllabus. They also assigned small groups of 10 to 20 students to work outside of the classroom. These students were to help each other on homework assignments and study exam questions. The findings revealed that the students were comfortable working together as a group. The small-group setting helped the students to feel they were enhancing each other's skills, not competing against each other. The study illustrated that students learn more when a variety of learning tools are available. Al-Salem explained that the most important finding of the study was that the students wanted their professors to recognize that they had different learning abilities and styles and that they wanted to be instructed accordingly.

The implementation of DI can be a challenge for educators because it requires planning and correlation of students' learning styles and learning profiles into the lesson. The aforementioned studies were examples of how DI has come to inform education and its ability to increase achievement across the curriculum, regardless of student population, when applied practically. Researchers (Bednar et al., 2002; Campbell & Campbell, 1999; Dean, 2007; Hanley et al., 2002; Levy, 2008; Mussen, 2007; Santangelo & Tomlinson, 2008; Stanford & Reeves, 2009; Roberts, 2009) have concluded that when traditional teaching methods are linked with DI approaches to differentiate instruction based upon students' learning styles, students display more eagerness to learn in class and often change their attitudes toward learning in that content area. They also

have encouraged educators to implement various instructional approaches into their classrooms to accommodate learning preferences. They also have attested that a strategy such as the theory of multiple intelligences has the potential to increase student learning if educators use it to differentiate their activities, for example, by allowing students to work in groups, and model various methods to learn a concept.

Additional researchers (Armstrong, 1999, 2002, 2003; Baum et al., 2005; Nelson, 1999) have supported strategies based upon the theory of multiple intelligences that encourage teachers to provide students with activities that embrace different intelligences and learning styles. They explained that a learning environment founded on the theory of multiple intelligences can significantly impact students' academic achievement. The goal of the theory of multiple intelligences is to help all students learn how to overcome their limitations; it has the potential to help students make academic gains in the classroom as well as on high stakes tests.

Some researchers (Carson, 2003; Ceci, 1990; Darius, 2008; McGuiness, 2007; Sternberg, 1988; White, 2005; Willingham, 2005) have expressed concern about insufficient experimental evaluation of the constructs of the theory of multiple intelligences. Supporters of the theory of multiple intelligences have voiced their favoritism about the theory rather than conduct sound studies that would strengthen the theoretical paradigm. For example, Willingham (2005) explained that components of the theory of multiple intelligences share similar cognitive process with IQ, such as verbal linguistic and logical mathematical. Ceci (1990) argued it is necessary to have a more precise method to determine individuals' perception of their intelligence and a tool

capable to measure the day-to-day performance of the intelligence. More recently, Darius (2008) and McGuiness (2007) disputed the uniqueness of the theory of multiple intelligences. McGuiness explained that other psychologists have identified up to 150 intelligences. Based upon this assertion, more research is needed to either confirm or negate the applicability of the theory of multiple intelligences to the classroom.

Teachers are not always willing to implement DI into the curriculum because of the time commitment (Geurts, 2008), even though some school districts are requiring it. Graham (2009) conducted a concurrent mixed methods study in a suburban high school to evaluate the relation between schools that mandated the use of DI and those that did not. The researcher wanted to measure the difference before and after the implementation of DI. The researcher also investigated the kind of strategies used for DI and the attitude of students and teachers toward DI. The study revealed no significant difference of passing test scores between the two schools. In the school that mandated DI to be implemented, the *t*-test analyses for Grade 9 biology and literature demonstrated significant differences before and after the implementation of DI. Teachers and students who took part in the survey evaluating their attitude toward DI understood that DI has the potential to be beneficial for student learning.

V. Wilson (2006) explained that some students might prefer visual or kinesthetic strategies instead of an auditory thinking style because the students require concrete understanding. Also, visual and kinesthetic thinkers are likely to benefit from teaching strategies that focus on the development of models and images designed to teach students not just the “how” but the “why” (V. Wilson, 2006). Lopez and Schroeder (2008)

suggested that teachers should incorporate a minimum of two teaching methods in lesson plans that can maximize learning. For example, students can read a math word problem, write a response, and then have a group discussion about the answer. Tomlinson (2007) explained that when teachers extend their lessons beyond the textbook and incorporate real-world activities, students are learning something new.

DI seems to be the bridge to connect the theory of multiple intelligences with a traditional pedagogy based upon students' learning styles to promote academic growth. DI can give students access with multimodality to learn a concept, for example, students can learn about fractions with manipulatives or use graphic organizers to create graphs. The students can color the graph different colors to demonstrate the quantity (denominator and numerator) of the fractions. Students can read recipes to correlate fractions to real-world applications. In addition, students can compose songs to illustrate their knowledge about fractions.

Math Curriculum

According to abundant research (Maryland State Department of Education, 2001; Sykes, 1995; Wang-Iverson, Myers, & Edmun, 2010; Ysseldyke et al., 2004), math students in the United States are lagging behind their peers in other countries. Problem solving, the new standard for math instruction, is considered one factor that can help to alleviate the math gap. Sykes (1995) explained that gaps in math scores significantly decreased in the United States after the introduction of the new math standard in 1989. Nevertheless, students in the United States, including students with LDs, are lagging behind in math when compared to students in other industrialized nations (Impecoven-

Lind & Foegen, 2010; Rosa & Campbell 2010; Templeton, 2008; Wang-Iverson et al., 2010; Ysseldyke et al., 2004).

Students with LDs in math, in particular, display difficulties with conceptual, procedural, and abstract-thinking skills (Ashcraft & Moore, 2009; Impecoven-Lind & Foegen, 2010; Gersten et al., 2009; Hasselbring et al., 2006; ; Rosas & Campbell 2010; Templeton, 2008; Toll, Van der Ven, Kroesbergen, & Van Luit, 2010; Swerling, 2005). One reason for the difficulties could be that logical-mathematical and verbal-linguistic intelligences are the core elements that educators traditionally base instruction upon, which may not be sufficient to meet the academics needs of all students (Gardner, 1993). Not all students learn best from the traditional methods that derive mainly from linguistic and logical skills.

Researchers have written about the importance of using the theory of multiple intelligences and learning styles when designing lessons for students with LDs (Tabuk & Özdemir, 2009). The NCTM (2006) emphasized the importance of lesson materials being designed according to instructional principles described in the special education literature and how it may transform students' attitudes toward math. Berch and Mazzocco (2007) explained that it is well known throughout the educational system that many students have LDs that prevent them from understanding mathematics. Berch and Mazzocco explained that an LD in math is linked with reading disabilities and procedural processing deficits. The researchers argued that in order to impact students with LDs in math, educators must be dedicated, and diverse leaning strategies must be in place. Philipp (2007) stated that math teachers who instruct in a traditional fashion tend to inactively

teach their students. Teachers need to be more active when teaching their students. Gagnon and Maccini (n.d.) explained that experimental and validated instructional approaches are the most essential methods to teach students who have LDs.

Furthermore, students with LDs often exhibit deficits in verbal or logical intelligences (Stanford, 2003; Tomblin, 2006), the most common intelligences used by educators. One possible reason students, including students with LDs, are having difficulties may be that most teachers used to follow a linguistic or a logical method of instruction only. Therefore, teachers have a tendency to transfer the same pedagogy into their classroom (Olson, 2009; Weimer, 2006). Some researchers (Burns, 2007; Impecoven-Lind & Foegen, 2010; Rosas & Campbell 2010; Shellard, 2004; Templeton, 2008) have stated that students with LDs must be presented with more than one opportunity to learn math. Burns (2007) and Chamberlin and Powers, (2010) explained that when students are given the opportunity to express their ideas to others, they are more likely to master the concept.

High school math students are expected to possess some basic conceptual math skills and should be able to perform addition and subtraction word problems, but in reality, a word problem with addition and subtraction could represent five procedures: Identify problems, compare problems, change problems, combine problems, and equalize problems. These types of problems require a concrete understanding of conceptual knowledge, an understanding that some students with LDs may not have (Lewis, 2010).

Ferrantelli (2008) conducted a quasi-experimental study in a New York City public high school in Staten Island with at-risk Grade 9 and Grade 10 students. The

researcher wanted to determine whether there was a difference between students who were being taught using the procedural model and students who were being taught using the conceptual model. Pre- and posttests were conducted, and the results showed that students being taught using the procedural model had significantly higher scores than those being taught with the conceptual approach.

Adams (2009) explained that teachers must understand that math is a language that most students only learn in school, unlike a primary language that they can acquire at home. Adams asserted, "While all languages have an aspect of abstraction, mathematics is entirely abstract" (p. 11). Adams emphasized that teachers are to implement literacy strategies into their math activities to improve students' abstract skills. Lopez and Schroeder (2008) explained that when teachers relate a math lesson to a real-world activity, students have a better understanding of the concept. For example, if students understand that the section in which they sit in a classroom is the area and the wall represents the perimeter, then measurement will make sense for them. Geometry then becomes meaningful to them.

A recent study has linked the types of mathematical errors students make to their specific LDs (Raghubar et al., 2009). The researchers studied children in Grades 3 and 4 ($N = 296$) from 20 schools in Houston, Texas, and Nashville, Tennessee, with math and reading difficulties, math difficulties, reading difficulties, or no LDs. They performed a second analysis by comparing children with severe math LDs, low average achievement in math, and no LDs. Each participant had to complete a problem sheet in 7 minutes. The researchers used a coded system to categorize errors: (a) math fact, (b) procedural,

(c) visual spatial, and (d) switch errors. The results indicated that math fact errors were related to the severity of the math difficulties displayed by the children, not to their reading capacity. Conversely, children who read at significantly low levels, apart from math achievement, committed more visual-spatial math errors. The children who displayed inattentive behavior had more conceptual errors, such as mistaking the operational sign, compared to students who pay attention. This latter finding recalled studies suggesting that a lack of attention may be related to math LDs (Gross-Tsur, Manor, & Shaley, 1996; Raghubar et al., 2009).

Research-based knowledge, such as the theory of multiple intelligences and learning styles and instructional strategies such as DI that can support the implementation of these theories in the classroom, have the potential to stem the problems faced by students with math LDs. Brown and Woodward (2006) conducted a study with 53 middle school students in suburban schools with similar socioeconomic status. They wanted to evaluate the effectiveness of teaching math with a curricular approach based upon principles (small-group setting, visuals, manipulatives) identified in the special education literature in comparison to teaching math with textbook instruction. They also wanted to determine whether intervention students would demonstrate more positive attitudes and beliefs about math than students in the comparison group. Both groups of students both demonstrated low achievement in math, with the exception that the intervention group had IEPs with LDs. The results indicated that the curriculum that used visual models and manipulatives and allowed students to work in groups exemplified research-based principals found in the special education literature and tended to produce greater

achievement with students with LDs in math. Furthermore, the survey results revealed that students favored activities that were differentiated and presented in various formats. These modalities allowed students to have numerous opportunities for success and extended time to solve math problems.

Brown and Woodward (2006) also noted that students enjoyed pair or small-group instruction, in which teachers monitored students' understanding and helped in the completion of activities. According to Brown and Woodward, the intervention of using DI materials designed according to students' learning styles with NCTM standards should be used to create math lessons. The researchers described such design as a curriculum capable of enhancing LDs in math.

Fleischner and Manheimer (2008) asserted that in order to benefit all students with LDs in math, teachers must use visual and acoustical methods. Without both methods, some students may show a lack of progress. However, it is not yet understood who will benefit from either method. The researchers also mentioned that many studies have been completed on the subject of strategies to implement with students with LDs in math. They concluded that teachers are faced with the responsibility to determine who will benefit from which instruction.

LDs in math are more common than general LDs; 5% to 10% all of students are diagnosed with some form of math LDs (Geary, Baily, & Hoard, 2009; Gross-Tsur et al., 2005). Jordan (2007) found that the difficulties of learning and understanding mathematics are not confined to students who are in special education. Students with an above average intelligence also have an inability to learn and understand math subject. It

is important to tackle the problem at an early age, according to Geary et al. (2009). They explained that some students, despite confidence in reading, have difficulties counting and computing addition, subtraction, and other simple operations.

Need for Further Research and Rationale for Research Method

My study is supported by researchers (Armstrong, 1999, 2000, 2002, 2003; Baum et al., 1999; Blomberg, 2009; Gardner, 1983, 1993; Helding, 2010; McKethan, Rabinowitz, & Kernodle, 2010) who have argued that the theory of multiple intelligences and learning styles have demonstrated a positive impact related to DI for students' academic achievement. Gault (2009) evaluated the effects of DI on student achievement in Grade 3 math classes in a Virginia school district. Gault stated that "implementation of DI does play a positive role in student achievement" (p. 97). The results indicated that DI was a successful strategy for math instruction.

A major study about MI theory and its effectiveness was conducted in six different school districts across the U. S. (Campbell & Campbell, 1999). The researchers reported that prior to implementation of strategies based upon the theory of multiple intelligences, instruction was basically teacher directed, and students were underperforming academically. In contrast, instruction based upon the theory of multiple intelligences improved students' academic interests and motivations to learn.

Learning styles also can impact students' academic achievement. A study was conducted by Hanley et al. (2002) on an intervention based upon the theory of multiple intelligences within social studies. The researchers wanted to evaluate the benefit of linking the theory of multiple intelligences with traditional teaching strategies to teach

students based upon their learning styles. The students demonstrated an increased interest in the areas of multimodel skills, improved attitude, and improved behavior. Hanley et al. explained that one of the benefits of linking it to what? was that the students had the opportunity to discover other ways to learn that they never experienced. As a result, the students demonstrated other interests, strengths, needs, and talents during the study.

Differentiated Instruction

DI is a research-based teaching method that allows teachers to effectively assist all classroom learners based upon the students' intelligences, abilities, or learning styles. DI was designed to challenge students at their ability level while providing them with support structures that can help them achieve. Many researchers (Armstrong, 1999, 2000, 2002, 2003; Baum et al., 1999; Gardner, 1983, 1993) have asserted that if instruction is differentiated, it can address the underperformance of students with LDs in math. Researchers such as Beattie et al. (2006) have expressed a similar belief about DI. DI has the capability to allow students with LDs to better understand their general education classroom materials. The implementation of DI in an inclusion setting is important for students with LDs.

Tomlinson and McTighe (2006) characterized DI as the foundation to plan for diverse learners. These researchers explained that DI is an instructional tool with a "primary goal of ensuring that teachers focus on processes and procedures that ensure effective learning for varied individuals" (p. 3). Friend and Bursuck (2008) viewed DI as an instrument to reach students academically. According to other researchers (Armstrong, 1999, 2000, 2002, 2003; Baum et al., 1999; Beattie et al., 2006; Tomlinson & McTighe,

2006), the intent of DI is to exploit each student's growth and individual accomplishment by meeting each student's learning abilities.

Multiple Intelligences

Gardner (1983, 1993) constructed the theory of multiple intelligences by questioning the competence of using only one or two cognitive constructs to describe intelligence. Gardner (1993) first developed seven intelligences, later adding an eighth intelligence, namely, naturalistic, which is the sensibility for nature, the ability to recognize plants, and people, and the capability to cultivate a sense of cause and effect (Armstrong, 1999, 2000, 2002, 2003; Baum et al., 1999; Gardner, 1983, 1993).

Bimonte (1998) and Kalelioglu and Gulbahar, (2010) asserted that the theory of multiple intelligences has transformed many classrooms. According to Gardener (1983), humans possess many different intelligences, with some being more dominant than others. Nonetheless, each intelligence has the ability to improve learning based upon the setting.

Learning Styles

Learning styles have been defined as the ways in which some students may prefer to learn (Dunn & Dunn, 2008). Traditional teaching methods (e.g., lecture and note taking) may not be sufficient to instruct all types of learners and their unique abilities effectively. Lopez and Schroeder (2008) explained that learning styles are not always address in general lesson plan. Because students have unique abilities to understand concepts, teachers should differentiate their lessons. DI strategies have been proven to be effective interventions to support students' achievement (Searson & Dunn, 2001).

Researchers (Armstrong, 1999, 2000, 2002, 2003; Baum et al., 1999; DeLay 2010; Gardner, 1983, 1993; King-Shaver, 2008; Manning, S., Stanford, & Reeves 2010; Wilson, S. 2009) have acknowledged that DI can impact students' academic achievement; however, many teachers who are not implementing DI in their classrooms. Adlam (2007) conducted a study to understand how knowledgeable teachers were about DI. Results revealed that many teachers were familiar with DI, but they did not differentiate instruction based on (a) insufficient of resources and (b) the amount of time required to plan a lesson.

Although the theory of multiple intelligences has been implemented by many educators to differentiate their instructions, some researchers (Carson, 2003; Ceci, 1990; McGuiness, 2007; Sternberg, 1988; White, 2005; Willingham, 2005) have suggested that there is not enough research to validate the effectiveness of the theory of multiple intelligences. For example, early researchers (Ceci, 1990; Sternberg, 1988; White, 2005) explained that no instrument is capable of measuring the day-to-day performance of the intelligence, and they explained that it is important to have a more specific approach to determine individuals' opinions of their intelligence. Also, more recent research (Carson, 2003; McGuiness, 2007; White, 2005; Willingham, 2005) has suggested that advocates of the theory of multiple intelligences should conduct more reliable studies that could reinforce the theoretical paradigm.

Further research should be done on using the theory of multiple intelligences and learning styles to differentiate instruction in inclusion math classes servicing students with LDs. The. Bureau of School Improvement (2008) recognized that some school

districts may not be providing relevant DI to meet the needs of students with LDs in inclusion math classes. Nonetheless, researchers have been limited by the lack of DI training resources available to teachers teaching inclusion math (Tomlinson & McTighe, 2006). One of the goals of this study is to identify the instructional strategies that inclusion teachers are using to promote the math academic achievement of underperforming students with LDs in the inclusion math classroom.

Conclusion

As stated by Bazzini and Morselli (2006), it is essential that teachers of mathematics accommodate all types of learners, especially because mathematics is a gatekeeper to many opportunities. A possible way to achieve this accommodation is for teachers to use research-based strategies to differentiate instruction. Marzano and Pickering (2004) explained that applying just one teaching practice to all instruction will not reach all students. Therefore, a differentiated blend of teaching and learning practices should be in place. The studies reviewed here suggested that that using a DI curriculum based upon students' learning styles and in which students can participate in activities that accommodate their multiple intelligences may have the potential to improve academic outcomes in math of students with LDs.

Section 3: Methodology

Introduction

Students who have learning disabilities (LDs) perceive to be underperforming in their math classes. Many of these students are at a Level 1 score in their standardized state math test. They may require additional instructional methods for academic achievement in math. The school district used a Level 3 as the grade level criterion, meaning that regular education and students with LDs need to score a Level 3 to meet graduation requirement.

Students who scored a Level 1 or Level 2 would have to take remedial classes to supplement their academic deficiency in math. Many researchers (Armstrong, 2002, 2003; Baum et al., 2005; Downing, & Cornett, 2006; Landrum & Mcduffie, 2010; Lopez & Schroeder, 2008; Nelson, 1999; Steele, 2010; Subban, 2006; Templeton et al., 2008) vindicated differentiated instruction (DI) as an effective instructional tool when used in classrooms with diverse learners. These researchers explained that DI is designed to challenge students at their own ability levels while providing them with support structures that can help them to achieve. The question of why students with LDs continued to score a Level 1 in math was raised, as was the question of the perception of teachers who teach math to underperforming students about implementing DI in their classroom.

This section describes the plan for a qualitative study with a grounded theory design. The purpose was to explore how inclusion math teachers differentiate their instruction to meet the needs of their diverse groups of students.

Research Design

Grounded Theory

I employed a qualitative study with a grounded theory design to give voice to the participants who have experience with the phenomenon (Charmaz, 2006; Glaser & Strauss, 1967; Stoner, 2007). Using a qualitative grounded theory approach adheres to what Tashakkori and Teddlie (1998) called paradigm relativism, which refers to the use of whatever method is most appropriate to the study at hand. Corbin and Strauss (2008) explained that grounded theory is an explicit methodology designed by Glaser and Strauss (1967) with the objective of constructing theory from data. In comparison to other approaches, a grounded theory design is the most appropriate for this qualitative study, the purpose of which was to understand the perceptions of teachers who teach math in an inclusion setting. A quantitative method approach uses a sample to validate information on a whole population, whereas a qualitative approach centers on a specific setting or population (Creswell, 2003). This approach can reveal the teachers' views about the implementation and effectiveness of DI in an inclusive mathematics classroom in order to build theory from the data collected during the study.

Ethnography

The ethnographic approach was not appropriate for this study because ethnographic researchers explore the society and culture of a specified group of people (Merriam & Associates, 2002). The purpose of this study was to identify which instructional practices inclusion teachers are using to promote the math academic

achievement of underperforming students with LDs in inclusion math classes. My focus was to understand how inclusion teachers are using DI in their classrooms, not how DI affects the culture of the classroom. As a result, I rejected ethnography as a research approach.

Phenomenology

Another qualitative approach that was not selected is phenomenology. In this approach, the focus is on ways to describe the commonalities among the participants' experiences (e.g., grief is universally experienced). Creswell (2007) explained that "the purpose of phenomenology is to reduce individual experiences with a phenomenon to a description of the universal essence" (p. 58). The ways that teachers differentiate their instruction in the inclusion math classroom is an instructional approach meant to improve academic progress. The current study is my attempt to understand how inclusion teachers perceive this instructional approach to generate a theory; consequently, a phenomenological approach for this study was rejected.

Case Study

I also rejected a case study approach. Baxter and Jack (2008) explained that a case study approach allows the researcher to answer " 'how' and 'why' type questions, while taking into consideration how a phenomenon is influenced by the context within which it is situated" (p. 556). Because the individual contexts in which the teachers work are not the focus of this study, I did not select a case study approach.

Considering the nature of this study, a grounded theory model allowed me to build theory from the data. The integration of approaches is necessary in the collection

and interpretation of data for this grounded theory study, in which data from the survey and interviews was analyzed to explore teachers' perceptions about DI to improve the academic math achievement of students with LDs.

I administered the open-ended survey and interviewed all of the participating teachers. I examined these data systematically using grounded theory methods (Charmaz, 2006; Creswell, 2003; Strauss & Corbin, 1998). A theory of the types of instructional practices that help students achieve academic success and why they are perceived to be effective were presented from the teachers' viewpoint.

I developed the survey (Appendix A) and 5 interview questions (Appendix B) for this study to achieve a deep understanding of the phenomenon. The selection of the instruments was intended to allow the participants, who have experience with an inclusion math classroom, to explain their perceptions about using instructional methods that reach a diverse body of students. The survey consisted of numerous structured open-ended questions, which "provide a numeric description of trends, attitudes, and opinions of a population by studying a sample of that population" (Creswell, 2003, p. 153). The open-ended questions allowed me to collect information to explore the reasons the teachers chose or did not choose to use DI in an inclusive setting. In addition, I designed a range of questions about the participants' professional experiences, perceptions, and practices related to the need to improve the academic math achievement of students with LDs. This study may contribute to scholarly research by illustrating the perceptions of teachers who teach math in an inclusion setting servicing students with LDs by

differentiating their instructions. The study may function as a resource for other teachers and administrators, both locally and abroad.

Research Questions

The following research question and three subquestions guided the proposed study:

1. What perceptions do teachers who teach math in an inclusion setting have about the use of DI in their inclusive mathematics classes?

   a) What criteria do teachers use to differentiate instruction in an inclusion math class, and why?

   b) What are the most and least prevalent methods of differentiating instruction among teachers who teach math in an inclusion setting, and why?

   c) What examples are provided by teachers regarding strategies to improve students understanding of mathematics, and why?

Context of the Study

The research site was located in an urban school district in a southeastern state. The school provided service to 255 students. Among this number, 94% were Black, 3% were multiracial, 2% were Hispanic, and 2% were White. Eighty-five percent of these students were eligible for a free or reduced-cost lunch. Students with LDs make up approximately 56, or 25%, of the total student population. Many of these 56 students were enrolled in an inclusion math course and were required to take the state math test in order for their schools to meet the AYP requirement (FLDoE, 2010). They may be enrolled in an inclusion math class that required that individualized education program

(IEPs) with a math goal to be developed. This school's FCAT results have shown improvement across grade levels in math. Despite the range of progress made by all the students in math, there were still concerns that the underperforming students who continued to perform at a level 1score in math may need supplementary instructional methods for academic achievement in math. The sample for this study was all inclusion math teachers across the grade levels in this urban school district in a southeastern state.

Ethical Considerations

This qualitative study with a grounded theory approach gave me the opportunity to develop a theory that can explore the reasons teachers use, or do not use, DI in an inclusion setting. For that reason, Hatch, (2002) stated a certain amount of "time commitments, trust in the researcher, access to their everyday lives, intimate and honest details about them professionally and personally, and permission to record, document, and share research findings" (p. 65) were asked of the participants. As a result, I valued the participants' time and took every preventative measure to protect the participants' rights by treating them respectfully and protecting them from any harm during their participation in the study. I informed the participants that the interviews would be audiotaped, and I gave them a copy of the pertinent interview guide prior to the interview date. I also kept all data confidential and ensured that it was password protected on my computer.

I began to collect data once I receive approval to conduct the study from Walden University's Institutional Reviews Board. I obtained informed consent from the volunteer

participants. I maintained the privacy of the participants and kept all data confidential. I stored all in a locked file cabinet for a maximum of 5 years.

I ensured that the administrators, teachers, and any other involved parties were aware not only of the goals of this study but also the rights and responsibilities of myself as the researcher and the participants. The participants received an informed consent form and an explanation of all potential risks associated with participating in this study. All of the participants reviewed and signed Walden University's informed consent form. A copy of the informed consent form for the participating in the study is provided in Appendix C, as well as a copy of the letter of cooperation Appendix D.

The consent form clarified the purpose of the study and the way in which I will share the findings. The data collection procedures, the voluntary concept of participation, the potential risks and the benefits, and the criteria of protecting confidentiality were clearly explained in the consent form. I did not use the participants' real names. To ensure their anonymity, I assigned pseudonyms to the participants. I also encouraged the participants to ask any questions or express any concerns that they may have about the study. They were not be coerced into participating in the study.

Access to the Participants

Creswell (2007) explained that researchers must be aware of the impact that their presence can cause when entering a research site. Creswell argued that researchers "always need to be sensitive to the potential of our research to disturb the site and potentially (and often unintentionally) exploit the vulnerable populations we study"

(p. 44). In that sense, my goal was to avoid any incidents that can negatively impact the participants and their work environment. I planned to set my interview sessions in advance with the participants and at times outside of school hours that were the most convenient for them.

I gained permission to conduct the research at the school in this urban county school district in a southeastern state by contacting the school principal. I explained the research purpose, methods, potential risks, and benefits. The school did not have an IRB representative in place; therefore the principal signed a letter of cooperation allowing me to access the school site. See Appendix C for a sample of the letter of cooperation that was used in the study. Once permission to access the school site was granted, I proceeded with the data collection.

Role of the Researcher

I currently teach in a different school district. Last year I worked as an inclusion math teacher, and served a case manager for more than 20 students with learning disabilities. Five years prior I worked as a French teacher. Presently I work in a self-contained classroom. In addition to teaching, I serve as a case manager and a mentor for 20 students. I develop IEPs and progress reports with specific goals for students who are in my caseload. As a mentor, I hold monthly meetings with the students and work closely with their teachers to monitor their grades. I have the opportunity to support and guide the teachers by discussing teaching strategies and accommodations that may be beneficial to meet the students' academic achievement.

Hatch (2002) encouraged researchers to be cautious when conducting research in familiar settings. To lessen potential bias, I explained to the participant teachers that they would not be forced to be part of this study and that I had no authority over their employment. I was merely another teacher hoping to make a difference for students with LDs who are in an inclusion math class.

Creswell (2003) explained that it is possible for researchers to investigate a known site. However, I was aware that extra precautions must be in place. Because of my role as a teacher, I have personal and professional interests in the success of the students with LDs in math classes, and this poses a potential bias. I have served as a case manager advocate for increased DI teaching strategies in inclusion math classes to impact students' achievement; nonetheless, using a grounded theory approach minimized any personal bias during the interpretation of the data.

Criteria for Participant Selection

The purpose of this study was to develop theory from data (Hatch, 2002) representing the voices of the individuals who have experienced the phenomenon. Hatch (2002) stated that "Grounded theory works from the assumption that rigorous methods can be used to discover approximations of social reality that are represented in collected data"(p. 26). All inclusion teachers who were teaching mathematics were invited to participate in the initial data collection via the survey and later were interviewed in order to gain more knowledge about their perceptions about using instructional methods to reach a diverse population of students.

All the math teachers in this urban county school in a southeastern state were chosen because I wanted to develop a deep understanding of the perceptions of teachers who implement DI in inclusion math settings about the impact of DI on the academic achievement of students with LDs across the school. An open-ended survey was administered, and an interview was conducted to provide data that represented the multifaceted perceptions of the participants (Creswell, 2007). Some teachers who felt that they were successful with their students, as well as some who did not feel that they were successful, participated.

Data Collection

In a research study the "intent of a grounded theory study is to generate or discover a theory, an abstract analytical schema of a phenomenon, that relates for a particular situation" (Creswell, 1998, p. 56). The researcher must consider the data collection process (Creswell, 2003). The process of setting the boundaries for collecting and recording the data, as well as establishing the protocol and guidelines for both the survey and the interview data-recording process (Creswell, 2003) . My goal was to take into account these important factors prior to creating the data collection plan described in the next section.

I collected the data over 9 weeks. This time frame is parallel to the school district calendar, which gave me sufficient time to administer and analyze the survey before conducting the interviews with the participants from the school. I used a researcher-designed survey and a researcher-constructed interview to collect the data. The interview questions were created based upon the responses to the survey. The purpose of these

interviews was to expand on the information that was received from the teachers via the survey questions and consisted in part of questions that prompted the participants to "tell more" about their responses to particular survey items or to give examples from their classrooms.

Procedures

I obtained signed consent forms from the teachers and the principal and approval from Walden University's Institutional Review Board (IRB) before beginning the collection of data. Once the consent forms and approvals were in place, I conducted the survey and the interviews.

The survey and a self-stamped return envelope was sent by mail to all the participants from the school. The participants had the choice to either respond to the survey online via SurveyMonkey.com or complete the hard copy that was mailed to them. The survey took approximately 15 to 20 minutes to be completed. Participants had 2 weeks to complete the survey. Each survey response was entered into an Excel spreadsheet. Once the deadline for receiving the surveys was reached, I analyzed the survey responses to identify initial themes and to select the participants to be invited for interviews. A reminder letter (Appendix E) was sent to the participants during the 2 weeks available to them to complete the survey. Nonresponders were sent a follow-up query.

The five interview questions related to the participants' familiarity and experience with DI in their inclusion classrooms. Each interview lasted approximately 20 minutes. I took notes during the interview sessions about major emergent themes. Also, I audiotaped

the interview sessions for later analysis. I reviewed the audiotapes to transcribe the data after the interview occurs. I then analyzed the transcriptions and my interview field notes.

Organization and Storage of the Data

To ensure that the data were collected in a timely fashion, I wrote weekly updates containing the following information: description of the research time line, details about the data that have been collected, data that were still needed, and the steps necessary to obtain the outstanding data. After obtaining the data, I kept them confidential by storing them in a secure and locked file for up to 5 years. Later on, the data will be shredded and data saved on the computer will be deleted. All tape recordings from teacher interviews also will be deleted.

Data Analysis

Hatch (2002) explained that "analysis means organizing and interrogating data in ways that allow researchers to see patterns, identify themes, discover relationships, develop explanations, make interpretations, mount critiques, or generate theories" (p. 148). Analysis in this study was conducted in two stages. Once the survey data had been collected, it was be subjected to an initial analysis to identify themes to prompt interview questions. As the interviews were conducted, they were transcribed and analyzed for emerging themes. Once the data are collected, they were analyzed as a whole. Thus, data analysis began as soon as the first set of data was collected and continued until all relevant themes and categories had been explored. I anticipated this work being done by Week 9 of the study. Because I began analyzing the data in the first

week, the goal was to finish the data analysis no later than 4 weeks after the final data had been collected.

Coding of Categories and Themes

I used open, axial, and selective ways to code and analyze the collected data (Merriam & Associates, 1998; Yin, 2009). I coded the survey responses as they were returned and the teacher interview responses as they were transcribed. The analysis allowed me to identify and track emergent categories and potential themes. An example of the coding matrix used is included in Appendix D. I categorized the research by codes that identified factual information to describe the data and codes that related to analysis and interpretation (Merriam & Associates, 2002). Short words and phrases that were repeated throughout the analysis determined the codes used in the study and identified emergent themes and categories (B. Johnson & Christensen, 2004).

Besides the textual data that were analyzed using open, axial, and selective coding. There were also the numerical data analysis methods that were used response count and response percent (numbers and percentage) and charts for analyzing the numerical data to display the significant findings of the survey results about inclusion math teachers' perceptions on the effectiveness of differentiated instruction with students with learning disabilities (LDs) in inclusion math classes, for example, the data numerically displayed the number of teachers who responded or skipped a specific question.

Open coding. The first step in the coding process is open coding. Corbin and Strauss (2008) described "open coding as the breaking apart and outlining concepts to

stand for blocks of raw data and at the same time, one is qualifying those concepts in terms of their properties and dimensions" (p. 195). Strauss (2008) explained that open coding is the exploration of data in order to categorize and rename the data. When conducting a study with a grounded theory approach, open coding is the first creative step in data analysis. I planned to incorporate the open-coding process during the initial analysis of the survey responses and the interview transcripts.

Axial coding. The second step in the coding process is axial coding. Corbin and Strauss (2008) characterized axial coding as cross-cutting or linking concepts to each other; axial coding is also the act of grouping concepts to each other. Strauss and Corbin (2008) described axial coding as subcategorizing the data by creating new categories to develop several other categories. Axial coding started with the selection of the interview participants based upon some of the emerging themes in the survey data. It continued after the interview data had been transcribed and added to the data pool, and was used to look for relationships between and among the emergent categories.

Selective coding. The third step in the coding process is selective coding. Strauss and Corbin (2008) explained that the selective coding process allows a researcher to choose one category (i.e., the core variable) from the data and later connect all other categories to that category to form a story line. The core variable is the category that explains most of the variance in the data and underlies the participants' main concern. Creswell (1998) stated that "the researcher identifies a 'story line' and writes a story that integrates the categories in the axial coding model" (p. 57). I used the continuous comparative approach as well as open and axial coding to develop and categorize patterns

and emerging themes to construct a grounded theory of teachers' perspectives of effective instruction practices in inclusion mathematics.

In this study, I explored ways in which my qualitative research will help to support the current available research by performing coding (open, axial, selective); triangulation, and member checking as based upon the theoretical framework of Mills (2003), who described "validity as a test of whether the data we collect accurately gauges what we are trying to measure" (p. 96). I also established the relevance of this qualitative study. Charmaz (2005) recommended revisiting the original criteria established by Glaser and Strauss (1967) for evaluating grounded theory studies. The original criteria include fit, workability, relevance, and modifiability. In order to understand the evaluation criteria, Charmaz (2005) asserted:

> Theory must fit the empirical world it purports to analyze, provide a workable understanding and explanation of this world, address problems and processes in it, and allow for variation and change that make the core theory useful over time. The criterion of modifiability allows for refinements of the theory that simultaneously make it more precise and enduring. (p. 526)

Charmez also noted the importance of additional criteria to evaluate social justice studies. These criteria include credibility, originality, resonance, and usefulness.

Creswell (1998) added that "validity…is seen as strength of qualitative research, but it is used to suggest determining whether the findings are accurate from the standpoint of the researcher, the participant, or the readers" (p. 195). By interviewing the inclusion math teachers about their perceptions of using or not using DI in their

classrooms, I gave them a voice that had been lacking. Before any curriculum changes in the methods used to teach inclusion math were made, the instructors needed to be involved and consulted.

This study aligned with the work of Mills (2003), who described criteria for trustworthiness of a qualitative research. The first is descriptive trustworthiness, also known as factual accuracy. It is an essential piece of any qualitative research study explanation and is an important part of this study. I explored, as a member of the learning community being studied, the teachers' actual experiences concerning inclusion math. The second criterion is interpretative trustworthiness, which illustrates the concern for the participants' perceptions about the study. I gave the teachers the opportunity to share those perceptions. The third is theoretical trustworthiness, which helped me to illustrate the findings of the phenomenon in the research report. The fourth is internal generalization, which is associated with the mathematic curriculum for students with LDs in the inclusive math classroom. The fifth criterion is evaluative trustworthiness, which requires the presentation of unevaluated data. I explored the perceptions of a select group not usually represented in the research.

I used markers of internal trustworthiness in this study because I was dealing with the question of (Merriam & Associates, 2002) "how research findings match reality….Do the findings capture what is really there? Are investigators observing or measuring what they think they are measuring?"(p. 201). During the internal trustworthiness process, if more than one type of data is authentic, then the findings must be reevaluated. I used triangulation, and member checks, to establish internal

trustworthiness. I also verified my findings by collecting various forms of data that can be compared and contrasted to confirm or substantiate themes and categories (Merriam & Associates, 2002). Creswell (2003) defined triangulation as the examination step to evaluate data in order to develop themes. The two sources of the data that I collected were responses to a survey and an interview. The interview data allowed the initial themes that emerge during the survey responses to be verified or refuted.

During this process, the participants reviewed my interpretations of the survey and interview responses with me. Creswell (2007) explained that member checking is done to obtain feedback from the participants about the relevance and accuracy of the tentative findings. Furthermore, Creswell characterized member checking as a tool to establish the correctness of the themes by allowing the participants to access my interpretation of their responses. The analysis of the interviews were sent back to the participants for review. The participants shared feedback to ensure that their viewpoints were accurately represented.

My study was opened to members checking to facilitate the validation of the accounts and ensure authenticity (Creswell, 2003). I shared and asked for feedback about my interpretation of the results with the participants. My dissertation committee also reviewed the study to provide input and to question the findings. Receiving feedback from the participants will ensured that I accurately reflected the perceptions of the inclusion teachers who teach math to students with LDs.

Conclusion

I used a qualitative grounded theory design to explore the perceptions of teachers of math in an inclusion setting about the implementation and effectiveness of DI. I collected the data from a survey and interviews. I sought to understand and interpret the teachers' perceptions of DI for students with LDs in inclusive math classes by using triangulation, member checking, and an audit trail. I also explained how I will address ethical concerns in my treatment of the participants. I will present the results and data analysis in section 4.

Section 4: Results

Introduction

Section 4 presents the major findings of this qualitative study, which was an exploration of inclusion math teachers' perceptions of the effectiveness of differentiated instruction (DI) with students with learning disabilities (LDs) in their classes. Data were gathered from a survey and an interview. The results are organized in order of the participants, the data collection process, the research questions, a review of the findings pertaining to the research questions, and an explanation of the evaluation of the results in order to answer the research questions. A description of the themes that emerged from the analysis also is presented.

Generation of the Data

The research site was an urban school district in a southeastern state. The school provides service to 255 students, of whom 94% are Black, 3% are multiracial, 2% are Hispanic, and 2% are White. Eighty-five percent of these students are eligible for a free or reduced-cost lunch. Approximately 56 students, or 25% of the total student population, have LDs. Many of these 56 students are enrolled in an inclusion math course and are required to take the state math test in order for their schools to meet the adequate yearly progress (AYP) requirement (FLDoE, 2010). They may be enrolled in an inclusion math class that requires individualize education plan (IEPs) with a math goal. This school's FCAT results have shown improvement across grade levels in math. However, despite the range of progress made by all students in math, concerns remain that the underperforming students who continue to perform at a Level 1score in math may need

supplementary instructional methods to achieve academically in math. The sample comprised seven inclusion math teachers across the grade levels in this urban school district in a southeastern state.

The conceptual framework for this study was based on differentiated instruction (DI). DI is a research-based teaching method that allows teachers to effectively assist all classroom learners with diverse range of needs that include differences in developmental levels and different intelligences, abilities, or learning styles (Tomlinson & McTighe, 2006; Landrum & Mcduffie, 2010). DI challenges students at their own ability level while providing them with support structures that can help them achieve. Many researchers (Armstrong, 1999, 2000, 2002, 2003; Baum et al., 1999; Impecoven-Lind & Foegen, 2010) have asserted that DI can address the underperformance of students with LDs in math. Researchers (Beattie et al., 2006; Friend & Bursuck, 2008) have agreed that DI has the capability to allow students with LDs to better understand their general education classroom materials.

Tomlinson and McTighe (2006) characterized DI as the foundation on which to plan for diverse learners. These researchers explained that DI is an instructional tool with a "primary goal of ensuring that teachers focus on processes and procedures that ensure effective learning for varied individuals" (Tomlinson & McTighe, 2006, p. 3). According to Berch and Mazzocco (2007), because many students have difficulty learning mathematics, it is critical to differentiate instruction to ensure success for all students. Two possible ways to differentiate are to develop instruction around students' own

intelligences or learning styles (Armstrong, 1999, 2000, 2002, 2003; Baum et al., 1999; Gardner, 1983, 1993; Landrum & Mcduffie, 2010).

Data Collection

I obtained signed consent forms from the teachers, and I received approval from the principal and Walden University's Institutional Review Board before collecting the data. Once the consent forms and approvals were received, I conducted the survey and the interviews over a period of 9 weeks. This time frame was parallel to the school district calendar, so it gave me sufficient time to administer and analyze the survey before conducting the interviews with the participants from the school. I used a researcher-designed survey and a researcher-constructed interview to collect the data. The interview questions were developed based upon the responses to the survey. The purpose of the interviews was to expand on the information provided by the teachers via the survey questions. The interview questions prompted the participants to provide more detailed responses to particular survey items or to give examples from their classrooms.

Data Gathering

On May 4, 2011, I attended a faculty and staff meeting to introduce myself to the teachers. During the meeting, I explained the objective of the study and distributed a sample copy of the survey questions. I answered questions from the teachers. On May 5, 2011, I sent the survey and a self-stamped return envelope by mail to all of the participants from the school. The participants could either respond to the survey online via SurveyMonkey or complete the hard copy that I had mailed to them. The survey took approximately 15 to 20 minutes to complete. Participants had 2 weeks to complete the

survey. The first survey was completed by May 6, 2011. I send a group email to the participants to thank them for their support and time. A reminder letter (see Appendix E) was sent to the participants during the 2 weeks available to them to complete the survey. Nonresponders were sent a follow-up query.

Data Recording

Each survey response was entered into an Excel spreadsheet. Once the deadline for receiving the surveys was reached, I analyzed the survey responses and identified several initial themes: low level of math, behavior issues challenges, teaching tools, DI, and lack of parental involvement. I invited five participants based upon their availability and convenience to be interviewed. The five interview questions were related to the participants' familiarity and experience with DI in their inclusion math classrooms. Each interview was approximately 20 minutes long. I took notes during the interview sessions about major emergent themes. I also audiotaped the interview sessions for later analysis. I reviewed the audiotapes to transcribe the responses. I then analyzed the transcriptions and reviewed my interview field notes.

To ensure that the data were collected in a timely fashion, I wrote weekly updates that included information about the research time line, details about the collected data, data that were still needed, and the steps necessary to obtain the outstanding data. After obtaining the data, I keep them confidential by storing them in a secure and locked file. The data will be kept for up to 5 years, after which time the data will be shredded. Any data saved on the computer and all recordings of the interviews also will be deleted.

Data Analysis

Hatch (2002) explained that "analysis means organizing and interrogating data in ways that allow researchers to see patterns, identify themes, discover relationships, develop explanations, make interpretations, mount critiques, or generate theories" (p. 148). Analysis of the data collected in this study was conducted in two stages. Once the survey data were collected, they were subjected to an initial analysis to identify themes to prompt interview questions. As the interviews were conducted, they were transcribed and analyzed for emerging themes. Once the data were collected, they were analyzed as a whole. Thus, data analysis began as soon as the data were collected and continued until all relevant themes and categories were explored. I anticipated this work being done by Week 9 of the study. Because I began analyzing the data in the first week, the goal was to finish the data analysis no later than 4 weeks after the final data had been collected.

Coding of Categories and Themes

Open, axial, and selective were used to code and analyze the collected data (Merriam & Associates, 1998; Yin, 2009). The survey responses were coded as they were returned and the teacher interview responses as they were transcribed. The analysis helped to identify and track emergent categories and potential themes. An example of the coding matrix that was used is included in Appendix F.

Descriptive Data and Findings

DI is a research-based teaching method that allows teachers to effectively help all classroom learners because they all have a diverse range of needs, including differences

in developmental levels, intelligences, abilities, and learning styles (Landrum & Mcduffie, 2010; Tomlinson & McTighe, 2006). The exploration of how the teachers perceived the instructional techniques or the underlying theories on which they based their instruction could relate to how successful their students were in the classroom. Experiences of teachers who may feel that they are successful in their instructional practices could be used as a model for other inclusion teachers looking to promote the academic math growth of underperforming students with LDs. Surveys and interviews were conducted to explore these instructional practices from the teachers' perspectives.

Surveys

The survey was conducted online via SurveyMonkey to obtain the perspectives of a sample of teachers who were teaching math to students with LDs in their inclusion math classes. The survey was completed over 2 weeks. The first one was completed on May 6, 2011, and the last one was completed on May 18, 2011. I identified several initial themes: low level of math skills, behavior issues challenges, teaching tools, DI, and lack of parental involvement. The responses indicated that DI was an effective teaching tool in improving the academic achievement of students with LDs.

Research Question 1

The first research question asked, "What perceptions do teachers who teach math in an inclusion setting have about the use of DI in their inclusive mathematics classes?"

Four of the seven teachers explained that they were teaching math classes with students, who not only had LDs in math but also were unmotivated about math and came from low-income environments with very little parental support. One participant wrote,

"I had 18 students with varied academic levels and 98% were from low income homes." Another one wrote, "Several students had difficulty with speech and language - most students were low economically and very low motivationally" and "had lack of reinforcement of skills at home" According to one participant, even though only about 10% of the student population received parental support, the successful academic rates of these students was remarkable. One teacher stated, "I perceive a better than 80% rate helping students to meet the required standards in math." That same teacher explained that during the 2009-2010 academic year, "the actual success rate [of students] was 87%."

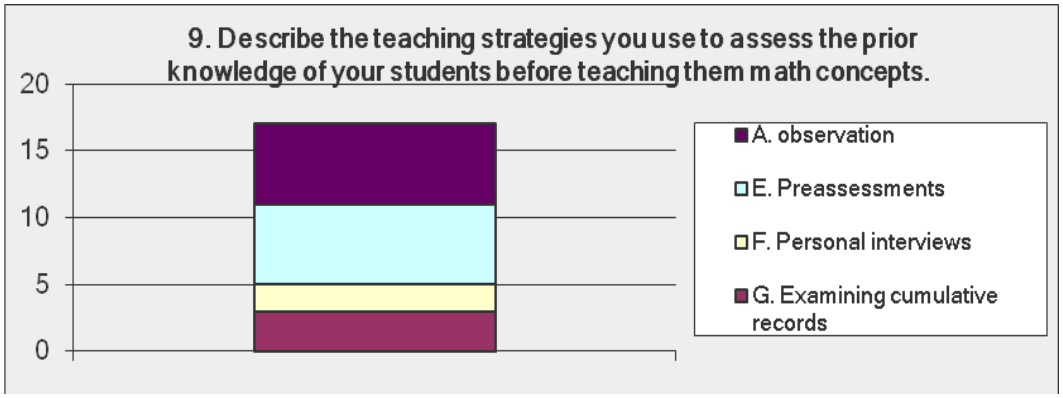
These participant teachers understood the challenges that they were facing in the classroom. One stated, "Most of the students had been challenged with adding/subtracting integers. Many mathematics principles were lacking." They credited DI teaching tools as allowing them to design individualized minilessons and activities tailored to these students' academic needs.

Subquestion A

Subquestion A asked, "What criteria do teachers use to differentiate instruction in an inclusion math class, and why?" Most of the participant teachers understood that their students had different learning styles and required different strategies to learn math concepts. The teachers were taking drastic measure to help their students academically. One teacher explained, "I realize that some students learn better when someone on their level explains. When I realized that a couple of students were struggling regardless of how often I explained I resorted to cooperative peer teaching and learning."

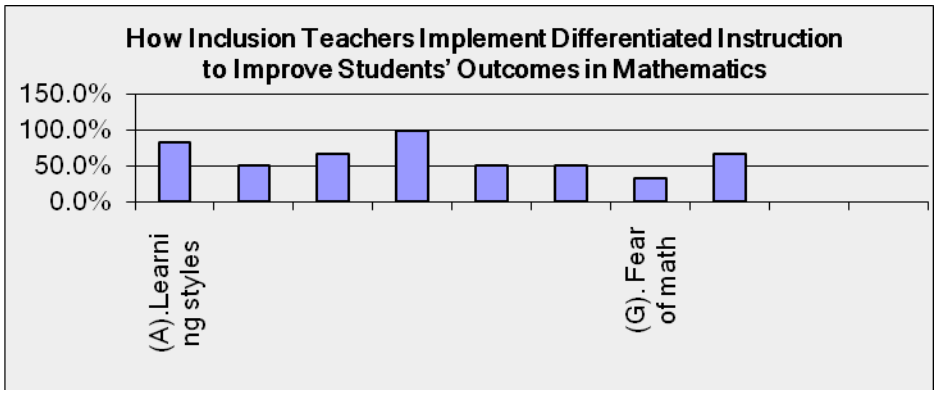
The survey responses indicated that the teachers had to implement various teaching strategies to determine their students' math levels. For example, one teacher stated, "I always had students complete a pretest to determine where they are starting off. Per that test, I would create packets for small groups of students for that lesson." Six of the seven teachers also had used the preassessment method and other approaches in their math classroom to facilitate the learning of their students. The participant teachers implement DI to assess their students' abilities. Figure 1 shows the number of participant teachers who implemented DI preassessments to assess their students' prior knowledge in math.

Figure 1. Teaching strategies used to assess prior knowledge.



The analysis of the data from the survey revealed that 83% of the participant teachers kept their students' learning styles in mind when they planned their math lessons. In addition, 50% of the participant teachers acknowledged that their students had different intelligences and required various teaching approaches. Figure 2 represents the percentage of these participant teachers.

Figure 2. Differentiated instruction to improve students' outcomes in mathematics



Subquestion B

Subquestion B asked, "What are the most and least prevalent methods of differentiating instruction among teachers who teach math in an inclusion setting, and why?" The teachers implemented DI to help their students to gain a better understanding of math concepts. Based upon the survey results, it became clear that some teachers preferred some strategies over others. For example, 16.7% of the teachers used cooperative group work in their classrooms, but none of them assigned group projects to their students, and 50% of the participant teachers used manipulatives to demonstrate math concepts, yet none of them allowed students to explore these math concepts. As for classroom discussion and debate about a math concept occurred in none of the math classes. The survey data indicated that low parental involvement played a significant role in why the teachers were reluctant to assign group projects. The teachers explained that the students received support and one-on-one accommodation in class, a support not available to them at home (see Table 1).

Table 1

Students received support and one-on-one accommodation in class.

15.From the list below, please circle the DI strategies that you use in your math classes. If you decide not to answer this question, please choose Option 8.		
Answer options	Response Percent	Response Count
(1). I use debates and class discussions	0.0%	0
(2). . I use music while students are working math problems.	0.0%	0
(3). I use manipulatives in lessons to demonstrate a math concept.	50.0%	3
(4). use manipulatives in lessons to allow students to explore math concepts.	0.0%	0
(5). I use a math diary to allow students reflecting on their learning experiences.	16.7%	1
(6).I use cooperative group work in my classroom.	16.7%	1
(7).I assign group project to my students.	0.0%	0
(8). Participant chose not to answer.	16.7%	1
	answered question	6
	skipped question	1

The survey data showed that the teachers spent 80% of their time reteaching to the whole class and providing one-on-one teaching when necessary. One teacher explained, "Small-group instruction was utilized as much as possible. Extended day was also an option for those struggling students, working in small group an additional hour at the end of the day" was very common in that setting.

Subquestion C

Subquestion C asked, "Give an example of how you perceive your strategies are engaging in improving students' understanding of mathematics, and why?" Most of the participant teachers expressed that even though DI may be an effective strategy, teachers sometimes have to use a variety of approaches before finding the most suitable method to

tailor an activity based upon their students' learning styles. The survey data indicated that the teachers used various DI strategies in their classrooms. Following are examples of some of the survey responses demonstrating the types of DI strategies that the participant teachers used in their math classrooms to engage students. According to the teachers, these strategies improved students' understanding of math.

"I had make changes in my approach for a particular student to keep this student on grade level. I had to work one on one with him to ensure him that he could do the assigned task."

"Small group instruction was utilized as much as possible. Extended day was also an option for those struggling students, working in small group an additional hour at the end of the day."

"Used manipulative for hands on activities to help students understand the mathematics concepts."

"Practical illustrations that connected to personal experiences, extensive student involvement and a lot of practice."

"Visual aids for visual learners, using flashcards, charts, computer assignments."

"I was teaching expanded notation and four students needed additional assistance. I used a different strategy for the group but continued using the same one with the others."

"The process of learning is done through actually working the problems; class presentations are also used; and students may even act out the problem illustrating the concept."

Interviews

I conducted two interview sessions with each of five selected participants to explore which DI practices the inclusion math teachers were using to promote the academic achievement of underperforming students with LDs in their classrooms. Calloway and Knapp (2010) explained that interviewing is an effective tool in grounded theory research. The interviews were conducted over a 2-week period and were 15 to 20 minutes long. Prior to the first interview session on May 4, 2011, I had the opportunity to observe some of the participants' teaching styles and the ways they interacted with their students. I conducted my first two interviews during the teachers' planning periods and another two at the end of the school day in the teachers' classrooms. The fifth one took place outside of the school setting. To save time, I audio recorded and transcribed the in-person interviews as soon as possible during the week.

On May 17, 2011, I returned to the school to observe three other participants in their classrooms. I used that time to share the interview transcripts with the first five participants and to address any concerns. I also asked for feedback to ensure that their viewpoints had not been misrepresented. The fact that I was willing to spend the whole day at the school and observe the participants in their classrooms facilitated three of my second interview sessions. The last two interviews took place on Sunday, May 22, 2011, and Monday, May 23, 2011, outside of the school setting.

Printed transcripts were identified by numerical to protect the identities of the participants. I read each interview transcription several times. I bracketed responses to the participants' interview questions by writing in the margins and highlighting quotes. Hatch

(2002) explained that bracketing can help researchers to differentiate preliminary interpretations and reflections from the final analysis of the data. During further reading of the interview transcriptions, I identified recurring themes. Rubin (2005) asserted that identifying themes can help the researcher to derive meaning not only about the topic but also about the participants. The identification of themes led to the coding categories. I copied the coded statements into one document for further analysis. I further examined the participants' interview responses to identify similarities and differences.

As already mentioned, I used open, axial, and selective coding to analyze the data (Merriam & Associates, 1998; Yin, 2009). I began line-by-line open coding with a transcription of each interview and then begin to explore ways to identify the codes. Three interviews had similar and an equal number of codes, at 16 each. One interview session had 17 codes, and in Interviewee 5, I identified 49 codes.

Open coding. The open coding data analysis led to three categories: *teaching strategies, teachers and students' challenges, and teachers and students' responsibilities*. These categories helped me to identify patterns to link the categories explaining how these inclusion math teachers differentiated instruction to meet the academic needs of students who were underperforming in math. I kept memos throughout the open coding phase to make comparisons and to question the meaning of the codes. The questioning was very helpful in keeping me focused and on task.

The open coding data analysis identified three themes: consistency, outcome oriented, and shared vision. To illustrate the theme of consistency, the open coding data analysis showed that all five interviewees used DI in their classrooms. Four of the five

interviewees responded that they had taken DI workshops and had conducted discussion about DI as ways to identify teaching strategies to improve their students' academic achievement in math. Interviewee 1 stated, "I attended 3 weeks of math instructional over at Florida Gulf Coast University (FGCU) where we did a different type of math for middle school students which helped me sometimes with differentiated instruction (DI) class instruction."

The open coding data analysis also displayed significant responses by all five participants in reference to the theme of outcome oriented. Interviewee 5 explained that she was willing to try many strategies in order to find the one that could take her students to the mastery level. She argued:

> So with DI, I can explain for whatever way it takes for the child to understand whether they need hands on they need me to sing it on a song, to clap it out, you know, dance and cheer, whatever the case maybe but at the end of it they understand the whole purpose is to have them have an understanding uhm what happen if don't teach so they can understand regardless of how many times I have to go over it or how many students have it that one child who doesn't get is still at a disadvantage and still will not be able to be academically successful and pretty much just left off.

As evidenced from the interview responses, the teachers in this study shared a common concern, namely, equal academic opportunities for all students. This common element reflected their vision.

The last category of shared vision in the open coding analysis exemplified the attitudes of the teachers in this study. When the five interviewees were asked how they planned lessons with DI, all of them agreed to differentiate their lesson plans according to the students' academic needs. Interviewee 2 stated, "We actually look at what their needs are." A full display of the transcribed interview and open coding data analysis is located in Appendix H.

Axial coding. The second step in the coding process is axial coding. During the axial coding data analysis, I attempted to further collapse the emergent categories into a simpler context to develop new categories. The axial coding data analysis provided eight central categories and corresponding subcategories (Strauss & Corbin, 2008). The first central category was strategies used effectively; the subcategories were teaching strategies, learning styles, and diverse teaching approaches. The second central category was engagement, followed by the subcategories of higher lever thinking skills, manipulatives, and related stories. The third category was challenges of low motivation, followed by the subcategories of additional time, behavior issues, retainers, and late learners. The fourth category was low parental involvement. The fifth category was low engagement. The sixth central category was more training. The seventh category was influence of peer Work. The eighth category was lack of prior knowledge about math.

The central category of strategies used effectively emerged during the axial coding analysis. It illustrated how the teachers defined the strategies that they found effective. Interview respondents stated the following in response to the interview

question, “In terms of the learning process of students with learning disabilities, what specific DI strategies do you use to help them access the math curriculum?”

Interviewee 4 said this “Ok for like some students…like those students I tend to use a lot of visual aids and also for those students is one-on-one with them to make sure that they are grasping the concept because…once you see that…uhm the other students you know are doing well by just like giving them just a brief assessment it tells you who understand the concept and who didn’t. so that means I have to reteach …that means I have to do what is necessary so most of the time I have to do one-on-one and with teaching aid that will make the concept more clearer to them.”

Interviewee 3 said that “Yes I had to use one-on-one, reteaching to the missing skills and peer assistance from uhm …students who understand and already passed from that concept …. in order to help her to be successful on grade level.”

Interviewee 1 said “…what I would do I would use manipulative uhm … , I would use examples from the book , and I would look up from the internet, examples to try to make things easier even to go to youtube …”

Teaching tools, teachers’ responsibilities, students’ interests, and outcomes exemplified the type of axial coding presented in this study related to the central category of strategies used effectively.

The context of this category research study is teachers’ attitudes. Possible teaching tools related to the category of strategies used effectively were informal assessment, lesson plan with DI, lesson plan with the Sunshine State standards requirements, and implementation of learning styles strategies. Possible teachers’

responsibilities related to Strategies Used Effectively were professional discussion concerning students' academic achievement, the use of school resources to meet students' academic needs, and after school tutoring to provide additional learning support to improve students lacking in math concepts.

Possible teachers responsibilities related to Strategies Used Effectively were students' interests, monitoring of students' academic progress to meet their academic needs, and leadership to encourage students to take control of their learning experience so that they could achieve their academic potentiality. That being said, the outcomes resulting from strategies used effectively were elevated academic level among students, improve students achievement in classroom and standardized assessment, and improved school AYP requirements. Similar axial coding delineations were developed for each category and identified during the coding phase.

Selective coding. The third step in the coding process is selective coding. I sorted the data from each phase on numerous occasions. That process played an important role in formulating the theories underpinning the categories (Goulding, 2002; Strauss & Corbin, 2008). The data begins to conceptualize itself during the selective coding phase. I related the different categories to each other and the key phenomena. I chose one category (i.e., the core variable) the consistency of strategies use effectively from the data and later I connect all other categories to that category to form a story line select (Strauss and Corbin, 2008) .The core variable: the consistency of strategies use effectively is the category that explains most of the variance in the data and underlies the participants' main concerns. The subcategories were lack of math prior knowledge, challenges of low

motivation/high motivation, engagement, lack of parental involvement, strategies used effectively, more training, and outcomes oriented.

Most of the participants' interview responses indicated that they were aware that their students began school with insufficient math skills caused by many factors. Despite the teachers' concerns about these numerous factors and challenges that contributed to the underperformance of students with low motivation in math class, and the lack of parental involvement to support these students. Most survey and interview responses conveyed that the teachers went above and beyond their duty to create lessons using various teaching modes and approaches to meet their students' academic needs. Through the process, the teachers demonstrated a significant positive attitude toward the willingness to meet their students at their levels of ability. They implemented strategies and used them effectively to help the students to make math gains. The teachers shared common goals and were outcome oriented. The teachers' positive attitudes were welcome in their classrooms and ultimately outweighed the factors and challenges that they faced.

Interviewee 1 explained:

> With our students we…we have done …we…we try to set our goals for them to reach" and he continues "... sometimes you have to dig in and make sure you have the students going on the right track I think that what DI will so beneficial to help us as teachers.

Interviewee 2 added:

> So we actually look at what their needs are …and… and some of them are more …you know ….you kind of got to know them as the school year progresses some

> kids are very visual learners, some are very tactile so they have different activities based on that …and sometimes I also teach a lesson in maybe three different ways… I may have a series of lecture for the auditory, and bunch of hands on activities. Now we are centered on the student we realized that students are very different you know you are not teaching class you are teaching students as individuals.

Interviewee 2 also argued:

> And if I am the teacher and have a student who is struggling with a specific skill I have to make sure that now I do whatever is necessary to ensure that the students master the skills before they leave my classroom because the next year they are not going to be academically successful because they did not have the skills the prerequisite that they needed it from my classroom in order to be successful in the next grade level.

The teachers in this study acknowledged that their students possessed different backgrounds, abilities, and challenges that resulted in diverse learning styles. The teachers responses reflected views similar to those of other researchers (e.g., Dunn & Dunn, 2008; Klingensmith, 2006; Landrum & Mcduffie, 2010; Pape, 2010), who described learning styles as the preferred ways in which students engage, learn, and understand concepts.

Discrepant Cases

According to (Hatch, 2002) discrepant data are inferred as evidence that contradicts what has been proposed in the research study findings. As a result, the data

analysis has to be recoded to ensure that all inconsistencies in categories and subcategories are being considered. In this study, I meticulously read, reread, and analyzed the data. I found some inconsistent responses in the findings and several discrepancies in the data sources in relation to the findings, as discussed next.

Survey Responses

Based upon the nature of the research questions and the participant teachers' survey and interview responses, I grouped the responses into two categories: The data-source findings supported the beliefs of how inclusion teachers implemented DI to improve students' outcomes in mathematics. Data that did not support the findings were determined to be discrepant data (Hatch, 2002).

All seven participant teachers completed the survey, and several discrepancies appeared during the analysis of the data. Five participant teachers agreed to teach math in 2009 and 2010. One participant teacher did not teach math in 2009 and 2010 but had service students with LDs and had used DI in the classroom. He/she explains:

> I had two helpers from the special education department in my room at all times. I always had students complete a pre-test to determine where they are starting off. Per that test, I would create packets for small groups of students for that lesson; which was very time consuming. I also had high school students come over three days a week to assist in the classroom. (Survey)

Another participant agreed to teach math in 2009 and 2010 but felt unprepared because of being a new teacher. Following are some of the DI strategies that a participant teacher used in the classroom:

> I used a lot of computer based games/programs for a few students since their interest was computers. One student loved comic books, so I created a story when he was working on word problems. A few students who had low self-esteem, I used to help "mentor" other students in the classroom that were struggling on a skill that they had already mastered. I tried to find that one thing the student would be interested in and form the lesson based on that. (Survey)

One of the criteria for this study was that all of the participant teachers had to be math teachers in 2009 and 2010, but because of the school setting, two participant teachers did not quite meet that guideline, as previously explained. However, both participant teachers demonstrated strong skills of DI implementation in their classrooms because of their positive attitudes and their willingness to meet their students' academic needs, regardless of the setting might be or the subject content.

Interview Responses

Several discrepancies were apparent in the participant teachers' interview responses that contrasted with the findings. Although some participant teachers felt that DI is the ultimate answer to improve students' academic achievement in math to make gains in the classroom and standardized assessments, some participant teachers did not agree. Although they knew that DI is an effective teaching tool, when I asked Interviewee 5, "Do you perceive DI can improve students standardized test scores enough to meet the AYP requirements?" the participant answered, "In actuality, I don't," asserting that students also need parental supports at home to reinforce what they are learning in school.

Another participant teacher explained that students were not always receptive to extra help and support. When referring to one particular student, the participant stated:

> He did not do…he didn't do too well even though we had extra help…I had extra help to make sure that I was able to help him uhm he just wasn't as receptive as the other ones. I think DI can be a very helpful instrument to help students learn but you must make sure they buy into that new strategy because with students today we have to approach them differently than the way I have learned.

DI can be implemented in two possible ways, namely, by developing instruction around students' own intelligences or their learning styles (Armstrong, 1999, 2000, 2002, 2003; Baum et al., 1999; Gardner, 1983, 1993; Landrum & Mcduffie, 2010). In this study, the participant teachers implemented these two suggested applications of DI. They were concerned that because not all students were receptive to DI, it may not have produced the same results across the board.

Patterns and Themes, Coding Analysis, and Literature Comparisons

This section illustrates the categories that emerged during the coding process and links them to the extant literature. The subheadings are the subcategories identified during the selective coding analysis. These subheadings are supported with survey responses and interview excerpts to demonstrate how themes emerged and justify how their relating categories relates to current research in the field of education.

Lack of Math Prior Knowledge

Each survey and interview response showed agreement that some students began school with a lack of math skills. Four of the seven participants explained that they were teaching math classes with students who had LDs in math.

This participant stated, "Abilities ranking from very low to high. Most of them were academically motivated, but had struggled in previous years."

Another participant stated, "There were 80% on grade level and the other 20% had varied abilities."

Another participant explained, "My class has students of various abilities 20% at the top 40% is at the intermediate level 40% at the lower level."

Interviewee 5 responded, "In my class, is the fact that I do have students on different grade levels."

The quotes supported the finding that the teachers were insightful that their students began school with insufficient math skills caused by many factors and challenges. Nonetheless, the teachers understood that regardless of the reasons for the students' poor performance in math, their ultimate goal was to find teaching approaches that could meet their students' academic needs, contrary to teachers who did not differentiate instruction to meet diverse student needs because of insufficient resources and time (Adlam, 2007; Finley, 2008; Tomlinson & McTighe, 2006). These teachers were willing to go above and beyond.

This participant stated:

> The bottom line you want kids to learn is not about if whether you just deliver the lesson but whether they really get it so DI is diff… differentiated instruction is really all about are you finding what their needs are so they are able to grasp a lesson and once you are able to get kids to know what they are supposed to learn of course you are going to see them succeed.

This participant suggested:

> Trying different things for as taking them back to a lower level and giving them instruction on the board and then let them come to the board to see and actually get to see what they are missing. The ultimate goal is for the child to understand is not just a matter of the teacher to put on the time in and say ok I deliver the lecture but did the student really understand so at the end of the day your concern is really did they learn what you were supposed to teach them …so I think it is great that teachers…because on my time when I was a student school there were no such things as DI.

As already mentioned, the participant teachers wanted to meet the academic needs of their students. As a result, they modified their lessons accordingly. The teachers also understood that the students with LDs tended to fall behind in their math classes (Hasselbring et al., 1988; Rosas & Campbell, 2010; Wagner, 1995; Ysseldyke et al., 2004); therefore, they were taking steps to prevent their students from falling behind.

Challenges of Low Motivation

Despite the willingness of these teachers to meet their students' academic needs in math, they also understood that the students were faced with challenges that led to their

low motivation. Thus, the teachers sought to find methods that would inspire the students to do better in their math classes. According to Marzano and Pickering (2004), students need to be exposed to more than one teaching approach because one teaching method will not reach all students. As a result, the teachers embarked various teaching modes with the belief that one ought to work. The survey responses indicated that these students had many challenges that exceeded the complexity of finding effective teaching tools to meet their academic needs. The following survey responses and interview excerpts explain.

One survey respondent stated, "Most of the students were challenges were adding/subtracting integers. Many mathematics principles were lacking."

This participant stated:

> If there is some information I think may be difficult or they… they have a difficult time to interpret what I would do I would use manipulative uhm … , I would use examples from the book , I would look up from the internet ,examples to try to make things easier even to go to YouTube. …I do a lot of one-on-one teaching looking over the shoulder to make sure… make sure they are on the right path of getting the math.

This participant explained:

> I try to remember that each student has a different modes of learning and I try to encourage all students to use as many as possible hoping that one…one of the modes we hit upon for example I tell them some students learn better by hearing information, some students learn better by reading information, some students by

> say it out loud I try to make them try all three during a lesson …they hear, see I try to use a variety of things hoping to help the students.

This participant commented:

> I had so many behavior issues to deal with on top of academic challenges. Students, due to his/her disability, were at different levels at all times. I had to teach the students more on a one-on-one level to cater to each students needs. (Survey)

This participant explained:

> There were behavior issues; however, I believe many of the behavior issues were to cover up what students did not know rather than to let on in class that they truly did not grasp the various concepts. (Survey)

This participant stated:

> One to one with student is best but quite difficult to do with behavior issues. (Survey)

This participant stated:

> Students who are having difficulty for whatever reasons sometimes is attention sometimes is to stay focus on what they are doing… or just moving around uhm uhm …they can't sit still so we allow …we allow them those students to get up walk around take a break or to try… to refocus themselves.

This participant explained:

> And you also have students who are late learners what I mean is that they cannot learn if they don't have the right teacher. You have to make sure you come up with the right strategies to meet the needs of these students so if you are good at

> doing that then you know there is greater chance that these students can become successful. (p.21)
>
> This participant commented:
>
> So that for me …that is just the biggest problem and then once those students get frustrated uhm… it is very hard to uhm …to pull them back as for to tell them well I realized that that it is frustrated I understand that it is difficult but you got to keep pushing through this to …you know to motivate them …keep push to actually learn the concept.

Most of the survey and interview responses revealed that the teachers were coping with the students' challenges in math and that they were implementing individualized activities based upon their students' academic needs to improve their learning abilities. Dunn and Dunn (2008) explained that when teachers use these methods and strategies, students become more motivated and produce better results in content areas and on state-required tests. Dunn and Dunn's explanation was relevant to this study.

Engagement

Throughout this study, engagement was a recurring theme of what fosters the teachers in this research study to implement the diverse activities in their classroom. For the purposes of this study, engagement referred to the ways that the teachers engaged with their students to encourage them to make gains in math achievement. Engagement also can reflect the way in which students can demonstrate their willingness to learn and show gains in their classroom and standardized assessments. In this study, the teachers

tended to assess their students' ability levels in order to create individualized activities for them.

This participant explained:

> It just means that you have… the thing about it…it means you have to go the extra miles you cannot just teach the class as a whole. You have to look at each student as individual you have to look at it as you are trying to meet the need of each student so if you are about meeting the needs of each students then you are going to make sure your lesson plan reflects that. You are going to make sure that your techniques …you are going to make sure that …everything that you do uhm involves uhm …making sure that you are teaching each student.

This participant commented:

> So instead of writing down stuff just the simple with some kids just the simple act of working with cards and seeing them before their eyes and really trying to manipulate the words it works for them. I guess the bottom line is to see where they learn well. Some kids they learn well when I ask them to draw stuff like can you draw to explain the word.

Interviewee 5 explained that she would engage her students by telling them stories to make math relevant to their everyday life routines:

> So I tell them the story every year of a student that I had when she was a first grader she asked her mom if she can have one dollar to go to the ice cream truck so her mom told her yes and go get one dollar from her purse well the little girl pick up a $100.00 bill instead of one dollar bill and she bought a $1.00 ice cream

and never get any change … and …so that is my first example to them every year how this girl gave away $99.00.

Gagnon and Maccini (n.d.) argued that experimental and validated instructional approaches are the most essential methods to teach students who have LDs.

Lack of Parental Involvement

Lack of parental involvement was intertwined with every aspect of consistency of strategies used effectively. One participant explained that parental involvement was the most essential element for any good learning strategy. Parental involvement was that important because the students needed to have the skills that they learned reinforced at home.

Interviewee 5 commented:

We can impact students in the way that they learn for example for those who learn k**inesthetic** we meet them at their needs for those who are visual learners we meet them at their needs for those are auditory we meet them at their needs but we also have to have the partnership of their parents because as a teacher. I can only impact them as much as the parents will support me.

If you the parent don't tell the child that it is important for them to learn this skill so much so you take out your time to make sure they are learning it regardless of I much I do they are still not going to mastery at a level to be successful.

In this study, the teachers offered after-school tutoring for students who were not performing at the same pace as their peers during instructional class activities. The

teachers were faced with the challenge of students not being able to stay after school for unknown reasons. The teachers were concerned that these parents were neither helping their children at home nor allowing them to take advantage of the after-school tutoring session. The survey data revealed significant low parental involvement.

One participant comments, "More parent involvement with students who needed additional assistance. Lack of reinforcement of skills at home. Only about 10% in this area." (Survey)

The teachers explained that the students received a lot of support and one-on-one accommodation in class, a support that most parents were offering to their children. An interview excerpt illustrated this point:

> we can do as much as we can as a teacher but ultimately but we…we have to have the parents piece where mom and dad say look baby I realized that it is hard, I know how you like going outside I know you don't like doing this, I know you don't like to read but as a parent you have to encourage that part because if you are at home and say well child that what you do in school I have something else to do. (P.x)
>
> …the kind of kids that we have they really need to be guided they really need to be supervised… (P.10)

Strategies Used Effectively

The teachers implemented many approaches to meet their students' academic needs. Survey responses and interview excerpts follow:

I used a lot of computer based games/programs for a few students since their interest was computers. One student loved comic books, so I created a story when he was working on word problems. A few students who had low self-esteem, I used to help "mentor" other students in the classroom that were struggling on a skill that they had already mastered. I tried to find that one thing the student would be interested in and form the lesson based on that. Again, VERY TIME CONSUMING. (Survey)

"I had made changes in my approach to a particular student to keep this student on grade level. I had to work one on one with him to ensure him that he could do the assigned task." (Survey)

Absolutely, the teaching strategies are varied. I realize that some students learn better when someone on their level explains. When I realized that a couple of students were struggling regardless of how often I explained, I resorted to cooperative peer teaching/learning. That was GREAT. (Survey)

"Yes. Visual aids for visual learners, using flashcards, charts, computer."

"Yes, this is done through think pair share with student of varying abilities." (Survey)

"Yes. I give students opportunities to work problems n the board. We allow them to work in small groups and/or with a partner." (Survey)

"Yes, the process of learning is done through actually working the problems; class presentations are also used; and students may even act out the problem illustrating the concept." (Survey)

"I was teaching expanded notation and four students needed additional assistance. I used a different strategy for the group but continued using the same one with the others." (Survey)

> Some students were NOT paper and pencil test takers. I would ask the students to come work out a couple of problems on the board and based on that, I would take a grade on how well they did working it out, if they had the right answer, and if they needed guidance in answering the problem. (Survey)
>
> Various manners of assessment are used. First, there is the traditional paper and pencil. In addition to that some tests are set up multiple choice [students still need to show their work], and lastly I allow buddy assignments to be demonstrated equally to the class. (Survey)

"My teaching strategies are modified by extended day tutoring; one-on-one assistance from the teacher; and having students design their own assessments." (Survey)

"I try teaching them slightly above their ability level to increase learning." (Survey)

"Reteach, reteach, reteach, review then retest." (Survey)

"At the beginning of each math lesson, some type of example is discussed in depth that requires students to have prior knowledge." (Survey)

"Brainstorming for knowledge of concept being taught. Introduce new concept as the problem of that given day to test for previous knowledge." (Survey)

"Problem modeling." (Survey)

"Used manipulatives for hands on activities to help students understand the mathematics concepts." (Survey)

This teacher participant explained:

> DI may help the standardized test, but I think sometimes is mostly the students that are challenged by the standardized test because they may not be good test takers. If DI can help them understand the skills of uhm … how to eliminate uhm…two of the answers strategy, yes it will. But as I work with students with standardized exams uhm… I try to show them that there are two answers that are nowhere near to the correct answer so I am trying to give them a fifty percent chance to get the right answer so if we have this skill of DI that we incorporate to eliminate the two answers t that nowhere near to the original nowhere near to the answer that they need yes it can help. Elimination.

This teacher participant stated:

> I think DI will identify the areas students really need to be supported in the area they really need help and …and once we can identify that area that they need the help then I think it will be an approach…and focus on giving them the right instructional needs to find out what kinds of students they are what kind of learners they are … are they kinesthetic… are they visual… are they hands once we can get those things identify I think the learning process for them will become more easier because now you can become a little more social …the word that I am looking for a little bit …more interactive with the students.

…well when you DI you make sure you really teaching the child not just delivering a lesson… (P.12)

This teacher participant explained, "Differentiated instruction makes the student pay more responsibility for their own learning because they looking at the fact that oh ok I am ready to move on."

These participant teachers not only demonstrated the importance of DI but also illustrated, explained, and articulated their interest for DI. These participant teachers understood that their students did not learn the same way and that their students had different interests. They also understood that their students were capable of learning as long as the material was presented in a way that made sense to them. Because of these concerns, the participant teachers created and developed lesson that their students could comprehend and yet be challenged by.

Interviewee 2 explained:

> Well, when you DI you make sure you really teaching the child not just delivering a lesson so the ultimate goal is for the child to understand is not just a matter of the teacher to put on the time in and say ok I deliver the lecture but did the student really understand so at the end of the day your concern is really did they learn what you were supposed to teach them.

These participant teachers were truly motivated and dedicated to teaching based upon their students' learning styles and abilities.

More Training

More training was intertwined with consistency of strategies used effectively. The teachers recognized the importance of attending staff developmental meeting, workshops, and in-service programs. The teachers met once a week after school to discuss the students' progress. As a group, the teachers shared strategies that they had found effective in their classrooms. They also developed strategies that the whole school could use to create a learning atmosphere among the student body. During the observation phase, I had the opportunity to attend one of the staff meetings. I was very impressed with the agenda. I also was amazed that the agenda was not dictated by time, but by accomplishment, such as discussing strategies, creating lessons, developing activities, and sharing ideas about strategies that could promote academic gain across the board. IN addition, many of the teachers had attended workshops or in-services about teaching strategies to improve their teaching skills.

Interviewee 5 explained:

> I had attended workshop from the school district, I had professional development from the charter school, and I had discussion in our faculty staff meeting about DI uhm…I also uhm had discussion with the ESE teachers and the ESE specialist about DI …uhm more specifically to find out ways on how to meet the academic needs of my students.

Interviewee 3 stated, "Yes, I have attended classes to learn about DI."

Interviewee 1 commented, “I attended 3 weeks of math instructional over at FGCU where we did different type of math for middle school students which help me sometimes with differentiated instruction (DI).”

Many of the interview responses indicated that the teachers had often attended workshops outside of their normal teaching hours to meet the needs of their students.

Outcome Oriented

The teachers shared the same motive, which was to help every student to make academic gains in math. During my visit at the school, I had the opportunity to see how the teachers interacted with their students. I had the privilege of witnessing the ways they demonstrated their willingness to meet each student’s academic needs.

A participant explained, “Most of the time what I do is that I try to find out the students weaknesses and work within that…many times we have such a diverse differences in students capabilities.”

Another teacher participant asserted, “Well …we…actually…we have resources that are very handy and helping us to differentiate instruction.”

Another teacher participant explained, “Because I have been teaching here for three years now so I know what activities kind of work with for certain kids.”

Another teacher participant argued, “It depends on the need of the students some students they really won’t get anything that you lecture to them unless they are doing it themselves.”

Another teacher participant explained, “I would say some of kids that I had initially a couple years who could not seat still to a 20 minutes lecture now they are able to do it now.”

Another teacher participant explained:

Well, there are different kinds of lessons if I am doing groups I try to provide (could not hear)…I have different level in the groups. Sometimes I let the kids help one another. Sometimes I adjust a general assignment I give to everyone I will adjust different expectation for the students.

Another teacher participant remarked:

I keep in mind the strengths and the weaknesses of my students I do have students who are ranged just at the fourth grade level and I uhm…also have students who do need a lot of on-on-one support , uhm…I have…as well as students who are way above the fourth grade level of course I have to create lesson that challenge all these students at the academic level that they are. Keeping this in mind I work to ensure that there are hands material available, manipulative, and uhm…additional time for these students who are may need assistance to learn a specific concept. I do look at where they are academically before I begin a new concept so say for instance if I have a student who and still working on learning all the multiplication facts I know they will gradually and continue to use the multiplication charts uhm in order to work on division because those students need uhm …additional supports uhm…those students uhm…I know who have mastered their multiplication facts uhm… of course they can then uhm… be

> taught on grade level uhm… or look at grade level experiment and then they may need some supports but not as much uhm …then there those students uhm…who get it the first time you present the lesson without even going through much of explanation so those students to be challenged in more difficult kind of problems or even higher order think skills of problems sometimes they may be used as an assistant to help other students who are struggling still.

These participant teachers clearly demonstrated their unity in being outcome oriented. As a group they strived to create and provide activities that are diversify based on the students' academic needs. They fostered a learning environment that encouraged their students to believe that they were capable of learning. The students may have needed to use manipulatives, arrange one-on-one learning to reinforce concepts, or participate in after-school tutoring to practice their skills, but the reality is that whatever they needed in support, their teachers were more than willing to provide it.

Evidence of Quality

I explored ways in which my qualitative research could help to support the current available research by performing open, axial, and selective coding; triangulation; and member checking, as based upon the theoretical framework of Mills (2003), who described "validity as a test of whether the data we collect accurately gauges what we are trying to measure" (p. 96). I also established the relevance of this qualitative study. Charmaz (2005) recommended revisiting the original criteria established by Glaser and Strauss (1967) to evaluate grounded theory studies. The original criteria included fitness,

workability, relevance, and modifiability. In order to understand the evaluation criteria, Charmaz asserted:

> Theory must fit the empirical world it purports to analyze, provide a workable understanding and explanation of this world, address problems and processes in it, and allow for variation and change that make the core theory useful over time. The criterion of modifiability allows for refinements of the theory that simultaneously make it more precise and enduring. (p. 526)

Charmez also noted the importance of additional criteria (i.e., credibility, originality, resonance, and usefulness) to evaluate social justice studies.

Creswell (1998) added that "validity…is seen as strength of qualitative research, but it is used to suggest determining whether the findings are accurate from the standpoint of the researcher, the participant, or the readers" (p. 195). By interviewing the inclusion math teachers about their perceptions of using or not using DI in their classrooms, I gave them a voice that had been lacking. Before any curriculum changes in the methods used to teach inclusion math are made, the instructors need to be involved and consulted.

This study aligned with the research conducted by Mills (2003), who described the criteria ensuring the trustworthiness of a qualitative research. The first is descriptive trustworthiness, also known as factual accuracy. It is an essential piece of any qualitative study explanation and was an important part of this study. As a member of the learning community being studied, I explored the teachers' actual experiences concerning inclusion math. The second criterion is interpretative trustworthiness, or concern for the

participants' perceptions about the study. I gave the teachers the opportunity to share those perceptions. The third is theoretical trustworthiness, which allowed me to be confident in presenting the findings of the phenomenon in the study. The fourth is internal generalization, which was associated with the math curriculum for students with LDs in the inclusive math classroom. The fifth criterion is evaluative trustworthiness, which requires the presentation of unevaluated data. I explored the perceptions of a select group not usually represented in the research.

I used markers of internal trustworthiness in this study because I was dealing with the question of (Merriam & Associates, 2002) "how research findings match reality….Do the findings capture what is really there? Are investigators observing or measuring what they think they are measuring?"(p. 201). During the internal trustworthiness process, if more than one type of data is authentic, then the findings have to be reevaluated. I use triangulation and member checks to establish internal trustworthiness. I also verified my findings by collecting various forms of data that could be compared and contrasted to confirm or substantiate themes and categories (Merriam & Associates, 2002). Creswell (2003) defined triangulation as the examination step to evaluate data in order to develop themes. The two sources of the data that I collected were responses to a survey and an interview. The interview responses allow the initial themes that emerged during the survey responses to be verified or refuted.

During this process, the participants also reviewed my interpretations of the survey and interview responses with me. Creswell (2007) explained that member checking is conducted to obtain feedback from the participants about the relevance and

accuracy of the tentative findings. Creswell also characterized member checking as a tool to establish the correctness of the themes. I allowed the participants to access my interpretation of their responses. Analysis of the interview responses was sent back to the participants for review. The participants shared feedback to ensure that I had accurately represented their viewpoints.

My research study was open to member checking to facilitate the validation of the accounts and to ensure authenticity (Creswell, 2003). I shared and asked for feedback about my interpretation of the results with the participants. My dissertation committee also reviewed the study to provide input and to question the findings. Receiving feedback from the participants ensured that I accurately reflected the perceptions of the inclusion teachers who teach math to students with LDs.

Summary of Findings

Section 4 provided a description of the sample; an explanation of how the data were collected, documented, and analyzed; and a discussion of the results. A detailed description of the themes that emerged from the analysis also was presented. The findings related major categories to explain how the inclusion math teachers implemented DI to improve students' outcomes in mathematics. Themes and categories reflecting how the participant teachers' implementation of DI may have impacted students' outcomes in mathematics were identified. Five initial themes were identified based upon the survey responses: low level of math, behavior issues challenges, teaching tools, DI, and lack of parental involvement.

Based upon the five participant teachers' interview responses, during the open coding data analysis, three themes were identified: consistency, outcome oriented, and shared vision. The axial coding data analysis identified eight central categories and corresponding subcategories. The first central category was strategies used effectively; the subcategories were teaching strategies, learning styles, and diverse teaching approaches. The second central category was engagement, followed by the subcategories of higher lever thinking skills, manipulatives, and related stories. The third category was challenges of low motivation, followed by the subcategories of additional time, behavior issues, retainers, and late learners. The fourth category was low parental involvement. The fifth category was low engagement. The sixth central category was more training. The seventh category was influence of peer work. The eighth category was lack of prior knowledge about math.

As revealed during the selective coding process, the core category that emerged was consistency of strategies use effectively. The affiliated subcategories that were used as building blocks were lack of math prior knowledge, challenges of low motivation, engagement, lack of parental involvement, strategies used effectively, more training, and outcome oriented. The subcategories were presented as related statements of correlated concepts regarding the participants' existing experience with consistency of strategies use effectively among the survey and the interview responses. The concepts were grounded in the data via survey questions and interview responses that supported the emerging themes.

Mazzini and Morselli (2006) argued that it is essential that teachers of mathematics accommodate all types of learners, especially because mathematics is an important subject that is linked to many career choices. I discovered through the coding process the type of strategies that the teachers used in their classrooms to meet the needs of all type of learners. The teachers exemplified the importance of implementing diverse teaching modes because students learn differently. As Marzano and Pickering (2004) stated, applying just one teaching practice to all instruction will not reach all students. A differentiated blend of teaching and learning practices should be in place.

When students with LDs in math receive instruction based upon their learning styles and abilities, they are capable of learning. Therefore, based upon the results, it is reasonable to suggest that inclusion math teachers with students who are underperforming might benefit by implementing DI into their lessons. This might help students with LDs in math make gains in their classroom assessments and standardized tests, thus contributing to their academic achievement.

Section 5 provides an overview, analysis, and interpretation of the findings; a discussion of the implications of the findings; recommendations for action and further study; reflections of my experiences in the research study process; and a concluding statement.

Section 5: Summary, Recommendations, and Conclusions

Introduction

This study explored teachers perceptions of the effectiveness of differentiated instruction (DI) practices inclusion teachers were using to promote math academic achievement as an educational intervention for underperforming students with learning disabilities (LDs) in inclusion math classrooms. The exploration of how teachers perceive the instructional techniques or the underlying theories on which they base their instruction could relate to how successful their students are in the classroom. The key findings suggest teachers become more effective when they work as a team, when they attend educational workshop, and they share their ideas. As a group they can design DI strategies that are fundamentally based on students learning styles, intelligences, and interests.

Overview Interpretation of Findings

The purpose of this research study was to describe how DI practices were used by inclusion math teachers to promote the math academic achievement of underperforming students with LDs in their classrooms. The theoretical proposition anticipated that DI will allow teachers to effectively assist all classroom learners with diverse range of needs that include differences in developmental levels and different intelligences, abilities, or learning styles as argued some researchers (Tomlinson & McTighe, 2006; Landrum & Mcduffie, 2010). The central research question for this study asked what perceptions teachers who teach math in an inclusion setting have about the use of DI in their inclusive mathematics classes as evidenced by completing the survey questions and going through

the interview sessions. The Key finding of this research study indicated that DI is an effective instructional that can help students with learning disabilities make academic improvement in math. Overall, the participants indicated that DI the implementation of DI can be a challenge for educators because it requires planning and correlation of students' learning styles and learning profiles into the lesson. However, they explained that it is worth putting the extra planning times if it allows students to master the math concept.

The interpretation of these findings is presented in relation to the conceptual framework and the literature review. The conceptual framework for this research study was based on a model of differentiated instruction (DI). Differentiated instruction as a model relies on teachers to effectively assist all classroom learners with diverse range of needs, abilities, or learning styles (Tomlinson & McTighe, 2006; Landrum & Mcduffie, 2010). These researchers argued that DI challenge students at their own ability level while providing them with support structures to help them achieve (Armstrong, 1999, 2000, 2002, 2003; Baum et al., 1999; Impecoven-Lind & Foegen, 2010). These researchers have asserted that DI can address the underperformance of students with LDs in math. Researchers (Beattie, Jordan, & Algozzine, 2006; Friend & Bursuck, 2008) have agreed that DI has the capability to allow students with LDs to better understand their math classes.

Open, axial, and selective coding was used (Merriam & Associates, 1998; Yin, 2009) to display the significant findings of the survey and the interview results about the math teachers' perceptions of the effectiveness of DI with students with LDs in inclusion

math classes. Theories about the types of instructional practices that are effective in helping students learn, and why, will be presented from the teachers' viewpoints.

Themes and Conceptual Categories

The summary includes a discussion of the ways in which the themes informed the study questions and substantiated the findings of previous studies. Themes and categories are identified that reflect how the participant teachers implemented DI and how this implementation may have impacted students' outcomes in mathematics.

This qualitative study was guided by one research question and three subquestions:

1. What perceptions do teachers who teach math in an inclusion setting have about the use of DI in their inclusive mathematics classes?

a) What criteria do teachers use to differentiate instruction in an inclusion math class, and why?

b) What are the most and least prevalent methods of differentiating instruction among teachers who teach math in an inclusion setting, and why?

c) What examples are provided by teachers regarding strategies to improve students understanding of mathematics, and why?

Conclusions

The core category that emerged during the selective coding was the consistency of strategies used effectively with the affiliated subcategories (lack of math Prior knowledge, challenges of low motivation, engagement, lack of parental involvement, strategies used effectively, more training, and outcomes oriented).

Regarding the subcategory lack of math prior knowledge, the teachers were insightful and understood that some of their students may have begun school with insufficient math skills. They also were aware that because the students with LDs tended to fall behind in their math classes (Hasselbring et al., 1988; Rosa & Campbell, 2010; Wagner, 1995; Ysseldyke et al., 2004), they implemented DI into their math lessons. They created activities based upon the students learning styles and abilities, as Berch and Mazzocco (2007) explained, because many students had difficulty learning mathematics, so it was critical to differentiate instruction to ensure success for all students.

The participant teachers were determined to reach all of their underperforming students, even though DI takes a lot of time and a lot more resources (Adlam, 2007; Finley, 2008; Tomlinson & McTighe, 2006). The data analysis indicated that the participant teachers had an internal desire or inspiration to want to help their students with LDs to achieve in math. They created DI activities that helped the students to relate the material to their own lives. Even though the process required them to devote time outside of the classroom, they made it happen because they cared.

The participant teachers shared views similar to those of Tomlinson and McTighe (2006) in terms of implementing DI to meet the needs of their students. Tomlinson and McTighe characterized DI as the foundation on which to plan for diverse learners. These researchers argued that DI is an instructional tool with a "primary goal of ensuring that teachers focus on processes and procedures that ensure effective learning for varied individuals" (p. 3). The teachers adhered to this concept.

Researchers have asserted that students with LDs in math often lack conceptual, procedural, and abstract thinking skills (Gersten et al., 2009; Hasselbring Lott, & Zydney, 2006; Templeton, Neel, & Blood, 2008; Swerling, 2005) and may lack the ability to learn at the same pace as their peers in regular educational math classes (Lambie & Milson, 2010; Rosas & Campbell, 2010; Woodward & Baxter, 1997; Ysseldyke et al., 2004). The students' insufficient skills added to their low motivation challenges. Table 2 shows that 50% of the participant teachers who completed the survey agreed that their students had low motivation in math, which could have accounted for the challenges in how they learned math concepts. All of the participant teachers agreed that having or lacking background skills in math is a contributing factor to how students learn math concepts.

Table 2

Students' insufficient skills added to their low motivation challenges.

Answer options	Response percent	Response count
(A).Learning styles	83.3%	5
(B). Insufficient opportunities to practice	50.0%	3
(C) Level of development of self-concept in math	66.7%	4
(D). Background skills in mathematics	100.0%	6
(E). Low motivation in mathematics	50.0%	3
(F). Different intelligences	50.0%	3
(G). Fear of math	33.3%	2
(H). Poor attitude toward math	66.7%	4
(I). Lack of accommodations or interventions	0.0%	0
(J). Participant chose not to answer	0.0%	0
answered question		6
skipped question		1

The subcategory challenges of low motivation revealed that the teachers were coping with the students' challenges in math and had begun to implement individualized activities based upon their students' academic needs. Dunn and Dunn (2008) argued that

when teachers use DI strategies, students are motivated and produce better results on content areas and state-required tests.

Gagnon and Maccini (n.d.) explained that experimental and validated instructional approaches are the most essential methods to teach students who have LDs. The subcategory Engagement showed that most of the survey and interview responses indicated that the participant teachers believed in and used teaching strategies that engaged their students. They believed in creating math activities that encouraged students to learn. As a result, they implemented DI strategies based upon their students' interests.

Participant 5 explained that she engaged her students by telling them stories to make math relevant to their everyday life routine:

> So I tell them the story every year of a student that I had when she was a first grader she asked her mom if she can have one dollar to go to the ice cream truck so her mom told her yes and go get one dollar from her purse well the little girl pick up a $100 .00 bill instead of one dollar bill and she bought a $1.00 ice cream and never get any change … and …so that is my first example to them every year how this girl gave away $99.00.

Some researchers have concluded that when DI is implemented based upon different instructional approaches, students' interest in math and their math achievement increase (Armstrong, 2002, 2003; Baum et al., 2005; Kane, Walker, & Schmidt, 2011; Lopez & Schroeder, 2008; Nelson, 1999). In addition, the NCTM (2000, 2006) asserted that math achievement is an essential life skill. To foster the mathematical achievement of all students, guidelines must be in place to more effectively teach students, including

ways to link the learning of mathematics to real-world experiences, which is a much more effective way than rules and formula memorization to teach math skills (NCTM, 2000, 2006; Stone, 2007) and engage students.

The subcategory lack of parental involvement showed that the teachers agreed that they needed the parents to be more involved with their children academically. One participant considered parental involvement the most essential element of any good learning strategy because students need the skills that they have learned at school to be reinforced at home.

Participant 5 explained:

> We can impact students in the way that they learn for example for those who learn **kinesthetic** we meet them at their needs for those who are visual learners we meet them at their needs for those are auditory we meet them at their needs but we also have to have the partnership of their parents because as a teacher. I can only impact them as much as the parents will support me.

The participant teachers understood that they could not force parents to be involved; however, they could create activities to reinforce the learning skills that the students were struggling with. For example, the school provided after-school tutoring for students who could stay after school, and some teachers worked individually during lunch with students who were unable to attend the after-school tutoring.

The subcategory strategies used effectively revealed that the participant teachers were tailoring their lessons according to their students' learning abilities. The teachers implemented only activities that provided benefits to the students. Many researchers (e.g.,

Armstrong, 2002, 2003; Baum et al., 2005; Lopez & Schroeder, 2008; Nelson, 1999) have argued that teachers are more inclined to use traditional, whole-class teaching methods during instructional time rather than diverse approaches for a number of reasons, including lack of resources and the amount of time required to integrate DI into lesson plans (Adlam, 2007; Finley, 2008; Tomlinson & McTighe, 2006). It is a time-consuming effort to implement DI, so many teachers resist using DI. However, Beauchaine (2009), similar to the participant teachers, supported the use of DI as a way to help underperforming math students make gains and change their attitudes about learning math. Table 3 shows that 50% of the participant teachers responded "OK" to how effective DI was in their classrooms; 33.3% participant teachers answered with "Well."

Table 3

Teachers supported the use of DI as a way to help underperforming math students.

Answer options	Response percent	Response count
(1). Not well	0.0%	0
(2). Somewhat	0.0%	0
(3). Don't know	16.7%	1
(4) OK	50.0%	3
(5) Well	33.3%	2
(6) Not answered	0.0%	0
answered question		6
skipped question		1

The subcategory more training revealed that the participants attended a workshop or an in-service about DI. The participant teachers also attended weekly staff professional meetings to analyze and assess ways that they could create meaningful math activities for their students. According to the interview responses, four of the five participant teachers had attended a DI workshop. One participant teacher explained, "I attended 3 weeks of

math instructional over at Florida Golf Coast University (FGCU) where we did different type of math for middle school students which helped me sometimes with differentiated instruction."

Interviewee 5 explained:

> I had attended workshop from the school district, I had professional development from the charter school, and I had discussion in our faculty staff meeting about DI uhm…I also, uhm, had discussion with the ESE teachers and the ESE specialist about DI …uhm, more specifically to find out ways on how to meet the academic needs of my students.

As a group, the teachers shared strategies that they found effective in their classrooms. They also developed strategies that the whole school could use to create a climate of unity among the student body.

The subcategory outcome oriented revealed that the participant teachers orchestrated their teaching skills as a group to create a DI learning environment. The participant teachers shared the same vision, which was academic gain in math by every student. During my visits to the school, I witnessed the dedication that these teachers devoted to their students. They provided one-on-one instruction, they stayed after school to reteach lessons, and they met once a week as a group to assess their students' progress. I also attended a staff meeting during the study. It was evident during the staff meeting that time was not a concern for the teachers. The meeting was not completed until everyone was fully satisfied with their assessments for their students.

The participant teachers also shared and compared DI strategies with their colleagues. They created a learning environment that encouraged students to believe that they deserved to learn because they were capable of learning. Regardless of what their needs were, the most essential element was that the teachers were always available. Some researchers have suggested that teachers have problems implementing nontraditional instructional strategies because they were taught in a traditional manner, not a diverse instructional approach (Armstrong, 2002, 2003; Baum et al., 2005; Lopez & Schroeder, 2008; Nelson, 1999). The participant teachers recognized that they were taught differently when they were in school, but they chose to use DI to teach their lessons because they understood that students learn differently.

One teacher explained:

> You know, there is no separation of kids like when I was in school they had special class and those kids would be there all day but today we have to do or I do a lot of one-on-one teaching looking over the shoulder to make sure… make sure they are on the right path of getting the math assessment … ….reteaching reteaching , reteaching is what I have been doing.

This participant teacher added, "I think it is great that teachers…because on my time when I was a student school there were no such things as DI." This participant teacher also explained how she met her students' academic needs by commenting that "one of the things that I do of course is going though their data to find out the level of my students, then I adjust the curriculum …adjust the curriculum to meet their needs." Table 4 show how the seven participant teachers responded when asked how they perceived

that their students learned math concepts. Five (83) participant teachers declared that their students learned math concepts based upon their learning styles.

Table 4

Participant teachers used observation and preassessment to DI instruction.

	Answer options	Response percent	Response count
1.	Learning styles	83.3%	5
2.	Insufficient opportunities to practice	50.0%	3
3.	Level of development of self-concept in math	66.7%	4
4.	Background skills in mathematics	100.0%	6
5.	Low motivation in mathematics	50.0%	3
6.	Different intelligences	50.0%	3
7.	Fear of math	33.3%	2
8.	Poor attitude toward math	66.7%	4
9.	Lack of accommodations or interventions	0.0%	0
10.	Participant chose not to answer	0.0%	0
	answered question		6
	skipped question		1

The argument (Armstrong, 2002, 2003; Baum et al., 2005; Lopez & Schroeder, 2008; Nelson, 1999) that teachers were taught in a traditional manner therefore have difficulty implementing nontraditional instructional strategies is not the case for the participant teachers in this research study. The participant teachers recognized that they were taught differently when they were in school, but they chose to use DI to teach their lessons because they understood that students learn differently. In other words, teachers interpret innovative strategies through their preexisting perceptions of instruction were not applicable for the participant teachers in this research study according to Table 5. The figures in Table 5 display six (100) participant teachers used observation and preassessment to DI instruction in their math classes.

Table5

Implementation of DI to Improve Students' Outcomes in Mathematics

	Answer options	Response percent	Response count
1.	observation	100.0%	6
2.	interest surveys	33.3%	2
3.	parental information	33.3%	2
4.	Individual education plan (IEP) math goals	83.3%	5
5.	Preassessments	100.0%	6
6.	Personal interviews	33.3%	2
7.	Examining cumulative records	50.0%	3
8.	Interviews with previous teachers	33.3%	2
9.	Interviews with case managers of IEP	0.0%	0
10.	Participant chose not to answer	0.0%	0
	answered question		6
	skipped question		1

Implications for Social Change

The positive social impact of this research study lies in its identification of instructional practices that allow all students to achieve better results in mathematics. It not only provides inclusion math teachers and administrators with a framework to use DI to provide support to LDs students in math for academic achievement but also allows teachers to work as a group to discuss DI and to share strategies about DI to create and foster a learning atmosphere that encourages students to ask for help if they need it. This also may help math students with LDs to make gains in classroom and standardized assessments, an outcome that can contribute to their academic achievement.

In addition, this research study may provide teachers with ideas to develop diverse approaches to accommodate students who may need extra support. The study also may provide teachers with the resources and strategies to support and shape the

perceptions that students with LDs have about themselves, their peers, their education, and the world. Parents and community members can benefit from the findings derived from this study by working not only with teachers and administrators but also with their children to reinforce learning concepts.

Recommendations for Action

The findings will contribute to the extant body of knowledge. Teachers, administrators, policymakers, and parents also can benefit from the findings. The participant teachers mentioned that they had too many students in their classes, a situation that impacted their ability to differentiate their lessons. Sometimes, they could not provide one-on-one instruction to students.

One participant teacher explained, "We have such a diverse difference in students' capabilities until it is very and really difficult to implement because I am only one person class."

One participant teacher said:

> It is hard to actually do different lessons do or different approaches simultaneously…because I am the only one in the classroom so it is very hard …so I try to teach the lesson in different ways….teach the same materials in different ways.

Another participant teacher argued even when there were two teachers in the classroom, challenges still occurred. She explained that these teachers sometimes do not communicate well:

> In most classes of special education students there two teachers I found the biggest weakness is the inability to communicate well with the person that I am working with sometimes it is hard to get on the same page implementing strategies when another teacher has a different idea.

I believe that the teachers needed more support and resources from administrators and policymakers as well as other teachers to develop better approaches to meet these demands. The need to focus entirely on academic performance for students with LDs in math, teachers and administrators can design lessons and curriculum based on DI that are relevant on students intelligences, learning abilities, and learning styles; in which the students would be able to explore, experiment, and solve math problems independently or in group settings.

Some participant teachers also expressed concern about the lack of technology in the classroom and the lack of knowledge about ways to link technology to math lessons. During my observation, I noticed that the classrooms were not equipped technologically and students were not allowed to use calculators. The participant teachers also stated that they could benefit from more professional-development classes so that they could improve their own technology skills for their math classes. They mentioned that if they had more computers in the classroom, they could assign the students to do more independent work such as projects. Providing workshops and educational programs focused on technology could help these participant teachers to shape and enrich their awareness of designing creative math projects and create a learning environment aligned with real-world application.

The participant teachers mentioned that parental involvement was essential for a positive learning process because the parents could reinforce learned skills at home. The home environment should be an extension of the learning process at school and should reflect or reinforce what the students are learning. The participant teachers could create project that required parental involvement while the school could provide classes or seminars to inform the parents about the skills. A monthly or bimonthly newsletter could open a line of communication between parents and teachers. In addition, teachers, administrators, and policymakers might be able to engage in regular discussions to maintain connections with students who might have LDs in math by keeping current with various teaching strategies.

Recommendations for Further Study

The purpose of this research study was to explore which DI practices inclusion teachers were using to promote the math academic achievement for underperforming students with LDs in inclusion math classrooms. The sample comprised seven inclusion math teachers across grade levels in an urban school district in a southeastern state. Further research can be conducted on this topic involving a larger sample. The participants could be from other charter schools or from middle school and high school environments of public schools to determine whether there might be a difference in teachers' perceptions of how the implementation of DI can improve students' outcomes in mathematics. Further research also can be conducted to examine the types of DI that other teachers might be using in their math classes to meet the academic needs of students with LDs.

This study focused on the analysis of the survey and interview responses from the participant teachers, but future studies could be conducted to investigate how students with LDs in math perform in classroom assessments and standardized test by comparing previous year with current year test scores data. Other studies could be conducted to investigate which DI strategies are more effective with students with LDs in math. Some of the participant teachers expressed concern about not having computers in their math classrooms; therefore, I would recommend investigating the impact of having computers in a math classroom with students with LDs.

Researcher's Reflection

Conducting this research study was a valuable experience. I went into this research process not knowing what the outcomes would be. This process had allowed me to learn more about DI strategies and the various approaches to instruct students in math classrooms that serve student with LDs. Although I have been teaching for a few years myself, the participant teachers reminded me of the true purpose of teaching. During my observation, I witnessed these teachers going above and beyond their teaching duties to implement DI. The interview responses conveyed an overall positive attitude shared by all of the participant teachers. Their lessons and the learning activities reflected the same attitude.

My perspectives about DI strategies have changed. I learned that DI strategies are being implemented by many teachers and that students are making academic gains because of the introduction of DI strategies in the classroom. I learned that teachers are using DI, even though it requires additional time to plan activities. I also learned that it

possible to create a DI learning environment that supports and encourages students to take ownership of their education. This study helped me to understand that developing workshops and providing in-services and seminars for inclusion math teachers may be a valuable approach to help them learn how to create lessons using DI strategies that are based upon students' multiple intelligences, learning abilities, and learning styles in an effort to motivate them to challenge themselves in their math classes.

Summary of the Findings

The participant teachers demonstrated their willingness to use DI strategies in their math classes to meet their students' academic needs. They explained the types of DI practices that they used to meet these needs. They also elaborated on the lack of parental involvement as well as the technological concerns that they faced. Despite these challenges, the participant teachers remained confident that their students were capable of learning math concepts. These teachers provided one-on-one instruction, they encouraged peer assistance, they worked with students during their lunch break, and they stayed after school to provide tutoring services.

Teaching students with LDs in inclusion math classes may be daunting, but ensuring that these students had the opportunity to learn math with their peers was a very significant goal for the participant teachers. As result, they attend workshops, in-services, and seminars to learn the necessary DI strategies. They also met weekly to assess as a group their students' progress. In these meetings, they evaluated the DI strategies that they found effective for their setting and made improvements to those that were not as effective.

These participant teachers worked as a team to develop consistent strategies that were used effectively and were outcome oriented. This study can be a good tool for similar settings that may need to understand how DI is being implemented or how effective it is. It also may be used as a model for other inclusion teachers looking to promote the academic achievement in math of underperforming students with LDs.

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Appendix A: Survey

April 5, 2011

Dear Teacher:

You are invited to take part in a research study that explores which instructional practices inclusion teachers are using in their classrooms.

This research study is being conducted by Juniace Senecharles, a doctoral student at Walden University. The researcher also is a teacher at Palmetto Ridge High School.

Please take a few minutes to answer the survey questions online at http://www.surveymonkey.com/s/9MSTRLM, or you can complete the hard copy provided. Place your completed survey in the enclosed envelope. Postage on the return envelope is already paid.

I value your time and your opinion, and thank you in advance for your participation. If you have any questions, please feel free to contact me..

Sincerely,

Juniace Senecharles

Please answer all of the following questions. You may decline to answer any questions that you feel are too personal.

1. What was your mathematics classroom like last year (2009-2010) in terms of the diversity of your students' learning styles? Please describe the composition of your classes in term of numbers and abilities in 25 words or less (academic, cultural, linguistic, economic and motivational diversity of the students in your math classes).
2. How successful do you perceive you were in the 2009-2010 math classes in helping the students to meet the required standards in math?
3. What do you perceive were the challenges in your math classes?
4. What specific teaching strategies did you use in your math classes that you felt were successful in furthering your students' understanding of math?
5. Do you ever vary the teaching strategies based on the needs of different groups of students in your math classes? Please give an example.
6. Do you ever vary the teaching strategies in which you allow different groups of students to learn the same content (i.e., the process of learning)? Please give an example.
7. Do you ever vary the assessment strategies in the way you assess student knowledge (i.e., variable assessment)? Please give an example.
8. How do you modify your teaching strategies to accommodate students who do not meet standards in math?
9. Describe the teaching strategies you use to assess the prior knowledge of your students before teaching them math concepts.

10. Check the methods that you use to differentiate your instruction to meet your students' academic needs in your math classes. If you decide not to answer this question, please choose Option J.

A. Observation

B. interest surveys

C. Parental information

D. Individual education plan (IEP) math goals

E. Preassessments

F. Personal interviews

G. Examination of cumulative records

H. Interviews with previous teachers

I. Interviews with case managers of IEP

J. Participant chose not to answer

11. From the list below, please circle the 5 choices that you perceive account for most or the majority of differences in how your students learn math concepts. If you decide not to answer this question, please choose Option J.

A. Learning styles

B. Insufficient opportunities to practice

C. Level of development of self-concept in math

D. Background skills in mathematics

E. Low motivation in mathematics

F. Different intelligences

G. Fear of math

H. Poor attitude toward math

I. Lack of accommodations or interventions

J. Participant chose not to answer

12. How well do you think you differentiate instruction in your math classes?

1	2	3	4	5	6
Not well	Somewhat	Don't know	OK	Well	Not answered

13. How much do you think your management skills affect your ability to effectively differentiate instruction in your math classes?

1	2	3	4	5	6
Not much	A little	Don't know	Some	A lot	Not answered

14. What role does time to plan affects your ability to effectively differentiate instruction in your math classes?

1	2	3	4	5	6
Not much	A little	Don't know	Some	A lot	Not answered

15. From the list below, please circle the DI strategies that you use in your math classes. If you decide not to answer this question, please choose Option 8.

1. I use debates and class discussions.

2. I use music while students are working math problems.

3. I use manipulatives in lessons to demonstrate a math concept.

4. I use manipulatives in lessons to allow students to explore math concepts.

5. I use a math diary to allow students reflecting on their learning experiences.

6. I use cooperative group work in my classroom.

7. I assign group project to my students.

8. Participant chose not to answer.

16. I use my students' previous year math test scores to guide the planning of my math lessons. You may decide to answer this question or not. If you decide not to answer this question, please choose Option 6.

1	2	3	4	5	6
Always	Usually	Half the time	Seldom	Never	Not answered

Some of these questions were adapted from *Differentiating Instruction* by Tomlinson (2003) and *Integrating: Differentiated Instruction and Understanding by Design* (Tomlinson & McTighe, 2006).

Appendix B: Interview Questions

1. Please describe for me the steps that you followed when implementing DI in your class (i.e., previous attendance at workshops or in-service professional development, sharing information with colleagues about DI.
2. How do plan your lesson with DI?
3. In terms of the learning process of students with learning disabilities, what specific DI strategies do you use to help them access the math curriculum?
4. What are the strengths and the weaknesses of DI in your classroom setting, and what steps have you taken to improve the weaker aspects, if any, of DI?
5. In what ways do you think that DI can address students' academic needs and impact student achievement?

Appendix C: Consent Form

You are invited to take part in a research study that explores which instructional practices inclusion teachers are using in their classrooms.

You were chosen for the research study because you are teaching math in an inclusive setting. This form is part of a process called "informed consent" to allow you to understand this study before deciding whether to take part.

This research study is being conducted by a researcher named Juniace Senecharles, who is a doctoral student at Walden University. The researcher is also a teacher at School Palmetto Ridge High School.

Background Information:
The purpose of this research study is to explore which instructional practices inclusion teachers are using to promote math academic achievement for the underperforming students with learning disabilities (LDs) in inclusive math classrooms.
.

Procedures:
If you agree to be in this research study, you will be asked to:

- Complete a survey.
- Be interviewed and have the interview audiotaped.

Voluntary Nature of the Study:
Your participation in this research study is voluntary. This means that everyone will respect your decision of whether or not you want to be in the research study. If you decide to join the research study now, you can still change your mind during the research study. If you feel stressed during the research study you may stop at any time. You may skip any questions that you feel are too personal.

Risks and Benefits of Being in the Study:
A potential risk of this research study might be psychological discomfort or anxiety during the research procedures. Possible benefits include insights and professional growth in the area of developing differentiated strategies to promote math academic achievement for underperforming students with learning disabilities (LDs) in inclusion math classrooms.

Compensation:
You will receive no compensation for participating in the study.

Confidentiality:
Any information you provide will be kept confidential. The researcher will not use your information for any purposes outside of this research project. Also, the researcher will not include your name or anything else that could identify you in any reports of the study.

Contacts and Questions:
You may ask any questions you have now. Or if you have questions later, you may contact the researcher via (researcher's phone number and email address). If you want to talk privately about your rights as a participant, you may University representative who can discuss this with you. The phone number is 1-800-925-3368, extension 1210. Walden University's approval number for this study is 04-25-11-0079497 and it expires on April 24, 2012

The researcher will give you a copy of this form to keep.

Statement of Consent:

I have read the above information and I feel I understand the study well enough to make a decision about my involvement. By signing below, I am agreeing to the terms described above.

Printed Name of Participant

Date of consent

Participant's Written or Electronic* Signature

Researcher's Written or Electronic* Signature Juniace Senecharles

Electronic signatures are regulated by the Uniform Electronic Transactions Act. Legally, an "electronic signature" can be the person's typed name, their email address, or any other identifying marker. An electronic signature is just as valid as a written signature as long as both parties have agreed to conduct the transaction electronically.

Appendix D: Letter of Cooperation

October 22, 2010
Dear Dr.

My name is Juniace Senecharles, and I am a doctoral student in the School of Teacher Leadership at Walden University. I am preparing to conduct a research study to explore which instructional practices inclusion teachers are using to promote math academic achievement for the underperforming students with learning disabilities (LDs) in inclusive math classrooms.

I am requesting permission to conduct this research study at your school site (Lee Charter Academy). The participants for my research study will be the inclusive math teachers. I will administer a survey and conduct interviews. I will use a grounded theory approach and will collect the data over a 9-week period.

All research data will be kept in a secure file cabinet in my classroom and will be destroyed five years after the completion of the study. The result of this research study will publish in my dissertation. The results of this research study will be compiled and included in my dissertation for the School of Teacher Leadership, Walden University. Participants' privacy will be protected by using pseudonyms will be used to maintain confidentiality.
I am requesting your signature to document that I have cleared this data collection with you.

Sincerely,
Juniace S. Etienne
Printed Name of Principal

Date _____

Principal's Written or Electronic* Signature _____

Researcher's Written or Electronic* Signature Juniace Senecharles

An urban school district in a southeastern state. Florida

Dr.

January 6, 2011

Dear Ms. Senecharles:

This will acknowledge our discussion to allow you to conduct your research study at my school site (xxxxx.) My Mathematics Chair, Dr. xxxx, and I are looking forward to you working with us. Any contribution to the existing social change climate of our students at Lee Charter Academy is always welcomed. While we have made remarkable gains, there is always room for improvement.

My entire staff has been trained on differentiated instruction (DI). We are totally inclusive with no separate ESE classes. Your study to explore which DI practices inclusion teachers are using to promote math academic achievement for underperforming students with learning disabilities should prove to be successful. As indicated on the bottom of our letterhead, whatever we do, we have high expectations to do it well!

You are permitted to administer a survey and conduct interviews, using a grounded theory approach and collect the data over a 9-week period. This letter will confirm our acceptance to participate. As always, I remain

Educationally yours,

Dr. Principal

Appendix E: Reminder Letter

Juniace Senecharles Etienne

April 5, 2011

Dear Participant (Name):

I would like to thank you for your willingness to be part of my research study. Last week I mailed out the survey questions to which you can simply complete the hard copy that you have on hand and return the completed survey in the enclosed envelope. Postage on the return envelope is already paid. You can also complete the survey online at http://www.surveymonkey.com/s/9MSTRLM.
I value your time and your opinion, and thank you in advance for your participation.
If you have any questions, please feel free to contact me or email me juniace.senecharles@waldenu.edu.

Sincerely,

Juniace Senecharles

Appendix F: Coding Matrix

Participant Identifier:
Date:
Time:

Code List
Factual Information:

Analysis and Interpretation:

Line	Transcription/Observation/Analysis [Researcher reflection or interpretation in brackets]
1	Low Level Math
2	Math Students
3	Behavior Issues Challenges
4	Teaching Tools
5	Manipulatives
6	Learning Styles
7	assessments
8	2009-2010 Math Teachers Successful Rate
9	Students Readiness
10	One-on-One
11	Parental Involvement
12	Teachers Attitude
13	Students attitude
14	Group work
15	Struggling

Open Coding

Interview 1
Codes: Math workshop DI
Teacher's goals (teag)
Student weaknesses(stuw)
Diverse students abilities (dstuab)
Teachers difficulties(teadif)
Teachers attitudes(teaat)
Differentiated instruction (DI) strategies (dist)
Teaching strategies / tools (teast/too)
Informal assessment (infas)
Lesson Plan (lesp)
Students difficulties (studif)
Technology (tech)
School Goals (schgo)
Standards Comparison (staco)
School Comparison(sch/co
Effectiveness of DI (Effdi)

Interview 2
Individualize educational plan (IEP)
Students needs (stune)
Teacher's attitude (teaat)
Learning Styles (ls)
DI Strategies (dist)
Teaching strategies/tools (teasttoo)
Teacher's difficulties (teadif)
School Resources (schre)
Sunshine State Standards (SSS)
Lesson Plan (lp)
DI weaknesses (diw)
Students difficulties (studif)
Classroom challenges (clacha)
Student Progress (stupor)
DI strategies (dist)
Teacher's goals (teago)
School Comparison (schco)

Interview 3
Di workshops (diwor)
Teaching strategies/ tools (teasttoo)
Teacher's attitude (teaat)
Information sharing (infosh)
Lesson Plan (lp)
Informal assessment (infas)
DI Strategies (dist)
Student challenges (stuch)
Teacher's attitude (teat)
Learning Style (ls)
Classroom challenges (Clach)
School Solution (schsol)
In Service (ins)
Diverse Learners (divlea)
Teacher's concern (teacon)
Standardize testing (states)

Interview 4
No in service (noins)
Math Teacher (matea)
Students Level (stule)
Standardize testing (states)
Ability Level (able)
Understand concept (undcon)
Lesson Plan (lp)
Students needs (stune)
Teaching strategies/ tools (teasttoo)
Teacher's attitude (teaat)
Student progress (stupr)
DI effectiveness (dief)
Classroom challenges (Clach)
Teachers Challenges (teach)
Teacher's concern (teacon)
Diverse learners (divlea)

Interview # 5
Workshops (work)
In service (ins)
Discussion (dis)
Students needs (stune)
Professional Developments (prodev)
Teacher's attitude (teaat)
Discussion with ESE Staff
Lesson Plan (lp)
DI strategies (difst)
Students Level (stule)
Challenging lessons (chles)
Teaching tools (teatoo)
Students academic level
Math facts (mafa)
Student Interest (stuint)
peer assistance (peeass)
Student struggle (stustru)
Students behavior (stubeh)
Low level student (lolestu)
Lack of Math concepts (lacmacon)
Teachers assessment (teaass)
Lack of Pre requisites (lacpre)
Students readiness (sturea)
Teachers concerns (teacon)
Student responsibilities (stures)
Teaching strategies/ tools (teasttoo)
Students opportunities (stuopp)
Student responses
DI challenges (dich)
Extra support (exsup)
Lack of parental (lacpa)
Students frustration (stufr)
Student motivation (stumot)
Informal assessment (infas)
Student difficulties (studif)
Students leadings (stulea)
Teachers hope (teaho)
Usage of calculators (usacal)
Math works (mawo)

Axial Coding

Categories	Subcatagories	Axial coding
Strategies use effectively	teaching strategies, learning styles, and diverse teaching approaches.	<u>Teaching Tools</u> • Informal assessment • Sunshine state standards • Lesson plan with DI • Learning Styles Context: • Teachers' Attitude <u>Teachers responsibilities</u> • Professional development • School resources • Tutoring <u>Students Interests</u> • Monitoring • Leadership • Encouragement <u>Outcomes</u> • elevated academic level among students • improve students achievement in classroom and standardized assessment, • improve school AYP requirements.
Engagement	higher lever thinking skills, manipulative, and related stories	<u>Teaching Tools</u> • Manipulative • Group work • Go over students data

		Context: Teachers responsibilities What are the teachers doing to engage their students? • Discussion • Go over Students data • Progress monitoring • Motivation • engagement Teachers Attitude: How do the teachers feel about engaging their students? • Students Interests What is in there for the students? • Engage • Monitor progress • motivate Outcomes • Higher students achievement • AYP improvement • Higher Assessment scores
Challenges of low motivation	additional time, behavior issues, retainers, and late learners	Teaching Tools • Reteach • Tutoring • Peer assistance • Diverse lesson activities Context:

		Outcome oriented Teachers responsibilities • Motoring students progress • Discussion • Go over students data Students Interests • Motivate • Encouragement • Increase assessment scores • leaderships Outcomes: Increase assessment scores
Low parental, involvement.		Teaching Tools: • Homework • Projects • Context: Challenges Teachers responsibilities • Contact parents • Community outreach • discussion Students Interests: • Better behavior • Less struggle students

		• Leaderships • Assessment scores improvement Outcomes: Improvement of assessment scores
Low engagement.		Teaching Tools: • Reteaching • On-on-one • Manipulative • Group work • Informal assessment Context: Outcome oriented Teachers responsibilities • Motoring students progress • Discussion • Go over students data Students Interests • Better behavior • Less struggle students • Leaderships • Assessment scores improvement Outcomes Improvement of assessment scores

More training		Teaching Tools: • Technology (computer, calculators. Ect..) Context: Consistency Teachers responsibilities • Discussion • Attend workshops • Attend inservice • Design project/ lesson with technology Students Interests • Better behavior • Better climate • Improvement of Assessment scores • Informal assessment Outcomes: Assessment scores improvement
The influence of peer work.		Teaching Tools • Workshops • Inservice • Staff meeting Context: Share vision Teachers responsibilities • Group work • Foster peer assistance opportunities • Reach the low level students

		Students Interests • Leaderships • Less struggle students Outcomes: Assessment scores improvement
Lack of prior knowledge about math.		Teaching Tools: • Reteaching • Manipulative • One-on-one • Peer-assistance • DI lesson PLAN Context: Consistency Teachers responsibilities • Create DI lesson and activities • Informal assessment Students Interests : • Improve assessment scores • Becoming less struggle • leadership Outcomes: • Assessment scores improvement

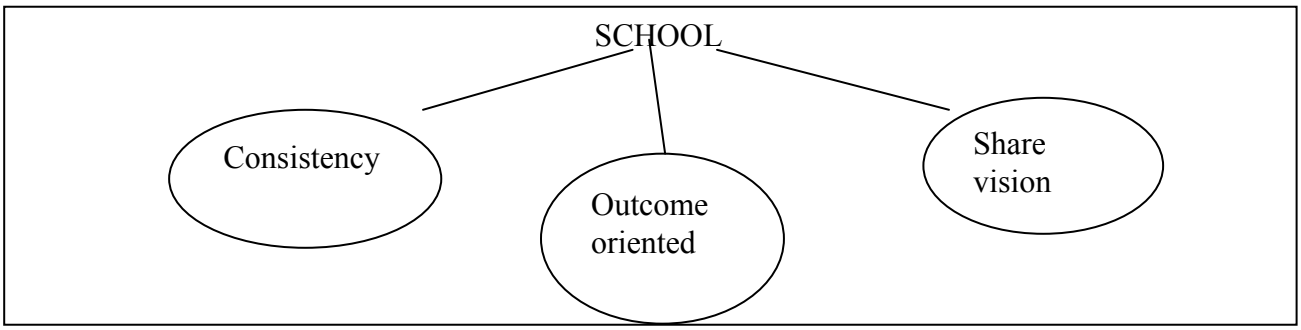
Selective Coding

Core Category	Strategies use effectively
Subcategories	1. Lack of math prior knowledge 2. Challenges of low motivation/high motivation 3. engagement 4. Lack of parental involvement 5. Strategies used effectively 6. More training 7. Outcomes Oriented
Storyline Validation	When I ask directly, most interview respondents indicate that they are aware that students begin school with insufficient math skills cause by many factors, despite their concerns of these numerous factors and challenges which contribute to underperforming students with low motivation in math class and the lack of parental involvement to support these students. Most interview respondents and survey respondents express that they go above and beyond to develop lesson with various teaching modes and approaches to meet their students' academic needs, and they show positive attitude toward the willingness to meet every students at their levels with the option of helping the students to make gain with the implementation of strategies use effectively because of common goals for outcome oriented ; which are gratifying in their classrooms and ultimately outweigh the many factors and challenges that they face in their classrooms.

Coding Analysis and Literature Comparisons

This section takes the propositions that emerged from this study during coding analysis and links them with existing literature. As such, the subheadings are the actual subcategories discovered during coding analysis. These subheadings are provided with text and interview excerpts which show how themes emerged and explain how they relate to current research in the field.

> Lack of math prior knowledge, Challenges of low motivation/high motivation, Engagement, Lack of parental involvement, Strategies use effectively, More training, and Outcomes Oriented.



Themes 1
In-serve

- Concerns
- Strategies (DI)
- Discussion
- Supports
- Professional development
- School resources
- School challenges
- Sunshine state

Themes 2
Students

- Behavior
- Diverse learners
- Needs
- Attitude
- Leading
- Challenges
- Success
- Disadvantages
- Responsibilities
- Struggling
- Extra supports

Themes 3
Teachers

- Instruction
- Teaching tools/strategies
- Lesson plan
- Challenges
- Belief
- Willingness
- Responsibilities
- Students' interest

Perception of DI outcomes

Themes 1
In-serve

- Concerns
- Strategies (DI)
- Discussion
- Supports
- Professional development
- School resources
- School challenges
- Sunshine state standards (SSS)

Themes 2
Students

- Behavior
- Diverse learners
- Needs
- Attitude
- Leading
- Challenges
- Success
- Disadvantages
- Responsibilities
- Struggling
- Extra supports
- Learning styles
- progress

Themes 3
Teachers

- Instruction
- Teaching tools/strategies
- Lesson plan
- Challenges
- Belief
- Willingness
- Responsibilities
- Students' interest

- Attitude
- Extra supports
- Assessment

Appendix G: Transcribed Interviews

Session 1

Researcher: Uhm ...right now I am with… I am going to call you Interviewee 1

I am not going to call your name

Interviewee 1: Ok

Researcher: … and I want to thank you for your time I am going to proceed… with my questions. This is my first time …there are only 5 questions …

Interviewee 1: Ok

Researcher…. feel free to answer or skip any questions that you want and if you feel like the questions are too personal…you can skip or say move to the next one ..ok

Interviewee 1: Ok

Researcher: Please describe for me the steps that you followed when implementing DI in your class for example uhm if you have attended any workshops on DI do you share your knowledge or information about DI with your colleagues (i.e., previous attendance at workshops or in-service professional development, sharing information with colleagues about DI).

Interviewee 1: I attended 3 weeks of math instructional over at FGCU where we did different type of math for middle school students which help me sometimes with differentiated instruction (DI) class instruction but most of the time what I do is that I try to find out the students weaknesses and work within that…many times we have such a diverse differences in students capabilities until it is very and really difficult to implement because I am only one person class. But I do the best that by trying to reach

them… by trying different things for as taking them back to a lower level and giving them instruction on the board and then let them come to the board to see and actually get to see what they are missing.

Research: Ok…alright…and question # 2. When you plan your lesson, how do plan your lesson with differentiated instruction any time you hear me say DI I am referring to differentiated instruction?

Interviewee 1: The way that I plan my lesson at the charter school here we have a weekly activity …a monthly activity… we have a monthly activity that Dr. Chapman and who have prepared so what I do I look at the list for the week and I look at the concepts t that we are trying to work on and if there is some information I think may be difficult or they… they have a difficult time to interpret what I would do I would use manipulative uhm … , I would use examples from the book , I would look up from the internet ,examples to try to make things easier even to go to youtube …

Researcher: Oh, youtube…

Interviewee 1: …which I found very useful information there for mathematics and so what I would do is trying to incorporate all of those and bring in the projector … projected on the board and even have that… whoever it may be the professor whoever it may be explain and I will reteach the lesson again .

Researcher: That is a good idea…a good idea…ok my next one is In terms of the learning process of students with learning disabilities, uhm…what specific DI strategies do you use to help them access the math curriculum?

Interviewee 1: Well with our students we…we have done …we…we try to set our goals for them to reach but at the same the students who are having difficulty for whatever reasons sometimes is attention sometimes is to stay focus on what they are doing or just moving around uhm uhm …they can't seat still so we allow …we allow them those students to get up walk around take a break or to try… to refocus themselves …but… but as you know there is no separation of kids like when I was in school they had special class and those kids would be there all day but today we have to do or I do a lot of one-on-one teaching looking over the shoulder to make sure… make sure they are on the right path of getting the math assessment … ….reteaching reteaching , reteaching is what I have been doing.

Researcher: Ok …ok uhm next question … What are the strengths and the weaknesses of DI in your classroom setting, and what steps have you taken to improve the weaker aspects, if any, of DI?

Interviewee 1: Well since uhm you know uhm working as you know with this dynamic of students this will be my first time that I will assess them and try to make improvement for next year.

Researcher: That is fair enough…and I think you are doing a great job consider that this is your first year. Alright this is the last question. In what ways do you think that DI can address students' academic needs and impact student achievement?

Interviewee 1: well I think DI will identify the areas students really need to be supported in the area they really need help and …and once we can identify that area that they need the help then I think it will be an approach…and focus on giving them the right

instructional needs to find out what kinds of students they are what kind of learners they are … are they kinesthetic… are they visual… are they hands once we can get those things identify I think the learning process for them will become more easier because now you can become a little more social …the word that I am looking for a little bit …more interactive with the students …

Researcher: ok

…once I understand the dynamic what you really having problems with I can help you a little bit better and I think that what will identify those areas that we don't see …right off…

Researcher: ok

Interviwee#1…some of the hiding areas sometimes you have to dig in and make sure you have the students going on the right track I think that what DI will so beneficial to help us as teachers.

Researcher: ok…thank you interviewee 1 it was a pleasure …and thank you for your time.

Interview 1
Codes: Math workshop DI
Teacher's goals (teag)
Student weaknesses(stuw)
Diverse students abilities (dstuab)
Teachers difficulties(teadif)
Teachers attitudes(teaat)
Differentiated instruction (DI) strategies (dist)
Teaching strategies / tools (teast/too)
Informal assessment (infas)
Lesson Plan (lesp)
Students difficulties (studif)
Technology (tech)
School Goals (schgo)
Standards Comparison (staco)
School Comparison(sch/co
Effectiveness of DI (Effdi)

Interviewee # 2

Researcher: alright …I am going to call you interviewer # 2 ….

Interviewee # 2: uhm..

Researcher: … because I am not going to use your name and we only have 5 questions… **Interviewee # 2:** uhm..

Researcher: … feel free to answer or skip any questions that you want and if you feel like the questions are too personal…you can skip or say move to the next one ...ok

Interviewee # 2: Alright

Researcher: uhm…the first one is …hold on…. (Paper flipping...)… here we are …uhm …Please describe for me the steps that you followed when implementing DI in your class…when I say DI I am refereeing to differentiated instructions… for example have you attended any workshops or in-service professional development, sharing information with colleagues about DI.

Interviewee # 2: uhm …yes … and we also…uhm… like certain kids have their individualize learning programs…educational program…

Researcher: That is the IEP right….

Interviewee # 2: yes… the IEP…

Researcher: ok…

Interviewee# 2: …so we actually look at what their needs are …and… and some of them are more …you know ….you kind of got to know them as the school year progresses some kids are very visual learners, some are very tactile so they have different activities

based on that …and sometimes I also teach a lesson in maybe three different ways… I may have a series of lecture for the auditory, and bunch of hands on activities and …I also have the students actually cut out words make sentences out of these because some children learn that way apparently …

Researcher: uhm...

Interviewee#2: …they don't catch stuff in the lecture they want to see the words and actually form…

Researcher: so if I understand correctly after you are done with the lecturing then you proceed with your hands on?

Interviewee# 2: uhm…

Researcher: ok

Interviewee# 2: uhm

Researcher: Everybody gets to participate in the hands on activity?

Interviewee# 2: everybody gets to participates…some gets they will catch it in the lecture some don't…so ...so they will catch it eventually in the hands on…so ...it is hard…it is hard…it is hard to actually do different lessons do or different approaches simultaneously…

Researcher: laugh…laughs…

Interviewee#2: …because I am the only one in the classroom so it is very hard …

Researcher: laugh…laughs…

Interviewee#2: …so I try to teach the lesson in different ways….teach the same materials in different ways…

Researcher: That is nice …nice…I like that…ok …my second question is How do plan your lesson with DI? When you are planning your lesson… do plan and say this is the strategy that I am going to use, or do the DI strategy just come as you are teaching the lesson.

Interviewee#2: Well …we…actually…we have resources that are very handy and helping us to differentiate instruction for example the …the standards that we use …that we follow… the next generation sunshine state standards if you go on their websites they actually have suggested ways to teach for special education students

Researcher: ok

Interviewee#2: …so that is a lot of help…takes a lot of work out of our hands because we just look at how we could simplify it further the activities they suggest some…some of the benchmarks even go into details on how to suggest a lesson plan..

Researcher: that is very good

Interviewee#2: …and yes …some of them you actually learn from experience…because I have been teaching here for three years now so I know what activities kind of work with for certain kids

Researcher: laugh…laughs…that is good …so you like working here…

Interviewee#2: Oh yes …we have tone of resources…I have tone of resources …uhm tones of uhm activity books and guides.

Researcher: Ok the next one In terms of the learning process of students with learning disabilities, what specific DI strategies do you use to help them access the math curriculum?

Interviewee#2: specific…

Researcher: uhm…

Interviewee#2: Well it depends of what the need is …if they have trouble with reading comprehension uhm for example we actually breakdown vocabulary words especially with kids… uhm and some of the vocabulary they have to learn …and they have trouble understanding so we breakdown words into roots for them to understand the concepts …it depends on the need of the students some students they really won't get anything that you lecture to them unless they are doing it themselves. That they have an activity that makes it concrete to them… so…I would say it is very hard to answer that question because it varies.

Researcher: oh…ok…I understand and the next one is What are the strengths and the weaknesses of DI in your classroom setting, and what steps have you taken to improve the weaker aspects, if any, of DI?

Interviewee#2: I would say the weakness in my classroom is that … because there is only me I don't really have the luxury of having an assistant full time I teach four different classes so there four preps everyday with no assistant I don't have the luxury of setting up different centers and just having the kids doing it by themselves because the ideal you would expect the kids to be able to do that if you give them instruction and they should be able to follow but because of the kind of kids that we have they really need to be guided they really need to be supervised

Researcher: uhm …uhm…

Interviewee#2: they really need to be guided

Researcher: Constance guidance …

Interviewee#2: …because of the demographic that we have that we be the weakness is that when I am doing a variety of approaches of teaching one topic I have to do….everybody has to the activity like if I am doing the lecture everybody has to seat and listen to the lecture and then when we do the hands on everybody has to the hands on they…they don't really have much freedom and say this half of the class can do this while the other half can do a center I don't have the luxury to do that . The strength that I get…uhm I would say it just comes with time that you able to expose the kids to all different ways of learning because they are forced to do it…so they are exposed to it… and I would say some of kids that I had initially a couple years who could not seat still to a 20 minutes lecture now they are able to do it now…

Researcher: Oh wow! That is nice

Interviewee#2: …they are used to me…I have been their teacher for the past three years. I would say that is a weakness that can also be strength.

Researcher: uhm a weakness and strength…

Interviewee#2: yes…

Researcher: uhm ok this my last and final question in what ways do you think that DI can address students' academic needs and impact student achievement?

Interviewee#2: well when you DI you make sure you really teaching the child not just delivering a lesson so the ultimate goal is for the child to understand is not just a matter of the teacher to put on the time in and say ok I deliver the lecture but did the student really understand so at the end of the day your concern is really did they learn what you

were supposed to teach them …so I think it is great that teachers…because on my time when I was a student school there were no such things as DI…

Researcher: that is very true…

Interviewee#2: …now we are centered on the student we realized that students are very different you know you are not teaching class you are teaching students as individuals.

Researcher: Thank you very much…I learn a lot just by listening to you

Interviewee#2: Thank you

Researcher: …and I can tell you are doing a great job differentiated your instructions. Your students are very fortunate to have you as a teacher.

Interviewee#2: Thank you (laugh...) thank you

Interview 2
Individualize educational plan (IEP)
Students needs (stune)
Teacher's attitude (teaat)
Learning Styles (ls)
DI Strategies (dist)
Teaching strategies/tools (teasttoo)
Teacher's difficulties (teadif)
School Resources (schre)
Sunshine State Standards (SSS)
Lesson Plan (lp)
DI weaknesses (diw)
Students difficulties (studif)
Classroom challenges (clacha)
Student Progress (stupor)
DI strategies (dist)
Teacher's goals (teago)
School Comparison (schco)

Interviewee#3

Researcher: Hello, I am not going to use your name I will call you interviewee#3..that will be your name.

Interviewee#3: Ok

Researcher: Thank you for taking the time to help me out with this interview…uhm we have five questions feel free to answer or skip any questions that you want and if you feel like the questions are too personal…you can say skip or say move to the next one also I promise I will not take too much of your time. The first question is Please describe for me the steps that you followed when implementing DI in your class…when I say DI I am refereeing to differentiated instructions… for example have you attended any workshops or in-service professional development, sharing information with colleagues about DI. Is that clear?

Interviewee#3: yes

Researcher: ok

Interviewee#3: yes I have attended classes to learn about DI one of the things that I do of course is going though their data to find out the level of my students, then I adjust the curriculum …adjust the curriculum to meet their needs (silence…)

Researcher: uhm …Do you find yourself like sharing information about DI with your co-workers and your colleagues?

Interviewee#3: of absolutely I try to do that as often as I can I remember there were a meeting about DI and I couldn't attend so I provided a big fat package of material that they could use at the meeting at my absence.

Researcher: oh that was good…ok lets to the next question. How do plan your lesson with DI?

Interviewee#3: uhm …I always…how do I plan my lesson with DI?

Researcher : uhm…

Interviewee#3: well there are different kinds of lessons if I am doing groups I try to provide (could not hear)…I have different level in the groups. Sometimes I let the kids help one another. Sometimes I adjust a general assignment I give to everyone I will adjust different expectation for the students. These are the two examples DI I can think on the top of my head…uhm

Researcher: alright …that is good enough now let's go to the next one In terms of the learning process of students with learning disabilities, what specific DI strategies do you use to help them access the math curriculum?

Interviewee#3: I try to remember that each student has a different modes of learning and I try to encourage all students to use as many as possible hoping that one…one of the modes we hit upon for example I tell them some students learn better by hearing information, some students learn better by reading information , some students by say it out loud I try to make them try all three during a lesson …they hear, see I try to use a variety of things hoping to help the students.

Researcher: Good …good ok the next one is …we are almost done …the next one is What are the strengths and the weaknesses of DI in your classroom setting, and what steps have you taken to improve the weaker aspects, if any, of DI?

Interviewee#3: strength and weakness of DI…

Researcher: uhm…uhm..

Interviewee#3: uhm…in most classes of special education students there two teachers I found the biggest weakness is the inability to communicate well with the person that I am working with . Sometimes it is hard to get on the same page implementing strategies when another teacher has a different idea.

Researcher: ok

Interviewee#3: and how I am trying to solve that …uhm trying to get the school to have the school to implement a situation where we would have common planning to discuss these issues

Researcher: ok so that would be like …maybe …something you can talk about during your inservice?

Interviewee#3: yes…yes that is a good idea

Researcher: ok...Sounds good last and final question

Interviewee#3: You said that before (laugh…laugh)

Researcher: (laugh…laugh) I said we have five questions, I believe this is the last one ok. What ways do you think that DI can address students' academic needs and impact student achievement?

Interviewee#3: I think it can help increase learning I… I don't see a dramatic increase…I expect all my students to increase learning but they may still not be able to pass standardize testing because every kids are different and the kids that need it most are very… very low and we can implement DI and help them but that is not going to help

them with FCAT they may have increase but still won't help them with the that is a concern that I have

Researcher: That is a good concern…well thank for your time and I may contact you for a second interview.

Interviewee#3: ok.

Interview 3
Di workshops (diwor)
Teaching strategies/ tools (teasttoo)
Teacher's attitude (teaat)
Information sharing (infosh)
Lesson Plan (lp)
Informal assessment (infas)
DI Strategies (dist)
Student challenges (stuch)
Teacher's attitude (teat)
Learning Style (ls)
Classroom challenges (Clach)
School Solution (schsol)
In Service (ins)
Diverse Learners (divlea)
Teacher's concern (teacon)
Standardize testing (states)

Interviewee#4

Researcher: Ok I am going to call you interviewee # 4

Interviewee#4: Ok..

Researcher: …because I am not going to use your name. also right now you are been recorded…I am recording our interview session.

Interviewee#4: ok

Researcher: Perfect, and then there are only five questions …five questions feel free to answer or skip any questions that you want and if you feel like the questions are too personal…you can say skip or say move to the next one also I promise I will not take too much of your time. The first question is Please describe for me the steps that you followed when implementing DI in your class…when I say DI I am refereeing to differentiated instructions… for example have you attended any workshops or in-service professional development, sharing information with colleagues about DI.

Interviewee#4: Well…not to my knowledge….

Researcher: have you had any in-service or workshop in your school…

Interviewee#4: I don't think so…

Researcher: How long have you been at your site?

Interviewee#4: This is my second year.

Researcher: ok did you teach math last year?

Interviewee#4: yes

Researcher: Do you remember talking about DI with your colleagues?

Interviewee#4: no…

Researcher: Ok, we will go to the next question then…

Interviewee#4: ok

Researcher: Ok so how do plan your lesson with differentiated instruction?

Interviewee#4: well depends on the level the students are at

Researcher: uhm…

Interviewee#4: and based on their previous standardized assessment scores ….

Researcher: ok

Interviewee#4: then I also look at their reading levels it has a lot to do with it because a lot of math concepts have to be read and they must understand the context for themselves so if they cannot then that tells me …

Researcher: uhm…

Interviewee#4: so they cannot my lesson plan has to …uhm cover the basic for everybody it just can't be for students who are advanced…but I have to reach the students who are also lower levels

Researcher: uhm uhm …ok good…that is good …so the next question is In terms of the learning process of students with learning disabilities, what specific DI strategies do you use to help them access the math curriculum?

Interviewee#4: ok for like some students…like those students I tend to use a lot of visual aids and also for those students is one-on-one with them to make sure that they are grasping the concept because…once you see that…uhm the other students you know are doing well by just like giving them just a brief assessment it tells you who understand the concept and who didn't. so that means I have to reteach …that means I have to do what is

necessary so most of the time I have to do one-on-one and with teaching aid that will make the concept more clearer to them.

Researcher: ok …very good. Ok question number 4 What are the strengths and the weaknesses of DI in your classroom setting, and what steps have you taken to improve the weaker aspects, if any, of DI?

Interviewee#4: ok strengths will be that I am able to assist students to grasp a concept you know …that they would not easily attend you know…

Researcher: uhm…

Interviewee#4: …if I did not use the differentiated method

Researcher: ok

Interviewee#4: I would say the weaknesses would be that if I have too many students you know who have learning disabilities I don't have sufficient time you know to…

Researcher: uhm…

Interviewee#4: …because you know that could be a problem…

Researcher: uhm…

Interviewee#4: but I really haven't have that problem, because I did not have an amount of students I couldn't handle but I can foresee it being a problem.

Researcher: uhm..uhm …how about weaknesses? Did you talk about weaknesses? I am sorry …I know you talk about the strengths?

Interviewee#4: yes that was the time frame. I said if there are too many students …that was the time frame.

Researcher: ok I understand …Oh I am sorry I guess my mind was wondering a little bit I apologize.

Interviewee#4: yes the time frame with that you have to do a lot of one-on-one, you have to do a lot of individual time.

Researcher: yes I understand that one-on-one can take a lot of time.

Interviewee#4: Right,

Researcher: Alright one more question in what ways do you think that DI can address students' academic needs and impact student achievement?

Interviewee#4: well not every student will learn the same you have different kind of learners

Researcher: uhm …

Researcher: and you also have students who are late learners what I mean is that they cannot learn if they don't have the right teacher. You have to make sure you come up with the right strategies to meet the needs of these students so if you are good at doing that then you know there is greater chance that these students can become successful.

Interviewee#4: ok

Researcher: ok, very good and that completes our session one and I will contact you for session. Once again I appreciate your time. Is there anything else you would like to add?

Interviewee#4: I think I cover it all. Thanks

Interview 4
No in service (noins)
Math Teacher (matea)
Students Level (stule)
Standardize testing (states)
Ability Level (able)
Understand concept (undcon)
Lesson Plan (lp)
Students needs (stune)
Teaching strategies/ tools (teasttoo)
Teacher's attitude (teaat)
Student progress (stupr)
DI effectiveness (dief)
Classroom challenges (Clach)
Teachers Challenges (teach)
Teacher's concern (teacon)
Diverse learners (divlea)

Interviewee#5

Researcher: For now your name will be interviewee # 5

Interviewee#5 : Ok..

Researcher: …because I am not going to use your name. Also right now you are been recorded…I am recording our interview session.

Interviewee#5: ok

Researcher: Perfect, and then there are only five questions …five questions feel free to answer or skip any questions that you want and if you feel like the questions are too personal…you can say skip or say move to the next one also I promise I will not take too much of your time.

Interviewee#5: Ok

Researcher: Also I truly appreciate the fact that you are taking the time to help me with this research study on a Sunday afternoon.

Interviewee#5 Not a problem

Researcher: The first question is Please describe for me the steps that you followed when implementing DI in your class…when I say DI I am refereeing to differentiated instructions… for example have you attended any workshops or in-service, professional development, sharing information with colleagues about DI.

Interviewee#5: yes, yes, yes I have done all of these from precious workshops and professional development. I had attended workshop from the school district, I had professional development from the charter school, and I had discussion in our faculty staff meeting about DI uhm…I also uhm had discussion with the ESE teachers and the

ESE specialist about DI …uhm more specifically to find out ways on how to meet the academic needs of my students.

Researcher: Very interesting …very good ok the second question is how do you plan your lesson with DI? (pause) when you plan your lesson how do you do it?

Interviewee#5: uhm…when I plan my lesson plan I keep in mind the strengths and the weaknesses of my students I do have students who are ranged just at the fourth grade level and I uhm…also have students who do need a lot of on-on-one support , uhm…I have…as well as students who are way above the fourth grade level of course I have to create lesson that challenge all these students at the academic level that they are. Keeping this in mind I work to ensure that there are hands material available, manipulative, and uhm…additional time for these students who are may need assistance to learn a specific concept. I do look at where they are academically before I begin a new concept so say for instance if I have a student who and still working on learning all the multiplication facts I know they will gradually and continue to use the multiplication charts uhm in order to work on division because those students need uhm …additional supports uhm…those students uhm…I know who have mastered their multiplication facts uhm… of course they can then uhm… be taught on grade level uhm… or look at grade level experiment and then they may need some supports but not as much uhm …then there those students uhm…who get it the first time you present the lesson without even going through much of explanation so those students to be challenged in more difficult kind of problems or even higher order think skills of problems sometimes they may be used as an assistant to help other students who are struggling still..

Researcher: Alright very good…thank you …and the next one is In terms of the learning process of students with learning disabilities, what specific DI strategies do...do you use to help them access the math curriculum?

Interviewee#5: (pause)

Researcher: I think you kind of cover that from the previous question, I am interested to hear you response.

Interviewee#5: ok…well..Uhm…let me see if I understand the question you said looking at what my students …uhm specifically with my class what my students strengths and weaknesses are… are you say what specific DI strategies that I use?

Researcher: Yes…in terms of …let say if for example you have a student with learning disability do you have a specific DI that strategy that will you use with that particular student

Interviewee#5: I …uhm …in this particular class I do not have a student who has been specifically labeled l with a learning disability, however from working with these students this year I do have students who struggled

Researcher: ok…

Interviewee#5: so I don't have any who have been specifically being labeled ESE for academic but I have students who have labeled ESE because of their behaviors...

Researcher: Ok...

Interviewee#5… not because of academic.

Researcher: ok…

Interviewee#5:…although they may be smart but I do have a specific young lady in my class who are is the low level uhm… in math and when I look at is the fact she is missing some the uhm..Prerequisite for fourth grade math …uhm she did not have a strong uhm…base in third grade…uhm she did not have a strong concept of numbers…uhm.. Of whole numbers uhm…uhm…uhm…of multiplication facts how numbers are out together specifically with …uhm like addition uhm…uhm…rounding being able uhm to regroup in subtraction and things like that and carrying on to addition so by her not having those skills although she not label specifically ESE with a disability but uhm you have to treat her though she has a disability because she did not have those prerequisite skills so we had had to go back and meet her where she is we had to go back uhm…to build those skills in order to help her to be successful on grade level.

Researcher: Can you give some examples of the kinds of strategies who had implemented with this young lady?

Interviewee#5: yes I had to use one-on-one, reteaching to the missing skills and peer assistance from uhm …students who understand and already past from that concept …. in order to help her to be successful on grade level.

Researcher: Alright ok…thank you …that was good. Now the next one is what are the strengths and the weaknesses of DI in your classroom setting, and what steps have you taken to improve the weaker aspects, if any, of DI?

Interviewee#5: ok the strengths of differentiated instruction in my class is the fact that I do have students on different grade level I can see immediately that uhm…some students are going to need …uhm supported more and uhm there are those students who are

definitely ready to be kept challenge and that uhm you can see clearly uhm… it is like in the beginning uhm when I started teaching I think uhm I think I wanted uhm everybody to be together uhhm….that would have made our job easier. (Laugh…laugh)

Researcher: Laugh…laugh

Interviewee#5: uhm…as a teacher I wanted to be able to say this where we starting uhm…this is what everybody already knows and this is where we are going from here uhm in a perfect…perfect world it would be wonderful because everybody would be able to move along in the same pace. Unfortunately uhm you are going to have these students uhm…I have those students who grasp the concept very quickly uhm and ready to move on and to hold them back would almost a criminal uhm and that would create an uprising in my classroom because of their…their strong personalities

Researcher: uhm…

Interviewee#5: and uhm…so uhm for them it makes …it makes the stud…you know the differentiated instruction make the student pay more responsibility for their own learning because they looking at the fact that oh ok I am ready to move on and she sees that and she allows me to move uhn and where those students who are still struggling they don't feel like oh it just to be bad you didn't get it and uhm so we are moving to the next lesson so you can continue to struggle in …uhm in this skill but they know that they are not of the hook . They are still are responsible for learning this skill so even if it means that uhm…somebody will have less homework , practice in this skill they have an additional sheet because they need more practice on that skill. Or maybe they had fail a test and

uhm like in a lot of schools once you fail a test you know uhm too bad that is the grade that you get…

Researcher: Laugh…laugh…

Interviewee#5: but…but what I learned is that we have to give them the opportunity to be successful uhm…the whole point is for them to learn uhm …not necessary for them to just be graded

Researcher: right

Interviewee#5: we want them to actually learn the skills…the weaknesses …ok that I find with differentiated instruction is sometimes I find it difficult to find a way to meet certain students academic needs because of the fact that there 20 students in the classroom

Researcher: How many students?

Interviewee#5: I have 20 students

Researcher: ok

Interviewee#5: and with 20 students you know even if it just 3 students you know who need the teacher's attention I am still …still bound to make sure that the other 17 are still moving forward so uhm …uhm I do have the option to be able to uhm work with some students after school but those students of course that I find need the most support are the students whose parents don't necessary allowed them to stay after school (laugh)

Researcher: yerr

Interviewee#5: so that for me …that is just the biggest problem and then once those students get frustrated uhm… it is very hard to uhm …to pull them back as for to tell them well I realized that that it is frustrated I understand that it is difficult but you got to keep pushing through this to …you know to motivate them …keep push to actually learn the concept

Researcher: That is very interesting …very interesting uhm… so now if I understand correctly the students who are making progress and they are moving forward very good do you allow them to come to you right away and say teacher I got this concept I understand it can I go to the next one? Or …or are you the one who initiate the idea of them to move on to the next concept.

Interviewee#5: no actually I give them the opportunity to show me

Researcher: that is nice..

Interviewee#5: so sometime what they can do uhm …uhm is uhm to uhm sometimes what they can write on paper maybe difficult for some students to explain

Researcher: ok

Interviewee#5: I am going to use a writing example for the purpose

Researcher: ok

Interviewee#5: they maybe to tell me the steps verbally they have in their minds

Researcher: uhm

Interviewee#5: but …if …if I tell them to write an essay it is more difficult for them because now they are trying to remember spelling and uhm putting in all you know in the correct context and all of that, but all I am asking them for is just the steps. Uhm

what steps do you need to write this paragraph if they can verbally tell me ok I know what to do, uhm , now can I go ahead and get started , so now I can look for the next step that I am having to struggle with uhm and for math I have students say for instance they know their multiplication facts and they can tell me very quickly uhm

Researcher: uhm

Interviewee#5: but when they have a set of multiplication set problems if…if I am looking at whether or they still know their multiplication facts down (for the frustration) they can ok teacher I know my 8 times table I am ready for the next step. I can do it I know I can … can you help me to move on to the next step.

Researcher: ok interesting very interesting …uhm so do find yourself doing a lot of group work because of that or not?

Interviewee#5: well I try to keep everybody uhm on task and a lot of time the way to keep them on task those students who are moving on you have to give them something to do on their own. I don't have a lot of computer in my room, a lot of technology available in my room

Researcher: uhm…

Interviewee#5: so …it is kind of limit me of to what can allow them to do in for that matter it requires that they do a lot of book work but I think the more I am able to incorporate technology and different things then uhm I will be able to have them try other things uhm to show what they can learn in different area

Researcher: ok good

Interviewee#5: and for me it is also a difficult…uhm like I can come up with a zillion activities technology wise to do with writing but with math I find difficult to incorporate technology because as soon as you tell them to get in the computer they find the calculator (laugh…laugh)

Researcher: (Laughs …laugh…)

Interviewee#5: and you know they are not doing the work they are just using the calculator.

Researcher: (Laughs …laugh…)

Interviewee#5: and I want to make sure that they are actually doing…doing the math

Researcher: you know I find it very…very interesting because when I was at your school observing I noticed none of you are allowing the students to use the calculators…

Interviewee#5: right I know …as I said if I put them in the computer they will find the calculator

Researcher: yes …I understand that …but there are many schools that allow them to use the calculator …and I think they are learning more in your setting because they are not using the calculator. They will really have a strong concept of numbers

Interviewee#5: right…yes I have concern for students who can do it in the calculator and when you ask them you know to do it without the calculator they can't figure it out.

Researcher: uhm..

Interviewee#5: what I use for my kids …the example that I use for my kids

Researcher: uhm

Interviewee#5: the example of the ice cream man …the ice cream man will cheat you if you can't count

Researcher: absolutely

Interviewee#5:so I tell them the story every year of a student that I had when she was a first grader she asked her mom if she can have one dollar to go to the ice cream truck so her mom told her yes and go get one dollar from her purse well the little girl pick up a $100 .00 bill instead of one dollar bill and she bought a $1.00 ice cream and never get any change

Researcher: wow!

Interviewee#5: and …so that is my first example to them every year how this girl gave away $99.00

Researcher: Laugh…laugh…that is a good example

Interviewee#5: Laughs…laugh…

Researcher: Laughs…laugh… that is very good examples ok we are almost done now the next one is in what ways do you think that DI can address students' academic needs and impact student achievement?

Interviewee#5: well uhm it addresses their academic needs because it meets them where they are if I have a student…uhm the way I look at it the new ….the next generation sunshine state standards uhm it has specific skills that are taught at specific grade level uhm and those skills are not addressed again in the next grade level they are expecting those skills to be taught at mastery the old standard uhm went back over those skills…so if they have learned time in first grade, they went over it in second grade then they went

over it in third grade again, but now they are expecting… they …they wave the standard …the standard less therefore they want the students to master it so as a teacher it is my job to ensure that whatever skills those students have they have to learn it to the point of mastery so they can take that skills and be able to build upon in the next school year. And if I am the teacher and have a student who is struggling with a specific skill I have to make sure that now I do whatever is necessary to ensure that the students master the skills before they leave my classroom because the next year they are not going to be academically successful because they did not have the skills the prerequisite that they needed it from my classroom in order to be successful in the next grade level and that teacher and that parent uhm if looking back if they want they could say if you taught that skills to my kid last year they would be able to do a good job this year uhm in that particular area. For instance if I don't teach them the concept of fraction in order to understand what fraction is, a fraction is part of a number, a fraction can be represented one number on top of another number, a fraction can be a decimal number, it can be less than 1 but more than zero if they don't have all these concepts you know really understood well when they go to fifth graded and it is time to divide and multiply these fraction or those decimals then the child is at a disadvantage so with DI I can explain for whatever way it takes for the child to understand whether they need hands on they need me to sing it on a song, to clap it out, you know dance and cheer whatever the case maybe but at the end of it they understand the whole purpose is to have them have an understanding uhm what happen if don't teach so they can understand regardless of how many times I have to go over it or how many students het it that one child who doesn't

get is still at a disadvantage and still will not be able to be academically successful and pretty much just left off

Researcher: that is very true and very good information…alright good I am getting some good inputs from you. That concludes our session 1 and I truly appreciate your time your inputs and your supports. You an excellent teacher

Interviewee#5: Thank you

Researcher: I will be calling you for the second session and a transcribe of this interview will be provided. Thank you.

Interviewee#5: thank you it was a pleasure.

Interview # 5
Workshops (work)
In service (ins)
Discussion (dis)
Students needs (stune)
Professional Developments (prodev)
Teacher's attitude (teaat)
Discussion with ESE Staff
Lesson Plan (lp)
DI strategies (difst)
Students Level (stule)
Challenging lessons (chles)
Teaching tools (teatoo)
Students academic level
Math facts (mafa)
Student Interest (stuint)
peer assistance (peeass)
Student struggle (stustru)
Students behavior (stubeh)
Low level student (lolestu)
Lack of Math concepts (lacmacon)
Teachers assessment (teaass)
Lack of Pre requisites (lacpre)
Students readiness (sturea)
Teachers concerns (teacon)
Student responsibilities (stures)
Teaching strategies/ tools (teasttoo)
Students opportunities (stuopp)
Student responses
DI challenges (dich)
Extra support (exsup)
Lack of parental (lacpa)
Students frustration (stufr)
Student motivation (stumot)
Informal assessment (infas)
Student difficulties (studif)
Students leadings (stulea)
Teachers hope (teaho)
Usage of calculators (usacal)
Math works (mawo)

Session Two

Researcher: Hello Interviewee#1, how are you?

Interviewee#1: Fine, how are you doing?

Researcher: Ok good, I would like to thank again for the last interview we had, and again thank for this second interview. Today I have two more questions for you and I promise I will not take too much of your time.

Interviewee#1: Ok...

Researcher: The first one is do you perceive DI can improve students standardized test scores enough to help the school meeting the AYP requirements.

Interviewee#1: well…DI may help the standardized test, but I think sometimes is mostly the students that are challenged by the standardized test because they may not be good test takers. If DI can help them understand the skills of uhm … how to eliminate uhm…two of the answers strategy, yes it will. But as I work with students with standardized exams uhm… I try to show them that there are two answers that are nowhere near to the correct answer so I am trying to give them a fifty percent chance to get the right answer so if we have this skill of DI that we incorporate to eliminate the two answers t that nowhere near to the original nowhere near to the answer that they need yes it can help.

Researcher: so basically you said if you teach them how to do elimination…

Interviewee#1: elimination…

Researcher: ok …perfect …

Interviewee#1: yes

Research: Sounds good... The next question is Based on your experience or your observation, how would you describe students' attitude toward DI. Do you think this a strategy that the students really like or I guess what I am trying to say when you compare the way you were taught when you where in school and then now students have so many options of doing group work, receiving one-on-one instruction …I mean do you think the students like having different options.

Interviewee#1: Well…I think any new strategies that …that are introduced to students if you can get the students to buy into the strategies it helps…

Researcher: ok…

Interviewee#1: and …and…and I think DI can be a very helpful instrument to help students learn but you must make sure they buy into that new strategy because with students today we have to approach them differently than the way I have learned .

Researcher: yes

Interviewee#1: and I am sure different from the way you were taught because there are so many dynamics that had changed since you and I have been in elementary middle and high school students just have a tendency to have to really enjoy your teaching styles and like you in order to receive any types of new instructional advice that you may give them so if DI uhm…uhm.. Methods and procedures are something they are gear to and like it will be a great tool to work with.

Researcher: Ok …and I think you have answered all my questions for today, and again thank you for your time.

Interviewee#1: Thank you.

Interviewee#2

Researcher: Alright interviewee#2 how is you today?

Interviewee#1: I am good and you?

Researcher: and it was so a pleasure last time as I said before I had learned so much from you and observing your class today I must say you great classroom management skills.

Interviewee#2: laugh…laugh….thank you

Researcher: so I have two more questions for you today. Let see what I have here Which DI strategies would you say are more engaging in improving students understanding of a math concept?

Interviewee#2: well I would the strategy that work the most is if I tailor the lesson according to their preference like some …some of the kids really learn…like if I want to teach them a concept they learn most by …some kids learn most by putting words together like I make uhm…cards of the difference vocabulary words and they try to strand together all the words to try to explain the concept. So instead of writing down stuff just the simple with some kids just the simple act of working with cards and seeing them before their eyes and really trying to manipulate the words it works for them. I guess the bottom line is to see where they learn well. Some kids they learn well when I ask them to draw stuff like can you draw to explain the word.

Researcher: ok alright good. Now my second one is do you the implementation of DI can improve AYP? Actually let me rephrase that, do you think the implementation of DI can

help improving students' academic achievement in terms of…also to a point that can improve the AYP for the school.

Interviewee#2: oh yes absolutely, because the bottom line you want kids to learn is not about if whether you just deliver the lesson but whether they really get it so DI is diff… differentiated instruction is really all about are you finding what their needs are so they are able to grasp a lesson and once you are able to get kids to know what they are supposed to learn of course you are going to see them succeed when you assess them they are going to do well naturally so if every kid does well then the whole school does well.

Researcher: alright then, well thank you very much …laugh…laugh again thank for taking time out to answer these questions for me.

Interviewee#2: Oh thank you…I wish you luck. Good luck with all your …your …after you look at all your data that ...that must be really challenging…

Researcher: I could not do it without your participation. Thank you.

Interviewee#3:

Researcher: Ok, interviewee#3, how are you?

Interviewee#3: Great thanks

Researcher: pause

Interviewee#3: yes I am number 3 laugh…laugh

Researcher: laugh, laugh, ok I would like to thank you again for allowing to conduct this interview and for taking the time out for it.

Interviewee#3: it is my pleasure

Researcher: thank you laugh laugh, today I have two questions for you and these questions are based on what you shared with me during our last session…session one interview.

Interviewee#3: ok…

Researcher: Do you perceive DI can improve students' achievement in math to impact the school AYP requirement or to meet AYP?

Interviewee#3: I think in most setting it can…as long as it is…for example I really like when there is an inclusion teacher and a regular ed. classroom and two teachers doing co-teaching as long as the co-teacher in tune with what the inclusion teacher is doing. I think it can bee a wonderful success. The problem is at time the inclusion teacher is not included in the instructional class planning.

Researcher: so you can elaborate a little bit more about success? When you say success do you mean enough achievement to meet AYP or academic success in the classroom assessment?

Interviewee#3: All I can think to answer that… is that each student is different from another student so it is depend of the student disabilities. Some disabilities the scores can go up in the FCAT but some disabilities I think the scores cannot be seen in the FCAT but can be seen in the classroom but not related to AYP.

Researcher: Ok, I guess I was more concerned about AYP because every school now is about meeting AYP and meeting AYP.

Interviewee#3: and the schools should not be because they should exclude modified curriculum (MC) 1 and (MC) 2 students.

Researcher: from AYP?

Interviewee#3: yes

Researcher: ok, second question and the last one laugh… based on your experirience and your observation how would describe students' attitude toward DI?

Interviewee#3: well I think for the most part students are not aware about DI is being implemented

Researcher: interesting

Interviewee#3: and sometimes if they are, they are very gretful that they get what they think is alittle break. I have seen students denied it.

Researcher: of really, do you mean refused to do certain activity or be part of a group? Can you elaborate on that for me please?

Interviewee#3: yes they want that accommodation or whatever the DI might be, because they don't want to be different from the other students, but overall by far for the most students… (Pause) yes they like it.

Researcher: so ok let reverse that how would describe teachers' attitude toward DI?

Interviewee#3: I think it needs room for improvement because most teachers are trying to keep students on the same standards, the same page, and the same box they are not willing to negociate. They think all students are they same and learn they same way and that is not true.

Researcher: alright, is there anythingelse you would like to add?

Interviewee#3: no that is all.

Researcher: Well, again thank you for your time and support.

Interviewee#3: you are welcomed**.**

Interviewee#4:

Researcher: I would like to thank you for allowing me the time and the privilege to interview you for a second time. Today I have two more questions, I promise I will not take too much of your time.

Interviewee#4: ok that is fine

Researcher: During our last interview your answers were very intriguing which help me to come up with this particular question ok there we go ok

Interviewee#4: uhm uhm …

Researcher: ok do you perceive DI can improve students standardized test scores for…to meet …to meet the AYP requirements.

Interviewee#4: yes…yes it can

Researcher: ok

Interviewee#4: it just means that you have… the thing about it…it means you have to go the extra miles you cannot just teach the class as a whole. You have to look at each student as individual you have to look at it as you are trying to meet the need of each student so if you are about meeting the needs of each students then you are going to make sure your lesson plan reflects that. You are going to make sure that your techniques …you are going to make sure that …everything that you do uhm involves uhm …making sure that you are teaching each student.

Researcher: very good. Ok and now last and final question, based on your experience or your observation, how would you describe students' attitude toward DI.

Interviewee#4: for I say that…most of the time I say that you know 98% of the time students tend to be more receptive what I notice this time because I had three students who were retainers

Researcher: uhm

Interviewee#4: and there is one particular student I can't tell you what is problem was I don't know if he was embarrassed but or if it was just laziness …

Researcher: uhm

Interviewee#4: he did not do…he didn't do too well even though we had extra help…I had extra help to make sure that I was able to help him uhm he just wasn't as receptive as the other ones, but you know I worked with him as much as I could have but ..the other students you know just got over the fact of embarrassment that they were retained

Researcher: uhm

Interviewee#4: and they continued to work

Researcher: ok

Interviewee#4: sometimes that has to do with the students' attitude also

Researcher: Ok and that concluded our session for today and thank you so much for your time

Interviewee#4: it was a pleasure

Interviewee#5:

Researcher: I would like to thank you for allowing me the time and the privilege to interview you for a second time. Today I have two more questions, I promise I will not take too much of your time.

Interviewee#5: It is a pleasure

Researcher: You know how every school has the requirement to meet AYP…they have to meet AYP do you perceive DI can improve students standardized test scores enough to meet the AYP requirements.

Interviewee#5: uhm in actuality I don't and the reason that I am going to say that is this although we can impact students in the way that they learn for example for those who learn k**inesthetic** we meet them at their needs for those who are visual learners we meet them at their needs for those are auditory we meet them at their needs but we also have to have the partnership of their parents because as a teacher I can only impact them as much as the parents will support me if I the teacher say ok this is where the child is so they need to practice this skill at home as well would please mom and dad while you are at home supervise that child so he or she can practice this skill, or while you are in the car can you have the child go over the steps would you please quiz them on the skill uhm…you know keep working with them. If you the parent don't tell the child that it is important for them to learn this skill so much so you take out your time to make sure they are learning it regardless of I much I do they are still not going to mastery at a level to be successful .

Researcher: yes you made a good point parents do have to be involved

Interviewee#5: we …we...we can do as much as we can as a teacher but ultimately but we…we have to have the parents piece where mom and dad say look baby I realized that it is hard, I know how you like going outside I know you don't like doing this, I know you don't like to read but as a parent you have to encourage that part because if you are at home and say well child that what you do in school I have something else to do. When the child doesn't see it as a necessity and they see the support then if you don't show them that it is important as a parent regardless of what I say as a teacher it is not going to have the same effect.

Researcher: you are right about that …very interesting ok the next question is based on your experience or your observation, how would you describe students' attitude toward DI.

Interviewee#5: uhm...in my classroom students like…well in any school I believe students get up in the morning with the mindset that they want to learn. I mean they wake up and say I want to have a successful day. Nobody wakes up in the morning and say…I mean adult or child and say you know today is going to be a terrible day I just decided in my mind when I got up this morning something is going to be terrible wrong and I am going to have terrible day I am not going to learn anything today. Nobody wakes up thinking that, everybody wakes up and when they get to school in the morning and they believe when they get to school they are going to learn something. So I believe when students walk up the door to school they are there to learn and they want to be successful now whatever happen in the process of their learning may or may not make that a reality but they come in wanting to learn if we …we really truly are trying to meet

their needs where…uhm… for instance a student verbally say I don't get it so if you say ok let seat down with me one-on-one in a small and you say I believe in you I know you can learn next time let try a different approach, let try a different way and let see if this way will help you than that student will say wow! You care enough about him to take time out …take out to make sure that he can lean , so the student will feel like that he is not stupid there is something that the teacher did not explain to me well and that is why the teacher comes by my desk to make sure I get it uhm …and finally the student will say ok the teacher shows me that there is more than one way to skin this cat so apparently the first way we did it did not work but I don't have to give up because there is another way to address it to make sure that I get it. Uhm … as long as uhm… I the teacher or any other teachers …uhm show that child that is not a waste of their time and they are not frustrated by the fact the student did not get it the first time and they care enough about the student to go back over…to make sure that the student get. So next time… that is really all that matters, so now the student will be confident enough in himself...uhm other students may follow and ask for help when they need because they believe that the teacher is there to truly help them the students will work as hard as they can they make sure that they do their very best on their end for the learning process.

Researcher: alright interviewee#5 thank you so much.

Interviewee#5:oh you are welcomed

Researcher: and you gave me some really… really good information. Before we conclude our session 2 and there anything else you would like to add.

Interviewee#5: No but thank you

CURRICULUM VITAE

3870 68TH AVE. N.E
NAPLES, FLORIDA 34120

PHONE 239 682-4436 • E-MAIL JUNIACE520@AOL.COM

JUNIACE SENECHARLES

OBJECTIVE

To motivate students in order to achieve their learning potential by implementing strategies that are based on their learning abilities and intelligences to help students increase their academic achievements.

WORK EXPERIENCE

2010-2011 Palmetto Ridge High School Naples, Fl
Self-contained 11th =12th grade VE class

2007-2010 Palmetto Ridge High School Naples, Fl
VE Math

2006 – 2007 Palmetto Ridge High School Naples, FL
French & ESE

2005 – 2006 Immokalee High School Immokalee, FL
VE Math & Health

EDUCATION

2008 – 2011 Walden University Minneapolis, MN
Doctor of Education, Teacher Leadership

2006 – 2007 Nova Southeastern University Ft. Myers, FL
Master of Science in Reading

2003 – 2005 Barry University Miami, Florida
Exceptional Student Education/ESOL

2001 – 2003 Brookhaven Community College Farmers Branch, Texas
Associate in Arts

ACCREDITATIONS

Exceptional Student Education
ESOL Endorsement
French K-12

Volunteer Activity	sponsor of the Hip Hop Club Student Advisory Council (SAC) member

LANGUAGES

Fluent in Creole, French