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Teachers' Perspectives: Face-to-Face and Computer-Based Instruction in Math

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COLLEGE OF EDUCATION

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2016

Abstract

Teachers' Perspectives: Face-to-Face and Computer-Based Instruction in Math

for Students With Disabilities

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MA, Virginia State University, 2005

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Doctoral Study Submitted in Partial Fulfillment

of the Requirements for the Degree of

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Administrator Leadership for Teaching and Learning

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Abstract

Differentiated instruction offers opportunities to improve student academic performance, specifically in students with learning disabilities. However, teachers' perceptions of which differentiated-instruction program works best to support differently abled students were unknown. The purpose of this qualitative case study was to explore teachers' perceptions on whether face-to-face instruction using response to intervention or computer-based learning using TenMarks works best in improving the academic performance of students who are differently abled in mathematics, specifically geometry. Constructivism, social disability theory, and Bandura's social learning theory formed the study's theoretical framework. Research questions guiding the study focused on teachers' perceptions of the advantages and challenges of traditional face-to-face instruction versus TenMarks when educating differently abled students. Data were collected through one-on-one interviews and member checking using a purposeful sample with six high school mathematic teachers. Thematic data analysis followed an open coding process to identify emergent themes. The findings showed that teachers perceived advantages and challenges with both instructional models. Further, teachers believed combining the two approaches would be most beneficial as the strengths and weaknesses of the two approaches are complementary, which correlates with disability's social and critical models. This study contributes to positive social change through school administrators and teachers in guiding school policies and practices related to differentiated-instruction approaches in classrooms that include differently abled students.

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Dedication

This dissertation is dedicated to my mother, Audrey Jones, the person from whom I learned love and perseverance. To my husband, Junious, my love, best friend, and boundless cheerleader, your belief in me has never wavered (You make me smile, Boyfriend). To my sons, Brandon and Brehon, my supreme gifts, you are and will always be my greatest inspiration.

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Section 1: Introduction to the Study

Computer-based instruction (CBI) gives teachers a broader range of methods for effectively teaching students with disabilities. Specifically, high school geometry teachers have successfully implemented CBI to increase academic success for students with disabilities (Cheung & Slavin, 2013). Studies have shown CBI's positive effects for various types of students. According to Serin (2011), there was a statistically significant increase in the achievements and problem-solving skills of the students who received CBI in their science and technology classes.

Wolgemuth et al. (2011) explored the effectiveness of CBI in improving the literacy outcomes of indigenous and nonindigenous students. Results showed that significantly higher phonological awareness scores were evident for indigenous and nonindigenous students who received ABRACADABRA CBI as compared to their counterparts in the control group (Wolgemuth et al., 2011). In addition to the benefits of CBI for general education students, such instruction can also be helpful in improving the academic performance of at-risk students who have learning disabilities (Pennington, Stenhoff, Gibson, & Ballou, 2012; Zheng, Warschauer, Hwang, & Collins, 2014).

Clarke et al. (2011) investigated the efficacy of Early Learning in Mathematics (ELM), a 120-lesson kindergarten math curriculum that includes number operations, mathematics vocabulary, measurement, and geometry. A pretest revealed no significant difference in the math scores between the students; however, a posttest revealed that the scores of at-risk students who received the intervention (ELM) were significantly higher than the scores of the at-risk students in the control group (Clarke et al., 2011). In a similar study, Zimmerman, Moylan, Hudesman, White, and Flugman (2011) used a classroom-based intervention to address the concerns of at-risk college math students. Results showed that students in the self-regulated or intervention group performed better in problem solving. Doabler et al. (2012) proposed eight practical guidelines for educators in making core instruction more systematic and explicit for students who have learning disabilities in mathematics. Doabler et al. proposed that the lesson drawn from a popular core math program could demonstrate how teachers can use the guidelines with their existing curriculum.

Torbeyns, Schneider, Xin, and Siegler (2014) claimed that putting more importance on fraction understanding is the key to having math-proficient students. The rationale for this claim was that numerical understanding and arithmetic skill development are easier to acquire than fraction understanding (Torbeyns et al., 2014). Montague, Enders, and Dietz (2011) also studied how to develop math-proficient students, especially students with learning disabilities. Understanding students' proficiencies and needs will provide better information on how to teach students, especially those with disabilities.

Differentiated instruction has been studied to improve academic performance of students, specifically students with learning disabilities such as delayed development in learning (Gearhart & Saxe, 2014). Gearhart and Saxe (2014) reiterated that students should not be isolated from a rigorous curriculum. Gearhart and Saxe (2014) also suggested that integrating diverse learners in a shared mathematical context required differentiated support based on the students' diverse ideas that will promote the learning of everyone in the class. Smit and Humpert (2012) focused on differentiated instruction as a means of improving the teaching culture through facilitating better teacher adaptation to heterogeneous student groups. Results revealed a difference in practices between different teachers with more- and less-developed cultures of differentiated instructions (Smit & Humpert, 2012). More importantly, Smit and Humpert found that team collaboration including pedagogical topics enhances teachers' use of differentiated learning and improves student performance.

Computer-based math programs have been effectively used in teaching mathematics concepts. Many educators use informational communication technology, including computer-based programs, for classroom instruction purposes (Al-Shammari, Aqeel, Faulkner, & Ansari, 2012). Al-Shammari et al. (2012) examined the benefits of using these computer- and web-based programs in teaching critical mathematics point subjects. Results showed that the learning and achievement of participants in mathematics have improved as a result of CBI (Al-Shammari et al., 2012). However, Sunderman and Shaughnessy’s (2013) results did not favor the use of iPad programs because daily flashcard and paper and pencil practice provided fact fluency improvement on a 2-min test.

In summary, the first indicator for priority school identification is graduation. The second indicator is participation and performance. The third and last indicator is Annual Yearly Progress (AYP). Because of the different methods of instruction for students with learning disabilities, it is important to gather information based on teacher perspectives, as explained in the problem statement of the present study.

Problem Statement

The general problem that drove the present study was that 78% of the 240 students at the study school with moderate intellectual disabilities, learning disabilities, and emotional disabilities as well as at-risk students (delayed learners) failed the end-of-year geometry assessments (School Report Card, 2012).[1] Low academic performance, particularly in mathematics, has had serious consequences on students' personal growth (Cave & Brown, 2010), and researchers have found that instructional methods have an important role in students' academic performance (Clarke et al., 2011). However, the specific problem addressed in the present study was the teachers' perceptions of which differentiated-instruction program works best to support students who are differently abled. During the mathematics professional learning community (PLC) meeting on differentiated learning programs at the study school, some teachers expressed concerns with computer-based learning, such as students misusing the computer, computers limiting peer interaction, and computer use negating the value of face-to-face learning strategies. Face-to-face instruction using response to intervention (RTI) and computer-based learning using TenMarks are the two differentiated-instruction programs investigated in this study.

An urban Title 1 school on the East Coast was the focus of the study. Title 1 schools are defined as schools that receive financial assistance through a federal grant because at least 40% of the students enrolled are disadvantaged. The Title I grant

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[1]. To preserve anonymity, citations and references to information related to the study school are not provided.

provides funds to support a variety of services designed to upgrade the entire educational programs for all students, particularly the lowest-achieving students. The grant's overall purpose is to ensure that all children have a fair, equal, and significant opportunity to obtain a high-quality education. In fall 2012, the identified school in the East Coast was chosen as a priority school because fewer than 60% of the students graduated with standard or advanced studies diplomas for 2 or more consecutive years. The students with disabilities did not show the same relative growth in geometry scores as the aggregate. The achievement disparity for students with disabilities was reported in three indicators, graduation, participation and performance, and AYP.

The Special Education Performance Report compared the division performance to the state target performance and revealed that for Indicator 1, graduation, 17% of the students with disabilities graduated from high school with standard diplomas. This percent fell below the state target of 52.76%. On Indicator 2, participation and performance, 78% of the students failed the statewide assessments, and on the third indicator the school failed to make AYP. AYP is a performance indicator based on the 2002 No Child Left Behind Act (NCLB) that determines how every public school and school district in the country is performing academically according to results on standardized tests.

In spring 2013, the students with disabilities performed below grade level in three areas on the geometry Standards of Learning test (SOL): reasoning, lines, and transformations; triangles; and polygons, circles, and three-dimensional figures. More specifically, students with learning disabilities garnered a mean score of 29.0 for reasoning, lines, and transformation; 26.3 for triangles; and 28.4 for polygons, circles, and three-dimensional figures. This resulted in a total mean score of 386.3. What is noticeable is that all of these mean scores are below the average student performance of both male and female genders. The given average scores for the three categories resulted in almost 70% of all the learning-disabled students who took the test receiving a failing mark.

The instructional model for the identified school on the East Coast is based on inclusive classes in which the emphasis is placed on reaching and motivating all learners. The most cited rationale for inclusive education is that it is a human right for students with disabilities to be in mainstream classes. Advocates have argued that segregating students with disabilities from mainstream classes violates the rights of students with disabilities by depriving them of access to the same opportunities available to students without disabilities (Cave & Brown, 2010). From this main principle of inclusive education, one of several policies that have been enacted is the Individuals with Disabilities Education Act (IDEA) of 2004 to ensure that students with disabilities are given the same educational opportunities.

Students in special education who are segregated from mainstream classes are exposed to an educational environment that is restrictive and less challenging, which could possibly affect their success in the future (Cave & Brown, 2010). The restrictive nature of special education can have a negative impact on the social well-being of students (Cave & Brown, 2010).

Because 50% of all geometry students are performing below grade level at the identified school in the East Coast, and it has been identified as a priority school, teachers throughout the school are implementing two differentiated models of instruction: face-to-face using RTI and computer-based using TenMarks. TenMarks is a web-based instructional solution designed to adapt, intervene, assess, and differentiate to reach the entire student population, specifically mainstream students, English language learners, students with special needs, and gifted students. TenMarks has a differentiated curriculum known as a *playlist*. The playlist is automatically generated based on how the student performed on assessments and teacher insight. The software complements the teachers' lessons.

During face-to-face instruction, teachers create local formative assessments to evaluate students' outcomes for the instructional lesson. Teachers use RTI assessment data to support instructional interventions and provide additional supports for students with academic difficulties regardless of a disability classification. Using RTI for measuring improvement among at-risk mathematics students has been found effective in terms of its validity and reliability (Clarke et al., 2011). For the case of Clarke et al. (2011), the program studied used ELM Tier I instruction through an RTI model.

Nature of the Study

In the present qualitative case study, the phenomenon explored was the perceptions of six high school geometry teachers on how best to support improvement in geometry instruction for students with learning disabilities, including at-risk students with poor school preparation. The focus was on face-to-face instruction using RTI compared to CBI using TenMarks. The participating teachers provided their perceptions about the planning, implementation, and evaluation of students' learning based on these two instructional models. Information regarding professional development was collected on each participating teacher. Professional development for teachers serves as an investment that can provide quality personnel (Kober, 2001) instructional strategies for literacy, particular subject matter, diversity, standards, and assessments (Laitsch, 2003; Rothman, 2002).

Qualitative research designs are used to study a particular phenomenon in its environment of existence (Creswell, 2009; Miles & Huberman, 1994). The purpose of the present qualitative case study was to examine teachers' perceptions on which of two differentiated-instruction models (face-to-face using RTI and computer-based learning using TenMarks) works best for improving academic performance for students who are differently abled in math, specifically geometry.

Research Questions

The following research questions were formulated to guide the present study:

Research Question 1: What are the teachers' perceptions regarding the advantages of traditional face-to-face instruction using RTI in promoting learning in geometry for students who are differently abled?

Research Question 2: What are the teachers' perceptions regarding the challenges of traditional face-to-face instruction using RTI in promoting learning in geometry for students who are differently abled?

Research Question 3: What are teachers' perceptions regarding the advantages of CBI using TenMarks in promoting learning in geometry for students who are differently abled?

Research Question 4: What are teachers' perceptions regarding the challenges of CBI using TenMarks in promoting learning in geometry for students who are differently abled?

Purpose of the Study

The purpose of this qualitative case study was to explore teachers' perceptions about which differentiated instructional model, face-to-face instruction using RTI and CBI using TenMarks, best supports the improvement of academic performance in geometry of students who are differently abled. I examined how teachers view the effects of strategies used to enhance students' geometry skills, specifically their perceptions of the advantages and challenges of using both face-to-face instruction and CBI in promoting learning in geometry for students who are differently abled. Finally, my goal was to explore the teachers' perceptions as to which of the two instructional models works best to support differently abled students who experience challenges in performing academically.

Conceptual Framework

This qualitative case study was based on three conceptual frameworks that are discussed next. The three theories are constructivism theory, disability theory, and observational learning theory.

Constructivism Theory

According to the constructivism learning theory, human beings use the interaction between their experiences and their ideas to develop knowledge and meaning for things, occurrences, or phenomena, (Piaget, 1967). Hence, constructivism is a learning theory that identifies how learning occurs. Through accommodation and assimilation, individuals are able to develop new knowledge from their experiences. Assimilation implies that human beings incorporate new experiences into a preexisting framework without changing that framework (Piaget, 1967). Piaget (1967) regarded education very highly and placed great importance on understanding how children learn. In the field of education, constructivism has been used to guide the development of curricula in the theoretical context that learning is an active process wherein students develop fresh ideas or concepts based on their current or past knowledge (Brandon & All, 2010). Brandon and All (2010) used constructivist theory as a basis for curriculum development to accommodate the changing needs of the health care environment. Using constructivism, the present study's concept was guided by the principle that learning is dynamic; thus, the processes surrounding it must also be changing depending on the demands of the situation, especially when dealing with students who have difficulty in learning.

According to Vygotsky (2012), social interaction is a precedent of social development, with socialization and social behavior producing consciousness and cognition among individuals. In the educational sense, social development theory promotes learning contexts wherein students play an active role in learning (Vygotsky, 2012). Unlike the traditional classroom setup where the teacher facilitates learning through instructional models, social development promotes collaboration between teachers and students to facilitate meaning construction in students (Vygotsky, 2012). Thus, social development posits that learning is a reciprocal experience for the students and teacher.

Disability Theory

There are several disability theories that reflect the social, political, cultural, and economic factors that define disability. Among the prominent disability theories is the social model of disability. The social model of disability holds that society has systemic barriers such as negative attitudes and intentional or unintentional exclusion regarding disabled people. Thus, the social model of disability implies that society is the main contributory factor in disabling people (Goering, 2010).

Critical disability theory states that disability is not the inevitable result of impairment; rather, it is a social construct. Disability is a complex interrelationship between impairment, an individual's response to that impairment, and the physical, institutional, and attitudinal environment (Meekosha & Shuttleworth, 2009). The social disadvantages that disabled people experience are the outcomes of the social environment's failure to adequately respond to the diversity presented by disability (Grech, 2009; Inahara, 2009; Meekosha, 2011; Meekosha & Shuttleworth, 2009). As it relates to the present study, to be a society that adequately responds to the needs of students with learning disabilities in mathematics, concerned individuals must determine the proper way of responding to the impairment that the students experience. That is what I aimed to determine in the area of geometry instruction.

A more related and equally prominent disability theory is the medical model of disability (Matthews, 2009; McDermott & Turk, 2011). This model implies that any medical disability in the form of a physical condition contributes to reducing an individual's quality of life, thus bringing disadvantages to the individual's life (Matthews, 2009; McDermott & Turk, 2011). For the present case study, the medical model of disability was the basis of the claim that students with learning disabilities experience challenges in performing academically. Based on this model, there are areas in the life of a person with a learning disability that must be addressed in order to alleviate the disadvantages that the person may experience related to academic life (Matthews, 2009; McDermott & Turk, 2011).

Observational Learning Theory

Observational learning, also known as social learning theory, focuses on the human being's learning patterns based on observation of other human beings (Bandura, 1971). Bandura (1971) stated that several aspects of learning can be influenced through observation. Observational learning can affect behavior in many ways, with both positive and negative consequences (Bandura, 1971). For example, behaviors, both good and bad, can be cultivated in an individual depending on the observations made and the society or specific people who are being observed. In line with this theory, Taylor, DeQuinzio, and Stine (2012) studied how observational learning has improved the academic performance of students with autism and claimed that the ability to learn by observing others is an essential skill for a student's academic success. However, students with learning disabilities have deficits in the fundamental skills necessary for observational learning

(Taylor et al., 2012). Hence, there is a need to address these deficiencies in order to improve ability to learn from observation in these students, which is an essential skill for good academic performance.

Definition of Terms

At-risk math students: At-risk students are generally classified as belonging to at least one of the following categories: minority students, special admission program students, students with poor school preparation, students in low socioeconomic groups, and commuter students (Zimmerman et al., 2011).

Developmental delay: Developmental delay is the presence of a barrier to the full cognitive, physical, and emotional development of students, making them fall behind their average peers in terms of performance (Nam & Chun, 2014). When children have developmental delays, there is a discrepancy between their ability and achievement and the expected perfomance of children of the same age.

Differentiation instruction: Differentiated instruction is tailoring instruction to meet the individual needs of students through content, process, products, or the learning environment (Tomlinson, 2000).

Learning disability: Learning disabilities are defined as a disorder in one or more of the basic psychological processes involved in understanding or using language, spoken or written, that affects a student's learning capabilities. A student with a learning disability does not process information in the same manner as somone who is not diagnosed with a learning disability (Kavale, 2013).

Math-proficient students: Math-proficient students are those who perform well in math courses (Montague et al., 2011; Torbeyns et al., 2014).

Response to intervention (RTI): Response to intervention is a method of academic intervention that involves administering early systematic assistance to children who are having difficulty learning in order to prevent academic failure (Saeki et al. 2011, Stephens, 2013; Stuart, Rinaldi, & Higgins-Averill, 2011). RTI involves tiers of support for student learning intervention. The first tier is the classroom teacher. The second tier involves supplemental instruction from a reading specialist.

Students with learning disabilities: Students with learning disabilities are those who have educational needs beyond that of a regular student because they have delayed development, which is needed for proper learning (Gearhart & Saxe, 2014).

TenMarks: TenMarks is a computer-based math program designed to help students learn mathematics and is purported to meet the individualized needs of each learner (TenMarks, n.d.).

Assumptions and Limitations

Assumptions

My assumptions were important in guiding me to the completion of this study through identifying accepted facts that did not require additional scholarly support because they were accepted to be true. My first assumption was that the data obtained were valid and reliable as I performed member checking and triangulation (Carlson, 2010; Denzin, 2012). My second assumption was that the NVivo 10 qualitative analysis software was a valid tool to analyze data. My third assumption was that participants responded truthfully to the interview questions. My fourth assumption was that the samples gathered for data analysis represented the target population considered in this study.

Limitations

The research included only six participant teachers who have taught mathematics for more than 3 years in an urban Title 1 high school; therefore, the demographic characteristics of participants considered in this study were limited to those who qualified under these criteria, which could have affected the study results. These participants and the site for the study were selected because they purposefully informed an understanding of the study's research problem and central phenomenon (Creswell, 2009). Moreover, this study's results cannot be generalized to be applicable to other populations of students.

Significance of the Study

The insights gained in this research study could contribute to face-to-face and computer-aided differentiated leaning for students with disabilities in geometry, especially in the identified school, which is an urban Title 1 school on the East Coast where students with disabilities did not show relative growth in aggregate geometry scores. According to the school's report card, 78% of the students with disabilities failed the end-of-year assessment. Low academic performance, particularly in mathematics, can have serious negative consequences for students' personal growth (Cave & Brown, 2010). The achievement disparity between students with disabilities at the study school and students with disabilities at other schools in the district were noted on three indicators at the end of the year on the Standards of Learning Test.

Results from this study may provide educators additional knowledge of effective and quality math instruction to better prepare the students with disabilities for academic success. Findings from this study may promote positive social change by leading to increased levels of educational success in math for differently abled students.

Summary

The problem identified for the present qualitative case study was lack of knowledge regarding teachers' perceptions of which of the two differentiated-instruction models works best to support learning for students with disabilities and at-risk students. The two differentiated-instruction models are face-to-face instruction using RTI and computer-based learning using TenMarks. This inquiry included teachers' concerns with computer-based learning, such as students misusing the computer, computers limiting peer interaction, and computer use limiting face-to-face learning strategies. A qualitative case study research design was used for this inquiry. This research approach is used to study a particular phenomenon in its environment of existence (Yin, 2013).

This study was based on four theoretical frameworks: constructivism theory, disability theory, observational learning theory, and social development theory. Terms that were significant to understanding this study were defined based on the most recent scholarly sources. Finally, how the study findings could contribute to the educational system and instructional approaches was stated clearly.

Section 2: Literature Review

Introduction

The purpose of this qualitative case study was to explore teachers' perceptions on which differentiated-instruction program—face-to-face or computer-based learning using TenMarks—works best in supporting improved academic performance in geometry of students with learning disabilities, including at-risk students. By using the research questions that guided this study, I examined teachers' perceptions of the effects of strategies employed for enhancing the geometry skills of differently abled students.

In Section 1, I offered an introduction to the study. The problem for which I sought a solution was that there is little published information on teachers' perceptions regarding which differentiated instruction program works best for supporting the geometry skills of students with disabilities, including at-risk students. By presenting the following literature review, I provide a context to the problem and an evaluation of major studies and theories that are important for understanding the problem that compelled me to conduct this study.

Organization of the Section

Throughout Section 2, I compare and contrast previous studies about subtopics related to the topic of the study, namely, which differentiated-instruction model best supports learning for students with disabilities, including at-risk students. These studies are helpful because they present valuable information for examining the research problem. By comparing and contrasting previous studies, I demonstrate what previous researchers have discovered about differentiated instruction with regard to supporting the learning for students with disabilities and thereby identify the research gap in the literature.

This literature review includes a historical background of efforts to provide a solution for the gaps in U.S. students' academic achievement, which provides a context for the research problem. In this section, I also explain how I devised the research questions based on what is known and not known about academic achievement and differentiated instruction, what is lacking in previous studies on academic achievement, and what should be studied about differentiated instruction, specifically about mathematics and technology-based instruction.

This section is organized as follows: An introduction to the section is followed by the sources of information presented in this section, which cover the background of the study, academic achievement, advantages and disadvantages of differentiated instruction, and teachers' perspective of differentiated instruction. I explain the similarities and differences between various instruction methods as well as introduce RTI, CBI, and TenMarks, the CBI technology that was part of this study. This section also includes information on several applicable theories and methodologies. The section closes with a summary of the major concepts found in the literature review and with a conclusion of the review itself.

Documentation

I conducted a search for pertinent information about differentiated instruction and CBI using a variety of document databases. I searched through journal databases to collect information helpful for the analysis of previous studies about differentiated instruction and teachers' perspectives about CBI. The objective in conducting this search was to provide a clear picture of what has been studied about differentiated instruction and what further studies are needed.

By conducting a comprehensive search, I amassed a large roster of possible information sources. To streamline the process so that I would not waste time reading irrelevant studies, I used specific keywords. The keywords and terms used included *differentiated instruction, differentiated instruction and advantages, differentiated instruction and disadvantages, differentiated instruction and teachers' perspective, computer-based instruction, computer-based instruction and advantages, computer-based instruction and disadvantages, computer-based instruction and teachers' perspective, face-to-face learning, face-to-face learning and advantages, face-to-face learning and disadvantages, face-to-face learning and teachers' perspective,* and *TenMarks Program*.

The studies presented in the literature review were drawn from the following databases: EBSCO, ERIC, SAGE Journals Online, PsycINFO, Taylor and Francis, and PsycARTICLES. The scope of the literature gathered from various databases includes previous studies about the topic as well as guidance to other sources. Most of the studies included in this review were published from 2009 to 2014 to ensure that the information obtained was both accurate and up to date. However, I also included several sources that were more than 5 years old because these studies are significant.

Background of the Study

In 1965, the Elementary and Secondary Education Act was passed. This national legislation marked the first step to address gaps in academic achievement based on race, ethnicity, and socioeconomic status (Hoy, Tarter, & Woolfolk Hoy, 2006). In 1966, the Coleman Report, a major study that addressed which strategy was more likely to equalize educational opportunities for poor minority students—compensatory education or racial integration—sparked a heated debate among educators across the United States. Eventually, parties in the debate concluded that school characteristics are more influential than family background characteristics in explaining the gaps in academic achievements that had been observed in schools up to that time (Barton & Coley, 2009). After years of studying the possible causes of academic achievement gaps in schools, researchers found that socioeconomic factors affected students inside and outside the school setting, which can weaken students' academic achievement potential (Barton & Coley, 2009). Over the years there have been efforts to minimize the inequalities that lead to poor academic achievement. There is a growing body of literature on new perspectives and practices to improve the performance of at-risk students. Differentiated instruction and technology-based teaching are some of the practices being implemented to improve the academic performance of at-risk students (Hoy et al., 2006).

During the latter part of the 1970s, researchers concluded that academic performance benefited from favorable learning environments and quality instruction (Hoy et al., 2006). Some researchers focused on school characteristics. According to Fleischman and Heppen (2009), the assessment and accountability mechanisms of standards-based school reform have acted as a “dynamic engine, driving the search for demonstrably more effective programs and practices” (p. 107) for turning around low-performing schools. School accountability is, therefore, an important performance indicator for schools.

A simple solution for eliminating the persistent gaps in academic achievement is elusive despite a broad spectrum of strategies that can be used for improving the academic performance of at-risk students. Among these strategies are intensive academic interventions (Cleary, Platten, & Nelson, 2008), adolescent literacy initiatives (Diamond, Corrin, & Levinson, 2004; Snipes & Horwitz, 2008; Wise, 2008), direct instruction (Grossen, 2002), group counseling and mentoring programs (Bemak, Chi-Ying, & Siroskey-Sabdo, 2005; Bruce, Getch, & Ziomek-Daigle, 2009; Mason & McMahon, 2009; Wyatt, 2009), service learning (Scales, Roehlkepartain, Neil, Kielsmeier, & Benson, 2006), and tutoring (Hock, Deshler, & Schumaker, 2001; Nesselrodt & Alger, 2005; Roskosky, 2010). Additional options include after-school programs (Martin, Martin, Gibson, & Wilkins, 2007; Tucker & Herman, 2002), graduation coaching (Lacefield, Zeller, & Van Kannel-Ray, 2010), and eliminating tracking and ability grouping to provide all students with access to an advanced curriculum (Boaler, 2006; Burris & Welner, 2005). Researchers have studied the effect of innovative school-wide models such as First Things First (Connell, 2003; Connell & Broom, 2004; Connell & Klem, 2006; The Institute for Research and Reform in Education, 2003) and school restructuring to create small academies and learning communities in large urban high schools (Darling-Hammond & Friedlaender, 2008; Fleischman & Heppen, 2009).

Teaching Students With Learning Disabilities

Approximately 13% of the nation's infants and toddlers are likely to have delays that would make them eligible for early intervention based on assessments of their cognitive and motor development (Rosenberg, Robinson, Shaw, & Ellison, 2013). In a study conducted on students with learning disabilities, McLeskey (2011) focused on learner-centered professional development for teachers who work with these students. In traditional concepts of professional development, most approaches have been expert-centered, which has been found to have a negligible influence on teacher practices and student performance (McLeskey, 2011). In contemporary learner-centered professional development, an effective approach to teaching has been demonstrated in order to change several common practices of teachers both in general and special education classrooms, thus also improving student performance (McLeskey, 2011). In a learner-centered professional development approach, learners' rights and responsibilities are addressed and their needs and concerns are prioritized (McLeskey, 2011).

Effectively educating students with learning disabilities partly depends on the teachers' beliefs about the nature of disability. Moreover, teacher effectiveness depends on their roles and responsibilities in working with students with special education needs (Kavale, 2013). Moreover, Kavale (2013) stated that classroom teachers who believe that students with learning disabilities are part of their responsibility are more likely to have higher overall effectiveness levels with all of their students.

Differentiated Instruction

Tomlinson (2013) described differentiated instruction as a teaching philosophy based on the premise that teachers should adapt instruction to student differences. Rather than marching students through the curriculum lockstep, teachers should modify their instruction to meet students' varying readiness levels, learning preferences, and interests. Therefore, the teacher proactively plans a variety of ways to "get at" and express learning (Tomlinson, 2013, p. 83).

Some researchers have focused on whether brain research principles influence differentiation of instruction to students (Chamberlin & Powers, 2010). Three principles were discovered relative to brain research—emotional safety, appropriate challenge, and self-constructed meaning—suggesting that a single approach in classroom teaching is not effective for most students and might even be damaging to some students (Tomlinson & Kalbfleisch, 1998). Students have different emotional reactions and standards and they perceive meaning differently. As such, their needs are different. Thus, learners' particular needs must be addressed if learning and teaching are to be effective.

Differentiated instruction in the classroom setting is different from traditional instruction because the process calls for teachers to consider the students' needs, especially when planning instruction (Tomlinson, 2005). Differentiation includes providing varied instruction methods such as whole group instruction, small group instruction, and individualized instruction. Researchers have also suggested that differentiated instruction is most effective when the learners are grouped by similar hobbies, readiness levels, and learning styles. Grouping together students with similar scholastic competencies and learning styles could make classrooms more productive for students. Scigliano and Hipsky (2010) also stated that learning profiles and interests should be considered first and that teachers must cater to each learner's strong points.

Differentiated instruction can help individual learners build on their strengths (Algozzine & Anderson, 2007). In K–12 programs, teachers are pressured to meet state and federal standards as well as work through the everyday stress of preparing lesson plans and ensuring that students are engaged. Despite teachers' best efforts, there are still students who are not engaged in class discussions or activities. According to Algozzine and Anderson (2007, p. 49), "Many argue that it is not at all idealistic to think that K-12 teachers can differentiate instruction to meet all children's needs while also adhering to standards and state performance testing." Algozzine and Anderson stated that differentiation requires teachers to know how students differ in their learning processes by getting to know the students' hobbies and interests.

Some teachers are skeptical about differentiated instruction (Manning, Stanford, & Reeves, 2010). However, researchers have suggested that differentiated instruction gives teachers opportunities to get to know each student's strengths and weaknesses and, once equipped with that knowledge, the ability to assess which type of teaching they should implement so that each student can learn effectively (Fuchs & Vaughn, 2012; Pentimonti & Justice, 2010; Reis, McCoach, Little, Muller, & Kaniskan, 2011). By providing instruction tailored to each student's needs, teachers can help students feel good and have a positive outlook about learning and teaching. With differentiated instruction, teachers can witness improvements in both student engagement in the classroom and student achievement.

In summary, differentiated instruction involves responding to the instructional needs of individual learners (Tomlinson, 2005). To provide differentiated instruction in the classroom, the teacher forms small groups of students based on each similar strengths and weaknesses among the students. By grouping together students according to their instructional needs, the teacher can limit the size of the group based on each group member's instructional needs. The teacher's instruction depends on the skill levels of the students in the group, as does the frequency of meeting with each group. Typically, groups with at-risk students need to meet more frequently and for longer periods. Differentiated instruction is one of several strategies teachers can use to ensure that each student's needs are being met, but the debate continues on whether differentiated instructions' advantages outweigh its disadvantages.

Advantages of Differentiated Instruction

The greatest advantage of differentiated instruction is its ability to empower teachers to connect to all the students and provide students different paths to understand the material they are studying (Dosch & Zidon, 2014; Stetson, Stetson, & Anderson, 2007; Watts-Taffe et al., 2012). When teachers present material without addressing each student's individual needs, students can become lost in the lesson. Getting lost in the lesson is especially damaging when the subject is mathematics because students need to learn foundational concepts to better comprehend the more complex concepts. In differentiated learning, students are presented with approaches to understanding concepts in ways that match their own skills and abilities. In classrooms where teachers practice differentiated instruction, students do not fall behind or experience the snowball effect. In fact, students gain more confidence in who they are and what they can do. For students who become lost in a lesson that was administered using strategies that do not meet their skills, abilities, and ways of learning, the learn aids of differentiated instruction can help put those students back on track. The learning aids of different instruction can be integrated into any curriculum and any lesson in the classroom.

Disadvantages of Differentiated Instruction

Differentiated instruction is a characteristic of quality instruction. Teachers provide differentiated instruction to help each learner develop his or her skills through methods that are tailored to the learner's needs. In a perfect classroom setting, the teacher uses differentiated instruction to make sure that each learner masters the essential skills needed in each topic and each subject. However, differentiated instruction has some drawbacks.

Effective differentiated instruction is complicated and has been reported as being difficult to promote in schools (Casey & Gable, 2012; Lightweis, 2013; Pham, 2012). First, it is challenging to implement differentiated instruction in a classroom containing more than 20 students. The ideal size for a group of students receiving differentiated instruction is three to five. If there are 25 students in the classroom, then the teacher must deliver differentiated instruction effectively to at least five groups. Without professional staff to assist the teacher, the teacher's workload of providing differentiated instruction to at least five groups is onerous, which is the second problem. One teacher alone cannot provide differentiated instruction to a full classroom of students. Working as a lone teacher, he or she might be able to design activities and develop the lesson plans, but implementing the activities and plans would be difficult for that lone teacher to do. Most schools cannot afford to have more than one teacher or professional staff in a classroom.

Teachers also hesitate to apply differentiated instruction because they do not have the resources, administrative support, and parental support needed (Casey & Gable, 2012). Differentiated instruction requires an assortment of materials and resources that the teacher uses to cater to each student's individual needs. For example, tactile learners prefer to learn using hands-on activities while visual learners prefer to see how a task is accomplished. Most schools cannot afford to have both manipulatives and videos on the use of manipulatives available all the time. The lack of administrative support stems from the background of the teachers and school administrators. Most school administrators tend to follow traditional practices, which include not moving students from activity to activity. Differentiated instruction requires collaboration between teachers and school administrators to manage how students learn. Parents have influence over the differentiated instruction's effectiveness, particularly if they are aware of their child's individual needs. Parents who grew up with traditional practices in school may not be aware that differentiated instruction is an option. Teachers need to collaborate with parents so that the lessons learned at school are reinforced at home. Finally, some teachers are reluctant to implement differentiated instruction because they prefer traditional methods.

Teachers' Perspective on Differentiated Instruction

Stetson et al. (2007) questioned 48 elementary school teachers who spent a semester implementing differentiated instruction on why some implemented differentiated instruction in their classrooms and whether differentiated instruction has a positive impact on student achievement. Stetson et al. had the teachers read Heacox's *Differentiating Instruction in the Regular Classroom: How to Reach and Teach All Learners, Grades 3-12* and then met with the teachers five times during one semester before the teachers implemented some of the ideas. The teachers were encouraged to differentiate not only in lesson planning but also in incorporating the students' learning styles and preferences. The teachers helped one another and provided feedback on which ideas they believed were effective for engaging students in the lesson.

In a span of one semester, the teachers taught 193 different lessons and gained experience with differentiated instruction (Stetson et al., 2007). After each lesson, the teachers submitted a learning log about the lesson's objective, the pretest results, differentiated instruction, the posttest results, and their reflections on what they learned about their students and how their students responded to the lessons in the classroom. Stetson et al. (2007) asked the teachers two key questions about the greatest benefits and biggest problems associated with differentiated instruction.

Perceived benefits. The 48 teachers identified 74 benefits, which Stetson et al. (2007) grouped into five categories.

- Students were more motivated in learning. Students showed more interest and maintained a higher level of energy for activities in class.

- Students' needs were being met. Students with the same skills and same interests were able to work together.
- Students experienced success and relevant learning. The teachers noted that the quality of the students' work improved with differentiated instruction.
- Students were more confident in their work and performances. The students were more eager to share what they had learned in class.
- The teachers gained more insights. The teachers learned about their students and about how their students learn and work.

These perceived benefits are considered the basis for using differentiated instructions. Moreover, because these are teacher-perceived benefits, the information teachers provided was relevant and valid because they were involved in the actual performance of differentiated instruction with students and they saw firsthand the benefits mentioned

Perceived challenges. Participants in Stetson et al.'s (2007) study cited 36 problems they encountered with differentiated instruction. The researchers grouped the problems into two categories. The first category represented the difficulty of the learning curve. Most teachers stated that differentiating instruction and incorporating every aspect of the lesson was intimidating for them and even overwhelming. The second category involved finding the time and resources to conduct differentiation instruction. A teacher's job is demanding enough with daily schedules and requirements. However, despite the perceived challenges of differentiated instruction, Stetson et al. noted that most teachers agreed that the perceived benefits to students who received differentiated instruction outweighed the challenges.

Casey and Gable (2012) explored the perceived efficacy of differentiated instruction among novice teachers by using a two-phase sequential mixed method to assess perceptions of teacher efficacy in differentiated instruction. The researchers found there was no significant relationship between teachers' tenure and their self-efficacy. They also found that teachers' self-efficacy relative to differentiated instruction was positively associated with teachers' feelings of preparedness. New teachers stated that they did not feel prepared to deliver their lessons using differentiated instruction when they lacked ample time to prepare for the lessons. As such, the teachers' actions resulted in unintentional implementation of only superficial differentiation rather than a deep understanding and implementation of differentiation (Casey & Gamble, 2012).

Differentiated Instruction and the Traditional Classroom

The many ways in which differentiated instruction is used in the traditional setting compared to face-to-face learning are presented in Table 1. It is unrealistic to believe that all aspects of differentiated instruction can be applied to all classroom settings in schools due to various factors. The aim of presenting this comparison is to convey how differentiated instruction can be used in some aspects of face-to-face learning.

Table 1

Comparison Between Traditional and Differentiated Classrooms

Traditional classroom	Differentiated classroom
Student differences are seen as problematic	Student differences are the focus of lesson planning
Assessment is done to determine who among the students understood the lesson	Assessment is primarily done to understand each learners' learning styles and to be more responsive to the needs of individual students
There is a narrow definition of intelligence	There are multiple forms of intelligence
Excellence has one single definition	Excellence is defined by the progress the learner has made from the start
The interests of the students are not taken into consideration	The interests and preferences of the students are considered in planning the lesson, the instruction and the activities.
Only a few learning profiles are taken into consideration	A wide array of learning profiles are provided especially during the delivery of the lesson
Whole-class instruction is frequently used.	Many instructional set-ups are used such as whole-class, small group, peer tutoring and individual learning
The instruction is usually based on the coverage of texts and curriculum	The performance, capabilities, readiness level, and interests of the students will be the basis of the instruction
Only one type of assignments are available	There are different options for the assignments which will be based on the abilities of the student
Dependent on one textbook or material	Various materials are provided to the students
There is only one interpretation	The classroom environment promotes multi-perspectives
The teachers solves the problems	The students solve the problems together with other students and the teacher
One method of assessment is used	Different ways of assessment

Note. Adapted from *How to Differentiate Instruction in Mixed-Ability Classrooms*, by C. A. Tomlinson, 2001, p. 27. Copyright 2001 by C. A. Tomlinson. Reprinted with permission.

Differentiation and Small Group Instruction

Small group instruction provides some benefits when it comes to meeting the needs of all students in one class. Small group instruction is different from the traditional method of instruction because it allows learners to develop their learning on their own. Small group instruction encourages independent thinking as the teacher is not always going to be there for the students (Peterman, 1991). In small group instruction, the learner reflects on his or her learning opportunities, which are based on constructivist approaches. In this type of instruction, “Learners gain respect in a constructivist environment. There is a bond between students and teachers in the constructivist classroom; ‘They all have one common purpose to be engaged in meaningful dialogue with each other’” (Faryadi, 2006, p. 1). Faryadi (2006) also stated that pairing up or grouping students for instruction purpose allows students to learn independently and prepares them for working with other people. Zuckerbrod (2011) suggested that even though the practice is to group students according to their academic ability, it is better and more effective to group students according to their learning styles and preferences.

Face-to-Face Learning

Face-to-face learning involves students and instructors meeting together in the same place at the same time. In other words, sessions in face-to-face learning are synchronous (Stone & Perumean-Chaney, 2011). A face-to-face session is a live meeting with all the participants present. Studies have shown that face-to-face interaction with learners helps break down barriers and provides real experiences as well as networking prospects that lead to developing and maintaining relationships with one another.

There are usually no communication technologies required in face-to-face learning sessions, but some instructors use overhead projectors and LCD cameras. Other media instructors might use handwritten notes, drawings, physical objects, and artifacts for emphasizing points in the discussion. In some face-to-face sessions, learners also watch videos to gain better understanding of a concept.

Advantages of Face-to-Face Learning

A face-to-face learning session offers some advantages to students such as more opportunities to interact with one another and experience the traditional method (Castle & McGuire, 2010). A classroom with face-to-face instruction has social benefits because the learners can together with their peers (Paechter & Maier, 2010). In the case of higher education, students can make connections that may benefit them in their professional lives. Further, students can participate in the lectures, which can help build their confidence and allow them to share their knowledge and opinions (Lewandowski, Rosenberg, Jordan Parks, & Siegel, 2011). If learners in face-to-face learning environments do not understand a topic, they can simply interrupt the class to ask for explanations.

Students used to traditional instructional methods might find the pacing of online classes difficult to master. In face-to-face learning sessions, the instructor is more hands-on with the learners and the lessons (Lewandowski et al., 2011; Paechter & Maier, 2010) as compared to online instruction. Rather than relying on one or two textbooks, watching video lectures, and engaging in self-directed activities, face-to-face sessions rely on the instructor’s accumulated knowledge, provide more chances for interaction between learners and the instructor, and allow opportunities for the instructor to guide the students during activities (Castle & McGuire, 2010; Paechter & Maier, 2010). However, despite the perceived advantages of face-to-face learning, there are also some disadvantages to this approach.

Disadvantages of Face-to-Face Learning

Face-to-face learning has some disadvantages, which include rigidity and difficulty when travel is considered (Paechter & Maier, 2010). Scheduled classes mean that a meeting time is predetermined and is unlikely to be subject to change (Turbill, 2015). As such, students who participate in face-to-face learning must work their personal schedules around their academic schedules. If a student is too ill to attend the class or has an emergency, then he or she has no recourse but to be absent from class. Working students may find it difficult to balance their work and school schedules; they may be forced to choose between getting quality education and earning the means to live.

Another disadvantage of face-to-face learning is travel considerations (Paechter & Maier, 2010; Stone & Perumean-Chaney, 2011). In face-to-face sessions, students must be physically present to get credit for their attendance. Some students have lengthy commutes. There are also instances in which inclement weather makes travel difficult for commutes and punctual arrivals.

Computer-Based Instruction (CBI)

Computer-based instruction (CBI), also known as computer-assisted instruction, was introduced in the education field in the 1950s (Sosa, Berger, Saw, & Mary, 2011). Pask and Moore, researchers at IBM, pioneered this movement. However, it was during the 1960s when CBI theory truly developed, aided by federal funding. With the government's backing, two programs were established: time-shared interactive computer-controlled information television and programmed logic for automatic teaching operation (Torgesen, Wagner, Rashotte, Herron, & Lindamood, 2010). Time-shared interactive computer-controlled information television was about teaching higher order concepts through the rule-example system, a system used as a way to store and manipulate knowledge in order to interpret information in a useful way. The audience for this project was adult learners. Programmed logic for automatic teaching operation was a computer-based training network that catered to library users (Torgesen et al., 2010).

As computer technology evolved, CBI also evolved. In the 21st century, CBI is used in various learning programs worldwide. Any program that involves computers, CD-ROMs, and DVDs is based on CBI. CBI can also be used with traditional teaching methods to ensure that learners have quality educational experiences. More complex lessons, especially those in science and mathematics, can be delivered through CBI (Aqda, Hamidi, & Rahimi, 2011). With CBI, students learn in a more effective and more reflective way. Even if students cannot physically attend school, they can be given a chance to learn through CBI.

CBI has many uses, including simulations, practice, tutorials, instructional games, and honing problem-solving skills (Fard, Asgary, Sarami, & Zarekar, 2014). Simulations are representations of real situations in which students can actually apply what they have learned. Aeronautics, nursing, and medicine are among the industries that use simulations to ensure that the students have learned empirically and will be ready if they encounter the situations in real life. With CBI, learners can practice using only a few resources. They can also practice whenever and wherever they want as long as they have the hardware and software needed. With CBI, learners can have access to tutorials, a feature that can be especially helpful for learners who are experiencing difficulty in class. Instructional games are one of the most popular CBI applications because they allow students to learn about a specific topic while playing a game. CBI can also help students hone their problem-solving skills as it can provide various scenarios tailored to students' needs.

Advantages of CBI

CBI offers numerous advantages. First, it is highly interactive (AbuSeileek, 2012). As such, it can motivate students to learn. CBI can also provide immediate feedback to the learner, as opposed to traditional method (AbuSeileek, 2012; Paechter & Maier, 2010). One of the major reasons why students prefer CBI is because CBI offers convenience (Khatib, 2013; Mama & Hennessy, 2013). With CBI, students can choose where and when to do coursework. Students who use CBI can also develop their Internet and technology skills. Some students prefer CBI because it offers multisensory appeal (Oğuz, 2011; Paechter & Maier, 2010). CBI learner records can be stored for a long time (Aldunate & Nussbaum, 2013). CBI can be easily adjusted depending on the learner's skills and abilities (Aldunate & Nussbaum, 2013). CBI uses a dynamic process and can be presented in multiple forms. Most importantly, CBI requires less preparation and administration time than a whiteboard.

Disadvantages of CBI

CBI also has its disadvantages (Castaño-Muñoz, Sancho-Vinuesa, & Duart, 2013). First, self-discipline is a required behavior, and students who do not have it must develop it. With CBI, learners without self-discipline might not learn as effectively as their peers. Students tend to enjoy interaction with instructors and their peers, which can only be done virtually with CBI. Even though instructors are available in various ways with CBI, the interpersonal relationship is still not the same. Moreover, misunderstandings and miscommunications are also widespread in CBI, especially because learners have to provide context and to decode the meaning from electronic messages, which is difficult for some to do.

Overly simplified applications might be moderately effective tools but also might not be the best way to use a computer. Developing CBI takes more time than developing other instructional methods and is also expensive (Aldunate & Nussbaum, 2013). More importantly, not all subjects can be supported by CBI. CBI might also be limited by modes unless a multimedia aspect can be integrated with it.

Teachers' Perspectives of CBI

Teachers are key players in the effective integration of teaching and learning. Results from several studies have shown technology's effectiveness for classroom instruction (AbuSeileek, 2012; Aldunate & Nussbaum, 2013; Aqda et al., 2011; Lee & Tsai, 2011; Marchand & Gutierrez, 2012). However, only a few researchers have addressed teachers' perspectives about CBI.

Early studies about teachers' perspectives on using technology in classroom instruction often did not adhere to embraced principles of teaching methods and teaching principles (Ertmer, Ottenbreit-Leftwich, Sadik, Sendurur, & Sendurur, 2012; Kim, Kim, Lee, Spector, & DeMeester, 2013; Kopcha, 2012; Mueller, Wood, Willoughby, Ross, & Specht, 2008; Hermans, Tondeur, van Braak, & Valcke, 2008). Teachers' beliefs and readiness greatly influence integration of computers and CBI in classroom instruction (Inan & Lowther, 2010). Researchers have reported that this influence was partly due to external factors that prevented the teachers from effectively using technology in a way that aligned closely to their beliefs (Aldunate & Nussbaum, 2013; An, Kim, & Kim, 2009; Inan & Lowther, 2010). On the other hand, some researchers have stated that perceived barriers do not predict technology use (Blackwell, Lauricella, Wartella, Robb, & Schomburg, 2013). Nonetheless, many external factors, such as access to technology and support from the administration, have been eliminated from most schools.

External barriers to technology use were the focus of Kopcha's (2012) study. Kopcha examined 18 elementary school teachers' perceptions about the barriers to technology integration. Study results indicated that teachers had positive perceptions regarding access and beliefs about technology integration after 1 year of mentoring. However, perceptions grew negative over time because the teachers had difficulty practicing what they learned without a mentor. Kopcha suggested that there should be a program for eliminating these external barriers to changing the way in which teachers perceive technology. This suggestion echoed that made by Ertmer et al. (2012). Another study about teachers' beliefs regarding the benefits of technology use in classroom instruction showed that several variables influenced teachers' beliefs such as the teacher's comfort with using computers, positive teaching experiences using computers, and support from the administration for resources (Mueller et al., 2008). In a similar study, researchers explored the relationship between teachers' educational beliefs and their typical approach to computer use in the classroom. Hermans et al. (2008) surveyed 574 elementary school teachers and found that teachers with strong constructivist beliefs who also had strong traditional beliefs reported a higher frequency of computer use.

One study examined the factors perceived by in-service teachers as either facilitating or impeding successful completion of online group work in a virtual graduate school of education program. An et al. (2009) concluded, through a quantified qualitative data analysis of open-ended questions, that there are five factors that facilitate learning using computers and online instruction: "(a) individual accountability, (b) affective team support, (c) the presence of a positive group leader, (d) consensus building skills, and (e) clear instructions" (p. 81). An et al. (2009) also identified factors that impede learning using computers and online instruction, including lack of individual accountability, technology problems, unclear instructional guidelines, challenges of written language, and lack of a leader in the group.

One study's focus was on developing a model to predict the level of technology acceptance of preservice teachers as opposed to in-service teachers (Teo, 2009). There were 475 participants in this study. Teo (2009) tested a hypothetical model and found it to be a good fit. Perceived usefulness, attitude toward computer use, and computer self-efficacy were found to have a positive impact on the preservice teacher's acceptance toward using technology. In a follow-up study, Teo (2011) also noted that only a handful of researchers have developed a model to explain teachers' intentions regarding technology use in the classroom. Teo (2011) collected data from 592 teachers in Singapore on perceived usefulness, perceived ease of use, facilitating conditions, and attitudes toward technology use in the classroom. Teo (2011) found that these matters had a significant influence on teachers' intention to use technology while subjective norms were not found to be a significant factor in influencing the teachers' intention to use technology.

Ifenthaler and Schweinbenz (2013) examined the acceptance of tablet PC usage in the classroom and found diversity in teachers' attitudes toward using tablet PCs in classroom instruction. The main reasons reported were performance expectancy and the facilitating conditions. Aside from computer-based learning, there is also face-to-face learning, which is the traditional form of learning.

Face-to-Face Learning Versus CBI

In this section, I compare and contrast face-to-face learning with CBI. There have been many studies conducted about learning in face-to-face settings. Teachers have developed strategies on how to teach effectively using face-to-face learning. However, it is not reasonable to assume that the skills and strategies used effectively in face-to-face learning can be applied to CBI or online learning. McConnell (2000) compared face-to-face learning and CBI, as shown in Table 2.

Table 2

Comparison of Face-to-Face Learning and Online Instruction

Factor	Online	Face-to-face
Instructor control	Less control from the instructor Easier for participants to not pay attention to instructor	Instructors are seen as leaders in class Not easy for participants to not pay attention to the instructor
Attendance	No latecomers or early leavers	Some people come late or some people leave during the session
Mode	Discussion through texts Structured Limited discussions	Verbal discussions Unstructured Unlimited discussion
Physical environment	Do not need to meet in a room at the same time No shared physical environment	Meet in a room at the same time Strong experience of shared physical environment
Time	Meeting is different from face-to-face meeting because there is no scheduled date or time Deadlines are flexible Less controllable	Strong sense of when and where the group meets Deadlines are not flexible Controllable
Discussion	Simultaneously discuss issues Less condensed When discussion stops, it will restart in the next session High levels of reflection Conversations can be reshaped during discussion	Discuss one issue at a time Condensed and focused Discussions are usually completed during one session Little time for reflection Less probability of conversation being reshaped

(table continues)

Factor	Online	Face-to-face
Group work	Members of a group have to learn how to interpret messages from other members	Most members have past experience of group work; no need to adjust
	Members are less anxious	Members are anxious
	Has equal participation	Has unequal participation
	Slower because of time delays	Quicker because of immediate interactions
Accessing other groups	Can access other groups easily	Does not have access to other groups
	Can participate in other groups	Cannot participate in other groups
Media effects	Effects of technology	Effects of room
Feedback	Feedback is detailed and focused	General feedback
	Textual feedback only	Verbal or visual feedback
	Delayed reactions	Immediate reactions
	Group can look at all the members' work at the same time	Group looks at one member's work at a time

Note. Adapted from *Implementing Computer-Supported Cooperative Learning*, by D. McConnell, 2000, p. 126. Copyright 2000 by D. McConnell. Reprinted with permission.

A government study conducted in 2009 included a comparison of literature published between 1996 and July 2008 about student learning in face-to-face classrooms and online courses. The analysts filtered the studies with the following criteria: "(a) contrasted an online to a face-to-face condition, (b) measured student learning outcomes, (c) used a rigorous research design, and (d) provided adequate information to calculate an effect size" (Means, Toyama, Murphy, Bakia, & Jones, 2010, p. 4). Using these inclusion criteria, Means et al. (2010) incorporated 50 studies in their meta-analysis. Based on their comparisons of the studies, Means et al. (2010) concluded that online courses might be slightly better than face-to-face classroom instruction because students who took all or part of their class online performed better, on average, than did students who took the same courses through traditional face-to-face instruction (Means et al., 2010). However, Means et al. (2010) did not consider the amount of time each learner spent on the task at hand.

Means et al. (2010) concluded that blended learning—a combination of face-to-face instruction and CBI—offered greater advantages than purely face-to-face instruction or purely CBI. Moreover, findings indicated that learners spent more time in online learning settings than in face-to-face instruction, which explained why students benefitted more from CBI or online instruction than from face-to-face instruction. Elements such as online quizzes or watching videos do not appear to influence the amount that students learn in online classes. However, providing online quizzes does not seem to be more effective than the traditional methods of giving homework.

Lee and Tsai (2011) evaluated students' perspectives on three different methods of instruction—collaboration, self-regulated learning (SRL), and information-seeking learning (ISL) in both Internet-based and traditional face-to-face learning contexts. The study explored "(1) potential differences of students' perceptions between Internet-based and face-to-face learning environments and (2) potential differences in the three aspects in relation to learners' attributes and the use of the Internet and enrollment in online courses" (Lee & Tsai, 2011, p. 906). Study results showed that students favored CBI, and they perceived higher levels of collaboration (SRL and ISL) in online learning as compared to the traditional face-to-face method.

In higher education, more instructors are choosing to deliver their courses online. However, there are still some instructors who hesitate to adopt online classes, believing they will have difficulty in transferring their traditional face-to-face classes into the online or computer medium (Turbill, 2015). Some instructors have provided information on the differences they have noticed between online learning and face-to-face learning. The first thing instructors have noticed was that students had more time for online learning than for face-to-face classes.

However, in terms of building a safe, risk-free environment, face-to-face learners were the first to develop this environment, well ahead of online learners. In online learning, the students behaved formally at first (Ottenbreit-Leftwich et al., 2012). The teachers also experienced difficulties in terms of using electronic resources to support teaching and learning (Ottenbreit-Leftwich et al., 2012; Turbill, 2015). Proctor and Marks (2013) examined the perspectives and in-class game usage of 259 award-winning educators from the 1996 to 2009. Results indicated that overall perceptions differed by subject area. Proctor and Marks noted that there were differences in the perception of game use among primary and secondary teachers, with primary teachers using games more than the secondary teachers.

Díaz and Entonado (2009) conducted a similar study to compare face-to-face learning and CBI with the objective of determining superiority. However, the authors focused on the teacher’s functions in each setting. Díaz and Entonado concluded that there were no notable differences in the teacher’s functions in face-to-face instruction and online learning. Any differences between the two instructional methods were actually the consequences of the teacher's involvement level.

In the search for related literature, I also found some articles on online instruction and teaching and learning of mathematics. Aqda et al. (2011) compared the effect of traditional face-to-face instruction and CBI on students' creativity in math classes. Fifty-seven students participated in the study. Results showed that CBI was more supportive of students' originality than was the traditional method of teaching mathematics. Suppes, Liang, Macken, and Flickinger (2014) examined CBI's impact on underachieving students of low socioeconomic status. Suppes et al. studied the effect of using computer-based online math and language arts courses developed by Stanford University over a 4-year span and found that technological support increased underachieving students' achievement, especially when motivated teachers guided these students. Sheriff and Boon (2014) conducted a similar study to examine the effects of using Kidspiration 3 software, a computer-based graphic organizer, to teach students with mild intellectual disability to solve one-step word problems. The results indicated that students improved their ability in solving one-step word problems using computer-based organizers as compared to traditional methods of teaching these students how to solve these problems (Sheriff & Boon, 2014).

Response to Intervention (RTI)

The Individuals with Disabilities Education Act mandated the RTI system (Murawski & Hughes, 2009). The RTI approach is a systematic method for identifying students with learning disabilities or at-risk students. The approach involves numerous levels of intervention, the overall aim of which is to help students maximize their achievement and reduce behavior problems (Murawski & Hughes, 2009). The RTI process starts with high-quality instruction from teachers as well as universal screening for all students in the classroom. Students identified as struggling are provided with interventions at intensity levels specific to their developmental learning level. General education teachers as well as special educators can provide RTI services. Learners are monitored regularly to evaluate their learning rate and performance level progress. Decisions about the intervention's intensity and length are determined by the student's response rate. The following essential components of the RTI approach must be implemented regularly and strictly:

- All students must receive high-quality instruction in the classroom, preferably using a proven scientific approach.
- There must be regular assessment to provide constant monitoring of the student's performance progress and response to the intervention.
- A multitier approach should be used to effectively differentiate instruction for all types of learners.
- Parents should be involved in the implementation of the RTI approach used for their children so that their children achieve holistic development.

Each of these essential components is important for RTI's effectiveness. There is no single practice of the RTI process; however, most users implement the three-tier model of the RTI approach, which is supported by findings from several studies. Tier 1 involves the quality of classroom instruction that the learner experiences as well as the screening process and possible intervention practices. If the learner does not make adequate progress in the regular classroom in Tier 1, then the learner is provided intensive instruction based on his or her needs and performance in Tier 2. If the learner does not demonstrate adequate progress at Tier 2, then Tier 3 is implemented. In Tier 3, the learner receives intensive individualized interventions that specifically target the skills the learner must improve.

Several studies have been conducted on the RTI approach and students who have difficulty in mathematics. Haugen (2012) explored the effects of the Delta Math as an RTI program based on the mathematics scores on state assessments. Haugen found a significant positive correlation between student success in Delta Math and student success in math performance on the state assessments.

Bryant et al. (2014) studied the effectiveness of an intensive Tier 3 intervention on the performance of Grade 2 students with severe mathematics difficulties. Study results indicated that students in the Tier 3 phase significantly improved their performance in mathematics and were eligible to exit the Tier 3 phase.

Mathematics and CBI

Since CBI emerged, researchers have investigated methods of integrating mathematics instruction and technology use. Cheung and Slavin (2013) conducted a meta-analysis of studies on the effects of educational technology on student achievement in mathematics in K–12 classrooms. In contrast to earlier studies, their study involved inclusion standards requiring high methodological standards. Cheung and Slavin reviewed 74 studies for a total sample of 56,886 K–12 students representing 45 elementary school studies and 29 secondary school studies. Results of Cheung and Slavin's meta-analysis indicated that incorporating educational technology in mathematics instruction generally produced a positive effect, unlike the traditional methods. Furthermore, Cheung and Slavin concluded that supplemental CBI had the largest effect on students.

Hwang, Wu, and Chen (2012) developed an online game specifically for promoting web-based problem-solving activities. They conducted their study to determine whether the online game could improve student mathematics learning. Study results indicated that the online game positively influenced students' interest in learning, learning attitude, and technology acceptance relative to learning mathematics (Hwang et al., 2012). Ke (2013) examined the potential of using computer games in urban and rural schools to aid mathematics learning, especially math tutoring. Study findings indicated significant improvement on the state performance tests by rural school students after they participated in the game-based tutoring program. However, no such significant improvement was found in students from the urban school (Ke, 2013).

Kebritchi, Hirumi, and Bai (2010) conducted a study on computer games and mathematics that included several factors, such as English language skill, prior mathematics knowledge, motivation, and computer skills, to determine whether computer games have an impact on students' achievement in mathematics. Ten teachers and 193 students participated in the study. The results indicated no significant improvement in students' motivation. English language skills, prior mathematics knowledge, and computer skills also did not affect students' mathematics achievement using the computer games

Tsuei (2012) explored the effects of a synchronous peer tutoring system on students' mathematics learning. The results revealed positive effects between a peer tutoring system and students' mathematics learning. The results also indicated that at-risk students showed a higher mathematics learning rate when their exposure to peer tutoring online was lengthened. Karim et al. (2014) explored students' perceptions of a peer-assisted learning strategy. Students were administered a diagnostic test during the first week of class. At the end of one semester, survey questionnaires were distributed to the students. The results indicated that the students had positive perceptions about the peer-assisted strategy and stated that it helped them improve their understanding of and learning of mathematics.

De Witte and Rogge (2014) used data from the 2011 Trends in International Mathematics and Science Study to determine the effectiveness and efficiency of information and communications technology (ICT) in mathematics education. They noted that previous findings were inconclusive regarding ICT's effectiveness and efficiency. De Witte and Rogge found that accounting for such factors as student, teacher, school, and regional characteristics could alter ICT's estimated impact.

TenMarks

TenMarks (n.d.) is a computer-based program designed to guide students to learn mathematics and is purported to meet the individualized needs of each learner. TenMarks has partnered with Academics Benchmark, a company that houses Common Core databases as well as individual state standards, to ensure that its curriculum matches the state standards where classes are located. The program is personalized for each learner based on diagnostic exams. Problems in the program are designed to build and strengthen students' mathematical skills foundations. Ten Marks is intended to build confidence in mathematics students. Feedback is delivered in real time (TenMarks, n.d.). For the present study, TenMarks was the specific computer-based learning instruction that was explored.

Constructivism Theory

According to Airasian and Walsh (1997), constructivism is an educational approach that encourages students to learn independently by participating in activities that promote self-learning. Settings allow focusing on students' specific needs by gender. In constructivism, experiences from individual environments and predispositions are used to shape the kind of learning and self-growth students exhibit.

A classroom in which a teacher applies social constructivism supports the diversity of learning methods students use. Mutual discourse in a classroom depends on students' reconstruction of their knowledge as a response to their environment. According to Palmer (2005), motivation is a teacher's driving force. Social constructivism takes into account teachers' actions in assisting the children with the different learning methods they choose. Palmer noted that learning is an active process that represents students' reactions to the environmental. Regardless of the environmental stimulus, students reconstruct their present knowledge by connecting their predispositions to current happenings. Chrenka (2001) stated that students should be motivated for learning and be interested in participating and acquiring information. Constructivism, then, includes the intrinsic domain in student learning. Although cognitive strategies may be different from constructivism, both approaches take into account how students connect previous knowledge with current understanding.

O'Shea (2005) noted that cognitive methods are integral to students. Cognitive methods offer advantages when students' learning experiences or instructions include learning modality options that befit their thinking and behavior. Recognizing students' various mental processes improves teachers' goal setting, which yields favorable outcomes in everyday lectures.

Disability Theory

There are many theories involving disability based on perspectives such as social, political, cultural, and economic disability. One such theory is the social model of disability. According to the social model of disability, social hindrances, such as unintended or intended isolation, are social disabilities (Goering, 2010). Proponents of the model claim society is the main cause of disability.

Another theory, critical disability theory, holds that impairment does not cause disability; instead, the notion of impairment is a social construct. Meekosha and Shuttleworth (2009) stated that disability is a complicated mechanism that covers the relationship between the so-called impairment, the disabled person's reaction to the impairment, and the environment to which he or she is exposed. According to Inahara (2009), the social drawbacks of disability point to the ineffectiveness of society to address the differences imposed by impairment. In terms of learning and education, society can support the needs of students with mathematical disabilities by discovering the most appropriate method with which students can overcome their impairment. The present study's goal was to discover such a method.

Matthews (2009) and McDermott and Turk (2011) presented the medical model of disability. The medical model of disability suggests that having a physical disability is a detriment because it restricts the kind and quality of life that an individual lives. I used the medical model of disability as the principle for the premise of this study, which is that students with learning disabilities have academic hindrances. According to this model, decreasing the academic discomforts disabled students feel calls for teachers to attend to multiple areas in the students' lives (Matthews, 2009; McDermott & Turk, 2011).

Observational Learning Theory

According to Bandura (1971), the social learning theory or observational learning theory focuses on a person's observational learning or imitation of others through observation. Observation can affect different areas of learning. Observational learning can also affect behavior and could have both positive and negative implications (Bandura 1971). Observations and the type of environment or people observed could result in either good or bad behavior. Taylor et al. (2012) reported on the importance of observational learning to academic success after they discovered that the academic performance of students with autism improved when the students used observational learning. The problem is that these students lack skills important for observational learning. These observational learning inadequacies must be addressed to improve these students' skills. This side of observational learning leads to the important part of addressing the needs of students with disabilities regarding observational learning, which is important for academic success.

Differing Methodologies

A qualitative case study was the method of choice for the present study because I wanted to understand the essence of the teachers' experiences from an intimate perspective. Their contributions to the field of education are invaluable.

In choosing to conduct a qualitative study, I considered the nature of the questions. I did not want to quantify, measure, and compare the phenomenon. My desire was to explore and describe through the participants' experiences to gain understanding. A quantitative approach was not selected because it is more appropriately used in studies that involve presenting analytical information derived from statistical data (Creswell, 2009). Creswell (2007) stated that the quantitative studies are appropriate for testing hypotheses and for applying the scientific method in discovering relationships and patterns between variables. However, the present study's goal was to gain knowledge from the teachers' experiences in order to discover the reasons and find the rationale behind their experiences. With this kind of goal, is it more appropriate to use a qualitative approach (Hatch, 2002).

According to Merriam (2002), qualitative research yields certain factors that can be used as future references for quantitative studies. According to Creswell (2003), conducting a mixed methods study requires using both qualitative and quantitative methods. The mixed methods researcher begins by making an assumption. Mixed methods studies involve using both open-ended and close-ended measures. Specifically, mixed methods approaches are used when the sample population is large and the researcher follows through by gathering specific knowledge from a smaller sample (Creswell, 2003).

The qualitative researcher does not use preset factors, as does the quantitative researcher, or assumptions, as does the mixed methods researcher. Themes can arise during the data collection process, allowing for discovery and subsequent elaboration (Tashakkori & Teddlie, 2010). There are greater opportunities for data collection and knowledge inquiry during the occurrence of the event (Creswell, 2007; Hatch, 2002; Janesick, 2004). According to Merriam (1998), there are many possible methods for collecting data, including interviews, documents, and observations used in qualitative research, which remove some of the biases that are present when the researcher uses only one source.

Summary

This review of literature offered a comprehensive review and discussion of material related to the proposed study. In this section, I explained concepts important to this study, such as face-to-face learning, CBI, and differentiated instruction. I offered an explanation of the foundation of differentiated instruction, the process of differentiated instruction, and compared face-to-face learning and CBI. In addition, I provided a discussion of intervention programs, particularly those targeted to mathematics. I reviewed qualitative, quantitative, and mixed methods research designs, and explained the rationale for selecting a qualitative case study design. I chose the qualitative case study design because it allowed me to gain understanding from the teachers' perceptions by formulating meaning from the data as they related to the study's research questions (Yin, 2013).

Section 3: Methodology

Introduction

The present study's purpose was to investigate teachers' perceptions on which differentiated-instruction program, face-to-face or computer-based learning, works best in supporting improved academic performance of differently abled students in geometry. The primary goal was to explore the effectiveness of the two differentiated-instruction programs through the perceived advantages and challenges identified by six math teachers. A case study research design was used to investigate the phenomenon (Cozby, 2009). The phenomenon was investigated through recorded interviews using open-ended questions to obtain perceptions from geometry teachers based on their first-hand experience of implementing the two differentiated programs. Interviews were used to identify thematic categories for the analyses in this qualitative inquiry (Merriam, 2009). This study addressed the following research questions through the italicized interview questions (see Appendix A):

1. What are teachers' perceptions regarding the advantages of traditional face-to-face instruction using RTI in promoting learning in geometry for students who are differently abled?
2. What are teachers' perceptions regarding the challenges of traditional face-to-face instruction using RTI in promoting learning in geometry for students who are differently abled?

3. What are teachers' perceptions regarding the advantages of CBI using TenMarks in promoting learning in geometry for students who are differently abled?
4. What are teachers' perceptions regarding the challenges of CBI using TenMarks in promoting learning in geometry for students who are differently abled?

This methodology section includes the research design overview and the applicability of the chosen research design, discussion of the research sample, the data collection procedures, the data analysis procedure and the qualitative analytic software that was used, and the issues associated with ethical considerations and trustworthiness of the participants.

Role of the Researcher

This research is a direct result of my interest in students who are differently abled and the effectiveness of the classroom instruction they receive. As a former special education teacher for students with learning disabilities, emotional disabilities, and intellectual disabilities, I have observed how differentiated instruction promotes their ability to be academically successful. Using instruction that addresses these students' different learning styles and functioning levels significantly influences their success as learners.

As an advocate of students with special needs, my desire is to help special education teachers and other teaching professionals to better assist differently abled students as they access the general education curriculum in mathematics and other subjects through using different instructional methods. This could allow practitioners to positively influence students and, by extension, family members and community stakeholders. I wanted to assist teachers by investigating the perspectives of six veteran geometry teachers on two instructional models used to promote success for students who are differently abled. I have also included a review of research focused on the advantages and challenges of face-to-face instruction using RTI and CBI. My interests are in studies on instructional models that enhanced the academic success of differently abled students. I wanted to focus on lesson delivery that would give teachers a greater understanding of reaching students at all levels of performance.

My role or participation in the research study was as an interviewer. I began with an exploration of secondary geometry teachers. I am not an acquaintance, friend, or colleague of any of the participants. I did not nor do I have any personal or professional relationships with the participants in the present study. Participants were obtained through community partnership and acquaintance referrals.

Research Design

I employed a qualitative research design for the present study. Qualitative research designs are used to study a particular phenomenon within its environment of existence (Creswell, 2009; Miles & Huberman, 1994). The specific problem of the study was that which of the two differentiated-instruction programs work best to support students with disabilities, including at-risk students, was unknown. The purpose of this qualitative case study was to explore teachers' perceptions on which of the two differentiated-instruction programs, face-to-face using RTI or computer-based learning using TenMarks, works best in supporting academic performance improvement of differently abled students in geometry. Student learning was investigated regarding face-to-face instructional strategies and computer-based strategies with the aid of a computer program. I explored teachers' perceptions of which method better supports student learning.

I conducted a qualitative study to understand the attitudes, behaviours, motivations, and concerns of a targeted research group (Babbie & Benaquisto, 2009). Qualitative research is used to explore a phenomenon in depth (Patton, 2002). For this study, a qualitative method was more appropriate for the objective of generating findings based on the experiences of the interview respondents because I would not have been able to analyze results for open-ended questions if I had used a quantitative approach. Open-ended interview questions were used to collect data. The use of a qualitative method was justified because of the need for in-depth and rich information from interview responses (Cozby, 2009).

The type of qualitative research design used was a case study research design. The use of a case study research design allows for investigating the participants' perceptions in order to provide evidence for a structured analysis and gain meaningful insights (Yin, 2013). A case study was the appropriate approach for the present study as its purpose and research questions were focused on studying perceptions (Yin, 2013). Yin (2013) proposed four criteria in choosing a case study approach: (a) the study aims to answer "why" and "how" questions, (b) the behavior of those involved in the study cannot be manipulated, (c) contextual conditions are covered since it is believed that these are important to the phenomenon under study, and (d) the phenomenon and context have unclear boundaries. The first of the four criteria was applicable to the research questions in the present study.

The second, third and fourth criteria were applicable to the phenomenon being studied. Hence, a case study was the most appropriate research design to be used. Also, case study is an appropriate method for conducting research when there is a need to develop valid inferences from events that do not involve the controlled environment of laboratories while remaining true to the goals of shared knowledge from laboratory science (Yin, 2013). Baxter and Jack (2008) stated that a case study offers richness from data gathered because of its ability to use different methods or sources for data gathering, such as in this study, where multiple sources of data, my interview observation notes, questionnaire answers, and interviews were used. With the proper execution of this research design, the researcher can explore individuals or organizations, relationships, communities, or programs (Baxter & Jack, 2008).

A qualitative case study was the method of choice for the present study because I wanted to explore the perceptions of six geometry teachers on how best to differentiate instruction for differently abled students; that is, students with disabilities and at-risk students. The focus was on face-to-face instruction using RTI compared with TenMarks, a computer-based learning program. The participating teachers gave their perceptions on the planning, implementation, and evaluation of students' learning based on these two instructional models. Information regarding professional development was collected on each participating teacher. Professional development for teachers serves as an investment that can provide quality personnel (Kober, 2001) instructional strategies for literacy, particular subject matter, diversity, standards, and assessments (Laitsch, 2003; Rothman, 2002).

Methodology

Population

The sample for this study was six teachers who had taught mathematics in high school for more than 3 years at the time of the study. The small sample size is typical for qualitative studies, because it is recommended that a qualitative sample should range from five to 25 participants (Polkinghorne, 2005). Five of the six mathematics teachers have master's degrees, and one of the five is a National Board Certified teacher. Their years of relevant experience range from 3 to 35 years (see Table 3). According to the school principal and the participating teachers, each teacher has been involved with direct instruction and CBI for inclusive classes and has received training on TenMarks and differentiated instruction over the summer in a 1-week workshop. Refresher workshops take place once a month during their PLC meetings at the school.

The setting for this qualitative study was an urban Title 1 high school on the East Coast of the United States with a population of 820 students during the course of the 2013–2014 academic school year. Ninety-eight percent, or almost all of the student population, were African American with 76% of these students receiving free or reduced lunch fees.

I used purposeful sampling to select the six geometry teachers included in the interviews. The participants and the site for the study were selected because they purposefully informed an understanding of the research problem and central phenomenon in the study (Creswell, 2009). Purposeful sampling was used, and the information obtained focused on a particular group of the population, which saved effort, time, and money (Patton, 2002). Purposeful sampling allows the unique voices of a small group of participants to be heard.

Table 3

Participant Demographics

Participant	Gender	Race	Region	Degree	Subject	Experience (years)
1	Male	White	South	M.Ed.	Algebra	10
2	Female	White	South	M.Ed.	Geometry/Algebra	15
3	Male	Black	South	M.Ed.	Fundamentals	10
4	Female	Black	South	M.Ed., NBC	Geometry	25
5	Female	Black	South	M.Ed.	Algebra	8
6	Male	Black	South	B.S.	Prealgebra	5

Note. M.Ed. = master's degree in education; B.S. = bachelor of science degree; NBC = national board certified.

Data Collection Procedure

The research was conducted with participants who met the criteria of being a current or previous secondary geometry teacher, 25 years of age or older, having at least 3 years or more teaching experience, currently teaching or have taught inclusive math classes with a diverse student population, and have used computer-based and face-to-face instructional models (see Appendix B for the form used to gather this information). Following permission from Walden University's Institutional Review Board (IRB), which was required to ensure that my research met the Walden University's ethical standards and adhered to U.S. Federal regulations (Walden University IRB for Ethical Standards in Research, 2015), potential participants were recruited via email announcements on my community partner's website and through word of mouth. The IRB assures that there is informed consent, equitable procedures, and minimized and reasonable risk, and that the potential benefits of the research outweighs the potential risks (Walden University IRB for Ethical Standards in Research, 2015); Walden University Approval # 08-24-15-0067045, Expiration: August 23, 2016. At no time did the community partner make direct contact or solicit participants on my behalf; instead, a link was made available directing participants to my Walden University email. The participants were asked to contact me by email, phone, or in person to express their interest and willingness to participate.

Once six mathematics teachers had met the criteria and accepted the invitation to participate in the study, they were given an informed consent form that contained information about the study process and assured their confidentiality and anonymity in the study. The participants were required to sign the informed consent form as proof of their agreement to participate in the study.

Data for this study were collected through face-to-face interviews. I provided a relaxed atmosphere for the respondents, which has been shown to result in better participation (Horrocks & King, 2010). The respondents were asked to commit to a 30- to 60-min interview session with the option of a follow-up meeting if needed. To create an environment of acceptance and empathy for the interviewees, I arranged the interviews to take place at a mutually agreed upon time and convenient location for the study participants, and the interview location was free from interruptions.

I conducted the recorded interviews using a digital voice recorder. I chose to audio record the interview sessions rather than simply rely on taking notes to ensure accurate recording of the participants’ responses. The participants were aware that they were being recorded and that notes were being taken. To ensure anonymity and confidentiality, each interviewee was assigned a number from 1 through 6. This numbering scheme allowed me to align the interviews with my thoughts concerning their responses and data interpretation.

During their interviews, the participants were given the freedom to express their personal experiences and opinions about the phenomenon, and the interviews were interactive in order to obtain in-depth responses. However, some of the respondents may have been reluctant to share their experiences because of their perceived differences of perspectives when compared to the other interview participants. To minimize the impact of this limitation, I reminded the participants of their anonymity and encouraged them to answer honestly. If an interviewee had refused to be recorded, only written notes would have been obtained. I asked open-ended questions in keeping with the interview protocol. The recorded interviews were sent to an independent contractor for transcription. This individual signed a confidentiality agreement (see Appendix C).

Interviews

I conducted face-to-face interviews as the data collection method for the study. I developed questions to gain the insights and information needed to inform me of the experiences, feeling, and beliefs of the six geometry teachers who had taught for 3 years or more. The interview questions were primarily open-ended questions to encourage participants to give elaborate and rich responses on the phenomenon. Using open-ended questions helped to obtain nonrestricted and open-ended responses (Streubert & Carpenter, 2011). Open-ended questions are questions that are free from predefined answers and that allow flexibility to the respondents as they provide their responses (Bynner & Stribley, 2010). This means that using open-ended interview questions allowed the participants to express their ideas and feelings openly and freely. The interview responses were coded to generate emerging themes from the responses. As the interviewer, my objective was to search for themes that helped identify the phenomenon and to answer the four research questions.

Analyzing Data

The transcribed interviews were reviewed and member checked to gain clarification and ensure accuracy and validity. In the verbatim responses, I looked for patterns in words and then used codes to search for themes. The transcribed interviews were saved as a PDF, which allowed collected data/documents to remain in the original configuration. Each file was saved to my computer hard drive in a personalized folder.

Qualitative Approach

I used matrix summaries to display the participants’ responses as they related to the four research questions. The raw textual data of the participant’s verbatim responses were analyzed thematically. I first looked for reoccurring patterns in the responses. Then, I began coding by marking responses that addressed the research questions. After this, I identified and defined themes as they began to develop. My goal was describe any inconsistences that might have existed between the matrix summary and the content analysis.

Content Analysis

I facilitated data analysis with the assistance of a hired analyst and a qualitative analysis software program, NVivo 10. I sorted and analyzed the data to search for themes to help identify the phenomenon. I developed clusters of meaning from the significant responses and used the software to identify repetition of words, sentences, and phases. I then used this analysis to determine themes that illuminated the advantages and challenges of face-to-face instruction using RTI and CBI.

NVivo qualitative analysis software is used primarily for content analysis in qualitative studies. Analysis began by using the member check transcripts of the interviews to categorize the information and identify patterns represented in the responses of the participants (Silverman & Seidman, 2011). Coding or theme analysis is a method used to analyze data. Gibbert and Ruigrok (2010) described coding as a process that produces a translation of the data to a higher conception level. Coding is accomplished by segregating the interview responses into words, phrases, sentences, or paragraphs and then creating categories that will group them together to form themes (Portney & Watkins, 2009).

Jointly the data were separated into logical categories by first looking at words then organized the words expressed in the interviews. Codes were used to sort verbatim responses into constructs to identify emergent themes (Saldaña, 2012; Smith & Firth, 2011).

The codes that emerged from each participant were arranged into themes. Merriam (2009) defined a theme as recurring highlights of analyzed data. Concurrently, I looked for repetitions, indigenous typographies and categories, metaphors and analogies, transitions, similarities and differences, linguistic connectors, missing data and theory related material (Ryan & Bernard, 2003). The analyst and I compared the coded data to determine which information would be considered for the next phase of the analysis.

As the analysis progressed, the number of categories increased to identify all relevant themes. The results of the content analysis with the verbatim transcriptions from the interviews supported the emergent themes during the analysis. Based on the themes, a summary and interpretation of themes were jointly composed, which served as the basis of the conclusions and recommendations of the study.

Validity

To ensure data validity, I performed member checking and triangulation (Carlson, 2010; Denzin, 2012). Member checking was performed by asking participants to review their transcripts from the face-to-face interview (Carlson, 2012). Investigator triangulation is a process of checking data validity by confirming responses, which can be facilitated using at least two data sources or data analysts for the study (Denzin, 2012). In this study, two analysts performed the coding data analysis. Triangulation can validate data and research by cross verifying the same results using different analysts (Denzin, 2012).

Ethical Considerations

I ensured that a consistent ethical approach was maintained when the interviews were conducted. Ethical approval was obtained from Walden University's IRB regarding the present study's methodology of the study, which included the recruitment process, interview approach, and procedures used to address ethical concerns related to the participants. Gaining IRB approval was essential and required to ensure that the research methodology would be ethical and that there would be no physical or psychological harm to the study participants.

Prior to the start of the interview process, the study participants were required to sign a letter of informed consent and were briefed about the study. An informed consent form is a document summarizing the purpose of the study, showing proof to the participant regarding assurance of anonymity and confidentiality and also eliminating or minimizing any ethical issues, and discussing how the interviews will be conducted with their participation.

Only I had access to the tape recordings and the interview transcripts in order to protect the study participants' privacy. Each tape recording and transcript was assigned a number from 1 to 6 that corresponded with the study participant (participants are identified in the remaining sections as P1 through P6). The participants' real names of the participants did not appear in any of the tape recordings or interview transcript files. The data collected in the interviews were stored in my password-protected computer and will be kept for 5 years, after which it will be permanently deleted if no longer needed (Cozby, 2009).

Summary

Section 3 included a discussion and explanation of the methodology used to conduct the present study. The research design, researcher’s role, data collection procedure, interview process, and data analysis were discussed as well as the phenomenological research approach to answer the research questions. Meekosha and Shuttleworth’s (2009) critical disability theory provided the theoretical framework combined with constructivism and observational learning theory. The findings are discussed in Section 4.

Section 4: Results

Introduction

The purpose of this qualitative case study was to explore teachers' perceptions on whether face-to-face instruction using RTI or computer-based learning using TenMarks works best in improving the academic performance of students who are differently abled in geometry. Their perceptions were investigated through recorded interviews using open-ended questions. Interviews were used to identify thematic categories for the analyses in this qualitative inquiry. Focusing on traditional face-to-face instruction using RTI compared to TenMarks CBI program, I developed four research questions to identify the advantages and challenges of both methods of instruction. Data analysis was conducted by means of thematic analysis using NVivo to systematize coding and tabulation of the themes, patterns, and relationships that emerged from the data. I also addressed how these findings corresponded to the topic, including the conceptual/theoretical framework, outliers, or discrepancies that emerged during analysis. Findings from this analysis are presented next.

Analytic Approach

My objective was to use data from interviews with study participants to answer the four research questions formulated for the present study. I considered each interview separately in my analysis. Common themes were identified across the data with regard to addressing the research questions.

The data analysis process involved "making sense out of text and data and preparing the data for analysis, conducting different analyses, moving deeper and deeper into understanding the data, representing the data, and making an interpretation of the larger meaning of the data" (Creswell, 2009, p. 183). The second level of identification occurred during the initial review of each transcribed interview. Upon receiving the transcripts, I read each transcript, member checked for accuracy, looked for patterns and themes, and then conducted open coding using NVivo 10 qualitative software. My goal was to describe the participants' subjective experiences and views.

I used open coding, which reflects a brainstorming technique described by Corbin and Strauss (2008). In open coding, the researcher thoroughly reviews the data contained in the data set before grouping and labeling concepts. During the coding process, the researcher takes the raw data, pulls out concepts, and then further develops them in terms of their properties and dimensions and groups them into themes. The data analysis process included the following steps:

1. Review all interview transcripts.
2. Member check all transcripts.
3. Look for patterns.
4. Look for themes.
5. Conduct open coding using NVivo.
6. Code all the interview data.

This analysis resulted in the following themes. Regarding RTI's advantages, the themes were:

- RTI helps teachers use differentiated instruction to better service the student,
- RTI helps students show their learning,

- RTI helps teachers use data driven instruction to better connect with the student,
- RTI helps teachers screen students to determine where they are, and
- RTI with tutoring and group work benefits students.

Challenges of RTI:

- Students may lose focus,
- dealing with a large class prevents one-on-one instruction,
- students have difficulty following along, and
- students are below grade level.

Advantages of TenMarks:

- TenMarks differentiates instruction,
- TenMarks enhances student learning,
- TenMarks appeals to students who regularly use computers and technology, TenMarks can be used at home,
- students feel confident when they have mastered an assignment, and
- TenMarks enhances face-to-face geometry instruction.

Challenges of TenMarks:

- TenMarks can be a distraction,
- TenMarks hinders students' progress,
- TenMarks does not require students to show steps,
- TenMarks does not scaffold learning, and

- Students do not know how to use the computer or TenMarks.

Validity, Trustworthiness, and Reliability

I ensured the validity of the analysis in various ways. According to Creswell (2009), qualitative validity means that the researcher checks for the accuracy of the findings by employing certain procedures (p. 190). Validation of findings in qualitative research occurs throughout the steps in the research process (Creswell, 2009). I did a continual check during the coding process to ensure that coding did not drift from the original intent as the coding process evolved. I used an electronic codebook in NVivo to code the data. As only I was responsible for data analysis, there was no need to cross check for intercoder agreement.

Coding

The coding process resulted in 19 primary themes. The themes were delineated according to the research questions. The first set of themes addressed teachers' perceptions regarding the advantages of traditional face-to-face instruction using RTI in promoting learning in geometry for students who are differently abled. The second set of themes focused on teachers' perceptions regarding the challenges of traditional face-to-face instruction using RTI in promoting learning in geometry for students who are differently abled. The third set of themes addressed teachers' perceptions regarding the advantages of CBI using TenMarks in promoting learning in geometry for students who are differently abled. The fourth set of themes focused on teachers' perceptions regarding the challenges of CBI using TenMarks in promoting learning in geometry for students who are differently abled. The findings for each research question are summarized next, and exemplars from the interviews are used to illustrate the themes.

Results for Research Question 1

Research Question 1: What are teachers' perceptions regarding the advantages of traditional face-to-face instruction using RTI in promoting learning in geometry for students who are differently abled? Results are shown in Table 4.

Table 4

Responses to Research Question 1

Participant responses	Advantages				
	Helps teachers differentiated instruction	Helps students show their learning	Helps teachers use data-driven instruction	Helps teachers screen students	Helps students with tutoring and group work
Participant 1	When I know where the problem area is, I know that they require different teaching methods. Working with partners and using a lot of visual aids helps them a lot.	Showing steps so that they can show me what they know as well.		I use RTI first to screen my students like I said it tells me where they may have problems."	Working in groups really can be helpful as tutoring for them."
Participant 2	RTI gives a teacher an idea of how to develop future lesson plans and them to the learning needs of the students in the classroom.	Well, I've been able to show my students that once you know what the steps are it will be easy to see where you make your mistakes.		I actually prefer using RTI with face-to-face instruction with my students because you gain a better understanding of your students when you are working with them.	

(table continues)

Participant responses	Advantages				
	Helps teachers differentiated instruction	Helps students show their learning	Helps teachers use data-driven instruction	Helps teachers screen students	Helps students with tutoring and group work
Participant 4	RTI come in, and you use it in your instruction, by assessing at every stage to see if these students are learning.	The blackboard gave students an opportunity to come forward to use their creativity and to learn step by step.	RTI guides my instruction, because of the assessment data . . . what level that I need to teach them on it drives my differentiated instruction.		
Participant 5	RTI allows me to differentiate my lesson through assessment.		Test data is always a good tool because it gives you I guess hard evidence on what it is that they are weak on and how.		
Participant 6	RTI forces me to break down my lesson so that each student has an opportunity to learn.	If you can explain it or teach it back to me, then you have grasped the information.	Without looking at the data, I would have no idea who should move on and who is not ready to move on.		

All of the study participants intensely agreed that face-to-face instruction using RTI enhances teaching and learning of differently abled students. The matrix summary shown in Table 4 shows quotes from six out of six participants stating that RTI has an advantage because *it helps teachers promote learning by differentiating instruction*. P1 stated, “When I know where the problem area is, I know that they require different teaching methods. . . .Working with partners and using a lot of visual aids helps them a lot." P2 stated, "RTI gives a teacher an idea of how to develop future lesson plans and to address the learning needs of the students in the classroom." Three participants stated that assessment data are essential for knowing how and where to differentiate the instruction. P3 stated, "RTI allows me to look at their assessments and determine where I need to modify instruction." P4 said, "RTI come in, and you use it in your instruction, by assessing at every stage to see if these students are learning." P5 offered, "RTI allows me to differentiate my lesson through assessment." P6 stated, "RTI forces me to break down my lesson so that each student has an opportunity to learn."

Four participants stated another advantage of RTI is it *helps students to show that they are learning*. P1 stated that it helped by "showing steps so that they can show me what they know as well." P2 stated, "Once you know what the steps are, it will be easy to see where you make your mistakes." P4 stated, "The blackboard gives students an opportunity to come forward to use their creativity and to learn step by step." P6 stated, "If you can explain it or teach it back to me, then you have grasped the information." Four participants articulated another advantage as *it helps teachers use data to drive instruction.* P3 said, "RTI allows me to break the subject matter down based on feedback from assessment." P4 added, "RTI guides my instruction, because of the assessment data." P5 said, "Assessments are hard evidence on what it is that they are weak on and how to address it." P6 offered, "Without looking at the data I would have no idea who should move on." Only two participants stated that RTI *helps teachers screen students,* as an advantage. P1 said, "I use RTI first to screen my students; like I said, it tells me where they may have problems." P2 stated, "You gain a better understanding of your students when you are working with them." However, screening students is a part of the assessment process in differentiating instruction.

Two participants stated that RTI *helps students with tutoring and group work* as another advantage. P1 said, "Working in groups really can be helpful as tutoring for them." P3 stated it helped with "using the more independent students to act as peer tutors . . . [and] gives my special ed students the opportunity to work with their general ed peers and really experience inclusion." The participants' verbatim quotes in the matrix supported the same themes as the content analysis, which served as the basis for the conclusions and recommendations of the study.

Reflected in Table 5, the primary themes derived from participant responses were (a) RTI helps teachers use differentiated instruction to better service students, (b) RTI helps students show their learning, (c) RTI helps teachers use data driven instruction to better connect with students, (d) RTI helps teachers screen students to determine where they are, and (e) RTI helps with tutoring, and group work benefits students. Table 6 shows the frequency with which the themes appeared across interviews and across the data.

Table 5

Themes and Definitions for Research Question 1

Theme	Definition
RTI helps teachers use differentiated instruction	This theme refers to the perception that RTI helps teachers use differentiated instruction and modify instruction as needed for traditional face-to-face instruction.
RTI helps students show their learning	This theme refers to the perception that using RTI for traditional face-to-face instruction helps students learn and show what they know.
RTI helps teachers use data driven instruction	This theme refers to the perception that RTI for traditional face-to-face instruction helps teachers use data-driven instruction.
RTI helps teachers screen students	This theme refers to perception that using RTI for traditional face-to-face instruction helps teachers screen students and assess their learning in geometry.
RTI with tutoring and group work benefits students	This theme refers to the perception that using RTI for traditional face-to-face instruction benefits students when used with tutoring and group work.

Table 6

Frequency of Themes for Research Question 1

Theme	Number of interviewees mentioning this theme	Total exemplar quotes
RTI helps teachers use differentiated instruction	6	20
RTI helps students show their learning	4	8
RTI helps teachers use data driven instruction	4	8
RTI helps teachers screen students	2	4
RTI with tutoring and group work benefits students	2	4

Theme 1: RTI Helps Teachers Use Differentiated Instruction

The first theme for Research Question 1 was *RTI helps teachers conduct differentiated instruction*. This theme refers to the perception that RTI helps teachers conduct differentiated instruction and modify instruction as needed for traditional face-to-face instruction. This theme was mentioned 20 times in six interviews. An example of this theme can be seen in a comment made by P1.

> Actually, I use RTI first to screen my students. Like I said, it tells me where they may have problems. It is very good for my special ed students. I already know that they are starting most of the time at a lower level than the regular student.

Later in the interview, P1 commented, “When I know where the problem area is I know that they require different teaching methods. Working with partners and using a lot of visual aids helps them a lot.” P5 said,

> RTI actually help me to prepare for how I'm going to teach a lesson. With RTI I give constant assessment so that I know how many ways I need to differentiate my lesson . . . It's been especially effective for my students with special needs it has helped me to meet them at their level of cognition and improve their learning.

P5 also indicated, "RTI allows me to differentiate my lesson through assessment." P6 felt similarly and indicated,

> In order for a student to learn I need to know where to start with him. RTI in the form of a preassessment is my guide for teaching by creating a lesson plan that will reach a wide range of students so that each one can learn . . . RTI forces me to break down my lesson so that each student has an opportunity to learn.

P2 described how RTI helped to differentiate instruction.

> [With] RTI you identify their areas of need by getting a breakdown of information pertaining to their weaknesses. Then you are able to meet them at their level even at the most minute level and help them to build until they are where they need to be. RTI gives a teacher an idea of how to develop future lesson plans and them to the learning needs of the students in the classroom

P4 described the use of RTI to differentiate instruction as follows.

> You might have to go a little deeper, and disseminate your instructions in order for them to understand, that's where RTI come in, and you use it in your instruction, by assessing at every stage to see if these students are learning.
>
> With RTI you can break down a concept that they don't understand into little smaller pieces, maybe you might have to go, maybe to an elementary level in

> which they can understand the basic and learn. This gives them the opportunity just to follow instruction and enjoy what they are learning and how to do it, without being difficult for them.

In a final example of this theme, P3 mentioned,

> Just because some students don't have any official paperwork, or any documentation that tells me I need to add any accommodations or any other kind of modification to enhance their learning. Those students still need some additional enhancements for the instructions. RTI allows me to look at their assessments and determine where I need to modify instruction for them as well as for my special ed students.

Theme 2: RTI Helps Students Show Their Learning

The next theme for Research Question 1 was *RTI helps students show their learning*, which refers to the perception that using RTI for traditional face-to-face instruction helps students learn and show what they know. This theme was mentioned eight times in four interviews. Examples of this theme as evident in the interview data presented next.

P6 emphasized the importance of students showing what they know to facilitate learning.

> When I ask a lot of questions, no matter what I ask you, I always want to know why, because I believe in you need to not only know what it is, but if you can explain it or teach it back to me, then you have grasped the information.

> Well, after the traditional teaching and your questions and answering sessions, you basically can see or you can judge what they know; however, you give as assessment. You can look at the data from quizzes, paperwork, or test. This is important because just because some kids may be able to say it verbally, doesn't mean that they are able to transfer it to paper. Or you'll have some students that do not verbalized too well but they can write or transfer their thoughts to paper.

P2 explained the role of showing steps when learning math.

> The process is like building blocks; it's very important for our students to see math in steps. That everything is a process and also you are able to show this to students through RTI. You start where they are and build upon it. Well, I've been able to show my students that once you know what the steps are it will be easy to see where you make your mistakes. Once they can accomplish this I know that they are learning.
>
> So once you follow the appropriate steps and your answer is incorrect you can show them where to go back within the problem and find where they made the mistake. I'm more comfortable teaching face-to-face using RTI as my guide. I can either do a formal assessment or an informal assessment based on the different levels that I see in the classroom or are revealed from assessments. Once I have them at the board they can show me what they've learn, I just check for understanding to can see whether or not they understand the process

P4 indicated, “The blackboard gave students an opportunity to come forward to use their creativity and to learn step by step.” In a final example of this theme, P1 also felt it was important to show the steps for teaching and learning math by commenting,

> I’ve found that the old teaching style of dry erase board and some markers is very effective with enhancing my students learning and achievement. I believe that they have to see things on the board and see things broken down with multiple steps and a variety of ways shown to them in which they can do a certain type of math problem. I’m also a firm believer in a kid going to the board and actually doing the problems themselves. Showing steps so that they can show me what they know as well.

Theme 3: RTI Helps Teachers Use Data-Driven Instruction

The next theme for Research Question 1 was *RTI helps teachers use data-driven instruction*. This theme refers to the perception that RTI for traditional face-to-face instruction helps teachers use data-driven instruction. This theme was mentioned eight times in four interviews. The following examples illustrate teachers’ use of data to inform their pedagogy.

P5 shared, “Again, like I said RTI drives my lesson plan. I design my lessons based on the students’ assessment scores and their areas of needs.” P5 also stated, “Test data is always a good tool because it gives you I guess hard evidence on what it is that they are weak on and how.” P6 described the use of data-driven instruction and RTI for traditional face-to-face instruction in the following manner,

> Well, after the traditional teaching and your questions and answering sessions you basically can see or you can judge what they know; however, you give as assessment. You can look at the data from quizzes, paperwork, or test. This is important because just because some kids may be able to say it verbally, doesn't mean that they are able to transfer it to paper. Or you'll have some students that do not verbalized too well but they can write or transfer their thoughts to paper.
>
> So then you could compare the two sources of information, the data you have and the data you got through traditional instruction and you get a better idea of where the students stand and how approach them. Also like I said, now that you have the paper you have data to go by and to drive your instruction with. So, it helps balance everything off.

P6 further elaborated,

> The most positive aspects of RTI are the assessments. The data from the students' test, quizzes and classwork is what drive my instruction. Without looking at the data I would have no idea who should move on and who is not ready to move on.

P4 shared that "RTI guides my instruction, because of the assessment data. It gave me an opportunity to see what they know, what they didn't know, what level that I need to teach them on it drives my differentiated instruction." P4 added that "It also give me an opportunity to go back and look at the data before class to see what were their weaknesses in order for me to utilize or to promote activities to promote a better understanding for them." In a final example of the perception that RTI for traditional face-to-face instruction helps teachers use data-driven instruction, P3 explained, "RTI allows me to break the subject matter down based on feedback from assessment, assessment and assessment. It is the only way to be proactive when teaching a diverse group of students."

Theme 4: RTI Helps Teachers Screen Students

The next theme for Research Question 1 was *RTI helps teachers screen students*. This theme refers to perception that using RTI for traditional face-to-face instruction helps teachers screen students and assess their learning in geometry. This theme was mentioned four times in two interviews. P1 explained how he used RTI for traditional face-to-face instruction to assess students' learning in geometry. P1 commented,

> Well, with the years of teaching that I've had, I've used RTI as an instructional approach. It helps me know where the student is having a problem, you know the area, and to know where he is so that I know where to start.

Later in the interview P1 commented,

> Actually, I use RTI first to screen my students, like I said it tells me where they may have problems. It's very good for my special ed students. I already know that they are starting most of the time at a lower level than the regular student.

In a final example of the theme, P2 stated,

> I actually prefer using RTI with face-to-face instruction with my students because you gain a better understanding of your students when you are working with them. So you know when they don't understand the content or the new content that's being introduced.

Theme 5: RTI With Tutoring and Group Work Benefits Students

The final theme for Research Question 1 was *RTI with tutoring and group work benefits students*, which refers to the perception that using RTI for traditional face-to-face instruction benefits students when used with tutoring and group work. This theme was mentioned four times in two interviews. P1 stated, “This [working in groups] really can be helpful as tutoring for them.” P3 shared,

> By using the more independent students to act as peer tutors, by using collaborative groups consisting of different levels of abilities. I can break up my classes there is a lot of different levels in a class. So, I find those informal leaders sort of and say, “Okay, you have seen the mass of this, can you come over here and you help this group while I’m doing this and this one is doing that.” Many times we have to do that, especially in our tutoring sessions I get even more diversity in those 2 sessions. This gives my special ed students the opportunity to work with their general ed peers and really experience inclusion.

P3 offered additional thoughts about how using RTI for traditional face-to-face instruction benefits students when used with tutoring and group work by indicating, “There must be activity, movement to keep the students engaged. Working in collaborative groups, sharing ideas and interacting with one another is a way to stimulate the students.”

Results for Research Question 2

Research Question 2: What are the teachers’ perceptions regarding the challenges of traditional face-to-face instruction using RTI in promoting learning in geometry for students who are differently abled? Responses to this research question are shown in Table 7.

Table 7

Responses to Research Question 2

Participant response	Challenges			
	Students may lose focus	Dealing with large classes	Students have difficulty following along	Students are below grade level
Participant 1			Sometimes they really have problems following the instruction, that's when I assign a partner."	I feel that because a lot of teachers have not bought into RTI a lot of the special ed students will always be farther behind than they should be.
Participant 2		We have some classes that have maybe 35 students in the class, which is overwhelming when there are multiple learning styles in the class.		
Participant 3	When I look at them and can see that I am losing them . . . I get them moving, getting them physically involved.	Whereas when we are in a class of whatever size our class do the repetition but we may not do it enough for that child or at that child's pace of learning.		

(table continues)

Participant response	Challenges			
	Students may lose focus	Dealing with large classes	Students have difficulty following along	Students are below grade level
Participant 4	My special ed students are easily distracted, and because they don't understand the curriculum they get bored easily.			
Participant 5		I think distractions like large class sizes prevent some students from getting that one-on-one time that they might need.	In large classes even when you are using RTI students with special needs tend to fall behind and kind of get lost.	
Participant 6	Students become bored with just face-to-face it doesn't give them enough stimulation.			

All of the participants agreed that there are challenges associated with traditional face-to-face instruction using RTI. The matrix reflected in Table 7 shows that three participants stated that differently abled students lose focus. P6 stated, "Students become bored with just face-to-face, it doesn't give them enough stimulation." P4 stated, "My special ed students are easily distracted, because they don't understand the curriculum they get bored easily." P3 stated, "When I look at them and can see that I am losing them . . . I get them moving, by getting them physically involved." Another challenge mentioned was *dealing with large class sizes*. Again, three participants stated that large class sizes impedes the one-on-one instruction needed for differently abled students. P3 stated, “Whereas when we are in a class of whatever size our class do the repetition but we may not do it enough for that child or at that child’s pace of learning.”

P5 stated, “I think distractions like large class sizes prevent some students from getting that one-on-one time that they might need.” P2 said, “We have some classes that have maybe 35 students in the class, which is overwhelming when there are multiple learning styles in the class.” Two participants viewed *students having difficulty following along* as a challenge. Participant 5 stated, “In large classes even when you are using RTI students with special needs tend to fall behind and kind of get lost,” and P1 stated, “Sometimes they really have problems following the instruction, that’s when I assign a partner.” One participant perceived *students are below grade level* as a challenge. P1 stated, “I feel that because a lot of teachers have not bought into RTI a lot of the special ed students will always be farther behind than they should be.”

All participants agreed that the challenges focused on how large class size lessens the effectiveness of face-to-face instruction using RTI. All participants agreed that with large class sizes other classroom management skills or modifications must be used to promote differentiation of instruction and student engagement. The matrix analysis with the verbatim quotes from the participants supported the content analysis that served as the basis for my conclusions and recommendations in the present study.

The four primary themes related to the second research question are summarized next. Tables presenting the definitions of the identified themes are included along with the frequency of occurrence for the themes and the number of interviewees who mentioned a specific theme. As reflected in Table 8, the primary themes were (a) *students* *may lose focus*, (b) *dealing with a large class prevents one-on-one instruction*, (c) *students have difficulty following along*, and (d) *students are below grade level*. Table 9 shows the frequency with which the themes appeared across interviews and across the data.

Table 8

Themes for Research Question 2

Theme	Definition
Students may lose focus	This theme refers to the perception that students may lose focus or be bored due to the lack of stimulation during traditional face-to-face instruction using RTI for geometry.
Dealing with a large class is challenging	This theme refers to the perception that dealing with a large class is challenging when using RTI in face-to-face instruction for geometry.
Students have difficulty following along	This theme refers to the perception that students have difficulty following along when using RTI in face-to-face instruction for geometry.
Students are below grade level	This theme refers to the perception that students are below grade level, which poses a challenge for using RTI in face-to-face instruction for geometry.

Table 9

Frequency of Themes for Research Question 2

Theme	Number of interviewees mentioning this theme	Total exemplar quotes
Students may lose focus	3	5
Dealing with a large class is challenging	3	4
Students have difficulty following along	2	3
Students are below grade level	1	2

Theme 1: Students May Lose Focus

The first theme for Research Question 2 was *students may lose focus,* which refers to the perception that students may lose focus or be bored due to the lack of stimulation during traditional face-to-face instruction using RTI for geometry. This theme was mentioned five times in three interviews. In the first example P6 described how some students lose focus during traditional face-to-face instruction using RTI for geometry.

> With some students you can talk your head off, and they are not going to get it unless it dances a little bit across the screen, because it's more accustomed to what they see on TV. So, you do need that balance to give more differentiation in your instruction to try to get through to more students

P6 further explained that students may become bored during traditional face-to-face instruction using RTI for geometry due to lack of stimulation.

> From babies, some of these students have played with tablets and smartphones. So, they are so accustomed to seeing movement by touching screens and moving

> it to the left to the right. So, when you just introduce paper, they are not stimulated enough, sometimes they need that technology.

P4 commented,

> The only negative I've seen is sometimes the students feel that they should be moving through the curriculum at a faster pace, and they get frustrated with having to go back and practice or at having the process being reiterated.

P4 then described the implications of students losing focus.

> When my special ed students become bored they also become easily distracted, then learning comes to a halt. I find that most of my special ed students are already trouble understanding even after the curriculum has been broken down they become disillusioned and will sometime revert to disruption of the class. This behavior impedes the learning of everyone in the class.

In the final example for this theme, P3 said,

> The engagement, you know, the attention span. You got to learn to kind of temperate it. I had to figure out what is enough is 15 minutes too short, is 30 too long. What I find, is you have them engaged then I look at them and can see that I am losing them. So, I am finding merit in getting them real tactile. Get them engaged, get them moving, getting them physically involved.

Theme 2: Dealing With a Large Class Is Challenging

The second theme for Research Question 2 was *dealing with a large class is challenging*, which refers to the perception that dealing with a large class is challenging when using RTI in face-to-face instruction for geometry. This theme was mentioned four times in three interviews. P5 felt that dealing with a large class was a distraction. “I think distractions like large class sizes prevent some students from getting that one-on-one time that they might need to help them to be more successful and to feel more comfortable with the subject matter.” P5 also indicated that a large class was a challenge because it can be difficult to reach certain students and emphasized that “When special ed students are in large inclusive classes they tend to try to fade into the back ground even with the use of RTI, without individualized one-on-one monitoring these students will be challenged academically.”

P2 indicated that large classes were overwhelming for the teacher. As such, RTI was essential.

> We have some classes that have maybe 35 students in the class. So if you have four classes, no, three classes with 35 students, which are overwhelming for a teacher, because you have multiple learning styles within your classroom, RTI is essential.

In the final example of the theme that dealing with a large class is challenging when using RTI in face-to-face instruction for geometry, P3 shared, “Whereas when we are in a class of whatever size our class do the repetition but we may not do it enough for that child or at that child’s pace of learning.”

Theme 3: Students Have Difficulty Following Along

The next theme for Research Question 2 was *students have difficulty following along*. This theme is defined as the perception that students have difficulty following along when using RTI in face-to-face instruction for geometry. This theme was mentioned three times in two interviews. P1 explained, “Sometimes they really have problems following the instruction, that’s when I assign a partner.” P1 also stated, “Well, there again some of the special ed students need that one-on-one instruction with that traditional instruction.” P5 said,

> I think distractions like large class sizes prevent some students from getting that one-on-one time that they might need to help them to be more successful and to feel more comfortable with the subject matter. In large classes even when you are using RTI students with special needs tend to fall behind and kind of get lost.

Theme 4: Students Are Below Grade Level

The final theme for Research Question 2 was *students are below grade level*. This theme refers to the perception that students are below grade level, which poses a challenge for using RTI in face-to-face instruction for geometry. This theme was mentioned two times in only one interview. P1 was the only interviewee who felt that students being below grade level were a challenge for using RTI in face-to-face instruction for geometry. P1 further commented,

> The biggest challenge is we get special ed students in high school math that are on second-, third-, or fourth-grade level in math. Although they may want to learn, some are embarrassed to work at elementary levels because they don’t know the basics. Also, they are still held accountable for the end-of-the-year testing that is given on grade level.

P1 then stated, “I feel that because a lot of teachers have not bought into RTI a lot of the special ed students will always be farther behind than they should be.”

Results for Research Question 3

Research Question 3: What are teachers' perceptions regarding the advantages of CBI using TenMarks in promoting learning in geometry for students who are differently abled? Table 10 shows the responses to this research question.

Table 10

Responses to Research Question 3

	Advantages					
Participant response	TenMarks differentiates instruction	TenMarks enhances student learning	TenMarks appeals to students who regularly use computers and technology	TenMarks can be used at home	Students feel confident when they have mastered an assignment	TenMarks enhances face-to-face geometry instruction
Participant 1	They work on the level of instruction that's best suited for their needs.	By being computer-based it can appeal to them, and enhance student learning.	The computer tends to keep them more focused than one-on-one instructional, instruction at the board.	Can work on it at home and after school	It provides the right amount of challenge yet helps the students recognize that they can be successful.	Well, in my opinion TenMarks actually enhances face-to-face instruction. It meets the students where they are. It gives them exercises and then gives a test.
Participant 3	Because of their pre-assessment scores they work on different levels of difficulties.	They are tested throughout their units to show mastery before moving forward.	You know I look at children that may be very, very challenged cognitively and very challenged physically but they still connect to the cellular phones and the computers.	With TenMarks they can complete their assessment or their assignment in a tutoring session or at home.		

(table continues)

Participant response	Advantages					
	TenMarks differentiates instruction	TenMarks enhances student learning	TenMarks appeals to students who regularly use computers and technology	TenMarks can be used at home	Students feel confident when they have mastered an assignment	TenMarks enhances face-to-face geometry instruction.
Participant 4	TenMarks gives each student the privacy to work at their own pace.	It allows each student to work and learn starting at their level of knowledge.				I use TenMarks for the entire class along with my traditional teaching."
Participant 5	Students are working on the same lessons but on different levels.	With the use of TenMarks each and every student has made progress.				I implement TenMarks in conjunction with my traditional classroom instruction, after students' assessments, individualized lesson plans are created for each student.
Participant 6	TenMarks is individualized for the particular student"	TenMarks brings more dimensions into the teaching process. . . . When students' needs and learning styles are met they tend to remain more focused and improve academically.	Our world is all about computers and technology they need to know how to use the computer constructively.	Offers them the choice to work on lessons away from school; they just need to sign on.		

All participants agreed that TenMarks has advantages that promote learning in geometry for students who are differently abled. The matrix revealed that all six participants' perceptions were that TenMarks *differentiates instruction* to individualize the curriculum for DA students. P1 stated, "They work on the level of instruction that's best suited for their needs." P5 stated, "Students are working on the same lessons but on different levels." P6 stated, "TenMarks is individualized for the particular student." P2 stated, "For my special ed kids and lower functioning kids, TenMarks can be personalized just for them." P4 remarked, "TenMarks gives each student the privacy to work at their own pace." and P3 stated, "Because of their preassessment scores they work on different levels of difficulties."

Also, all six participants' perceptions were that *TenMarks enhances student learning.* P 2 stated, "TenMarks provides the right amount of rigor with practice problems to help them gain a better understanding and reinforce previous lessons." P6 said, "TenMarks brings more dimensions into the teaching process. When students' needs and learning styles are met they tend to remain more focused and improve academically." P5 stated, "With the use of TenMarks each and every student has made progress." P1 said, "By being computer-based it can appeal to them, and enhance student learning." P4 remarked, "It allows each student to work and learn starting at their level of knowledge," and P3 stated, "They are tested throughout their units to show mastery before moving forward."

The participants perceived technology, specifically TenMarks, as an advantage for students who are differently abled, as reflected in the perception that *TenMarks* *appeals to students who regularly use computers and technology.* Four participants commented on this. P1 stated, “The computer tends to keep them more focused than one-on-one instructional, instruction at the board.” P6 stated, “Our world is all about computers and technology. They need to know how to use the computer constructively.” P2 stated, “Some of my lowest functioning students are excited to get on TenMarks,” and P3 remarked, “You know, I look at children that may be very, very challenged cognitively and very challenged physically but they still connect to the cellular phones and the computers.”

The participants agreed that students did not have to be restricted to the classroom to benefit from TenMarks, as reflected in the perception that *TenMarks can be used at home.* P1 stated, “can work on it at home and after school.” P6 stated, “offers them the choice to work on lessons away from school; they just need to sign on.” P2 said, “TenMarks is also free so if the students have a computer at home it is just like having a private tutor,” and P3 stated, “With TenMarks they can complete their assessment or their assignment in a tutoring session or at home.” The participants agreed that another advantage is that TenMarks promotes confidents and success, as reflected in the perception that *students feel confident when they have mastered an assignment.* P1 stated, “It provides the right amount of challenge yet helps the students recognize that they can be successful,” and P2 stated, “With TenMarks the student feels more in control. They get very excited when they’ve mastered an assignment. The more that these students use TenMarks the more confident they become.” The participants agreed that both instructional methods used jointly to enhance instruction and student learning was an advantage, as reflected in the perception that *TenMarks enhances face-to-face geometry instruction.* P1 stated, “Well, in my opinion TenMarks actually enhances face-to-face instruction. It meets the students where they are. It gives them exercises and then gives a test.” P5 stated, “I implement TenMarks in conjunction with my traditional classroom instruction, after students’ assessments, individualized lesson plans are created for each student.” P2 stated, “On TenMarks they are learning the fundamentals or building blocks of the same lesson that I’m teaching,” and P4 said, “I use TenMarks for the entire class along with my traditional teaching.”

The analysis of the matrix of responses related to the third research question, What are teachers’ perceptions regarding the advantages of CBI using TenMarks in promoting learning in geometry for students who are differently abled?” is consistent with the content analysis. All participants agreed that TenMarks differentiates instruction to individualize the curriculum and promotes individualized instruction for differently abled students. The participants’ verbatim responses were consistent with the themes extracted from the content analysis that served as the basis for my conclusions and recommendations in the present study.

The six primary themes related to this research question are summarized in the following section. As reflected in Table 11, the primary themes were (a) TenMarks differentiates instruction, (b) TenMarks enhances student learning, (c) TenMarks appeals to students who regularly use computers and technology, (d) TenMarks can be used at home, (e) students feel confident when they have mastered an assignment, and (f)

TenMarks enhances face-to-face geometry instruction. Table 12 shows the frequency with which the themes appeared across interviews and across the data.

Table 11

Themes for Research Question 3

Theme	Definition
TenMarks differentiates instruction	This theme refers to the perception that TenMarks differentiates instruction so students can work at their pace or level.
Ten Marks enhances student learning	This theme refers to the perception that TenMarks enhances student learning of geometry.
TenMarks appeals to students who regularly use computers and technology	This theme refers to the perception that TenMarks appeals to students who regularly use computers and technology.
TenMarks can be used at home	This theme refers to the perception that an advantage of TenMarks is that students can use it at home to learn of geometry.
Students feel confident when they have mastered an assignment	This theme refers to the perception that students feel confident in their abilities when they have mastered a math or geometry assignment in TenMarks.
TenMarks enhances face-to-face geometry instruction	This theme refers to the perception that Ten Marks enhances face-to-face traditional instruction of geometry.

Table 12

Frequency of Themes for Research Question 3

Theme	Number of interviewees mentioning this theme	Total exemplar quotes
TenMarks differentiates instruction	6	20
TenMarks enhances student learning	6	8
TenMarks appeals to students who regularly use computers and technology	4	7
TenMarks can be used at home	4	6
Students feel confident when they have mastered an assignment	2	5
TenMarks enhances face-to-face geometry instruction	4	4

Theme 1: TenMarks Differentiates Instruction

The first theme for Research Question 3 was *TenMarks differentiates instruction*. This theme is defined as the perception that TenMarks differentiates instruction in a manner that allows students to work at their pace or level of knowledge. This theme was mentioned 20 times in six interviews. Several examples of this theme, as evident in the interviews with the participants, are shared next.

P1 described how TenMarks differentiates instruction in a manner that allows students to work at their pace and level of knowledge and commented, “They work on the level of instruction that’s best suited for their needs, like the amount of assistance that they need to be successful in a unit that we are covering.” Regarding students’ use of TenMarks, P1 stated, “It’s at the student’s own pace. Once something is mastered the student can move on.”

P5 also described how TenMarks differentiates instruction in a manner that allows students to work at their own level. "Sometimes I introduce a new lesson through lecture and sometimes the new lesson is introduced through TenMarks. Students are working on the same lessons but on different levels." P5 further stated, "By making TenMarks a daily part of the curriculum with the individualized programs design for each student, they are able to grasp concepts the ways that best fit their learning style, through their playlist designed by TenMarks."

P6 described TenMarks' differentiation of instruction as "TenMarks offers students a way to learn at their own pace, and they can move as slowly as they need to or advance as quickly as they can." P6 also explained that "TenMarks is individualized for the particular student" and that "TenMarks brings more dimensions into the teaching process, which is what students who are differently abled need; all exercises are catered to fit the student's needs." P2 had a similar perception and indicated, "For my special ed kids and lower functioning kids, TenMarks can be personalized just for them." P4 shared, "Most of the time the kids love working on TenMarks because it gives each student the privacy to work at their own pace. First it assesses them to determine just where they should start." In a final example of this theme, P3 shared,

> At first I'm thinking, "Oh my lord this is just going to take so much time away from my instruction." Then after training I could not wait to get started. When we take the class to the lab each student can began on the same unit. The difference is because of their preassessment scores they will be working on different levels of difficulties.

> In some cases the digital environment or technological environment gives them their own little private tutor. They are working at their pace. You know what I mean? Like, they can play it over again until they get it.

Theme 2: TenMarks Enhances Student Learning

The next theme for Research Question 3 was *TenMarks enhances student learning*, which refers to the perception that TenMarks enhances student learning of geometry. This theme was mentioned eight times in six interviews. P1 said TenMarks enhances student learning of geometry "by being computer-based it can appeal to them, and enhance student learning." P5 shared how TenMarks enhances student learning of geometry.

> TenMarks have improved all of my student's academic performance. I usually give a pretest at the beginning of a unit and a posttest at the end of the unit with the use of TenMarks each and every student has made progress.

P6 had a similar perception as reflected in his statement:

> TenMarks brings more dimensions into the teaching process, which is what students who are differently abled need; all exercises are catered to fit the student's needs. When students' needs and learning styles are met they tend to remain more focused and improve academically.

P2 indicated, "TenMarks will provide the right amount of rigor with practice problems to help them gain a better understanding and reinforce previous lessons." P4 said, "This is where TenMarks is an excellent teaching tool, it allows each student to work and learn starting at their level of knowledge." In the final example of the theme that TenMarks enhances student learning of geometry, P3 stated, "They are tested throughout their units to show mastery before moving forward. So the assessment is primarily based on retention of information learned."

Theme 3: TenMarks Appeals to Students Who Regularly Use Computers and Technology

The next theme for Research Question 3 was *TenMarks appeals to students who regularly use computers and technology*. This theme refers to the perception that TenMarks appeals to students who regularly use computers and technology. This theme was mentioned seven times in four interviews. P2 said,

> TenMarks can be tailored for a specific student by meeting them at whatever level they are learning on. Some of my lowest functioning students are excited to get on TenMarks. I know one reason is because it's on the computer, and you know this generation on kids and computers right?

P3 mentioned that Ten Marks was appealing to students because this generation is connected to technology.

> Because we are in this digital age, these are digital babies. You know, I look at children that may be very, very challenged cognitively and very challenged physically but they still connect to the cellular phones and the computers. You observe them, you see their minds just going, just trying to figure out how to do this. It's just amazing to me to watch. Then they get it, it's all of the colors and emotions and movement, all of that that helps their attention span. The mere fact that TenMarks is computer based is a positive.

P6 said, “First of all they need to know how to use the computer constructively, because our world is all about computers and technology.” P1 described why TenMarks appeals to students who regularly use computers and technology.

> Some kids nowadays are not like the kids that used to go outside and play and do things. They are more inside; they play games a lot. They learn tricks and trades from the computer. Well, once again, in this computer era and in this era of more students having ADHD, at which they lose focus. They can’t pay attention for a long time, short attention spans. The computer tends to keep them more focused than one-on-one instructional, instruction at the board.

P1 further explained,

> Sometimes kids want to hear something different, sometimes kids just knowing that it’s coming from the computer instead of the teacher standing there instructing them. It kind of eases their mind and it kind of gets them to understand or say to themselves that, “Hey, we are learning technology day-to-day, through technology today. We are learning math, through technology approach.”

Theme 4: TenMarks Can Be Used at Home

The next theme for Research Question 3 was *TenMarks can be used at home*, which refers to the perception that an advantage of TenMarks is that students can use it at home to learn geometry. This theme was mentioned six times in five interviews. Describing a student who was struggling with math, P1 indicated that the student “can work on it at home and after school” with TenMarks. P6 said that TenMarks “offers them the choice to work on lessons away from school; they just need to sign on.” P2 also indicated that an advantage of TenMarks was being able to use it at home. P2 stated, "TenMarks is also free so if the students have a computer at home it is just like having a private tutor." P2 also commented that "I use it sometime to introduce a lesson, sometimes as practice work and then sometimes as homework. Each student can sign in from home with a computer." P3 said, "Another positive is the students can sign in from home." P3 also stated, "With TenMarks they can complete their assessment or their assignment in a tutoring session or at home."

Theme 5: Students Feel Confident When They Have Mastered an Assignment

The next theme for Research Question 3 was *students feel confident when they have mastered an assignment*. This theme is defined as the perception that students feel confident in their abilities when they have mastered a math or geometry assignment in TenMarks. This theme was mentioned five times in three interviews. P1 felt that "TenMarks certainly give the students a sense of being successful." P1 further stated, "It provides the right amount of challenge yet helps the students recognize that they can be successful." P2 described why students feel confident in their abilities when they have mastered a math or geometry assignment in TenMarks.

> Like I said, they are participating, they are working on a level that they understand, yet there is still some challenge. They are able to see success when the take the unit assessment test. I think the important thing is they are doing the same work as all of the other students in the class. They feel that they are fitting in.

P2 also described why students feel confident in their abilities when they have mastered a math or geometry assignment in TenMarks. “With TenMarks the student feels more in control. They get very excited when they’ve mastered an assignment and then they can move on. They can use it at home like a tutoring session.” P2 also stated, “The more that these students use TenMarks the more confident they become in their ability to understand the lessons. I see a lot of excitement and they are doing so much better on their assessment scores.”

Theme 6: TenMarks Enhances Face-to-Face Math and Geometry Instruction

The final theme for Research Question 3 was *TenMarks enhances face-to-face geometry instruction*. This theme refers to the perception that TenMarks enhances face-to-face traditional instruction geometry. This theme was mentioned four times in four interviews.

Several interviewees felt that TenMarks enhances face-to-face geometry instruction. P1 indicated,

> Well, in my opinion TenMarks actually enhances face-to-face instruction. It meets the students where they are. It gives them exercises and then gives a test. Only when they pass the test can they move on. There are situations where the kids seem to tend to get more active at some points in the room in which they can use computer-based programs, and this is another resource.

P5 stated, “I implement TenMarks in conjunction with my traditional classroom instruction, after students’ assessments, individualized lesson plans are created for each student.” P2 described how she used TenMarks to enhance face-to-face instruction.

> Well, first I use formative assessments, you know, this tells you basically where your students are, their functioning level, also where you need to start on a particular unit. So for some students I can do regular class instruction and some others might be on TenMarks where they are learning the fundamentals or building blocks of the same lesson that I'm teaching.

In a final example of this theme, P4 said, "I use TenMarks for the entire class along with my traditional teaching."

Results for Research Question 4

Research Question 4: What are teachers' perceptions regarding the challenges of CBI using TenMarks in promoting learning in geometry for students who are differently abled? Table 13 shows the responses to this research question.

Table 13

Responses to Research Question 4

Participant responses	Challenges				
	TenMarks can be a distraction	TenMarks hinders students' progress	TenMarks does not require students to show steps	TenMarks does not scaffold learning	Students do not know how to use the computer or TenMarks
Participant 1		Special ed students need a lot of guided practice.	I'm a firm believer that in mathematics that you don't know it until you can show it.	Computer cannot give that personal touch that they may need.	The computer can be confusing for some, they may not know how to click on this or drag this.
Participant 2	Some of the students they are so use to that click button motion that they are just clicking.		There is a difference between working the problem out and just answering it on the computer.	Unless the student has a computer in their home they can't get in as much practice as they need	
Participant 3	Students have a tendency to visit other computer sites, switching back and forth.	Although TenMarks is tailored for the student this does not mean that the student will understand how to carry out a process.	I've watched a lot of kids go right to the problems, without reading instructions.	The computer program cannot hold a student to a standard in the same way an instructor does.	
Participant 4		My special ed students require much more intense one-on-one teacher assistance.			Believe it or not all students are not computer savvy.

(table continues)

Participant responses	Challenges				
	TenMarks can be a distraction	TenMarks hinders students' progress	TenMarks does not require students to show steps	TenMarks does not scaffold learning	Students do not know how to use the computer or TenMarks
Participant 5	They can get sidetracked, they have gone to Facebook.	Well, you know the more time you spend having to monitor the use of the computers less time is spent giving one-on-one guidance.			
Participant 6	They sometimes get lost in the sounds, the controls, the switching and the clicking.	When a student doesn't understand the assignment he is less likely to continue with it.			

All participants agreed that there are challenges with computer based-instruction/TenMarks in promoting geometry learning for students who are differently abled. The matrix revealed that four participants stated *distraction a*s a challenge. P6 stated, "They sometimes get lost in the sounds, the controls, the switching, and the clicking." P5 said, "They can get sidetracked, they have gone to Facebook." P 2 commented that "Some of the students, they are so used to that click button motion that they are just clicking," and P3 stated, "Students have a tendency to visit other computer sites, switching back and forth." Five participants stated that student progress could be hindered by a lack of individualized, one-on-one guidance. P6 said, "When a student doesn't understand the assignment he is less likely to continue with it." P5 stated, "Well, you know, the more time you spend having to monitor the use of the computers less time is spent giving one-on-one guidance." P3 remarked, "Although TenMarks is tailored for the student this does not mean that the student will understand how to carry out a process." P1 stated, "Special ed students need a lot of guided practice," and P4 agreed by stating, "My special ed students require much more intense, one-on-one teacher assistance." Three participants agreed that mastery is when students can show their work. P2 stated, "There is a difference between working the problem out and just answering it on the computer." P3 commented, "I've watched a lot of kids go right to the problems, without reading instructions," and P1 stated, "I'm a firm believer that in mathematics that you don't know it until you can show it." Three participants associated the students' lack of studying and lack of a personal touch from the computer with the CBI not being scaffold. P2 stated, "Unless the student has a computer in their home they can't get in as much practice as they need." P3 said, "The computer program cannot hold a student to a standard in the same way an instructor does," and P1 stated, "[The] computer cannot give that personal touch that they may need." Two participants commented on the inability to use a computer as a challenge. P1 stated, "The computer can be confusing for some, they may not know how to click on this or drag this," and P4 said, "Believe it or not, all students are not computer savvy."

The five primary themes related to this research question are summarized in the following section. As seen in Table 14, the primary themes were (a) TenMarks can be a distraction, (b) TenMarks hinders students' progress, (c) TenMarks does not require students to show steps, (d) TenMarks does not scaffold learning, and (e) students do not know how to use the computer or TenMarks. Table 15 shows the frequency with which the themes appeared across interviews and across the data.

Table 14

Themes for Research Question 4

Theme	Definition
TenMarks can be a distraction	This theme refers to the perception that TenMarks can be a distraction for some students when used to promote learning in geometry.
TenMarks hinders students’ progress	This theme refers to the perception that TenMarks hinders the progress of students who need a great deal of assistance when learning geometry.
TenMarks does not require students to show steps	This theme refers to the perception that TenMarks does not require students to show the steps; it allows them to take shortcuts.
TenMarks does not scaffold learning	This theme refers to the perception that TenMarks does not scaffold student learning by showing the steps for geometry.
Students do not know how to use the computer or TenMarks	This theme refers to the perception that using TenMarks to promote geometry instruction is a problem because students do not know how to use the computer or the program.

Table 15

Frequency of Themes for Research Question 4

Theme	Number of interviewees mentioning this theme	Total exemplar quotes
TenMarks can be a distraction	4	6
TenMarks hinders students’ progress	5	5
TenMarks does not require students to show steps	3	5
TenMarks does not scaffold learning	3	3
Students do not know how to use the computer or TenMarks	2	2

Theme 1: TenMarks Can Be a Distraction

The first theme for Research Question 4 was *TenMarks can be a distraction*. This theme refers to the perception that TenMarks can be a distraction for some students when used to promote learning in geometry. This theme was mentioned six times in four interviews. P6 stated,

> Although some students learn well with TenMarks, it can be a distraction to other students, because they sometimes get lost in the sounds, the controls, the switching and the clicking. My special ed students’ nemesis is vocabulary, challenging vocabulary prevents them from grasping the material that they are trying to learn.

P5 described how TenMarks could be a distraction.

> As with any computer program it gives them the ability to actually surf the Web. So, they can get sidetracked, they have gone to Facebook or looking at just music

> videos on YouTube versus the instruction videos. Therefore, computer-based learning require a lot of monitoring for some students, and when the classes are very large this present a challenge.

P2 said,

> Although TenMarks is an excellent instructional tool, it is still computer based, and some of the students they are so use to that click button motion that they are just clicking. They don't take any pride in their work, they are just rushing through their work just to get it done not trying to understand it. Plus, students won't complete the assignments or remain on the assignment.

P3 described how using TenMarks was a distraction for some students. "Also with very large classes the teacher's ability to monitor all of the computers is limited. Students have a tendency to visit other computer sites, switching back and forth."

Theme 2: TenMarks Hinders Students' Progress

The next theme for Research Question 4 was *TenMarks hinders progress for students*, which refers to the perception that TenMarks hinders the progress of students who need a great deal of assistance when learning geometry. This theme was mentioned five times in five interviews.

P1 felt that TenMarks hindered the progress of those students who need additional assistance, "like the special ed students need a lot of guided practice to help them understand sometimes." P5 said, "Well, you know, the more time you spend having to monitor the use of the computers less time is spent giving one-on-one guidance, therefore, students who require a lot of guidance maybe receiving a fraction of it." P6 shared that TenMarks hindered the progress of students who need additional assistance because,

> When a student doesn't understand the assignment he is less likely to continue with it. It is imperative to utilize peer tutors when there is a very low-functioning student. Using group activities also counters any one student being totally lost, within the group one student can be the reader so that everyone in the group understands the directions and assignment.

P4 felt that TenMarks hindered the progress of those students who need additional assistance for the same reasons as P6, and stated,

> My special ed students require much more intense one-on-one teacher assistance; left on their own they will not get a lot of the assignments completed. They do not ask a lot of question for fear of feeling embarrassed by their low level of function.

In a final example, P3 stated,

> Although TenMarks is tailored for the student this does not mean that the student will understand how to carry out a process. There are instructions; whether the instruction are verbal or written the students still might not understand. The program does not know the student, does not know the student's background, how well he or she can read. So if the student doesn't understand and chooses not to seek help, the student can become uninterested and either clicks on any button to try to answer a question or start looking at other sites.

Theme 3: TenMarks Does Not Require Students to Show Steps

The next theme for Research Question 4 was *TenMarks does not require students show steps*. This theme refers to the perception that TenMarks does not require students to show the steps they take to solve problems; it allows them to take shortcuts. This theme was mentioned three times in three interviews. P3 explained that TenMarks does not require students to show the steps.

> I feel very strongly about what research says about writing and retaining, there is something that goes on in your mind when you are actually writing, you know. I've watched a lot of kids go right to the problems without reading instructions.

P1 indicated that

> On the computer I can only monitor and kind of regulate that. But when you go to the board or when you are using that dry erase board, and you have your own little dry erase board at your desk, I can see where you are actually making your mistakes.
>
> Getting the kids to think more. I believe that with the computer the kids just will sometime say, "Well, because this is a computer, because it has Google I can just get the answer real quick. Everything just happens automatically." But I'm a firm believer that in mathematics that you don't know it until you can show it.

P2 also mentioned that TenMarks does not require students to show the steps.

> They sometimes rush through their work because it doesn't require them to show certain steps; there is a difference between working the problem out and just

answering it on the computer. Sometimes when you have your students actually write the problem out they are learning by reinforcement. They are writing it out and they are retaining the information versus with the computer, they're clicking a button.

Theme 4: TenMarks Does Not Scaffold Learning

The next theme for Research Question 4 was *TenMarks does not scaffold learning*. This theme refers to the perception that TenMarks does not scaffold student learning by showing the steps for math or geometry. This theme was mentioned three times in three interviews.

P1 described how TenMarks does not scaffold student learning by showing the steps for math or geometry.

> Because my thing is at the end of the day, they have to demonstrate what they know. If they don't know the steps, the computer sometimes may not give them that additional step that they need. Or that personal touch that they may need, which traditional face-to-face instruction that does.

P2 mentioned,

> Another challenge is that TenMarks is only on computers, so unless the student has a computer in their home they can't get in as much practice as they need. As you know our school district certainly don't furnish students with computers, although they should for the special ed students.

In the final example of this theme, P3 indicated TenMarks does not scaffold student learning by showing the steps for math or geometry when she stated, "The computer program cannot hold a student to a standard in the same way an instructor does because there is no verbal dialogue."

Theme 5: Students Do Not Know How to Use the Computer or TenMarks

The final theme for Research Question 4 was *students do not know how to use the computer or TenMarks*. This theme is defined as the perception that using TenMarks to promote geometry learning is a problem because students do not know how to use the computer or the program. This theme was mentioned two times in two interviews.

P4 indicated that not all students are computer savvy, which might be a disadvantage of using TenMarks.

> Well, depending on the student's vocabulary level they might have a problem understanding or following direction when they are working on their own. Many times they get frustrated when they have to go back and redo a lesson again. These students like immediate gratification; believe it or not all students are not computer savvy.

P1 felt that "The computer can be confusing. They will click on something and still not know what the lesson is about. Some may not know how to click on this or drag this."

Evidence of Quality

To assure accuracy of the data I used a qualitative case study to better understand the attitudes, behaviors, motivators, and concerns of the targeted research group (Babbie & Benaquisto, 2009). Furthermore, this research design was acceptable because of the need for in-depth and rich content from the participants (Cozby, 2009). Such data provides evidence for a structured analysis and meaningful insight (Yin, 2013).

Purposeful sampling was used to select both the participants and the environment where the interviews would take place to better understand the research problem as well as the central phenomenon of the study (Creswell, 2009). In accordance with Polkinghorne's (2005) recommendation of a sample size ranging from five to 25 participants for a qualitative study, I selected six participants who have instructed mathematics/geometry for at least 3 years and as many as 35 years. Each participant was also experienced with both instruction methods under investigation (direct instruction and CBI). I conducted 60- to 90-min face-to-face interviews using open-ended questions. Data collection methods followed for the present study allowed participants the flexibility to respond freely and unrestricted (Bynner & Stribley, 2010; Streubert & Carpenter, 2011), which was essential for obtaining a full understanding of this phenomenon. All interviews were recorded using a digital voice recorder and transcribed for analysis. All participants granted permission to use these recordings. Finally, member checking was conducted for triangulation purposes. All participants reviewed their transcripts before they were analyzed and coded for themes. Additionally, according to Denzin (2012), two data sources or analysts can be used to check data for validity by confirming responses. For the present study, two analysts performed the coding and analysis.

Summary

When considering which differentiated-instruction program (face-to-face or computer-based learning) works best in supporting the improvement of academic performance of differently abled students in geometry, study participants (six math teachers) shared their perception on the advantages and disadvantages of both instructional methods. All of the teachers who participated in this study used face-to-face instruction as their primary method of instruction, agreed that RTI enhanced this traditional teaching method, and agreed that using this method helped identify specific areas where students needed assistance. Some participants also agreed that this method of instruction was helpful in meeting students exactly where they are in their learning process. Some participants supported the fact that RTI when combined with face-to-face instruction was helpful for developing learning plans as well as being an observational method, which supported Bandura (1971) observational learning theory, one of the four conceptual frameworks used for the present study.

However, because these participants shared that they often were dividing their attention between so many students who were all at different levels of instruction, they admitted being overwhelmed. Some participants shared that most class sizes were so large that it could be challenging to provide individual attention to every student. Participant 2 even stated, “Some classes that it may be 35 students in the class to one teacher. So if you have four classes, no three classes with 35 students that’s overwhelming for a teacher, because you have multiple learning styles within your classroom.” These participants have learned to stretch themselves to accommodate most of their students’ needs, but admitted that even though face-to-face instruction was their primary method, using computer-based programs such as TenMarks could help them give attention where it was most needed. P2 also shared that “It [CBI] will also allow me additional time to focus on the students who aren’t performing at the same level or below grade level. What I have noticed is that we have a lot of students who come into class. Not one but two to three grade levels behind."

However, even with a method such as TenMarks, which seemed beneficial, teachers noted some drawbacks. Students have used the computer-based method to search for answers on Google or to entertain themselves by surfing the Internet. Additionally, the teachers stated that these students seemed not able to truly connect with the lessons. The teachers felt that most students viewed TenMarks as a game where their only form of engagement came from the bright lights and bells received when they answered correctly.

When all the advantages and disadvantages are considered for both methods, the ideal approach appears to be establishing a curriculum that responds to the needs of the students and how their learning actually occurs, such as through constructivism theory. Additionally, based on teachers' experiences provided in the interviews conducted for the present study, both the social and critical models of disability theory should be incorporated into the curriculum in order to dismantle systematic barriers while acknowledging that a social construct places differently abled students at a disadvantage. In order to accomplish this goal, a balance of both instructional methods, traditional face-to-face and computer-based, should be considered, evaluated, and incorporated.

Section 5: Discussion

Introduction

The purpose of this qualitative case study was to investigate teachers' perspectives regarding advantages and challenges of two types of differentiated-instruction models for students with learning disabilities. Of specific interest were geometry teachers' perceptions of the advantages and challenges of traditional face-to-face instruction using RTI and TenMarks computer-based learning for teaching geometry to differently abled students. This study was important because in 2012, 78% of students with moderate intellectual disabilities, learning disabilities, emotional disabilities, and at-risk students attending the school from which the participant sample was drawn failed the end-of-year geometry assessment. The specific problem this study was intended to address was the lack of knowledge about teachers' perspectives regarding the effectiveness of these two differentiated-instruction approaches.

Summary of Findings

Research Question 1

Research Question 1: What are teachers' perceptions regarding the advantages of traditional face-to-face instruction using RTI in promoting learning in geometry for students who are differently abled? All of the participants adamantly agreed that face-to-face instruction using RTI is the foundation of teaching and learning for differently abled students. As shown in Table 4, participants concurred on this point.

The five themes that highlighted the advantages were that face-to-face instruction using RTI (a) helps teachers use differentiated instruction to better promote student learning, (b) helps students show their learning, (c) helps teachers use data-driven instruction to better connect with the students' needs, (d) helps teachers screen students to determine where they are, and (e) benefits students' learning and retention when paired with tutoring and group work.

These findings are consistent with recommendations in the literature that teachers build lesson plans around students' strengths and learning needs (Algozzine & Anderson, 2007; Scigliano & Hipsky, 2010; Tomlinson, 2005). Participants' experiences with RTI as a tool to individualize instruction based on students' abilities are in accordance with a body of literature that supports the effectiveness of differentiated instruction (Fuchs & Vaughn, 2012; Pentimonti & Justice, 2010; Reis et al., 2011). Participants described being better able to connect with students at their particular knowledge level, which is another benefit of differentiated instruction described previously by researchers (Dosch & Zidon, 2014; Stetson et al., 2007; Watts-Taffe et al., 2012).

Research Question 2

Research Question 2: What are teachers' perceptions regarding the challenges of traditional face-to-face instruction using RTI in promoting learning in geometry for students who are differently abled? All participants agreed that large class size lessens the effectiveness of face-to-face instruction using RTI. All participants agreed that with large class size, other classroom management skills or modifications must be used to promote differentiation of instruction and student engagement. Table 7 shows the participants' specific concerns.

The four themes that highlighted the challenges were:

- Students may lose focus. Participants expressed that they had to be aware of students’ attention spans and know when their attention was fading.
- Large class sizes. Participants suggested that classes were often too large to provide each student with the one-on-one teaching attention needed to enhance learning. Participants expressed that there are several different learning styles in any group of students and that the large classes prevent students’ individual needs from being met.
- Students have difficulty following along and limited attention span. Students need a more interactive instructional modality to maintain their engagement in learning.
- Students are below grade level.

Previous research indicated that some teachers were skeptical about differentiated instruction (Manning et al., 2010). Participants in the present study did not express skepticism about differentiated instruction itself but expressed practical difficulties with its implementation due to large class sizes, which was consistent with previous research (Casey & Gable, 2012; Lightweis, 2013; Pham, 2012). Casey and Gable (2012) discussed lack of resources and materials for properly implementing differentiated instruction, which may be relevant to participants’ concerns about students’ attention spans and need for more interactive teaching modalities. It is possible that additional resources and materials would facilitate staffing levels and teaching tools that would provide the stimulation necessary to keep students with limited attention spans engaged in the learning process. However, participants' concerns about students' limited attention spans were not specifically discussed in the literature reviewed for this study.

Research Question 3

Research Question 3: What are teachers' perceptions regarding the advantages of CBI using TenMarks in promoting learning in geometry for students who are differently abled?

Participants agreed that most differently abled students are more focused and engaged with their math lessons using TenMarks. Participants suggested that using TenMarks appeared to make the experience more fun for students, that most students were already inclined to use computers because of their personal experience, and that computer-based learning could be carried out at the student's own pace. Participants agreed that students could repeat problems or lessons as many times as necessary to fully learn the material and that the TenMarks system gave them instant feedback on their work. Table 10 details the specific comments from participants.

The six themes that highlighted the challenges were (a) TenMarks differentiates instruction, (b) TenMarks enhances student learning, (c) TenMarks appeals to students who regularly use computers and technology, (d) TenMarks can be used at home, (e) students feel confident when they have mastered an assignment, and (f) TenMarks enhances face-to-face geometry instruction.

The literature reviewed for this study did not include research that specifically investigated advantages of the TenMarks system; however, these findings were consistent with the research pertaining to the advantages of CBI that used other instructional programs. Previous researchers have found that CBI's highly interactive nature and the availability of immediate feedback were motivating to users (AbuSeileek, 2012; Paechter & Maier, 2010). The option to adjust CBI based on the user's skills and abilities was another benefit described in the literature (Aldunate & Nussbaum, 2013). These findings are also consistent with research indicating that CBI use for mathematics instruction positively affected students' attitudes toward learning (Hwang et al., 2012).

Additionally, participants stated that advanced students were able to work ahead while teachers attended to other learners with greater needs. These findings are consistent with Tomlinson's (2013) description of differentiated instruction as an approach that requires modification of teaching strategies and methods to suit the needs of diverse learners.

Research Question 4

Research Question 4: What are teachers' perceptions regarding the challenges of CBI using TenMarks in promoting learning in geometry for students who are differently abled? All of the participants noted that some students circumvented the actual learning process by simply clicking on answers in order to find the correct answer instead of working out the math problems themselves. Participants also suggested that some differently abled students seemed to view the TenMarks program as a game rather than a lesson and that these students may become absorbed in the sensory aspects of the program such as the music and sound effects. Participant comments are provided in Table 13.

Five themes highlighted the challenges. These themes were (a) TenMarks can be a distraction, (b) TenMarks hinders students' progress, (c) TenMarks does not require students to show steps, (d) TenMarks does not scaffold learning, and (e) students do not know how to use the computer or TenMarks.

Research specifically related to disadvantages of the TenMarks program was not available for review; however, previous studies have shown that misunderstandings and miscommunications were more common with other types of CBI compared with face-to-face teaching because of the lack of direct interpersonal communication (Castaño-Muñoz et al., 2013). Such miscommunication may underlie the difficulties students had with grasping the lesson material, as participants described. Teachers' concerns about students viewing the TenMarks program as a game and simply clicking on answers rather than doing the work were unique and were not reflected in the literature reviewed for the present study.

A unique response to the fourth question was that the TenMarks program only provided one way of teaching the current lesson, and, unlike face-to-face instruction, did not have the capability to present the lesson in a different manner. If a student did not understand the particular approach to instruction in the TenMarks program, then repeating it could result in frustration and eventually just picking random answers in an attempt to finish the lesson. This perspective was in contrast with perspectives of other participants who expressed that the option to repeat lessons in the TenMarks program enhanced the learning process, and it also differs from accounts in the literature of the flexibility of other types of CBI to meet different users' needs (Aldunate & Nussbaum, 2013).

Interpretation of the Findings

Findings from the present study confirmed many assertions in the literature regarding differential instruction and contributed specific teacher perspectives on the benefits and drawbacks of this approach to instruction with differently abled students. Participants perceived RTI as a tool that promotes including diverse learners in mainstream classrooms by helping teachers adjust their approach to students at different levels, which reflects the core philosophy of differentiated instruction (Tomlinson, 2005; Tomlinson & Kalbfleisch, 1998). Teachers who participated in the present study described using RTI as a guide for developing lesson plans that accommodate the needs of students with different learning styles and knowledge levels, which is another strength of differentiated instruction discussed by researchers (Dosch & Zidon, 2014; Stetson et al., 2007; Watts-Taffe et al., 2012).

Promoting success of differently abled students through adapting instructional materials to meet their needs reflects beliefs associated with social and critical disability theories, which posit that disability status is a socially constructed concept that arises due to poorness of fit between the individual's needs and the environment (Goering, 2010; Inahara, 2009; Meekosha & Shuttleworth, 2009). Participants in the present study and previous studies reported large class sizes as drawbacks related to RTI and other forms of differentiated instruction (Casey & Gable, 2012; Lightweis, 2013; Pham, 2012); however, viewed through the framework of social and critical disability theories, large class sizes may be considered a failure of the environment to respond to the diverse needs of students. Although large class sizes may be unavoidable, additional staffing may function as a disability accommodation for students who struggle to perform academically without one-on-one instruction (Casey & Gable, 2012).

A finding specific to this study was teachers' perceptions of students' limited attention spans as a drawback associated with RTI. Short attention spans may be considered inherent features of certain learning and developmental disabilities if considered using the medical model of disability (Matthews, 2009; McDermott & Turk, 2011). Considered through the social or critical models of disability, however, difficulties teaching students with short attention spans may relate to environmental inadequacies such as lack of staffing or distracting stimuli.

The present study's findings also confirmed many of the perspectives in the literature related to the advantages and disadvantages of computer-based learning and contributed new perspectives regarding challenges teachers experienced using the TenMarks instructional program with differently abled students. As reported in previous studies, participants in this study expressed that the self-regulated pace and immediate feedback of computer-based learning motivated students and successfully engaged their attention (AbuSeileek, 2012; Hwang et al., 2012; Paechter & Maier, 2010). The motivation student exhibited in response to CBI reflects the constructivism theory of learning, which describes learning as an active, self-driven process (Brandon & All, 2010). The benefits of self-paced learning associated with CBI are also harmonious with the aims of differentiated instruction because students can independently adjust their learning pace according to their current knowledge and abilities (Tomlinson, 2005).

Participants' concerns about differently abled students viewing the TenMarks program as a game and rushing through lessons by simply seeking correct answers rather than working out math problems were new contributions to the literature regarding computer-based learning and differently abled students. These student behaviors may be interpreted as undesired outcomes of observational learning because the experiences of observing and participating in games on the computer may have shaped these students' learning regarding the functions of computers (Bandura, 1971). Additionally, students may have observed other students clicking on correct answers and receiving reinforcing feedback but failed to understand the unseen cognitive processes involved in figuring out the correct answer. This process of observational learning without full understanding of the behavior they observed may be consistent with previous researchers' findings related to observational skill deficits in differently abled students (Taylor et al., 2012).

Participants expressed concerns about differently abled students failing to connect computer-based learning tasks presented through the TenMarks program with math lesson content and about students becoming frustrated when they could not understand the instruction provided via the computer-based program. These findings represent new contributions to the literature related to differently abled students using computer-based learning and reflect a failure of the TenMarks program to accommodate the learning needs of certain differently abled students. Although the learning tasks can be repeated on the TenMarks program, the instructional approach cannot be adjusted; therefore, if the teaching approach does not mesh with a particular student's learning style, the computer-based program would not accommodate the student's disability. Inflexibility of instructional approaches creates learning difficulties for some students, which is a problem differentiated instruction attempts to address (Tomlinson, 2005). Further, the inaccessibility of the instructional module for some students would be considered the cause of their disability status according to social and critical disability theories (Goering, 2010; Inahara, 2009; Meekosha & Shuttleworth, 2009).

The present study's findings were largely consistent with findings in the relevant research and did not appear to disconfirm findings presented in the literature reviewed for this study. In one case, a participant expressed that the TenMarks learning program had an inflexible teaching approach, which was in contrast to previous study findings about CBI's flexibility (Aldunate & Nussbaum, 2013). There are many different computer-based learning programs, and this difference of opinion most likely reflects differences between TenMarks and other programs, which may be more flexible. The deliberate sampling of teachers who instruct differently abled students for this study may also have bearing on this difference in perspectives because teaching students with disabilities may have sensitized participants to concerns of instructional flexibility. Participants in previous research regarding CBI may have been more interested in CBI's flexibility afforded by its self-driven nature and less concerned with disability-related teaching adaptations compared with participants in the current study.

Findings from this study extended knowledge regarding teachers' perspectives on instruction of differently abled students; specifically, teachers discussed short attention spans of students as a drawback related to RTI and specific difficulties differently abled students had with learning from the TenMarks computer-based program. It is likely that this study's qualitative design, specifically its open-ended questions, which allowed for elaboration and unique discussion that is not captured through quantitative approaches (Cozby, 2009), provided an appropriate approach for gaining these new perspectives. Review of the literature revealed inconsistent performance results for students who used computer-based learning (e.g., Ke, 2013); the present study's findings did not provide data regarding student performance on computer-based math lessons. Therefore, these contradictions in the literature were not addressed.

Implications for Social Change

The present study's findings may be of interest to school administrators and teachers who provide services to differently abled students. The study findings may be helpful in guiding school policy and practice related to differentiated-instruction approaches in classrooms that include differently abled students. Using traditional face-to-face/RTI and CBI collectively would be beneficial for students with disabilities and their nondisabled classmates. Both face-to-face/RTI and CBI using TenMarks had advantages and challenges for students and teachers. However, when used in combination the strengths and weaknesses of these two approaches were complementary. For example, computer-based learning capitalized on students' inner motivations to learn but caused confusion for some students. Using face-to-face instruction informed by RTI was then a useful approach for alleviating those students' confusion by providing alternate explanations on how to complete the math problem. Providing differentiated instruction through a combination of approaches informed by RTI would give differently abled students a better chance of success in learning and also allow more advanced students to work and learn at a pace that meet their needs.

The presents study's findings supported using both face-to-face instruction such as RTI and CBI such as TenMarks, which correlates with the social and critical models of disability. Using multiple teaching methods that are adjusted to meet the specific learning styles and abilities of individual students with disabilities would appropriately address gaps between the students' needs and the instructional environment, which is an approach that reflects perspectives of disability as being socially constructed (Goering, 2010; Inahara, 2009; Meekosha & Shuttleworth, 2009). This flexible teaching approach is also consistent with the aims of differentiated instruction (Tomlinson, 2005). Using a multifold approach to teaching would also provide more pathways for students to pursue their own learning according to constructivism theory; if students have multiple methods of learning available, they can actively develop their learning via the modality they find most engaging (Brandon & All, 2010). Further, having multiple learning methods available in the classroom would promote more diverse observational learning as differently abled students observe their classmates working on math problems in different ways (Bandura, 1971).

The present study's qualitative design was useful for drawing out detailed perceptions of the two differentiated-instruction approaches. However, the findings did not advance relevant research methodologies.

Recommendations for Further Study

Future research may be conducted for evaluating the extent to which the present study's findings generalize to other regions of the United States. This might be accomplished by formulating a fixed-choice survey instrument based on the responses provided by the current study's participants and using this as the basis of a quantitative study with a larger, more representative sample. This design would allow researchers to address questions that the current study's design did not. For example, a survey could measure the frequency with which a large teacher sample reports certain advantages and drawbacks to RTI and other differentiated-instruction approaches such as individualized lesson plans, large class size, and short attention spans of students. A survey could also be used to investigate opinions on using RTI, computer-based learning, or a combination of approaches.

Another consideration for future research would be the relative effectiveness of various differentiated-instruction approaches in terms of learning outcomes for students with disabilities. This may be accomplished by randomly assigning participants with learning disabilities to different instructional conditions and measuring their learning in each condition using pretests and posttests.

Qualitative inquiry into the experiences of students with disabilities would also help to enhance understanding of the advantages and challenges of differentiated-instruction approaches. Students with disabilities are not always able to communicate verbally in a clear manner, but combinations of individual interviews and observations of differently abled students may be used to address questions about the relative merits of approaches such as RTI and computer-based learning. For example, students with disabilities could share their perspectives on what helps them learn and what creates difficulties for them when trying to learn. Observations of students in the classroom could affirm these perspectives and provide other insights into how different instructional approaches work and do not work for students with disabilities.

Finally, future research efforts may focus on evaluating the efficacy of learning accommodations for improving the effectiveness of computer-based learning for differently abled students. Teachers in the present study reported that students with disabilities sometimes misunderstand what the computer-based program is teaching, that they mistakenly believe the teaching approach is a game, and that they simply click on answers and seek the correct one without doing the work. Disability-related accommodations such as special instruction and modeling by teachers or staff assistants may be tested to determine whether additional face-to-face instruction would improve student performance on computer-based learning programs.

Summary and Conclusions

This section was a discussion of a qualitative case study on teachers' perspectives regarding advantages and challenges of using two types of differentiated-instruction models with students who are differently abled. The specific focus was on teachers' perceptions of traditional face-to-face instruction using RTI and computer-based learning using TenMarks for teaching geometry to differently abled students. It was expected that teachers would describe advantages and challenges to learning that reflected disability theory, constructivism theory, and observational learning theory. Teachers' perspectives on using RTI and the TenMarks CBI program reflected assumptions of the social and critical models of disability as teachers often described differently abled students' learning success as hinging upon adjustment from the environment. Participants also described differently abled students' learning as being self-driven when using computer-based programs, which is in line with constructivism. Teachers described challenges to learning using the TenMarks program that may have reflected observational learning deficits common to differently abled students.

As discussed in the first section, a possible limitation of this study emerged from its small sample size. Using six participants in a qualitative study is considered adequate for achieving data saturation (Polkinghorne, 2005), but it is possible that important perspectives related to RTI and computer-based learning for differently abled students were not captured or adequately developed in the context of this small study. In certain cases, only one or two participants described a particular perception of advantages or disadvantages of the two differentiated-instruction methods. If a larger sample were used, such rare perspectives might be more frequent and therefore receive greater attention and development as major themes of the study.

Another possible limitation acknowledged in the first section stemmed from the narrow demographics of the study participants. All six participants were geometry teachers who worked for the same school on the East Coast of the United States. This sample was selected purposefully in order to permit a thorough investigation of the perspectives of math teachers who work with differently abled students. However, these deliberate constraints on sampling may have resulted in findings that do not represent the perspectives of teachers in other regions or teachers of other subjects who work with differently abled students.

Based on a review of the literature related to differentiated instruction, I expected that teachers would find RTI useful in gauging the specific learning needs of differently abled students. Review of the literature pertaining to computer-based learning suggested that this instructional modality is motivating and engaging for users. Participants' descriptions of the advantages and challenges associated with RTI and the TenMarks computer-based program were often consistent with these findings in the literature and provided new insights into benefits and drawbacks of each of these approaches. Overall, participants' descriptions of the two differentiated-instruction approaches suggested that combining the two approaches would be most beneficial for students with disabilities because the strengths and weaknesses of the two approaches are complementary.

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Appendix A: Interview Protocol

Teachers' Perceptions: Face-to-Face and Computer-Base Instruction in Math for Students with Disabilities

The italicized statements and questions will be used to obtain responses to the main research questions:

Part I Advantages of RTI

RQ1: What are teachers' perceptions regarding the advantages of traditional /Face-to-face instruction using response to intervention (RTI) in promoting learning in geometry/math for students that are differently abled?

- ✓ ***Tell me about your use of RTI as a form of face-to-face instruction.***
- ✓ ***How do you apply differentiated instruction through RTI?***
- ✓ ***Tell me about the positive aspects of RTI.***
- ✓ ***How do these positive aspects of RTI help to improve academic performance of students who are differently abled in math/geometry?***

Part II Challenges of RTI

RQ2: What are teachers' perceptions regarding the challenges of traditional/face-to-face instruction using RTI in promoting learning in geometry/math for students that are differently abled?

- ✓ ***Tell me about the challenges or negative aspects experienced through RTI.***
- ✓ ***How do these negative aspects of RTI challenge/hinder the improvement of academic performance of students who are differently abled in math/geometry?***

Part III: Advantages of TenMarks?

RQ3: What are teachers' perceptions regarding the advantages of computer-based instruction using TenMarks in promoting learning in math/geometry for students that are differently abled?

- ✓ ***Tell me about your use of TenMarks as a form of instruction.***
- ✓ ***How do you apply differentiated instruction through TenMarks?***
- ✓ ***Tell me about the positive aspects of TenMarks.***
- ✓ ***How do these positive aspects of TenMarks help in improving academic performance of students who are differently abled in math/geometry?***

Part IV: Challenges of TenMarks

RQ4: What are teachers' perceptions regarding the challenges of computer-based instruction using TenMarks in promoting learning in math/geometry for students who are differently abled?

- ✓ ***Tell me about the challenges or negative aspects that you experienced through TenMarks.***
- ✓ ***In what ways do you think TenMarks falls short in promoting learning for students who are differently abled?***

Unless you have any questions this concludes our interview and I thank you for your time and valued responses.

Appendix B: Participant Information Sheet

Name: ____ Age: _____

Address: ____

City____________________________State__________________Zip________

Home Phone: _ __________________________Cell Phone__________________

Email____

Gender: __________________________ Marital Status_______________________

Education:
Under graduate_________, Graduate.__________, Post graduate___________

Experience as a teacher:
Less than 3 Years_____, 3-7 Years_____, 8-12 Years_______, 13-17 Years_____18 years or more_____

What math course do you teach? ________________

Do you teach inclusion math classes? Yes______, No ________

Do you teach a diverse population of students? Yes______, No________

Do your instructional models include both face-to-face and computer-based instruction?
Yes ____, No____

Please describe your duties and responsibilities.
____
____
____

We sincerely appreciate your willingness to participate in this research study. If you would like to be informed of the results please indicate by checking the box below.

______ I would like to receive the 1-2 page results
______ I would like a copy of the complete study

Appendix C: Transcriber Confidentiality Agreement

CONFIDENTIALITY AGREEMENT

Name of Signer: [redacted]

During the course of collecting data for this research: "Teachers' Perceptions: Face-to-face and Computer-Based Instruction in Math for Students with Disabilities" I will have access to information, which is confidential and should not be disclosed. I acknowledge that the information must remain confidential, and that improper disclosure of confidential information can be damaging to the participant.

By signing this Confidentiality Agreement I acknowledge and agree that:

1. **I will not disclose or discuss any confidential information with others, including friends or family.**
2. **I will not in any way divulge copy, release, sell, and loan, alter or destroy any confidential information except as properly authorized.**
3. **I will not discuss confidential information where others can overhear the conversation. I understand that it is not acceptable to discuss confidential information even if the participant's name is not used.**
4. **I will not make any unauthorized transmissions, inquiries, modification or purging of confidential information.**
5. **I agree that my obligations under this agreement will continue after termination of the job that I will perform.**
6. **I understand that violation of this agreement will have legal implications.**
7. **I will only access or use systems or devices I'm officially authorized to access and I will not demonstrate the operation or function of systems or devices to unauthorized individuals.**

Signing this document, I acknowledge that I have read the agreement and I agree to comply with all the terms and conditions stated above.

Signature: [redacted] **Date: 05-07-2015**

Appendix D: Letter of Cooperation from a Research Partner

Community Research Partner Name NSAA Consultants, LLC
Contact Information [redacted]

August 03, 2015

Dear Mrs. Sessoms,

Based on my review of your research proposal, I am approving your request to conduct the study entitled "Teachers' Perceptions: Face-to-Face and Computer-Based Instruction in Math for Students with Disabilities" within the Richmond area. As part of this study, I authorize NSAA Consultants, LLC to disseminate recruitment information on your behalf so that you may conduct face-to-face interviews with secondary math teacher involved in implementing Face-to-Face Instruction and Computer-Based Instruction to students with disabilities. Individuals' participation will be voluntary and at their own discretion. The research will not involve the use of students as participants.

My signature acknowledges the researcher, Carolyn J. Sessoms, has presented a copy of her approved proposal, which I have reviewed. NSAA Consultants, LLC reserves the right to withdraw from the study at any time if our circumstances change.

This document confirms that Carolyn J. Sessoms is authorized to implement this research study within the venues provided by NSAA Consultants, LLC.

I understand that the data collected will remain entirely confidential and may not be provided to anyone outside of the student's supervising faculty/staff without permission from the Walden University IRB.

Sincerely,

Renata A. Hedrington Jones

Renata A. Hedrington Jones, MSW, SSWS, PhD
Executive Director, NSAA Consultants, LLC.

[redacted]

Appendix E: Invitation Email to Potential Participants

Dear Math Teachers,

My name is Carolyn Sessoms, a doctoral candidate at Walden University. I am conducting interviews as part of a research study to increase understanding of how Face-to-Face and Computer-Based Instruction can best be used to differentiate instruction in inclusive math classes for students who are differently abled.

As a math teacher you are in an ideal position to give me valuable first-hand information from your own perspective. The interview takes approximately 30-60 minutes. I am simply trying to capture your thoughts and perspectives on the advantages and challenges of Face-to-Face and Computer-Based Instruction. Your responses to the questions will be kept confidential. Each interviewee will be assigned a number code to help ensure that personal identifiers are not revealed during the analysis and write up of findings.

There is no compensation for participating in this study. However, your participation will be a valuable addition to my research, and findings could lead to greater academic understanding of how to promote academic achievement for students who are differently abled in inclusive math classes.

If you are willing to participate please suggest a date and time that suits you and I will do my best to be available. If you have any questions do not hesitate to contact me at [redacted], [redacted] or my faculty advisor Dr. Ella Benson at [redacted]

Respectfully,

Carolyn Sessoms, Ed.M.

Appendix F: Follow-Up Email

Dear Potential Participant,

I look forward to hearing from you. Your participation is valuable and will add richness to my research. I welcome any questions that you might have. Please don't hesitate to contact me or my faculty advisor, Dr. Ella Benson at [redacted]

Respectfully,

Carolyn J. Sessoms, Ed.M.

[redacted]

Appendix G: Recruitment Flyer

Secondary Math Teachers

I NEED YOUR ASSISTANCE

Participate in an Interview
(face-to-face)

RESEARCH STUDY ENTITLED:

Teachers' Perspectives: Face-to-Face and Computer-Based Instruction in Math For Students with Disabilities

The Desired Outcome: To identify Best Practices for Secondary Math Teachers who teaches inclusive classes and uses Face-to-Face and Computer-Based Instruction.

The exploration of Inclusive teachers' perspectives on the advantages and challenges of the two instructional models will aid in determining how best to differentiate instruction more effectively for Students with Disabilities. The finding will influence the development of best practices for this specific population of students. The outcome will influence social change by promoting academic achievement in math for Students with Disabilities.

I need you to help me make a difference. Step forward and be heard by participating in this research study.

If you are interested in participating in this study please contact me or my faculty advisor for information:

Carolyn J. Sessoms, Ed.M.
[redacted]
Dr. Ella Benson
[redacted]