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Reforms in Relation to Research-Based Theories Resulting in Successful Test Results

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COLLEGE OF EDUCATION

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Doctoral Study Submitted in Partial Fulfillment

of the Requirements for the Degree of

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Abstract

The study school in Bibb County, Georgia had a passing rate of approximately 60% on 9th grade literature and composition End of Course Tests (EOCT). An instructional paradigm was needed to help provide quality instruction and facilitate students' efforts to meet the mandate for performance. Research supports differentiated instruction (DI), instructional technology (IT), Gardner's multiple intelligences, and Vygotsky's theory of constructivism as the foundation for quality instruction. This ex post facto study used a cluster sample to explore 2 questions. One research questions explored the effect of DI enhanced with IT on students' learning in 9th grade literature and composition class. The other examined the differences in EOCT scores between students receiving 9th grade literature and composition instruction through a traditional approach and those receiving instruction through DI enhanced with IT. One hundred and five 1st time 9th graders in a literature and composition class were divided into 2 groups. One received traditional instruction, and the other received differentiated instruction with technology. Pretests and EOCTs were analyzed using a *t* test to determine the difference between the 2 instructional practices. Both groups achieved statistically significant growth between the pretest and posttest; however, the treatment group scored a statistically significant 7.4-points higher on the posttest when compared to the controlled group's posttest. It is recommended that stakeholders read this study, revise budgets, and seek out grants to create classrooms addressing the needs of 21st century learners. Significant growth is obtained from instructional practices that include differentiated instruction enhanced with technology, and teachers must be trained in instructional practices that incorporate DI and IT in order to promote positive social change in the educational system.

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Dedication

To my husband, Ron Christian, for his late-night tutoring in statistics and for his continual encouragement and support—without your afternoon excursions out of the house with kids in tow, I would not have be able to concentrate on finishing this. To Lisa Campbell, for not letting me give up on my dream. This is as much as yours as it is mine because of the long hours you gave up reminding me that I was capable of finishing this. To Kimberly Hernandez, who gave me a quiet place to think and fed me nourishment for the mind, body and soul, thank you for your kindness no matter what time of day.

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Thank you to my professors and faculty members who were very encouraging in helping me complete this study. The children, who worked diligently through every assignment, no matter how innovative or regular it was. My mother, Doris Harris, had a sense of awe that her daughter was reaching this far, and her sense of pride in knowing that with her sacrifices and unwavering support she was giving me the opportunity of a lifetime. I deeply appreciate your teachings on what determination can yield to those who persevere.

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Section 1: Introduction to the Study

Introduction

Each year, educational reforms are improved and created, and each year, teachers are expected to shoulder the bulk of the responsibility to make these reforms a success. Education reforms, however, do not correlate completely with scientific findings on cognitive processes (Orfield, 2006). Nor are legislative decisions on education based on expert teachers' advice and current findings of educational institutes (Nehring, 2007). Most decisions appear to be based on competitive goals for the nation (Lee, 2001). To be able to say that a nation produces better educated students who are able to compete successfully in the workforce is a coveted goal. If the nation is to make a serious difference in education so that students become life-long learners, active citizens, and contributors to the overall growth of society, then policy makers, educators, parents, and community members need to base reform on what is best for the students of today (Lee, 2001).

In the school system in Bibb County, Georgia, the ninth-grade passing rate was approximately 60% on the end-of-course test in ninth-grade literature and composition for 2009-2010 (Bibb County Board of Education, personal communication, July 28, 2010). Teachers are constantly engaged in professional development that introduces new instructional paradigms that are essential for new reforms, only to have these reforms be revised or changed later by policy makers. This requires teachers to revamp curricula and instructional paradigms, causing a gap within students' education.

Problem Statement

Education reforms are based on the international competitiveness of U.S. schools (Lee, 2001). This approach to school reform does not necessarily involve consideration of new instructional paradigms that could enhance students' learning and improve their performance on statewide standardized tests. In this study, the effectiveness of differentiated instruction enhanced with instructional technology was compared to the effectiveness of traditional instruction in order to ascertain which instructional paradigm (independent variable) would help students achieve higher scores (dependent variable) on state-mandated testing.

Nature of the Study

Research Questions

This study addressed the following research questions:

1. What effect does differentiated instruction enhanced with technology have on students' learning in a ninth-grade literature and composition class?
2. What are the differences in end of course test (EOCT) scores between students receiving ninth-grade literature and composition instruction through a traditional approach and those receiving the instruction through differentiated instruction enhanced with technology?

Answers to these questions may help shape future education reforms and support implementation of instructional practice that will facilitate success in meeting the mandates of future reforms.

Purpose of the Study

The purpose of this quantitative study was to evaluate the effectiveness of a particular instructional paradigm in helping students achieve higher scores on state-mandated testing. The chosen paradigm featured computer-based, differentiated instruction as part of students' regular English literature and composition instruction. The ex post facto study used cluster sampling to evaluate whether implementing the teaching paradigm would increase success on state standardized tests for ninth-grade literature and composition in a Georgia county.

With current education reform dictating the goals of the school, teachers are pressured to increase learning in a short amount of time. Furthermore, repetition, memorization, teacher-centered instruction, and one-size-fits-all teaching strategies not only are ineffectual, but also are deemed "poisonous to learning because they do not engage students" (Gardner, 2007, p. 546). Tomlinson (2001) confirmed that in a mixed-ability secondary classroom, a teacher must embrace differentiated instruction to match teaching and learning with diverse students. Most studies on differentiated instruction are focused on the following:

1. Elementary and middle-grade instruction, with a large portion of this research specializing in maintaining challenging instructional practices for gifted students (Tomlinson, 2001).
2. Special education related to successful implementation of inclusion classes (Sailor & Roger, 2005)
3. Incorporating technology in gifted classrooms (Heacox, 2002).

Few studies have focused on increasing scores on high-stakes, standardized tests in a regular education, mixed-ability classroom (Heacox, 2002). This study focuses on evaluating the effectiveness of a teaching strategy that is in alignment with the new reform's focus on graduating highly successful students who are competing with students nationally. Results of this study showed that differentiated instruction may have an effect on the success of high school students on state standardized tests, which could affect future education reforms. The results of this study could support a teaching method and theory that would guide educators in their instructional practices and ultimately increase test scores, allowing schools to meet the mandates of NCLB.

Theoretical Framework

The current education reform enacted in 2002, called *No Child Left Behind* (NCLB), demands accountability, standardized testing, public report cards of schools, and success for every student regardless of learning style, disability, or economic disadvantage. Though Orfield (2006) has documented that NCLB is severely underfunded, houses several loopholes that are not conducive to uniformity among the states, and demands impossible feats based on high-stakes testing that differs from state to state, teachers and teaching strategies are a focal point for bringing about change that will enable success for all. "NCLB places the focus on improving teacher quality because it is more closely related to student achievement than any other factor (i.e. class size, spending, and instructional materials)" (Sunderman, 2006, p. 3). With teaching practices being analyzed critically, educators are searching for a strategy that will enable them to not only challenge higher level students, but also improve and challenge lower level

students. With typical classrooms consisting of heterogeneous levels (Tomlinson, 2001), teachers are pressured to produce successful students who will be able to pass high-stakes standardized tests with only a short period of instructional time—regardless of the lack of resources teachers or students have available (Sailor & Roger, 2005). NCLB and accountability have pressured general education teachers to uniformly move students quickly through curriculum in order to cover essential elements that will allow them to be successful on a state test (Sailor & Roger, 2005). There has been a substantial amount of discussion on differentiated instruction and NCLB. Rotberg (2006) and Lee (2001), researchers on international education reforms, argued that accountability based on high-stakes testing is not the answer to close the educational gap. Tests results of various studies "do not vindicate a general educational reform effort focused almost exclusively on testing" or "provide adequate support to any argument that high-stakes testing is necessary to raise student achievement" (Marchant, Paulson, & Shunk, 2006, p. 23). Houston (2007) argued that high-stakes testing in a massive amount is not required to show progress and failure points in an educational system. Yet *differentiated instruction*—the teaching strategy that was used when school houses consisted of one classroom with several grade levels encompassed in that classroom (Nehring, 2007)—is the recipe for success. Tomlinson (2001) stated that in a mixed-ability classroom, a teacher must embrace differentiated instruction in order to match teaching and learning with the diverse student population. Thus, *differentiated instruction* needs to do the following:

- Efficiently move students along the curriculum.

- Simultaneously challenge all levels of students encompassed within one classroom.
- Successfully increase test scores to ensure that schools meet the mandates that are the direct result of NCLB.

Differentiated instruction and instructional technology work well together (Pitler, Hubbell, Kuhn, & Malenoski, 2007). "Teachers who have brought technology in to their classrooms are aware that it provides an opportunity to differentiate instruction and change their classrooms into dynamic learning environments" (Pitler et al., 2007, p. 2). Integrated technology has been encouraged by researchers who strongly believe that using technology not only enhances the quality of learning in the classroom, but also enlivens instruction so that students are eager to participate and learn (Fox, 2007; Heacox, 2002; Pitler et al., 2007).

Three important theories fueled this study. One is built on the belief that instruction should be an active experience involving hands-on opportunities and group interaction—*constructivism* (Schunk, 2004; Vygotsky, 1997). Another theory supports the belief that all learners specialize in an intelligence that fuels their learning—*Gardner's multiple intelligences* (Gardner, 2004). The third theory supports the belief that successful instruction must be designed to meet the needs of a diverse classroom—*differentiated instruction* (Tomlinson, 2001).

The first theory, Vygotsky's constructivism, is said not to be a theory but rather an epistemology (Schunk, 2004). Philosophers supporting this epistemology believe that learners need to be "actively involved with content through manipulation of materials and

social interaction" (Schunk, 2004, p. 288). Active involvement allows the learner to construct new meaning and understanding to enhance education. Constructivists support the idea that students learn by digesting information, relating it to personal experiences, and eventually arriving at a meaning that encompasses both the information and personal experiences (Bruning, Schraw, Norby, & Ronning, 2004). In short, an individual's learning is constructed from the inside, based on previous knowledge, previous experiences, and new interactions of that individual; therefore, learning differs from one individual to another (Bruning et al., 2004; Vygotsky, 1997).

Constructivism supports Gardner's theory of multiple intelligences. This theory indicates that each individual learns best in one or more of several areas (i.e., verbal/linguistic, logical/mathematical, spatial, musical, interpersonal, intrapersonal, natural, and kinesthetic; Gardner, 2004). *Learning style* refers to the way individuals learn and is usually related to the preferred way a student learns material—orally, visually, or kinesthetically (Sternberg & Zhang, 2005). Cuthbert (2005) stated that a learning style is a description of an "individual's preference for understanding his/her experiences and transforming them into knowledge" (p. 236). Knowing the learning style of students helps teachers to guide differentiated instruction.

Differentiated instruction supports Gardner's theory. Tomlinson (2001) suggested that the best teaching method for the different learning styles found in one classroom is differentiated instruction. It "provides different avenues to acquiring content, to processing or making sense of ideas, and to developing product so that each student can learn effectively" (Tomlinson, 2001, p.1). With constructivism supporting the idea that

learning differs across individuals because of their experiences, differentiated instruction complements that idea (Good, 2006). "It presents curriculum in a way that is relevant to [students'] lives and helps them make connections between concepts, which in turn helps them to retain new ideas" (Good, 2006, p. 10).

Operational Definitions

The following terms were used throughout this study:

Constructivism: Vygotsky's theory that learning is personalized by each individual; thus, learning is different for each student. Each individual views reality and meaning (basic learning experiences) as personally rather than universally defined, which causes an individual negotiation of meaning and construction of knowledge (Janassen & Land, 2000).

Differentiated instruction: Instruction inside the classroom that provides "multiple options for taking in information, making sense of ideas, and expressing what [is] learn[ed]" (Tomlinson, 2001, p. 1). It is an instructional strategy that addresses the way content is presented to the learner. It provides more opportunities for instruction and practice for students, and it allows the teacher to vary the presentation of new information, the review of old information, and the assessment of learned information (Heacox, 2002; Tomlinson, 2001).

End-of-course test (EOCT): State standardized test aligned with Georgia Performance Standards given to students upon the completion of an academic course to assess their learning (Georgia Department of Education, 2007).

Epistemology: A philosophy that considers the nature, foundation, extent, and validity of human knowledge (Schunk, 2004).

Gardner's multiple intelligences: A theory of cognitive abilities of learners. It describes several distinctive ways students process information, and it suggests several ways to assess students on learned content (Gardner, 2004).

Heterogeneous grouping: A grouping of students with different ability levels ranging from low to high in one classroom (Tomlinson, 2001).

Instructional technology: The integrating of technology and electronic devices to present instruction, enhance instruction, and provide ways for students to present what they have learned—an overall support system that helps to integrate several teaching strategies within one classroom (Pitler et al., 2007).

Learning styles: Refers to the ways in which individuals learn. Learning style is usually related to the preferred way a student learns material—orally, visually, and kinesthetically (Sternberg & Zhang, 2005). A learning style is a description of an "individual's preference for understanding his/her experiences and transforming them into knowledge" (Cuthbert, 2005, p. 236).

Mixed-ability classroom: A classroom that consists of students on different cognitive levels (Tomlinson, 2001).

Assumptions

The following assumptions were factors in this study. It was assumed that the instruction provided in both the control and experimental groups addressed the tested

objectives. Additionally, it was assumed that non-content skills related to the intervention did not enhance or reduce students' test-taking ability.

Limitations

This study was limited to one public school in Bibb County in Macon, Georgia. Data collected came from a small sample. Because of the sample size, the findings are not generalizable. Findings may not be generalizable to other subject areas, as any computer-based instruction that could be used might not be equivalent to the instruction used for this study.

Scope and Delimitations

This study included two groups of students. The sample came from one high school. Analysis of student test scores was limited to those associated with ninth-grade literature and composition instruction.

Significance of Study

Sailor and Roger (2005) argued that NCLB mandates and accountability have led teachers to struggle to find effective practices to use within the classroom to increase student achievement. Tomlinson (2001) stated that in a mixed-ability classroom, a teacher must embrace differentiated instruction in order to match teaching and learning with diverse students. In the past, education reform was implemented to make education equal for those who sought it (Parents United Together, n.d.). Now, education reforms are implemented in efforts to compete internationally with other educational institutions that are producing highly skilled graduates with a serious focus on mathematics, engineering, and science (Lee, 2001). With all of the research that supports learning theories that give

adequate information on how an individual learns, educational reforms should focus more on ensuring that effective instructional theories and instructional practices are implemented daily in the classroom. These reforms should also not depend heavily on state standardized testing because test results may not prove that quality instruction is being offered. The findings here may provide insight on which instructional practices are more successful and which area of focus future education reforms should address. Lee (2001) argued that although the main focus in U.S. educational reform is competing with international systems, international education reforms are starting to resemble American schools in their creativity and individualism.

Most studies on differentiated instruction are focused on elementary and middle grade instruction, special education related to inclusion classes, and incorporating technology in primary schools (Tomlinson, 2001). Heacox (2002) conducted a study that included secondary schools; however, this study did not focus on all the theories discussed here. Northey (2005) also conducted a study that included secondary schools; however, Northey focused on types of teaching strategies for any subject, rather than on high school instruction as a whole. Furthermore, few studies have focused on the correlation between education reform and the effects of said reform on the success of public schools. This study focused on the effects differentiated instruction has on standardized testing scores. The results of this study showed that differentiated instruction can have a positive effect on standardized testing in a regular education, mixed-ability classroom. Further, the results support consideration of constructivism,

multiple intelligences, integration of technology, and differentiated instruction in planning instruction.

Positive Social Change

Informed by the results of this study, educators may pursue structural change in classrooms by including more accessible technology for instructional purposes. Education reforms could be written to support the classroom focus on differentiated instruction enhanced with technology. Lastly, students may become more successful on high-stakes standardized tests showing mastery of content and skills.

Conclusion and Transition Statement

This study focused on differentiated instruction enhanced with technology as an instructional practice in a classroom of mixed-ability students. This instructional practice could provide great gains in high-stakes standardized testing. In Chapter 2, I discuss previous education reforms that have affected instructional practices in the classroom. In Chapter 3, I explain the research design and methodology implemented in this study. Chapter 4 contains a presentation of the collected data, while Chapter 5 contains findings and recommendations concluded from the analysis of the literature and data.

Section 2: Literature Review

Introduction

The following review involves major education reforms that contributed to a series of changes in the educational system. It also contains analysis of various instructional theories and practices of the past and present that have been recognized as being effective in classrooms. Educational databases such as ERIC were accessed for information on influential shifts in educational practice and leading instructional practices for mixed-ability classrooms.

Legislators have attempted to address problems found in education. Members of new U.S. administration apply an amendment to the current educational reform without looking for a way to permanently alleviate the problems found. This was the case with the mandate by the Bush administration cleverly titled *No Child Left Behind* (NCLB). Educators in states across America are attempting to improve their systems by jumping through hoops to meet the mandates set by NCLB (Maxwell, 2006). It is strongly believed that meeting these mandates will ensure that the system is not only giving "highly" recommended instruction, but also satisfying the standards that the federal government has presented as an "updated version of the 1965 Elementary and Secondary Education Act (ESEA)" (Parents United Together, n.d., p. 1). In short, history repeats itself with a newer version of an old concept.

Nehring (2007) argued that school leaders must "thwart the forces that have conspired against it [schools] since the 19th century" in order to enhance the quality of learning for all students (p. 425). Thus, educators must meet students' needs by rooting

out the ineffectual consistencies that plague education reform. With all of the changes being forced on education with the implementation of each reform, "parents, policy makers, and the leaders of [the] business community are becoming more and more dissatisfied with the educational outcomes of our schools" (Sailor & Roger, 2005, p. 507). Yet educational reforms are still being revised and reenacted to make the difference in producing well-educated students who will be able to compete internationally with other students (Lee, 2001). Are these revised editions and reenactments making a difference? In analyzing each education reform, educators have noticed that some changes have been beneficial (Messina & Messina, 2006).

Previous reform efforts are analyzed in the following sections. Each reform effort, though somewhat influential, has been ineffective in some areas because it has failed to address education as a whole. Each reform has only corrected one aspect of education instead of addressing the overall issues. The following review focuses on not only ongoing education reform, but also constructivist teaching approaches. It addresses how these teaching approaches relate to improving education. Finally, it addresses how researchers support instructional technology coupled with constructivist practices as the best solution to educate mixed-ability classrooms.

Education Reform: Past to Present

Elementary and Secondary Education Act 1965

In 1965, legislators decided that the federal government needed to set guidelines regarding high-poverty schools by providing an "11-billion-a-year Act" that would give "federal assistance to poor schools, communities, and children for nearly 30 years"

(Messina & Messina, 2006, p. 1). This act was titled the Elementary and Secondary Education Act 1965 (ESEA). This act, born of Lyndon Johnson's War on Poverty in 1965, supposedly started a change in legislation in regard to education. "[It] provided a comprehensive plan for readdressing the inequality of educational opportunity for economically underprivileged children. It became the statutory basis upon which early special education legislation was drafted" (Parents United Together, n.d., p. 1).

The purpose of this legislation was to improve the educational outcome for students who attended underprivileged schools or institutions. The basic focus was on high-poverty students and students under the special education umbrella (Parents United Together, n.d.). Of course, this legislation was a first of many attempts by the federal government to improve education in America. Other legislation developed from this foundation; however, the focus of these legislative changes was not always on high-poverty students or special education students.

This reform was quickly amended in 1965 to authorize grants to state institutions and state operated schools devoted to the education of children with disabilities, and reformed again in 1966 because policy makers wanted to offer a "federal grant program for the education of children and youth with disabilities at the local school level, rather than at state-operated schools or institutions" (Parents United Together, n.d., p. 1). This act was amended two more times to include special education legislation of the 1960s, which provided for *discretionary* programs that "supplemented and supported the expansion and improvement of special education services" (Parents United Together, n.d., p. 1). It also included Title VI, the Education of the Handicapped Act, which

"established a core grant program for local education agencies, now known as part B, and … authorized a number of *discretionary* programs" (Parents United Together, n.d., p. 1).

Again, policy makers hastily made decisions to provide a temporary solution for an ongoing problem in education. Unfortunately, those amendments had to undergo more amendments in order to make a true difference in education. For example, the Education Amendments of 1972, commonly known as called *Title IX*, focused on the equality of gender-based programs and activities provided by schools that received federal financial assistance (U.S. Environment Protection Agency, 2006). This particular amendment made it possible for girls to enter schools and engage in sports and other activities that were not previously open to their gender. It addressed the inequalities of gender-based education in regard to separation. At the time of implementation, it was believed that students should not be separated by gender because this practice violated certain rights; furthermore, it was believed that single-sex classrooms did not adequately prepare students for real-life situations ("Separate but Equal," 2006). It was felt that mixing the genders in a classroom would provide a learning experience for both parties involved ("Separate but Equal," 2006). Again, at that time, policy makers felt that this direction would bring about the best change in education that would result in the production of more highly skillful graduates ("Separate but Equal," 2006). However, "the U.S. Department of Education recently relaxed the rules surrounding Title IX" because supporters were saying that they had research results that strongly proved that "boys and girls can focus better on schoolwork when they are separated," which may greatly improve the production of highly skilled graduates in the United States ((("Separate but

Equal," 2006, p. 1). Will the constant drive of competitiveness be the constant drive of educational reform, or will the constant drive be the overall needs of the students?

The attempt to make education equal for all learners and to compete internationally with highly intelligent performers was the focus of Title IX (Lee, 2001). The positive outcomes of this education reform were the following:

1. High-poverty schools received the funding necessary to offer quality education.
2. Grants were given to schools to aid in the instruction of students with disabilities and handicaps.
3. The gender equality of programs and activities provided by schools that received federal financial assistance was ensured (Parents United Together, n.d.; ("Separate but Equal," 2006; U.S. Environment Protection Agency, 2006).

The Individuals With Disabilities Education Act

The Individuals with Disabilities Education Act (IDEA) was formulated to address the increasing number of students with disabilities not receiving quality and equal education. In 1975, Public Law 94-142 stipulated "that special education students are entitled to a free and appropriate public education as described in an Individual Education Plan (IEP)" (Orinda Union School District, n.d., p. 1). With this Act, students with disabilities expected to achieve more. The bar of expectations was slowly rising in regard to those less fortunate than others. However, again, the federal government was attempting to make education equal and appropriate for all learners so that America could

compete internationally (Lee, 2001). Nehring (2007) called this "the tendency to impose plans that look great from above and make little sense at ground level" (p. 427).

The wording of IDEA caused an uproar in education for several years after its passage (Messina & Messina, 2006). The first issue was that Congress had determined that free, appropriate public education would be available for all handicapped children between the ages of 3 and 21 years. Subsequently, the amendment needed to undergo serious changes several times to include newborn children with handicaps and preschool-aged children. With this change came the dissatisfaction of parents who felt that decisions about their children were being made without properly informing them (Messina & Messina, 2006). Thus, this act was restructured several times in order to adequately address issues in special education. In 1992, IDEA was given amendments primarily designed to address the Infants and Toddlers with Disabilities program (Parents United Together, n.d., p. 1). Again, policy makers realized that the first attempt at making education equal had been lacking a serious element; thus, they revised the law. The act was again modified in 1997 (Parents United Together, n.d.). This revision was considered a reauthorization of IDEA and was viewed as an opportunity to review, strengthen, and improve IDEA to better educate children with disabilities and enable them to achieve a quality education (Parents United Together, n.d.). With this amendment, Congress sought to achieve quality education for students with disabilities through the following:

1. Strengthening the roles of parents.
2. Ensuring access to the general curriculum and reforms.

3. Focusing on teaching and learning while reducing unnecessary paperwork requirements.
4. Assisting educational agencies in addressing the costs of improving special education and related services to children with disabilities and more. (Parents Untied Together, n.d.)

Nehring (2007) called this constant adding of amendments "the tendency of schools to say yes to all legitimate requests" (p. 428). Nehring wrote that in the attempt to be all things to everyone involved, nothing is done well.

A positive look at this act would show a few things:

1. Parental involvement in educating students with disabilities increased.
2. Infants and toddlers with disabilities were acknowledged and aided, to a point.
3. Students with disabilities were given individual education plans (IEPs), which raised the bar of expectations related to their education (Messina & Messina, 2006; Parents United Together, n.d.).

The Schools-to-Work Opportunities Act

Another attempt to improve education was seen through the Schools-to-Work Opportunities Act of 1994. This act was developed to aid U.S. students in preparing for ongoing competition with overseas peers and within the business world (Hughes, Bailey, & Karp, 2002). *A Nation at Risk* (1983) suggested that educational reform was needed to prepare learners for a new, demanding workforce (Hughes et al., 2002). "The workforce was changing because of the 'heightened international competition and new technologies'" (Hughes et al., 2002, p. 273). The goal in this case was simple. Schools

needed to improve their ability to prepare their students for the workforce by encouraging systems to adopt several policies:

- Career-related academics.
- Comprehensive career development activities.
- Paid or unpaid work experience linked to school. (Hughes et al., 2002, p. 275)

Once again, legislation was designed to quickly fix problems in education. Though the sole purpose was to offset "heightened international competition," this act was also meant to assist "disadvantaged students, students of diverse racial, ethnic, and cultural backgrounds, and students with disabilities, [who] do not complete high school" (Paris, 1994, p. 1). Proponents of this act believed that "in the United States [students] can achieve high academic and occupational standards and many learn better and retain more when the students learn in context, rather than in the abstract" (Paris, 1994, p. 1) Authors of the act did not intend to create a permanent, separate program (Hughes et al., 2002).

Nehring (2007) categorized this education reform as "the tendency of the system to crush promising innovation" (p. 427). One of the challenges in public education is that leaders tend to consider the effectiveness of new programs based on how they interplay with the status quo, rather than how effective they are in creating desired change (Nehring, 2007). Thus, the implementation of the School-to-Work Opportunity Act was an innovative way to prepare students to work, but it was not written to be a permanent presence in education. A promising innovation was crushed because it was never meant to be a permanent presence (Hughes et al., 2002; Nehring, 2007).

In terms of positive contributions to overall education reform, the School-to-Work Opportunity Act of 1994 provided several things:

1. An increase in career-oriented academics.
2. Paid and unpaid job experiences that are linked to school curriculum.
3. Comprehensive career development activities that prepare students for the workforce (Hughes et al., 2002; Paris, 1994).

Goals 2000: Educate America Act of 1994

With a new administration to lead the way came a new reform that should have been the answer to the inadequacies found in the prior education reform and its subsequent amendments. Thus, educators find education in a new reform that introduces an accountability system. Goals 2000 was created "to encourage systemic reform by providing grants to states for the development of standards, assessments, and accountability systems" (Superfine, 2005, p. 7). These grants were justified by submitting applications to the U.S. Education Department and creating state improvement plans. Wolk (2004) argued that Goals 2000 was implemented to reduce the national dropout rate from about "30 percent to 10 percent by the turn of the century" (p. 4). Others argued that student achievement was the sole purpose of Goals 2000 (Campbell, 2003; Superfine, 2005). The key component of improvement in education and "systemic reform in the American education system" was revamping standards, assessments, flexibility, and accountability (Superfine, 2005, p. 10). Thus, the eight specific objectives called for in Goals 2000 were as follows:

1. All children starting school would be prepared for learning.

2. The high school graduation rate should be 90 percent.
3. All Americans would become literate.
4. Drugs, guns, alcohol, and violence would be absent from the schools.
5. There would be a well-educated teaching force.
6. Parents would be involved with children's education.
7. America would be first in the world in science and math achievement.
8. High, world-class academic standards would be in place for all students in the traditional academic disciplines. (Campbell, 2003)

What Clinton (2003) believed was that the Goals 2000 bill "set world-class education standards for what every child in every American school should know in order to win when he or she becomes an adult" (para. 9).

The main additions from this education reform included parental involvement in education and programs for improving the professional education of teachers (Kessinger, 2007). Superfine (2005) suggested that the unraveling and failure of this act—and all other acts, for that matter—resulted in political battles and concerns between the federal government and state governments. This outcome would suggest that the federal government's involvement with education reform did not ensure the success of education on a state level because of the lack of experience in the required realm serviced by educators on a daily basis (Superfine, 2005). Campbell (2003) argued that Goals 2000 did not require accountability for meeting set goals, remarking, "If our success in achieving these goals is not important enough to evaluate, America might well rename its agenda Suggestive 2000" (p. 41).

The positive outcomes of this education reform were the following:

- Schools were being forced to look at the graduation rate.
- American schools started creating a stronger and challenging focus on math and science achievement.
- Programs for professional education of teachers were improved.
- Increased attention was paid to high-quality academic standards for all students in the traditional academic disciplines (Campbell, 2003; Kessinger, 2007; Superfine, 2005; Wolk, 2004).

However, educators and policy makers argued that for all the good intention and purposes of Goals 2000, no educational system was held accountable for meeting these goals (Campbell, 2003).

The No Child Left Behind Act

With this mandate, congress hoped to address the "issue of accountability in schools and help [the special] need students" (Parents United Together, n.d., p. 1). The creators of this bill hoped to touch on issues related to autism and the disability community (Parents United Together, n.d.). Stipulations made within this bill focused not only on schools themselves, but also the quality of the educator within the school (De Cohen, 2005). Teachers and paraprofessionals across the nation had to fit the *highly qualified* bill or risk unemployment (De Cohen, 2005). Basically, "schools that employ teacher aides [paraprofessional] could lose staff unable to comply with NCLB by the 2006 deadline" (De Cohen, 2005, p. 1). According to the Educational Policy Reform Research Institute (EPRRI) (2004), certified special education teachers were being told

that they were not highly qualified to teach unless they returned to school and received a degree in an academic area, meaning they had to undergo a concentration in an academic field in order to instruct students in that academic subject (p. 3). Because of accountability to NCLB, general education teachers were hard pressed to "move students as uniformly as possible through the curriculum" (Sailor & Roger, 2005, p. 504). Students with disabilities who could not progress at the pace of other students "on various components of the curriculum seem to belong somewhere else" (Sailor & Roger, 2005, p. 504). Though the writers of NCLB did address the importance of school accountability, they did not address the issues regarding special education and student improvement in special education (Messina & Messina, 2006; Orinda Union School District, n.d.; Sailor & Roger, 2005). This situation leaves a serious void for parents and educators across the globe. The creators of NCLB forced educators to obtain certain training to teach in classes where mainstreamed students who were not on grade level would be tested on grade level curriculum (De Cohen, 2005). These tests results then determined if a school met NCLB mandates. The issues regarding the equality and quality of public education is not being adequately addressed.

NCLB was another attempt at education reform. The writers of this particular education reform called for accountability from schools receiving federal funding. Schools had to adhere to certain production growth per year to meet the federal mandate. Since the implementation of this Act, schools across the nation are having a hard time meeting the requirements (Orfield, 2006; Stover, 2007). This failure has increased criticism of NCLB because of the ongoing complaints regarding the "overreliance on

testing, its heavy-handed approach to sanctions, and problems related to its provisions on teacher quality, school choice, tutoring, and the testing of students with special needs" (Stover, 2007, p. 21). Stover reported, like other education reforms discussed here, "more and more schools–many of them good schools—have run afoul of the law's complex and arcane rules regarding adequate yearly progress (AYP)" (p. 21). Though some educators agree with accountability, the fact that the entire success of accountability relies on high-stakes testing has caused a disagreement. The national government increased its influence on public education policies by obligating states to "increase standards, insure achievement by means of tests, expect higher qualified teachers and give evidence of greater accountability through annual yearly progress reports" (Kessinger, 2007, p. 18).

The strengths in this education reform include the following:

- Teachers and paraprofessionals were mandated to obtain adequate training to meet the *highly qualified* status.
- Schools were required to publish a yearly progress report.
- Students were required to undergo annual testing to show improvement and growth in instruction.
- Accountability across the board was a major component of meeting annual yearly progress (De Cohen, 2005; Kessinger, 2007; Sailor & Roger, 2005).

All of the writers of these reforms affected the educational system, which in turn affected classroom instruction. With these effects, instructional learning theories and practices were implemented to address the needs of the reforms.

Instructional Learning Theory and Practice

Constructivist Learning Theory

Learning theories have been researched to help educators understand their students' learning habits. Over the years, the creators of these theories have branched further than traditional behavioral theory. Now, the researchers are embracing the cognitive abilities of the brain. The belief is that once scientists and educators know how a student learns, instructional practices can be developed to maximize the instruction (Tomlinson, 2003). Again, the main focus is producing highly-skilled graduates. Though there are several learning theories that explain how student learn, constructivist learning theory focuses on cognitive thinking processes, which support differentiated instruction and instructional practices designed to challenge the cognitive levels of various learners in one classroom (Armstrong, 2000; Brooks & Brooks, 1999).

Constructivist learning theorists believe that their theory is "[to] not be a theory but rather an *epistemology*, or philosophical explanation about the nature of learning" (Schunk, 2004, p. 286). Schunk wrote "Vygotsky's theory is a constructivist perspective that emphasizes the social environment as a facilitator of development and learning" (p. 291). Thus, the theorist strongly argued that learning differs for each individual because each individual learns by associating the information with previous knowledge and experiences (Brooks & Brooks, 1999; Vygotsky, 1997). "A person's constructions are true to that person but not necessarily to anyone else. This is because people produce knowledge based on their beliefs and experiences, which differ from person to person" (Schunk, 2004, p. 287). Based on his brain research, Vygotsky (2004) concluded "the

brain is not only the organ that stores and retrieves our previous experience, it is also the organ that combines and creatively reworks elements of this past experience and uses them to generate new propositions and new behavior" (p. 9). Teachers who want to make a difference in education need to take into account the various levels of cognitive development and social implications.

Constructivists support the idea that students learn by digesting information, relating it to personal experiences, and eventually arriving at a meaning that encompasses both the information and personal experiences (Bruning, Schraw, Norby, & Ronning, 2004). Thus, depending on the make-up of the classroom, the cognitive thinking process can have various levels. "We know that absolutely every one of man's conditional reflex is determined by those environmental influences that reach him from outside" (Vygotsky, 1997, p. 211). This belief supports the constructivist theory that each learner learns differently based on their experiences, beliefs, and type of thinking; therefore, in order to supply the nation with highly-skilled graduates, educators need to employ effective instructional practices in their classrooms that support the constructivist learning theory (Vygotsky, 1997).

Differentiated Instruction

With the constant findings of multiple learning preferences by educational researchers, educators and policy makers are pressed to find instructional practices that work. Trying to meet the vast differences placed in one classroom, researchers study strategies to enhance the learning environment. Gardner (2004) argued new intelligences will be proposed each year and that several colleagues believe that there is an existence

of a digital, spiritual, and sexual intelligence. With this in mind, researchers believe that differentiated instruction is the best instructional strategy that addresses the different types of learners found in one classroom (Tomlinson, 2001).

Researchers of Differentiated instruction (DI) focused on the different ways to present and master instruction. Tomlinson (2001) suggested DI is proactively planned instruction that focuses on the variety of ways to "get at and express learning" (p. 3). Thus, DI is student-centered to ensure that the students receive the maximum level of instruction and learning. Differentiated instruction comprises "a blend of whole-class, group, and individual instruction" (Tomlinson, 2001, p. 5). This approach was based on the constructivist theory that everyone learns differently (Vygotsky, 1997). Learning was done in a variety of ways based on our culture, beliefs, gender and how our brains are wired; therefore, learning experiences should push "the learner a bit beyond his or her independence level" without causing frustration because "frustration results and learning does not" (Tomlinson, 2001, p. 8). All of these beliefs are based on Vygotsky, Gardner, and Piaget, leading theorist in the study of development and cognitive processes (Brooks & Brooks, 1999).

Effective schools using differentiated instruction have been making strides to reach the goal of producing highly-skilled graduates (Brooks & Brooks, 1999). Sample lesson plans deal with *parallel teaching* that focused on what to teach and allowing the students to decide how they learn (Armstrong, 2000; Benjamin, 2006). Benjamin (2006) pointed out that different group of students can learn about the 50 states, for example, using different learning strategies and manipulatives. Tomlinson (2001) called this

reaching the needs of mixed-ability learners. One group of students might use their kinesthetic abilities by piecing together a jigsaw puzzle to make a map, while another group might make flash cards or a display bulletin board, which caters to the visual learners (Benjamin, 2006). Armstrong (2000) supported this mode of learning "through experience; not through books" in order to reach students with multiple intelligences (p. 38). Marzano, Pickering and Pollock (2001) categorized this approach as reinforcing effort and providing recognition. Benjamin (2006) suggested that students follow up these activities with a journal entry to reflect on "how what they did helped them learn" (para. 7).

In this example, the students took ownership of what they learned; however, the standards that were important for them to master were effectively delivered (Benjamin, 2006). The goal of finding an effective instructional practice that will deliver instruction to students of various learning styles within one classroom was achieved. The question asked by Gregory and Kuzmich (2004) is how do educators plan appropriate assessment to fit differentiated instruction?

Northey (2005) agreed with Tomlinson (2001) that differentiation of instruction was the use of "strategies that adjust the content we teach, the process in which we teach it, and the products we ask students to give us so that we can determine their achievement in learning a concept or skill" (p. xi). Some of those strategies discussed by Northey are whole-class differentiation using the tier method; interest groups differentiation that focuses on issues, books, topic-centered discussion, research or writing discussions; small-group differentiation such as literature circles and study groups; cooperative

groups; and individualizing instruction using research projects, curriculum compacting, independent study, and the tic-tac-toe menu. Using these strategies allowed the teacher to match individual learning preferences with instructional strategies and assessment of learning (Northey, 2005). Tomlinson (2003) suggested a classroom that is diverse in a way that "hands-on learning experiences as well as written and spoken approaches to learning" are used gave the students within that classroom more opportunities to increase their learning success. Using these different strategies was a step in the right direction of differentiated instruction (Tomlinson, 2003).

Gardner's Theory of Multiple Intelligences

Substantial research completed by scientist on the different multiple intelligences identified in today's classrooms has fueled the direction of instructional practices (Gardner, 2004). Multiple intelligences theorist originally included eight intelligences (more have since been identified) that students can have mastery in (verbal/linguistic, mathematical/logical, interpersonal, intrapersonal, visual/spatial, kinesthetic, musical, natural, and digital which is still in the researching stage) (Gardner, 2004). Researchers believed that using these intelligences to focus the interest in the student's mastery of the curriculum gives them a better chance of success (Armstrong, 2000). Armstrong wrote "all children have different proclivities in the eight intelligences, so any particular strategy is likely to be highly successful with one group of students and less successful with other groups" (p. 51). The educators' purpose of knowing the multiple intelligences is to know the preferences of how learners in the classroom learn and to challenge those learners to adapt other ways of learning (Heacox, 2002).

Combining multiple intelligences with differentiated instruction and constructivism only increases the success of the student (Heacox, 2002). Students are now given choices in how they will learn through innovative lesson plans that incorporate their learning preferences, strategies that tailor to those learning strategies, and instruction that builds on their personal experiences to enhance their learning (Gardner, 2004; Heacox, 2002; Tomlinson, 2003; Vygotsky, 1997). Marzano, Pickering, and Pollock (2001) suggested that using research-based strategies helped increase student achievement when used effectively. Thus, incorporating student preferences for learning, different strategies that appeal to those different preferences, and building on personal experiences could increase student achievement.

Instructional Technology

Instructional technology (IT) was the incorporation of computers and other technology to deliver instruction; practice understanding of instruction; and provide an innovative way for students to submit information, assessments, and projects (Pitler, Hubbell, Kuhn, & Malenoski, 2007). The use of IT in a classroom provided 21st century instruction that was captivating and successful when combined with research-based instruction (Fox, 2007; Pitler et. al., 2007). In a particular study completed by Fox (2007) concerning two universities in Hong Kong, he used a sample size of 14 staff members (seven from each university) to implement technology in their classroom to enhance instruction. The researchers were allowed to investigate the "policies and attitudes towards teaching and learning and the use of IT in education" (Fox, 2007, p. 190). Once the faculty had a chance to share and discuss their successes and failures with the

integration of technology, teacher practices and attitudes changed. Furthermore, both facilities realized that IT could be an enhancement to every aspect of the universities, as long as the adoption of IT was "matched with careful, considered, planned and monitored initiatives that are fully supported, understood recognized, and properly rewarded" (Fox, 2007, p. 200).

Zhao's (2007) study on 17 social studies teachers who had effective professional development on IT showed those teachers were able to implement technology in their classrooms. Acceptance of technology and using technology combined with "teachers' positive attitudes towards technology and successful experiences with technology use encouraged them to use technology more frequently and creatively" (Zhao, 2007, p. 328). The more teachers used IT in their instructional practices, the more student success was seen because of student interest in instruction (Zhao, 2007). Differentiated instruction and instructional technology yields results (Pitler et. al., 2007; Zhao, 2007). Teachers who have embraced technology "are aware that it provides an opportunity to differentiate instruction and change their classrooms into dynamic learning environments" (Pitler et. al., 2007, p. 2). Integrated technology has been encouraged by researchers who strongly believe that using technology not only enhances the quality of learning in the classrooms, but it also excites instruction so that students are eager to participate and learn (Fox, 2007; Pitler et. al., 2007; Zhao, 2007)).

Conclusion

Some creators of education reforms have brought about necessary change (Campbell, 2003; Kessinger, 2007; Messina & Messina, 2006; Sailor & Roger, 2005;

Zhao, 2007). Education reforms discussed here required multiple iterations because they were not written to encompass all of the issues surrounding education. Even with the positive changes from the education reforms, some still argue the federal government's interference in education has increased the gap educators see among students of low-socioeconomic status (Lee, 2001; Nehring, 2007; Orfield, 2006). Competing with international results is the motivation for education reforms in the United States (Clinton, 2003; Lee, 2001). Unfortunately, results related to this competition can be misleading. Furthermore, those schools that are producing top students in this competitive environment have curriculum that is lacking creativity and sensitivity to the vast differences in their students (Rohlen, 1983). Instead of producing students who are productive, educators are producing over standardized students who lack motivation to be different and innovative (Houston, 2007; Rohlen, 1983).

With all of the studies that have been conducted by Brooks and Brooks (1999), Cuthbert (2005), Fox (2007), Northey (2005) and Tomlinson (2001) regarding the cognitive processes and best instructional practices to maximize the learning for students, there is a disconnect because they rely on test results of other countries to dictate future educational goals (Houston, 2007; Lee, 2001; Rotberg, 2006). The nation must learn from the past to direct the future. The education reforms that were successful in making a difference should be the foundation to the new education reforms that are embraced. Accountability is indeed important; however, it should not be used to decide if funding will be available or if a school system will be deemed excellent (Kessinger, 2007). Differentiated instruction can assist in the goal to educate students because it supports the

theory that students learn best when using their gender, experiences and understandings to approach and digest learning (Tomlinson, 2001; Vygotsky, 2004). If change is going to benefit students and not the bragging rights of the nation, then an education reform that addresses these items is needed.

Each act or amendment was created by administration to correct an ongoing problem detected in public education in America. Congress realized that equality and quality in public education needed to be uniformed across the globe and set out to make that possible. Funding for these amendments and acts were only temporarily mapped out to make a difference. When funding was depleted or a situation presented itself that showed the holes in the legislation, congress developed a new amendment or act to compensate for the lack of planning accurately. This resulted in the Department of Education adopting several mandates that overlapped or were neglecting of certain subgroups or areas in education. Each mandate created by congress was a quick fix to an ongoing problem that has yet to find a real solution. From the ESEA of 1965 to the improved, updated version of ESEA that is the NCLB Act of 2001, the federal government has applied temporary solutions that require a well-researched plan of action. Until the government can produce a winning education reform, educators need to implement a teaching strategy that will increase productivity and learning in a mixed-ability classroom. Tomlinson (2001) strongly suggested instructional practice be differentiated instruction. The research available in differentiated instruction does not adequately focus on high school instruction or focus on improving students' success on state standardized tests. Though there are studies on the implementation of technology in

the classroom, there is limited research on the effects of this implementation in a ninth-grade literature and composition classroom facing a high-stakes assessment near the end of instruction.

Section 3: Research Method

Introduction

Research suggests that education reform should be designed to ensure quality education to all individuals regardless of race, gender, or ability (Orfield, 2006). Legislation has been written and implemented with this cause in mind through the various reforms enacted over the years (Parents United Together, n.d.). The creators of current reforms seem to have lost sight of equality and have focused on competitiveness (Nehring, 2007). There is a need to distinguish which instructional practices and educational theories are best implemented in classrooms to aid in reaching the goals and requirements of current and future reforms (NCLB), which will help maintain a certain level of competitiveness and rigor within the classroom, as well as student success. Prior to this research, no studies had been solely focused on the effectiveness of differentiated instruction in ninth-grade literature and composition. I used an ex post facto study with a cluster sample, which is a sample of convenience.

Purpose of the Study

The purpose of this quantitative study was to evaluate the effectiveness of a particular instructional paradigm in helping students achieve higher scores on state-mandated testing. Too many demands are being placed on schools to meet federal requirements that may or may not provide quality and rigorous instruction that will produce educated students who are able to compete internationally (Lee, 2001). All future education reforms should promote proven research-based instructional practices and

theories that will produce highly educated students who can not only compete internationally, but also become successful, life-long learners.

Research Questions

In this study, I investigated the following questions:

1. What are the effects of differentiated instruction enhanced with technology on ninth-grade students' learning in ninth-grade literature and composition instruction?
2. What are the differences in EOCT scores between students receiving ninth-grade literature and composition instruction though a traditional approach and those receiving the instruction through differentiated instruction enhanced with technology?

Theoretical Framework

Tomlinson (2001) observed that differentiated instruction, implemented correctly, can meet the needs of diverse learners and increase mastery of content for students. Vygotsky (2004) wrote that each person learns based on relating personal experiences with new information. Using technology to implement constructivist theory with differentiated instruction teaching practices could increase success on state-mandated exams. No current study is available on the effectiveness of differentiated instruction enhanced with technology in ninth-grade literature and composition.

Student-centered instruction that incorporates differentiated instruction may result in students achieving higher test scores than those receiving more traditional instruction. Technology-enhanced instruction engages the learner more effectively because of

students' interest in and focus on technology. In this study, data from students enrolled in a ninth-grade literature and composition class in a classroom designed to incorporate technology within differentiated instruction were compared to data from students receiving more traditional instruction with no enhancement of technology. The analysis determined the effectiveness of the instruction.

Research Design Strategy

For this ex post facto study, I used cluster sampling to measure the effects of differentiated instruction enhanced with technology on ninth-grade students' learning in a ninth-grade literature and composition class against ninth-grade students' learning with more traditional teaching of ninth-grade literature and composition. The measuring factor was the difference in EOCT scores between the two groups. Two units used for measuring the effects were a pretest of ninth-grade literature and composition and the posttest, EOCT. The data were collected during the fall and spring semesters of the 2010-2011 school year. The dependent variables rely on test results—diagnostic test (pretest) and EOCT results (posttest).

The first instrument, the pretest, was a multiple-choice test from usatestprep.com consisting of 40 questions pertaining to ninth-grade literature and composition. This instrument is authentic in that it derives questions that can be presented on the state standardized test. The students took the medium test—50% of the actual test—to measure their understanding of the content, standards, and skills for ninth-grade literature and composition. The participants also completed a second multiple-choice instrument that

was a test given by the Georgia State Department of Education to assess students' mastery of the skills, standards, and content of ninth-grade literature and composition.

Both groups completed the posttest after receiving their respective instruction consisting of four units specialized for ninth-grade literature and composition taught by the same teacher during one semester. One group received traditional instruction during which there were teacher-led lectures focusing on required terms, skills, and standards-based content; daily practices with supplemental materials (e.g., worksheets and whole-group instruction); and readings from textbooks and teacher-chosen novels. The second group's instruction consisted of differentiated instruction enhanced with technology that consisted of cooperative learning in groups formulated on learning styles (Appendix A) and a color quiz (Appendix B); teacher-led instruction focusing on required terms, skills, and standards-based content that was designed to meet the specific learning styles of visual, kinesthetic, and auditory learners; and small group practice designed by readiness (scaffolding). Delivery of the differentiated instruction involved technology such as smartboards, email, laptops, and videos.

Population

The participants for this study came from a high school in Macon, Georgia with a ninth-grade passing rate of approximately 68% on the EOCT for 2009-2010. Demographics for the school year 2010-2011 as reported to the state of Georgia were as follows: approximately 1,125 students; a poverty percentage of approximately 53.87% of the student population; and the following racial/ethnic breakdown: 1% Asian, 46% Black, 4% Hispanic, 48% White, and 2% multiracial. The school where the research was

conducted had a high retention rate of 40% for first time ninth graders in their core subjects—mainly ninth-grade literature and composition. Improvement of the passing rate in ninth-grade literature and composition could reduce this rate by 25%. This study may assist in revamping instruction for greater success in this content area.

Sampling

This study involved a cluster-sampling technique with 20% of the ninth grade enrollment. Because all ninth graders must take ninth-grade literature and composition and take the EOCT at the end of the term, it was easier to choose two classes of this subject to reach a quarter of the ninth-grade population. The ninth-grade class was the largest percentage of the school's population, at 409 students; therefore, there were several sections of the course.

The demographics of the research sample were not similar to those of the school's general population. The demographics for this sample were approximately 1% Asian, 27% Black, 5% Hispanic, and 67% White. The ninth-grade literature and composition course is the foundation for all English courses in high school, and students are exposed to five domains for the state standardized test—conventions; writing; reading comprehension; reading analysis; and listening, viewing, and speaking.

Because the school used block scheduling, there were several sections of the course each semester. Using two classes for each semester allowed an increased sample size of approximately 20% of ninth graders. The size of each class ranged from 15-28 students who were assigned to their respective sections by the school registrar, who worked to match the course needs of students with available classroom seats.

Students received traditional instruction during the 2010-2011 school year, so the student test scores from that year represented the traditional instruction group. During the 2012-2013 school year, students received differentiated instruction enhanced with technology as mandated by the school system, and scores from that year represented the differentiated instruction with technology group. Two classes from each of the fall semester courses were used. Test data from the traditional instruction group and the differentiated instruction with technology group were compared. The traditional instruction group in the fall of 2010 was labeled Group A, and the group in the fall semester of 2012 with differentiated instruction enhanced with technology was labeled Group B. Group A2 was the traditional instruction group in the spring of 2011, and Group B2 was the differentiated instruction enhanced with technology group in spring 2013. There were also some students who were long-term absentees or transferred out of the school during the course of the research. These students' scores were not included in the results.

Role of the Researcher

At the site where this research was conducted, I have taught ninth-grade literature and composition for the past 8 years. Administration of the pretest and posttest and the collection and analysis of all data were performed by me. As a teacher of both groups, I made an effort to maintain professionalism during the collection of data to ensure proper and accurate documentation of data important to the study.

Instrumentation

Two testing instruments were used for this research study. The first instrument was an online diagnostic test provided by USATestPrep Inc. Students had individual accounts on this service's website that were purchased by the Bibb County Board of Education. On the website, students could choose a small, medium, or large diagnostic test. The tests consisted of multiple-choice questions designed similarly to the questions received on the end-of-course test. The test assigned to the students was the medium test—50% of the test questions. It consisted of 40 questions. This test functioned as the pretest for both groups. This instrument was considered authentic because the test questions were aligned with Georgia Performance Standards, and the company had been making review and diagnostic tests since 1998 (USATestprep). Over 80% of Georgia students use this website for remediation and preparation for standardized testing (USATestprep). A study conducted in 2010-2011 on the impact of USATestprep on student achievement showed statistically greater gains in reading comprehension for those who used the site than for a control group (USATestprep). On average, students using USATestprep showed about a year's more growth in reading than their peers in classes where USATestprep was not used (USATestprep). Information on the validity and reliability of the test questions could not be found. This instrument was given to both the traditional instruction group and the differentiated instruction with technology group as a pretest without a time limit. The test is presented in only one section, and it measures all five domains essential to the standards of the course. The website calculates the scores

immediately when students have completed the test. Test scores are stored in a database that is attached to the instructor's username and password.

The end-of-course test for ninth-grade literature and composition is a state standardized test consisting of 80 questions. Created and implemented by the Georgia Department of Education, test questions are created from a secured test bank of questions correlated to the Georgia Performance Standards. Some of these questions are based on field questions from previous EOCT test banks (Georgia Department of Education, 2003). The state of Georgia deems the EOCT a valid and reliable method of testing student achievement in Georgia schools; therefore, this instrument was considered authentic. This instrument is given in two sections, and students have 60 minutes to complete each section. Together, the sections test all five domains essential to the standards of the course. This instrument was administered as a posttest to students in both the control and the experimental groups. The standard error of measurement (SEM) is calculated for each test, and an error band (plus/minus one SEM unit) is reported together with the student's scale score (Georgia Department of Education, 2003). Less than 70 is below grade level, 70 meets grade-level expectations, and 90 is exceeding grade level (Georgia Department of Education, 2003).

These assessments were used to ascertain whether differentiated instruction enhanced with technology employed in the classroom changed the students' experience on a state standardized test. The pretest was used to measure the prior knowledge of the standards taught with the groups. The posttest was used to assess whether either instructional practice was more effective in providing quality instruction for the mastery

of standards for success on a high-stakes standardized test. The pretest was given at the beginning of the semester for each group. The posttest was administered at the end of the semester for each group.

Data Collection Procedures

The principal of the school studied granted permission and access to the test data. The pretest was graded immediately after the student answered the last questions and submitted a request to have the test graded electronically by USATestprep.com. The second instrument was sent to Georgia Department of Education to be graded. Data collection was accomplished by incorporating the scores from both instruments into SPSS 20.0 for analysis. Both numeric and graphic results were used for analysis.

Protection of Participants' Rights

The name of the school and the names of all participants were withheld in the study. Any information pertaining to test scores of the participants was only known to me. All data collected remained under lock and key under the supervision of me. I sought and was given approval from the school's principal to proceed with the study by completing a written request informing the principal of the purpose, procedures, and duration of the study. Conducting this study posed no threat or adverse effect on the population studied, and all data were collected ex post facto. The proposal was reviewed by the Institutional Review Board (IRB) at Walden University to ensure that the human rights of the participants were protected prior to the collection of data (IRB# 09-30-13-0048469).

Data Analysis Procedures

Comparisons between the mean scores of the participants from both groups were required procedures of the quantitative study design. The independent *t* test was also implemented to determine any significance between the means of the two groups. Analysis of the means for the pretest and posttest was conducted using a paired *t* test to identify the difference in the means of those who received the same type of instruction. This process was completed to determine if there was any learning or mastery between the pretest and posttest. By looking at the effect in terms of standard deviation units, the *t* test can identify whether the differences between the means of the groups are statistically significant (Creswell, 2008). The alpha level was set at .05. The *t* test used compares two groups that are formed by some type of matching or compares a single group's performance on a pre- and posttest or on different treatments. Thus, it is assumed that the independent *t* test will help determine the probability of a significant difference between the two groups. The results of the *t* test allowed me to determine whether the difference between the two groups were statistically significant. In order to determine the significance between the group's EOCT results, a two-tailed independent *t* test was conducted to compare the EOCT scores for both groups. To measure the statistical differences between the pretest and posttest of one group, a paired sample *t* test was used. This repeated-measures design used only one sample with the same individuals in both treatments. It was assumed that each group was independent of the other because the pretest was administered before the instruction and the posttest was administered after

instruction. Results would show statistically significant differences between the pretest given and the posttest given to each group after instruction.

Limitations of Methodology

The following could affect the study. Classroom instruction and holidays can interrupt the teaching practices and shorten the instructional time given to each group. I was also the instructor of the classes used for this analysis, which could possibly affect the outcome of this research; however, this limitation is mitigated by the fact that data were not collected specifically for the research, but rather were a part of regular school processes.

Threats to Validity

I was directly involved in the instruction of the each group. My bias could affect the validity of this study. To minimize my bias, strict lesson plans were implemented. In this study I used cluster sampling and was limited to one high school; therefore, generalization to other ninth graders was limited. Furthermore, students in both groups attended other classes together and may have shared their classroom experiences and practices with each other. Lastly, afterschool tutoring and parental support may have interfered with the outcome of this study. Parents and students were asked to not share details of this study with anyone outside of the classroom.

Conclusion

Creators of education reforms play an integral part in how instruction is implemented. Decisions by classroom teachers and school systems will always have a direct effect on the success of students within the classroom. Those decision can and will

affect the outcome of the learners. Furthermore, high-stakes testing continue to be the focal point of changes made in the classroom. The results from this study have shown that a particular teaching strategy or practice is more effective in a classroom of mixed-ability learners and caused further change in instruction. Furthermore, results from this study should provide direction for future education reforms that are based on proven researched-based instructional theories and practices that produce success in high-stakes testing.

Section 4: Results

Data Analysis

NCLB requires that teachers effectively teach students essential curriculum that is based on rigorous standards revamped to meet the federal mandates. This mandate causes teachers to search for research-based instructional practices that will enable them to not only challenge students on a higher level, but also provide instruction for students who are below level. Tomlinson (2001) declared that differentiated instruction can meet those needs. Heacox (2002) supported differentiated instruction coupled with instructional technology, saying that this combination can make a difference in student success. This research could provide the needed answer to the formidable question of how to increase test scores and student success on high-stakes, standardized tests—requirements for NCLB.

Many studies have been completed to analyze the effects of differentiated instruction implemented at the elementary and middle grade levels, and some studies have addressed mixed-level abilities in high school (Armstrong, 2000; Heacox, 2002; Tomlinson, 2001). Unfortunately, none have addressed the effectiveness of differentiated instruction enhanced with technology to increase test scores in a ninth-grade literature and composition class. The purpose of this quantitative study was to analyze past and present education reforms to show their weaknesses and strengths; furthermore, I analyzed the effectiveness of a particular instructional paradigm to assess which instructional practice will increase success on state standardized tests for ninth-grade

literature and composition in Bibb County—which is the requirement of the present era of education reform, NCLB.

Analysis of Research

The sample included 105 student test scores. As shown in Table 1, this ex post facto study had 52 participants in Group A and 53 participants in Group B (see Table 1).

Table 1

Sample Distribution of Both Test Groups

Variable	Frequency	Percent
Group A	52	49.5
Group B	53	50.5
Total	105	100.0

As shown in Table 2, the sample provided a good distribution of females ($N = 52$) and males ($N = 53$)—a nearly equal distribution between both sexes. Group A, which received traditional instruction, contained 28 males and 24 females, while Group B, receiving differentiated instruction with technology-based enhancements, contained 25 males and 28 females. The sample and design allowed me to answer the questions proposed in this study. Each research question and hypothesis is addressed separately.

Table 2

Research Sample of Both Test Groups

Variable	Frequency	Percent
Female	52	49.5
Male	53	50.5
Total	105	100.0

The first task was to determine whether the two groups were statistically similar at the outset. It was assumed that non-content skills related to the intervention did not enhance or reduce students' test-taking ability. This was done through the use of a paired *t* test on the pretest of Group A and Group B.

Table 3

Comparison of Pretests for Group A and Group B using a t Test

Variable	Mean	Std. deviation	Std. error mean	95% confidence interval of the difference		*t*	*df*	Sig.(2-tailed)
				Lower	Upper			
Pretest A Pretest B	1.1	24.1	3.3	-7.8	5.6	-.3	51	.6

As Table 3 indicates, the *t* test comparing the pretest results of Group A and Group B showed a *p*-value of .680. Thus, it can be inferred that Group A and Group B were similar in ability before instruction. This being the case, it is possible to move on to analyzing the data to answer the research questions, which are listed below:

What are the effects of differentiated instruction enhanced with technology on ninth-grade students in an intermediate and higher level of ninth-grade literature and composition instruction?

Null hypothesis ($H_0 1$). There will not be an increase in the pretest and EOCT scores between those receiving ninth-grade literature and composition instruction using traditional instruction and those receiving differentiated instruction enhanced with technology.

To answer this question, the variables included the pretest (Practice Test on USAtestprep.com) and posttest (EOCT) scores. A paired-sample *t* test was used because it would allow me to identify whether the means of the practice test (pretest) and the EOCT (posttest) differ significantly from each other.

Table 4 shows that there was a 20.4 point gain in Group A between the pretest and the posttest after receiving traditional instruction.

Table 4

Paired t Test of Group A on the Pretest and Posttest

Variable		Mean	*N*	Std. deviation	Std. error mean
Pair 1	Pretest A	59.8	52	16.0	2.2
	Posttest A	80.2	52	12.3	1.7

Table 5 shows that there was a statistically significant difference between the pretest and the posttest of Group A (< .001).

Table 5

Paired t-Test Results of Group A on the Pretest and Posttest

				95% confidence interval of the difference				
Variable	Mean	Std. deviation	Std. error mean	Lower	Upper	*t*	*df*	Sig. (2-tailed)
Pretest A Posttest A	20.4	9.0	1.2	17.8	22.9	16.3	51.0	<.000

Group B achieved a 27.8 point gain between the pretest and posttest after receiving differentiated instruction enhanced with technology (Table 6).

Table 6

Paired t Test of Group B on Pretest and Posttest

Variable	Mean	*N*	Std. deviation	Std. error mean
Pretest B	61.2	53	17.6	2.4
Posttest B	89.0	53	3.7	.50

Not only did the participants in Group B, receiving instruction enhanced with technology, achieve 7.4 points more than Group A, but they also demonstrated a statistically significant difference between their pretest and posttest results (< .001; Table 7).

Table 7

Paired t-Test Results of Group B

				95% confidence interval of the difference				
Variable	Mean	Std. deviation	Std. error mean	Lower	Upper	*t*	*df*	Sig. (2-tailed)
Pretest B Posttest B	27.8	17.3	2.3	32.5	23.0	11.6	52.0	<.000

Both Group A and Group B exhibited a statistically significant difference after receiving instruction. Thus, further analysis was conducted on the EOCT results for Group A and Group B to answer the second research question: What are the differences in EOCT scores between groups receiving ninth-grade literature and composition instruction through traditional instruction and those receiving the instruction of the content through differentiated instruction enhanced with technology?

Null hypothesis ($H_0$2). There will be no differences in test scores between those groups receiving ninth-grade literature and composition instruction using traditional instruction and those receiving differentiated instruction enhanced with technology.

Using an independent *t* test as the statistical tool allows a researcher to compare the means of two samples, so long as there is a shared variable (Creswell, 2008). The common variable, in this case, is the posttest. When the independent *t* test was run, the results showed a substantial difference between the two group means (Table 8).

Table 8

Group Statistics Posttest Results of EOCT Test for Both Groups

Variable	Group	*N*	Mean	Std. deviation	Std. error mean
EOCT	Group A	52	80.2	12.3	1.7
	Group B	53	89.0	3.7	.50

Group A scored 8.8 points less on the posttest than Group B. This finding is important because there was no statistically significant difference between the two groups on the pretests. Of course, in itself, this does not mean that the difference between the group's EOCT results was statistically significant. To determine significance, a two-tailed independent *t* test was conducted to compare the EOCT scores for both groups. As Table 9 shows, this analysis indicated that there was a statistically significant difference between the two groups (< .001).

Table 9

Independent Samples t Test for Posttest

		Levene's test for equality of variances		*t* test for equality of means						
									95% confidence interval of the difference	
		F	Sig.	*T*	*df*	Sig. (2-tailed)	Mean difference	Std. error difference	Lower	Upper
Posttest	Equal variances assumed	63.9	.000	4.9	103	.000	8.7	1.7	12.2	-5.2
	Equal variances not assumed			4.8	59.8	.000	8.7	1.7	12.3	-5.1

Summary

The findings of this analysis of the hypotheses are summarized in this chapter. The research findings indicated that all students showed statistically significant growth from pretest to posttest; however, students receiving differentiated instruction enhanced with technology showed statistically significantly higher EOCT scores than those students receiving traditional instruction. The implications of these findings are discussed in Chapter 5.

Section 5: Discussion, Conclusions, and Recommendations

Introduction

This chapter presents the summary and analysis of the results concerning the ex post facto study, which involved comparing the effectiveness of traditional instruction with differentiated instruction enhanced with technology in a mixed-ability classroom in ninth-grade literature and composition. The presentation and overview of the problem with a discussion of the significant findings are included. Important conclusions derived from the data presented in Chapter 4 are provided. Furthermore, this chapter contains a discussion of the implications for action and recommendations for further research regarding differentiated instruction enhanced with technology in a mixed-ability classroom.

Summary of the Study

Overview of the Problem

Research on education reforms has shown that said reforms do not correlate completely with scientific findings on cognitive processes (Orfield, 2006)—something that is essential to understanding how students learn. Legislators do not base their decisions on expert teachers' advice or current findings of educational institutes (Nehring, 2007). Education reforms are mainly created to serve competitive goals and the bragging rights of the nation (Lee, 2001). With this type of thinking, damage to the educational system affects the current learners and requires more changes and more education reforms. If educators are to make a true difference in education so that students are becoming life-long learners who care to be active citizens who contribute to the

overall growth of society, then policy makers, educators, parents, and community members need to base reform on what is best for the students of today (Lee, 2001).

No Child Left Behind (NCLB) demands accountability, standardized testing, public report cards of schools, and success for every student regardless of learning style, disability, or economic disadvantage; however, Orfield (2006) has documented that NCLB is severely underfunded and houses several loopholes that are not conducive to uniformity among the states. Furthermore, it demands impossible feats that are based on high-stakes testing that differs from state to state (Orfield, 2006). Teachers and teaching strategies are the focal point for addressing this mandate (Sunderman, 2006). With teaching practices being analyzed critically, educators are searching for strategies that will enable them to not only challenge higher level students, but also improve and challenge lower level students. With basic classrooms consisting of heterogeneous levels (Tomlinson, 2001), teachers are pressured to produced successful students who will be able to pass high-stakes standardized tests with only a short period of instructional time—regardless of the lack of resources that teachers or students have available (Sailor & Roger, 2005). Thus, differentiated instruction is considered the recipe for success. The substantial amount of discussion on differentiated instruction and NCLB indicates that accountability based on high-stakes testing is not the answer to closing the educational gap (Lee, 2001; Rotberg, 2006). Tests results of various studies "do not vindicate a general educational reform effort focused almost exclusively on testing nor … provide adequate support to any argument that high-stakes testing is necessary to raise student achievement" (Marchant, Paulson, & Shunk, 2006, p. 23). Current education reform still

heavily depends on high-stakes standardized testing. Tomlinson (2001) clearly stated that in a mixed-ability classroom, a teacher must embrace differentiated instruction to match teaching and learning with diverse students, which may allow teachers to do the following:

1. Efficiently move students along the curriculum.
2. Simultaneously challenge each different level of student encompassed within one classroom.
3. Successfully increase test scores to ensure that schools meet requirements that are the direct result of the current legislation.

Purpose Statement

The purpose of this quantitative study was to analyze past and present education reforms to show their weaknesses and strengths; furthermore, it entailed the analysis of effective learning theories coupled with research-based instructional practices to assess which instructional practice will increase success on state standardized tests for ninth-grade literature and composition in Bibb County, Georgia—which is a requirement of the present era of education reform, NCLB. Each year, educators search for the elusive teaching strategy that will promise student success on high-stakes standardized tests used to evaluate teachers' effectiveness. This information, as used by NCLB mandates, also dictates whether a school is a successful school or a failing school. Instead of focusing on test scores, teachers need to focus on instructional practices that will work. Differentiated instruction alone is not enough. "Teachers who have brought technology into their classrooms are aware that it provides an opportunity to differentiate instruction

and change their classrooms into dynamic learning environments" (Pitler, Hubbell, Kuhn, & Malenoski, 2007, p. 2).

Sunderman (2006) argued that NCLB places a spotlight on improving teacher quality because it is more directly responsible for student achievement than any other factor. Research suggests that differentiated instruction enhanced with technology can make significant strides within a mixed-ability classroom (Fox, 2007); thus, it was important to focus this research on the success of students on a state standardized test. Though there has been research on the effects of differentiated instruction in mixed-ability classrooms at the elementary level, there has been little research to show the effects of differentiated instruction enhanced with technology in a mixed-ability classroom for ninth-grade literature and composition.

The following research questions were examined in this study:

1. What effect does differentiated instruction enhanced with technology have on students' learning in a ninth-grade literature and composition class?
2. What are the differences in EOCT scores between students receiving ninth-grade literature and composition instruction though a traditional approach and those receiving the instruction through differentiated instruction enhanced with technology?

Review of the Methodology

This ex post facto study used cluster sampling in its methodology to identify whether differentiated instruction enhanced with technology will increase success on state standardized tests (ninth-grade literature and composition EOCT) relative to

traditional means of instruction. The dependent variables rely on test results—diagnostic test (pretest) and the EOCT results (posttest). The subjects for this study came from a high school in Macon, Georgia and comprised two groups, Group A and Group B. The school where the research was conducted was reported to have had a high retention rate of 40% for first-time ninth-graders in their core subjects—mainly ninth-grade literature and composition. The state reported a ninth-grade passing rate of approximately 68% on the EOCT for 2009-2010. The sample distribution included 105 student test scores—52 participants in Group A and 53 participants in Group B, as seen in Table 1. The demographics for this sample were approximately 1% Asian, 27% Black, 5% Hispanic, and 67% White. The sample provided a good distribution of females and males—nearly an equal distribution between both sexes in Group A and Group B.

A comparison of the pretests between the two groups was conducted using an independent *t* test to determine whether the control and treatment groups were statistically similar at the outset. The *t* test showed that Group A and Group B were similar in ability before instruction occurred, as shown in Table 3. A paired *t* test was conducted on the pretest and posttest of Group A and Group B in order to ascertain significance between the two types of instruction. The data showed that there was a statistically significant difference between the two instructional practices.

Interpretation of Findings

The collected data were analyzed using both independent and paired *t* tests to measure differences between those students receiving traditional instruction and those receiving differentiated instruction enhanced with technology from the pretest and

posttest results. In both research questions, students receiving differentiated instruction enhanced with technology outperformed the students receiving traditional instruction.

Research Question 1

The first research question address was as follows: What are the effects of differentiated instruction enhanced with technology on ninth-grade students in an intermediate and higher level of ninth-grade literature and composition instruction? Students in Group A had a 20.4-point gain between the pretest and the posttest after receiving traditional instruction, as shown in Table 4. Furthermore, students in Group B achieved a 27.8-point gain between the pretest and posttest after receiving differentiated instruction enhanced with technology, as shown in Table 6. Students who received differentiated instruction enhanced with technology were more successful on state standardized tests.

A paired-sample *t* test was used because it allowed me to determine whether the means of the practice test (pretest) and the EOCT (posttest) differ significantly from each other. Both Group A and Group B showed a statistically significant difference at $p = .000$, as shown in Table 5 and Table 7. Students in both groups had statistically significant growth in their learning after instruction was administered.

It is important to mention that Group A and Group B had a 1.7-point difference in the pretest. A *t* test would confirm that there were no statistical differences, $p = .680$ (Table 3), between the two groups completing the pretests before instruction was implemented. Not only did Group B, receiving differentiated instruction enhanced with technology, demonstrate a statistically significant difference between pretest and posttest,

but it also improved a total of 7.41 points more than Group A, which received traditional instruction. Though traditional instruction did provide intellectual growth within the classroom, students who received differentiated instruction enhanced with technology had a larger growth margin. As Tomlinson (2001) found in her research, differentiated instruction allows the teacher to align the curriculum with the abilities of the students. Students in Group B were assessed for their learning styles. This information enabled the teacher to fashion lessons that would best benefit the learners. Furthermore, with technology being the preferred choice for communicating in today's society, students are more willing to engage in learning when technology is involved. Not only does technology engage the learner, but it also allows the teacher to disseminate and manipulate the lesson for each student differently based on learning style and learning needs. This makes the learning process more effective. Teachers who are searching for a means to close the achievement gap and meet the requirements of the current educational reform need to embrace differentiated instruction enhanced with technology.

Students who are engaged in the learning environment tend to retain more information than those who are not. This is the significant difference in the two groups. In today's society, students are constantly surrounded by technology. It is their preferred mode of communication and entertainment. Incorporating technology into the instructional practices allowed the teacher to meet the students on their level and guide them through the curriculum in a more captivating manner (Fox, 2007). As indicated by Benjamin (2006), when students are allowed to decide how they learn, they are able to take ownership of what they learn, which allows the teacher to effectively deliver the

standards that are important for them to master. Differentiated instruction enhanced with technology provides a diverse classroom that allows hands-on learning experiences, as well as a variety of strategies to promote learning. Classrooms that are conducive to learning through technology and differentiated instruction will provide an environment that allows learners to grow.

What does this mean for future classrooms? Teachers who want to provide effective instruction should consider including differentiated instruction enhanced with technology. Their classrooms should incorporate cooperative learning, smart boards, and hands-on learning opportunities to see success on state standardized tests. Furthermore, no two classrooms will be alike. Teachers must assess their students' needs and learning styles in order to create a learning environment that incorporates research-based strategies that will help them become successful. They should incorporate constructivism, which means they should not only allow students to bring their personal experiences to the information being taught, but also allow for social interaction while manipulating the materials and content of the course. Without this vital information, differentiated instruction enhanced with technology is incomplete. No two students learn the same way because their personal experiences are different. Teachers who accept and implement this in their instructional practices will have a better chance of establishing a successful learning environment for their students—which will, in turn, provide higher results on state standardized tests.

Research Question 2

The second questions addressed in this study was the following: What are the differences in EOCT scores between groups receiving ninth-grade literature and composition instruction through traditional instruction and those receiving instruction through differentiated instruction enhanced with technology.

Using an independent *t* test as a statistical tool allows a researcher to compare the means of two samples, so long as there is a shared variable. In this case, the common variable is the posttest. The results of the independent *t* test showed a large, significant difference between the two groups being studied. Group A scored 8.76 less than Group B on the posttest, as shown in Table 8, demonstrating a significant difference because of the 1.36-point difference between the two groups on the pretest analysis (Table 3). Though both groups demonstrated a significant difference, $p = .000$, between the pretest and posttest, Group B achieved a 27.81-point difference in test score average between pretest and posttest scores. Group A achieved a 20.40-point gain between the pretest and posttest, but it was less than the 24.14-point gain achieved collectively by both groups. This confirms that students receiving differentiated instruction enhanced with technology score higher and are more successful on state-standardized tests in this course.

The results of this study support the need for differentiated instruction enhanced with technology for ninth-grade literature and composition. Educators who are searching for means to challenge mixed-ability classrooms while teaching required curriculum can implement differentiated instruction enhanced with technology to not only increase success on standardized tests, but also provide stimulating instruction that reaches the

needs of students of various abilities within one classroom. For both research questions, students receiving differentiated instruction enhanced with technology outperformed those students receiving traditional instruction. Results of this study can provide justification to continue providing teachers with functional technology and professional development in differentiated instruction enhanced with technology. Furthermore, this study adds to the ongoing research being conducted on differentiated instruction in other academic areas.

Teachers who are looking for answers to solve the problem of the education gap may benefit from attending professional development training on differentiated instruction enhanced with technology. Instead of teachers engaging in training that may or may not bring about change, it may be most beneficial to allow them to experience training in an instructional practice that has been researched thoroughly, with repeated successful results. Differentiated instruction does meet the needs of students in a mixed-ability classroom; however, DI enhanced with technology showed a statistically significant difference in scores on state standardized tests. Education reforms should incorporate instructional practices that are proven to provide a difference in the learners of today.

Implications for Social Change and Recommendations for Further Study

Sailor and Roger (2005) argued that the NCLB mandate and accountability have made teachers struggle to find effective practices to use within the classroom to increase student achievement. Tomlinson (2001) stated that in a mixed-ability classroom, a teacher must embrace differentiated instruction to match teaching and learning with

diverse students. In the past, education reform was implemented to make education equal for those who sought it (Parents United Together, n.d.). Now, education reforms are implemented to keep up with international results of producing highly skilled graduates with a serious focus in mathematics, engineering, and science (Lee, 2001). Reforms should focus more on matching effective learning strategies with an effective learning theory. Furthermore, these reforms should not depend solely on state standardize testing because their results do not adequately prove that quality instruction is not being offered. Students who received traditional instruction still showed a statistically significant difference between their pretest and posttest scores; however, students who received differentiated instruction enhanced with technology had larger growth. A state standardized test will not show this. A state standardized test will only show whether learning is taking place within the constraints of the test—not whether quality instruction is being offered. Further studies may strengthen support for the need to enhance differentiated instruction with technology to increase test scores on state-standardized tests. School systems across the globe that are struggling to close the achievement gap may improve curriculum and student success with implementation of differentiated instruction enhanced with technology. With so many grants available, technology can be updated to provide educators with state-of-the-art technology that will enhance instruction in a mixed-ability classroom.

Further research should include studying the benefits of differentiated instruction enhanced with technology to measure long-term achievement in writing. Passing the Georgia High School Writing Test is becoming a concern in the educational community.

Knowing the effects of differentiated instruction enhanced with technology on a state-standardized writing test could provide important information on instructional practices for student success.

Based on the research completed by Marzano, Pickering, and Pollock (2001) and Tomlinson (2001), one critical implication was educators who worked in a mixed-ability classroom should implement differentiated instruction. Educators unequipped with this method of instruction should be provided professional learning to provide that knowledge. Furthermore, instruction that incorporated differentiated instruction enhanced with technology provided better results for student success on state-standardized tests and should be a standard in all classrooms. Professional learning geared toward implementation of technology and differentiated instruction should be an ongoing event that is also included in teacher preparatory courses and institutions of higher learning. Lastly, education reforms that are solely based on high-stakes testing should be re-evaluated in order to maintain the integrity of instruction in the classrooms. School systems that are less threatened by test results and their implications may focus on quality instruction instead of federal and state mandates. This shift in focus could lead to effective instructional practices that yield an environment focused on developing life-long learners who are successful. Passing scores on a state standardized test do not necessarily confirm quality instruction is occurring, though education does need accountability in some form to ensure that learning is taking place. Teachers need to use instructional practices that have been proven to provide quality instruction and provide successful results on state standardize tests. Differentiated instruction enhanced with

technology is one solution to help learning institutions be more successful. An educational reform that allows teachers to implement differentiated instruction enhanced with technology without time constraints could enhance this approach.

Recommendations for Action

The results of this research need to be shared with teachers and members of the Board of Education so they are cognizant of the effects of differentiated instruction enhanced with technology. Budgets should be revised and grants should be sought to meet the needs of a 21st century classroom with 21st century students. Policy makers should conduct in-depth studies to show the long-term effects of incorporating this instructional practice, so future education reforms reflect research-driven instructional theories and practices that are proven successful. Once policy makers, member of the Board of Education, and teachers are aware of the possibilities, steps should be implemented to bring the necessary training and needed materials into the classrooms.

Conclusion

The key to student success on high-stakes state testing, is effective instructional practices in the classroom. Teachers must be trained in instructional practices that incorporate differentiated instruction enhanced with technology to meet the needs of a mixed-ability classroom of the 21st century. Research by Tomlinson (2001) and Fox (2007) stated the use of instructional technology in a classroom provides 21st century instruction that is captivating and successful when combined with research-based instruction that will meet a classroom of mixed-ability students. With today's classroom filled with mixed-ability children who are surrounded with technology every day,

educators must be able to reach them, teach them, and challenge them. Though research by Northey (2005) focused on differentiated instruction in middle and high schools in regards to high-stakes testing, it does not include the effects of differentiated instruction enhanced with technology. Most studies completed by researchers focused on differentiated instruction or instructional practices enhanced with technology, but not both (Pitler et al., 2007). This research shows that combining the two will allow students to be more successful on high-stakes state testing. Furthermore, Lee (2001) and Nehring (2007) indicated reforms that are solely created to compete with other countries or fix the previously, poorly written legislation will not fix the problems found in education. Educational reforms must be written to meet the needs of the learners and must be written without the ineffectual consistencies that have plagued educational reforms in the past. In short, it must be based on researched theories and instructional practices that have been proven effective. Though traditional instruction can provide some growth in a classroom, the data clearly show significant growth is obtained from instructional practices that include differentiated instruction enhanced with technology. Unfortunately, teachers incorporating this proven instructional practice will not be able to successfully teach a full curriculum when the current educational reform does not provide adequate support and time to thoroughly implement it correctly.

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Appendix A: Learning Style Inventory

Learning Styles Assessment

Read each statement and select the appropriate number response as it applies to you.

Often (3) **Sometimes (2)** **Seldom/Never (1)**

Visual Modality

_____ I remember information better if I write it down.
_____ Looking at the person helps keep me focused.
_____ I need a quiet place to get my work done.
_____ When I take a test, I can see the textbook page in my head.
_____ I need to write down directions, not just take them verbally.
_____ Music or background noise distracts my attention from the task at hand.
_____ I don't always get the meaning of a joke.
_____ I doodle and draw pictures on the margins of my notebook pages.
_____ I have trouble following lectures.
_____ I react very strongly to colors.
_____ Total

Auditory Modality

_____ My papers and notebooks always seem messy.
_____ When I read, I need to use my index finger to track my place on the line.
_____ I do not follow written directions well.
_____ If I hear something, I will remember it.
_____ Writing has always been difficult for me.
_____ I often misread words from the text-(i.e.,"them" for "then").
_____ I would rather listen and learn than read and learn.
_____ I'm not very good at interpreting an individual's body language.
_____ Pages with small print or poor quality copies are difficult for me to read.
_____ My eyes tire quickly, even though my vision check-up is always fine.
_____ Total

Kinesthetic/Tactile Modality

_____ I start a project before reading the directions.
_____ I hate to sit at a desk for long periods of time.
_____ I prefer first to see something done and then to do it myself.
_____ I use the trial and error approach to problem-solving.
_____ I like to read my textbook while riding an exercise bike.
_____ I take frequent study breaks.
_____ I have a difficult time giving step-by-step instructions.
_____ I enjoy sports and do well at several different types of sports.
_____ I use my hands when describing things.
_____ I have to rewrite or type my class notes to reinforce the material.
_____ Total

Appendix B: True Color Quiz

True Colors Personality Quiz

Describe Yourself: In the boxes below are groups of word clusters printed **horizontally** in rows. Look at all the choices in the first box (A,B,C,D). Read the words and **decide which of the four letter choices is most like you.** Give that a "4". Then rank order the next three letter choices from 3-1 in descending preference. You will end up with a box of four letter choices, ranked from "4" (most like you) to "1" (least like you). Continue this process with the remaining four boxes until each have a 4, 3, 2, and 1.

Box One			
A _____	B_____	C_____	D_____
active	parental	authentic	versatile
opportunistic	traditional	harmonious	inventive
spontaneous	responsible	compassionate	competent

Box Two			
E _____	F_____	G_____	H_____
curious	unique	practical	competitive
conceptual	empathetic	sensible	impetuous
knowledgeable	communicative	dependable	impactful

Box Three			
I _____	J_____	K_____	L_____
loyal	devoted	realistic	theoretical
conservative	warm	open-minded	seeking
organized	poetic	adventuresome	ingenious

Box Four			
M _____	N_____	O_____	P_____
concerned	daring	tender	determined
procedural	impulsive	inspirational	complex
cooperative	fun	dramatic	composed

Box Five			
Q _____	R_____	S_____	T_____
philosophical	vivacious	exciting	orderly
principled	affectionate	courageous	conventional
rational	sympathetic	skillful	caring

A,H,K,N,S __orange__ = _____ B,G,I,M,T __gold__ = _____

C,F,J,O,R ___blue___ = _____ D,E,L,P,Q __green__ = _____

Curriculum Vitae

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Education and Certification

Doctor of Education – Teacher Leadership
2009-2015 Walden University, Minneapolis, MN

Master of Education - Instructional Technology
2003-2004 American Intercontinental University, Schaumburg, IL

Bachelor of Arts (English Education)
1994-1998 University of Maryland Eastern Shore, Princess Anne, Maryland

Professional Experience

Secondary School English Teacher

2005-Present Rutland High School, Macon, Georgia

- Cooperating Teacher for student teachers
- Varsity Cheer Coach
- One-Act Coach
- Literary Competition Coordinator
- New Teacher Mentor
- Developed lessons with English teachers to better prepare students for standardized testing
- Developed lessons with technology to engage students' learning in English

1999-2005 Statesboro High School, Statesboro, Georgia

- 9th Grade Academy Teacher
- Lead 9th Grade Teacher
- Homebound Teacher

References

Available upon request