ABSTRACT

Pamela C. Patterson, A PROGRAM EVALUATION OF CLASSWORKS™ (Under the direction of Dr. James McDowelle). Department of Educational Leadership, November, 2015.

North Carolina has increased the math course requirements for graduation and the rigor of standards students are expected to master at each grade level. Richmond County School students have consistently lagged behind the state average on the North Carolina End-of-Grade assessment in grades three through eight, an assessment used to determine grade level proficiency. The district implemented Classworks™, an intervention program designed to improve grade level proficiency for students who participate in the program. This dissertation is a Problem of Practice designed to inform the district of the impact of Classworks™ on proficiency levels of elementary and middle grades students. Because a comprehensive evaluation had not been conducted by the school district, the need was essential. Due to limited budgets, it is vitally important for the district to be frugal when determining resources for improving academic achievement.

The study utilizes qualitative and quantitative data that are both descriptive in nature. The qualitative data provides insight to the fidelity by which the program was implemented in the schools, a factor that can have a substantive impact on the results. Proficiency levels on the math end-of-grade assessments provided the quantitative data. As a result of analyzing test scores, it was determined that the program appeared to have a positive impact on student achievement for the 2011-2012 school year. Due to a change in state standards and the end-of-grade assessment, test scores across the state dropped significantly for the 2012-2013 school year; therefore, the use of this data was invalid when determining the impact of Classworks™ for this particular school year. Fidelity of program implementation varied widely among the schools impacting the outcome of the program.

The overarching recommendation focuses on the fidelity of implementation. Developing specific guidelines that are adhered to by each school will provide structure and a means for obtaining sufficient data for monitoring. Other recommendations include providing consistent and continuous professional development for administrators and teachers, directly involving teachers to monitor student progress and assist in designing the individualized program for their students, and developing an on-going monitoring and evaluation plan that will ensure the effectiveness of the program.

A PROGRAM EVALUATION OF CLASSWORKS™

A Dissertation

Presented to

The Faculty of the Department of Educational Leadership

East Carolina University

In Partial Fulfillment

of the Requirements for the Degree

Doctor of Education in Educational Leadership

by

Pamela C. Patterson

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A PROGRAM EVALUATION OF CLASSWORKS™

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DEDICATION

I would like to dedicate this dissertation to my family: husband, Rodney, children, Kylee and Bryson, and to my parents, Joe and Juanita Cox.

ACKNOWLEDGEMENTS

This journey would not have been possible without academic and moral support from many individuals. I would like to thank East Carolina University and the University of North Carolina at Pembroke for the opportunity to participate in a cohort group developed by the universities. The experience and knowledge gained from this program is everlasting and will provide opportunities for my future. I would like to express my deepest appreciation to my committee members. Dr. James McDowelle, Committee Chair and Professor, has been instrumental in guiding me through this dissertation. He has a wealth of knowledge that ensured my success throughout the dissertation process. Dr. Charles Jenkins, professor from the University of North Carolina at Pembroke, has mentored me for many years and has bestowed knowledge upon me that has assisted in my success as an administrator. I will be eternally grateful for his commitment to students at the university level and beyond. Dr. George Norris, retired Superintendent of Richmond County Schools, is a man of knowledge pertaining to public education that is beyond comprehension. I have learned a great deal from him that will be of great benefit in my future. I would also like to thank Dr. William Rouse, Jr., Chair of the Department of Educational Leadership, and Dr. William Grobe, Associate Professor, both from East Carolina University. Their willingness to serve on my committee and their support throughout this process was instrumental to the success of my dissertation.

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CHAPTER 1: INTRODUCTION

Explication of Problem of Practice

Diane Ravitch, research professor of education for New York University and respected historian of education, recently made a stand in her blog concerning the Common Core Standards. For two years, she would not take a stand for or against the new national standards; however, she blogged on February 26, 2013 that she could not support the standards that have been adopted by 46 states primarily because of the lack of field testing. While she does believe national standards that are voluntary and serve as a guideline for states are needed, she feels that the effort is “fundamentally flawed” (Ravitch, 2013, para. 8). There is no evidence as to how the standards will affect students, teachers, or schools. She states, “We are a nation of guinea pigs” (Ravitch, 2013, para. 9). It is not uncommon in education for initiatives to be adopted without research-based evidence. The common core standards were developed by the organization Achieve, Inc. and the National Governor’s Association, both of which received generous funding from the Gates Foundation (Ravitch, 2013). Dr. William Schmidt, distinguished professor of Michigan State University, researched the common core math standards by reviewing existing research of standards in the world’s highest-achieving nations. The common core standards are similar in nature to the standards adopted by these nations. Furthermore, he researched the relationship between states in America that had adopted standards similar to the common core math standards and their National Assessment of Educational Progress (NAEP) math scores using the higher cut scores aligned with NAEP assessments. Early results show that those states have higher math scores. According to Schmidt’s research, North Carolina was one of 15 states that had standards considered as average on a scale ranging from least to most similar to the

Common Core State Standards (Schmidt, 2012). North Carolina adopted the Common Core State Standards in June of 2010 (Public Schools of North Carolina, n.d.c.).

In addition to implementing new standards as required by the state, school districts face numerous issues and challenges. Fitzpatrick, Sanders, and Worthen (2011) recognize that

> nonprofit sectors are grappling with complex issues: educating children for the new century; reducing functional illiteracy; strengthening families; training people to enter or return to the workforce; training employees who currently work in an organization; combating disease and mental illness; fighting discrimination; and reducing crime, drug abuse, and child and spouse abuse. (p. 3)

Some of these issues can have a direct impact on education and many of them can also have an indirect impact. Regardless of the underlying cause, interventions have to be implemented to minimize and/or eliminate the effect and to ensure academic success. Fitzpatrick et al. (2011) also realizes that we

> are facing challenging economic problems that touch every aspect of society. The policies and programs created to address these problems will require evaluation to determine which solutions to pursue and which programs and policies are working and which are not. Each new decade seems to add to the list of challenges, as society and the problems it confronts become increasingly complex. (p. 4)

The emphasis of this problem of practice is to evaluate a program that has been implemented in a school district where students consistently score below the state average on the End-of-Grade mathematics test in grades three through eight. The district purchased this program based on evidence provided by the vendor. It is essential for research to be conducted specific to the students, teachers, and schools in the local district to ensure the program is cost effective and produces the desired results. Although this study is small compared to evaluating national standards, it is an attempt to model practices that need to be a part of the decision-making process in schools, districts, states, and at the national level.

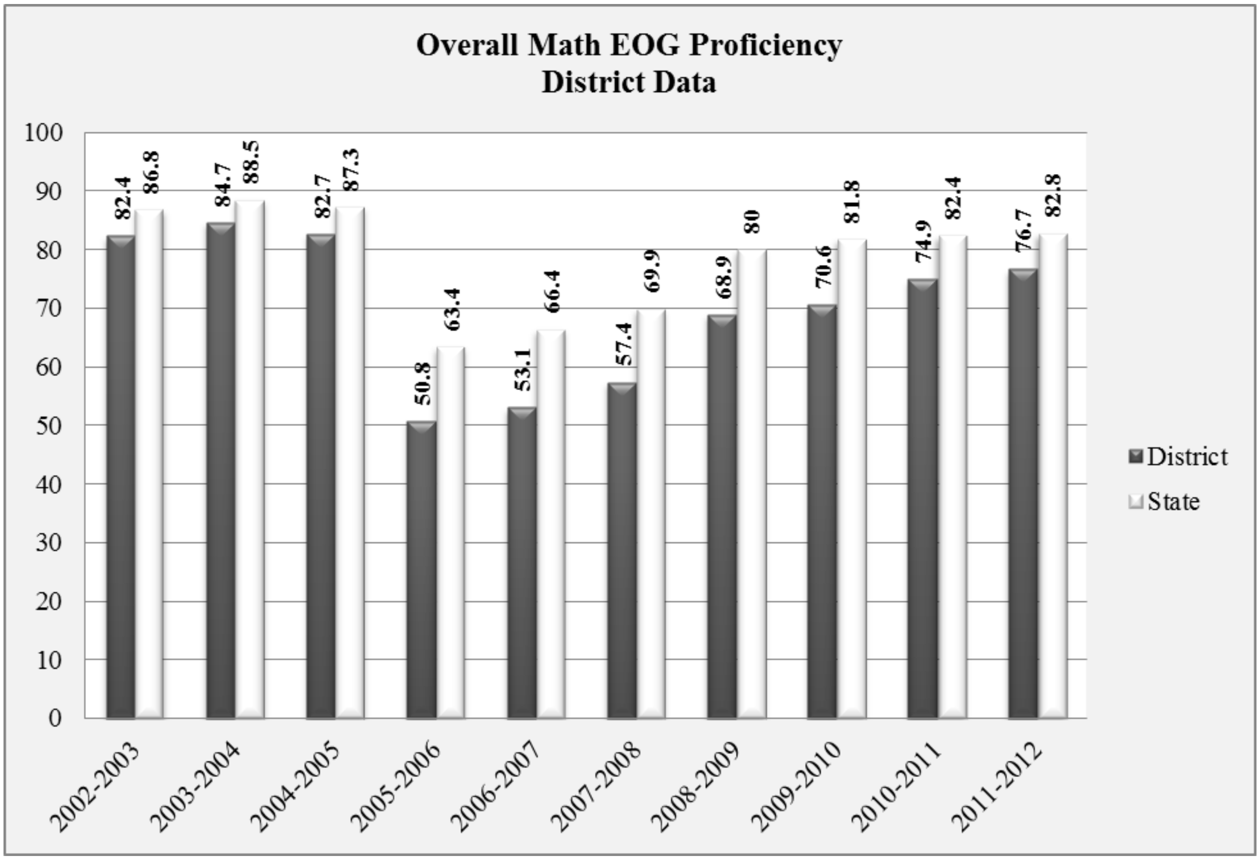
In North Carolina, the number of math credits required to graduate from high school increased from three to four beginning with ninth graders entering high school in the 2009–2010 school year. As part of this requirement, all students must successfully complete Algebra II and a math beyond Algebra II. This decision made by the North Carolina State Board of Education is evidence of an increase in expectations for North Carolina to better prepare students for the skills and knowledge necessary for college and careers in the 21st century (Public Schools of North Carolina, 2012a). In today's 21st-century workplace, the key to productivity is employing individuals who are mathematically capable. College graduates who major in math, engineering, and physical sciences tend to earn on average 19% more than graduates from other specialized fields, which "explains the national focus on improving math performance" (Vigdor, 2013, p. 1) of students. This emphasis on higher math standards in high school reiterates the importance of better preparation of students in elementary and middle school. In addition, students are losing ground by the time they reach high school. Based on long-term trend data from the National Assessment of Educational Progress (NAEP), nine- and 13-year-old students have made progress from 1978 to 2012 while 17-year-old students remained constant, indicating a lack of progress from middle to high school (National Center for Education Statistics [NCES], 2013b). Although the improvement for younger students is positive, it should be noted that only 32% of eighth graders were proficient on the math assessment in 2007 (Peterson, Woessmann, Hanushek, & Lastra-Anadon, 2011).

Statement of the Problem of Practice

This dissertation focuses on the evaluation of Classworks™, a web-based instructional program designed to improve mathematics skills of children in grades three through eight. The need for this program evaluation is critical because a comprehensive evaluation has not been completed by the Richmond County School district. It is important to determine the extent of the program's effectiveness in improving academic achievement in math for Richmond County School students. In this district, students consistently lag behind the state average on math End-of-Grade tests in grades three through eight as displayed in Figure 1 (Public Schools of North Carolina, 2012b). The underlying problem that concerns the district is that students are not learning math at the level that is necessary for them to be successful in future mathematical coursework. Math skills and concepts build upon previous knowledge. The gap in understanding will continue to grow wider year after year for students who are not on grade level before moving to the next course.

The district being studied is not alone in its concerns about student deficiencies in mathematics. In a national study released in December 2012, fourth- and eighth-grade students in the US still lag behind students in several East Asian and European countries (Rich, 2012). Of the 57 countries participating, fourth graders in the U.S. ranked 11th. Eighth-grade students ranked ninth when compared to other countries in the study. The average scores of American students were not significantly lower than the top performing countries; however, when comparing percentages of advanced students in mathematics, only 6% of fourth graders and 7% of eighth graders in the U.S. fall into this category (Provasnik et al., 2012; Rich, 2012).

The results of Rich's study are discouraging and reiterate the importance of advanced mathematical thinking in a global economy where these skills are needed to be competitive (Rich, 2012). In the article *Solving America's Math Problem*, Vigdor (2013) reinforces the magnitude of its importance when he states, "mathematical capability is a key determinant of productivity" (p. 1). Scores on the math Scholastic Aptitude Test (SAT) are directly related to earnings later in life (Vigdor, 2013).



Note. Data derived from Public Schools of North Carolina, 2012b.

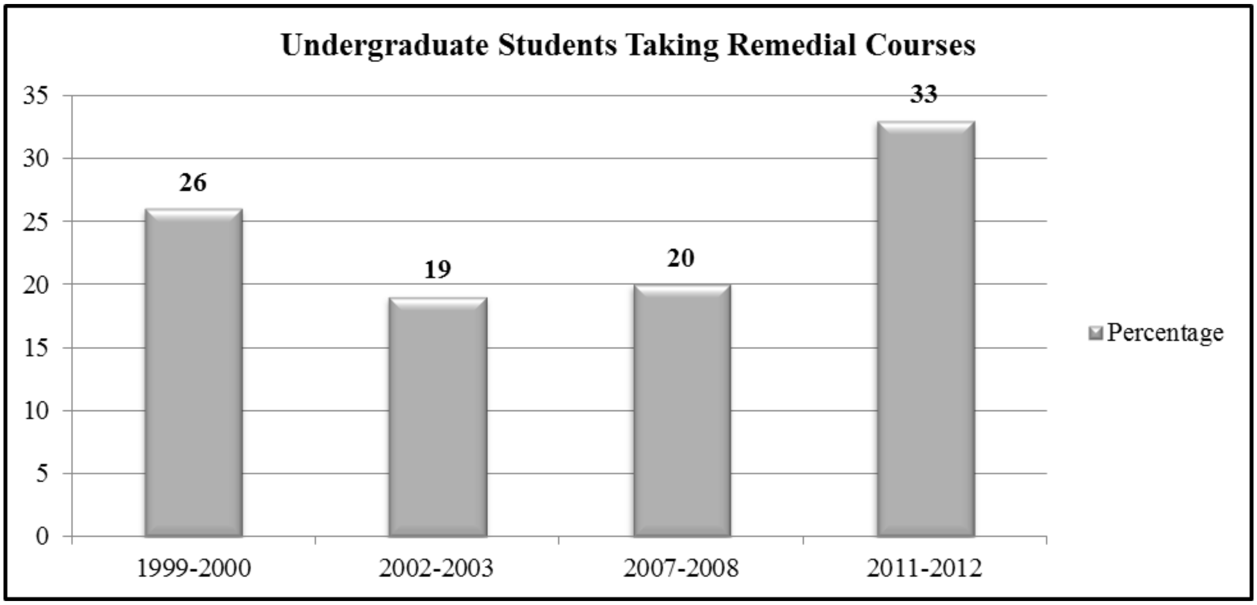
Figure 1. Proficiency on the end-of-grade test for Richmond County school district compared to the NC average from 2002 through 2012.

The concerns for global competitiveness began after the launch of Sputnik, earth's first artificial satellite, on October 4, 1957 by the Soviet Union. This event took America by surprise because it was believed that the U.S. would be the first to launch this type of technology (Garber, 2007). This marked the beginning of comparing America with other countries. In 1983, more than 25 years later, the famous *A Nation at Risk* report was released by the National Commission on Excellence in Education (NCEE). An interesting quote from this report states,

> the educational foundations of our society are presently being eroded by a rising tide of mediocrity that threatens our very future as a Nation and a people. What was unimaginable a generation ago has begun to occur—others are matching and surpassing our educational attainments. (Denning, 1983, p. 469)

Comparing the US to other countries continues to be an emphasis today and is often referred to in educational settings when discussing improvement in the academic achievement of students. It was specifically documented in the report that most 17-year-olds lacked higher order thinking skills and only about 40% had the ability to solve multistep math problems. At the time, 25% of students entering college required remedial math courses (Denning, 1983). Although 30 years have passed, there is no clear improvement in the percentage of first-year college students taking remedial math courses (Sparks & Malkus, 2013). The National Center for Education Statistics (NCES) collected data regarding the percentages of undergraduate students taking remedial courses. Figure 2 shows this continued trend (NCES, 2013a, 2014c).

The report *A Nation at Risk* stated, "Computers and computer-controlled equipment are penetrating every aspect of lives—homes, factories, and offices" (Denning, 1983, p. 470). Over 30 years later, technology is integrated into every facet of modern life. Because of the advances in technology, students must be academically prepared for careers that do not currently exist. This means that they must learn how to think critically and be problem solvers, both of which are



Note. Data obtained from the NCES (2013a, 2014c).

Figure 2. Percentage of undergraduate students taking remedial courses in college.

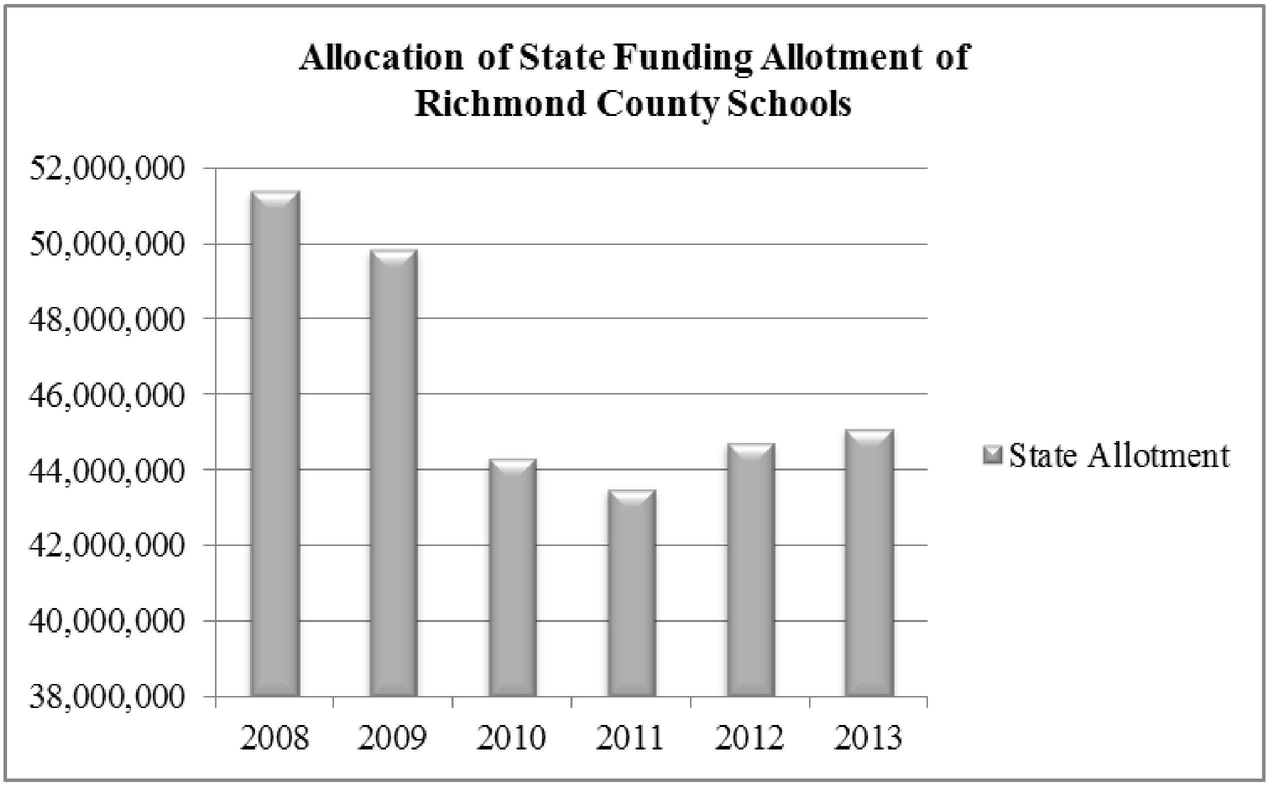
required for success in math. Students have been born into a technological society and with the appropriate instruction will adapt and become globally competitive leaders.

Students in high school have a deficiency in mathematical thinking. Based on data from the American College Test (ACT) administered in 2014, only 43% of students in the nation attained the benchmark score to be considered prepared to take college math courses. The percentage in North Carolina, where all graduates are tested, was 33% (ACT, 2014). The initial reaction is to blame high schools for not preparing students; however, learning mathematical skills and being able to solve higher order thinking problems starts in elementary school and proceeds through each grade until graduation. Because of this hierarchical nature of math content, ensuring that students are on grade level before leaving elementary school and middle school is critical to the success of students in high school math courses and math courses taken beyond the high school level (Hagedorn, Lester, & Cypers, 2010).

Financial Implications for the Problem of Practice

In an effort to fill the gaps in mathematical understanding and to progress all students to achieving grade level mastery in math, Richmond County Schools purchased the Classworks™ program as an intervention tool. The cost of the program was $81,314 per year for a three-year contract. This is a significant cost to the district. The decision to purchase a program of this cost was compounded by the decrease in funding provided to districts from the state of North Carolina. In 2008, the district was allotted $51,396,056 and in 2013 it had been reduced to $45,105,385 (Public Schools of North Carolina, n.d.a). Figure 3 displays the changes in funding during this time frame (Public Schools of North Carolina, n.d.a).

Although these data show a decrease in funding from 2008 to 2013, it is misleading. It is actually worse than it appears. Beginning with the year 2010, school districts were required to



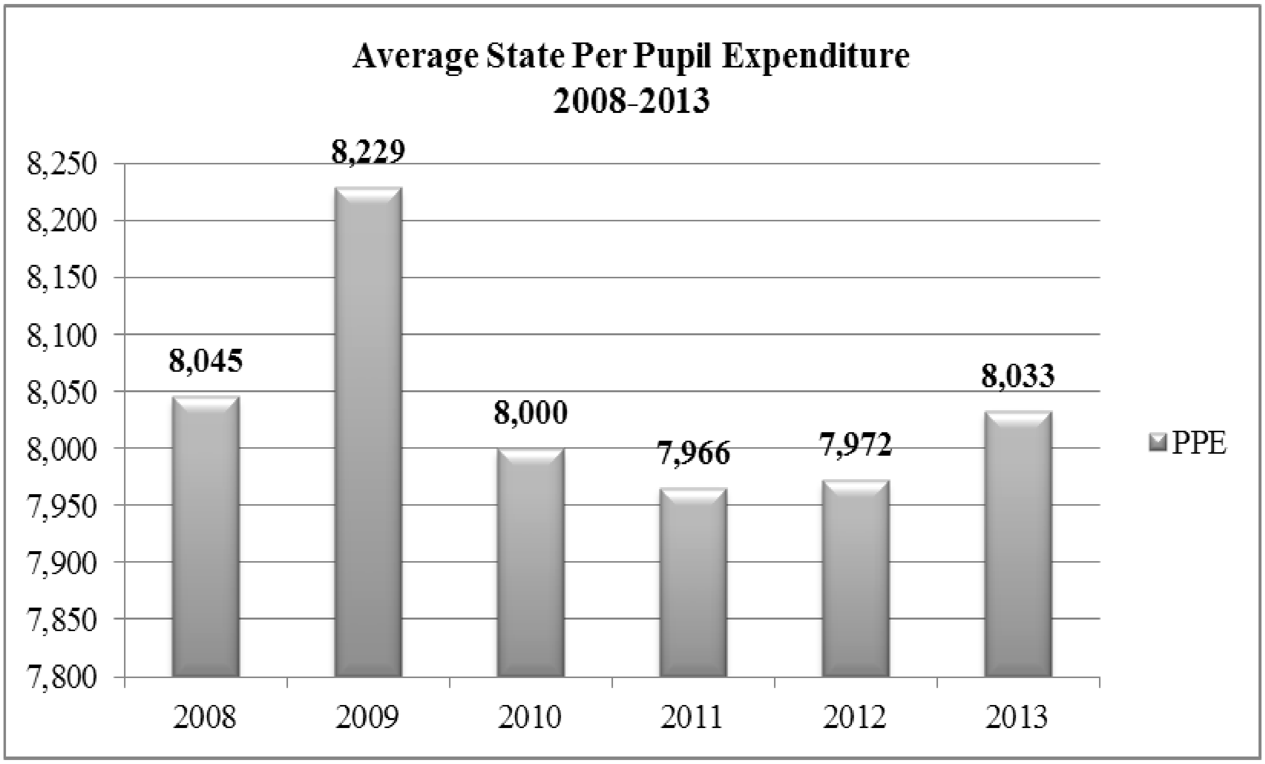
Note. Data obtained from Public Schools of North Carolina (n.d.a.).

Figure 3. Funding allotment in dollars for Richmond County schools provided by North Carolina from 2008 through 2013.

return money to the state after receiving it. The amount returned was deemed discretionary funds. The motive behind this process was to allow flexibility for districts to make decisions about where to cut funding. Overall, the amount of discretionary funds returned to the state was $225 million in 2010, $293 million in 2011, $428 million in 2012, and $503 million in 2013 (North Carolina Association of Educators [NCAE], n.d.; Public Schools of North Carolina, n.d.a). These cuts to public education have decreased the per pupil expenditure (PPE), the amount of money allocated for each student. Figure 4 represents the change in the PPE from 2008 to 2013 according to statistical data provided by the North Carolina Department of Public Instruction (Public Schools of North Carolina, n.d.a).

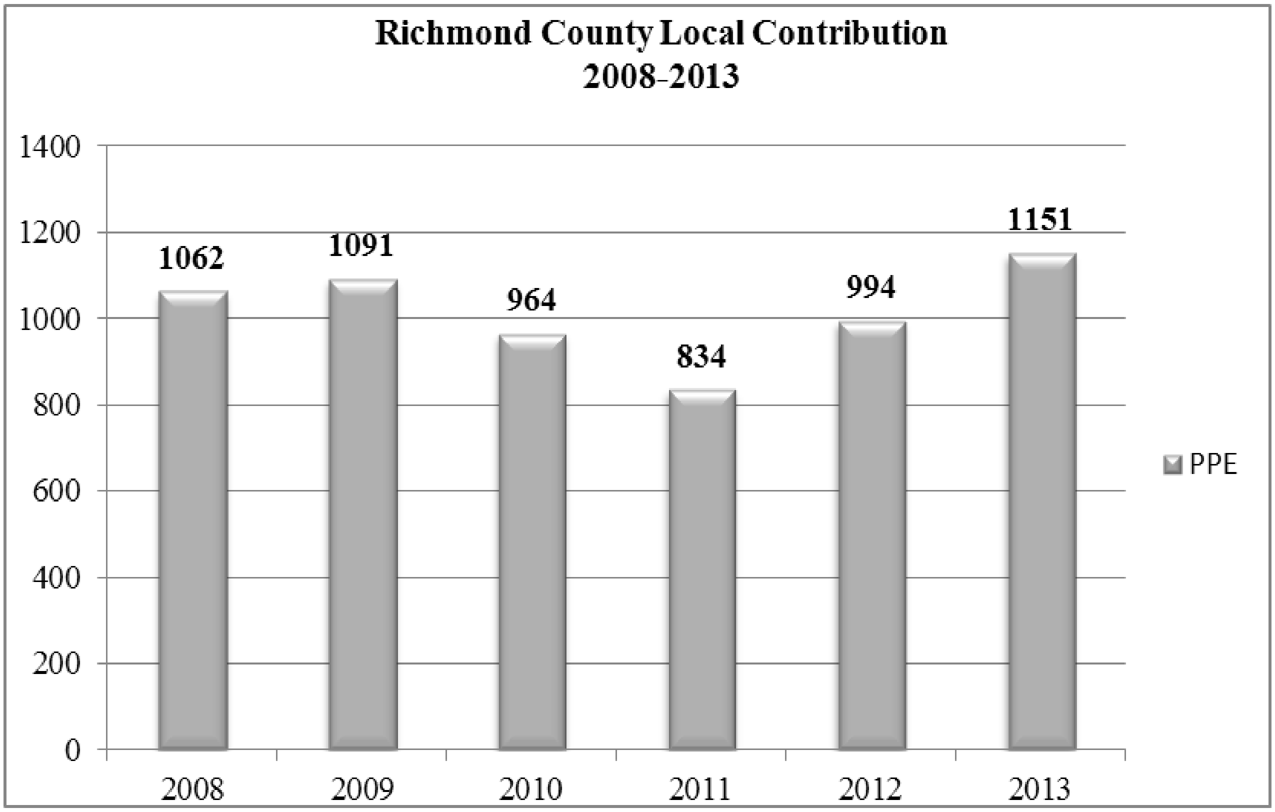
Changes in the state PPE has an adverse effect on the district level PPE, which in turn places a burden on the district to make up for the decrease in the allotment by the state. Richmond County is a rural, low wealth district that has been negatively affected by the failing economy. To make up for the changes in PPE by the state, the district turns to the county for funding support. Due to the economy, the county cannot make up the deficit. Figure 5 displays the local contribution to the PPE in Richmond County.

Although the 2013 contribution is greater than the 2008 amount, the graphs shows significant decreases in 2010 due to the decrease in state allotments in 2011 (Public Schools of North Carolina, n.d.a). Therefore, it is not surprising that the overall PPE in Richmond County has decreased since 2008 based on this information. Figure 6 represents the PPE for Richmond County Schools 2011 (Public Schools of North Carolina, n.d.a). The decrease in funding and the increase in cost of supplies and facility operation has been a challenge for the district. This study will inform the district of the practical significance of utilizing limited resources to fund the program.



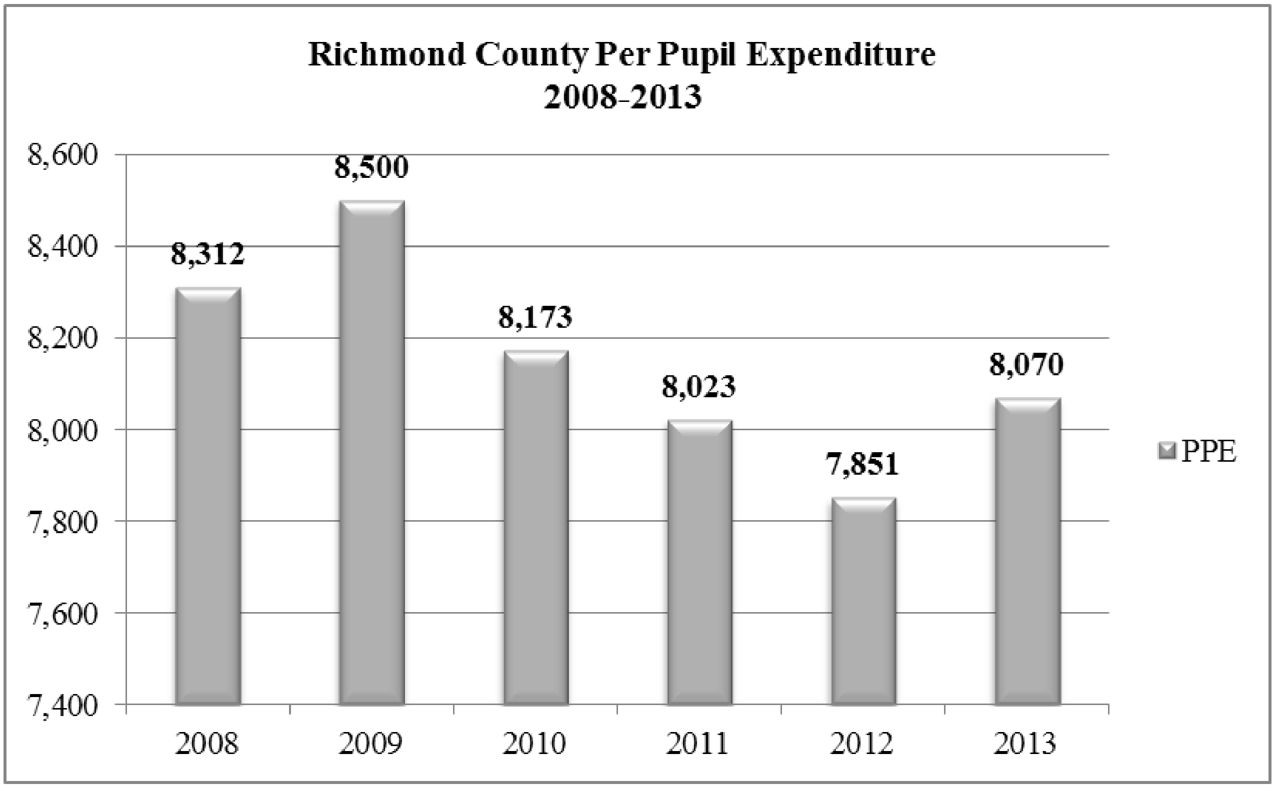
Note. Data obtained from Public Schools of North Carolina, n.d.a.

Figure 4. Average amount of dollars allotted per student in North Carolina.



Note. Data obtained from Public Schools of North Carolina (n.d.a)

Figure 5. Average amount of dollars allotted per student from the county for the students of Richmond County school district.



Note. Data obtained from Public Schools of North Carolina (n.d.a)

Figure 6. Total amount of money allotted for each student in Richmond County school district from 2008 through 2013. The amount includes the state allotment and county allotment combined.

Purpose of the Study

The purpose of the study is to evaluate Classworks™, a program implemented in the Richmond County School District as an intervention to improve math achievement. The intended outcome of the study is to determine if the program is improving state standardized test results for students in Grades 3–8 who are not on grade level. In North Carolina, schools are required to administer a math End-of-Grade standardized assessment to students in Grades 3–8 (Public Schools of North Carolina, 2012c). Students who score a level three or higher on the assessment are considered to be proficient in math for that particular school year. Proficiency on the state standardized test determines whether or not a student is considered on grade level (Public Schools of North Carolina, 2014).

The evaluation of the Classworks™ program is a Problem of Practice dissertation designed to inform and guide the local school district (Shulman, Golde, Bueschel, & Garabedian, 2006). According to Shulman et al. (2006), this type of dissertation can "enable practitioners to make practice and policy decisions" (p. 29). It is not intended to provide new knowledge to the field of education (Shulman et al., 2006). The study will be descriptive in nature and will use a mixed methods approach. It will employ both qualitative components and descriptive statistics. Qualitatively, the goal is to describe the consistency or fidelity by which the program was implemented across the schools. The main focus, as requested by the superintendent, is to determine the impact of the program on math End-of-Grade test scores. This will be accomplished through descriptive statistics by comparing the scores of students who participated in the program to their scores from the previous year. In addition, the data will be analyzed further to determine if sub-groups, particularly gender and ethnicity, show variation.

In the Richmond County School District, students in grades three through eight consistently lag behind the state average on math End-of-Grade tests (Public Schools of North Carolina, 2012b). The deficiency in math scores along with the implementation of higher standards indicated a need for improvement in elementary and middle school. Classworks™ was purchased by the district as an intervention with the goal of improving math skills in grades three through eight. In order to evaluate the Classworks™ program, a thorough review of the literature is needed. Chapter 2 includes the following themes; history of math education, history of math reform, math instruction, information on gender and ethnicity with regards to achievement in mathematics, the impact of using computer-assisted instruction, and details about the Classworks™ program .

Study Questions

The goal is to answer the following study questions at the completion of the study:

1. What impact did the Classworks™ program have on proficiency levels of elementary students on the North Carolina End-of-Grade mathematics assessment as a result of participation in the program during the 2011-2012 and 2012-2013 school years when compared to the individual student's prior year score?
2. What impact did the Classworks™ program have on proficiency levels of middle students on the North Carolina End-of-Grade mathematics assessment as a result of participation in the program during the 2011-2012 and 2012-2013 school years when compared to the individual student's prior year score?
3. Are there any variations based on gender for elementary students as a result of participation in the Classworks™ program during the 2011-2012 and 2012-2013 school years?

4. Are there any variations based on gender for middle students as a result of participation in the Classworks™ program during the 2011-2012 and 2012-2013 school years?
5. Are there any variations based on ethnicity for elementary school students as a result of participation in the Classworks™ during the 2011-2012 and 2012-2013 school years?
6. Are there any variations based on ethnicity for middle school students as a result of participation in the Classworks™ during the 2011-2012 and 2012-2013 school years?

Definition of the Terms

Achieve, Inc.—Achieve, Inc. is an organization established in 1996 that advocates for the preparation of students specifically in the area of college and career readiness. To improve this area, the organization believes in raising standards, increasing accountability, and improvement of assessments throughout the U.S. The organization is a nonprofit entity that affirms bipartisanship (Achieve, Inc., 2014).

Bench science—Refers to science content used in a laboratory setting (Collins English Dictionary, 2014).

Benchmark—Assessments given to students to determine academic progress in a course that can be used as a standard for comparison (Merriam-Webster, 2014).

Classworks™—A technology learning company that provides educational solutions through a web-based curriculum resource in mathematics, reading, language arts, and elementary science (Curriculum Advantage, Inc., 2014a).

Education Value-Added Assessment System (EVAASS)—Web-based system that provides comprehensive and cumulative data for North Carolina students that is utilized by principals, teachers, and central office staff (SAS Institute Incorporated, n.d.).

Gates Foundation—This organization promotes changes to improve quality of life through health and productivity via grants and contracts (Bill and Melinda Gates Foundation, 2014).

National Assessment of Educational Progress (NAEP)—Assessments of varying subjects administered nationwide that provides a continuum of data to determine the progress of students in America. The assessments that are administered every two years essentially remain unchanged as to provide a transparent view of students' progress (NCES, 2014b).

National Commission on Excellence in Education (NCEE)—A group formed by T. H. Bell in 1981 that was charged with determining the quality of education in America (Denning, 1983).

National Commission on Mathematics and Science Teaching for the 21st Century—An organization of 25 members appointed by Secretary Richard Riley on June 20, 1999 charged with the task to report on the quality of science and math in the U.S. (U.S. Department of Education, 2000).

National Council of Teachers of Mathematics (NCTM)—An organization founded in 1920 to serve as a voice for mathematics education (National Council of Teachers of Mathematics, 2014).

National Governors Association (NGA)—This organization, founded in 1908, is a nonpartisan group that serves as the voice for governors across the nation. The group identifies policy issues and develops and implements innovation solutions (National Governor Association, 2011).

No Child Left Behind Act of 2001—A legislative act to replace the Elementary and Secondary Act originally enacted in 1965. Its purpose was to improve education for all students and to increase accountability (National Center for Learning Disabilities, 2014).

North Carolina End-of-Course Test—Tests administered to high school students in public education that is used to determine content knowledge in specific subjects (Department of Public Instruction, n.d.b).

Scholastic Aptitude Test—A test given to U.S. high school students to measure academic ability (Encyclopedia Britannica, 2014).

Third International Mathematics and Science Study (TIMSS)—An assessment administered internationally to fourth- and eighth-grade students in the area of mathematics and science. It was first given in 1996 and is given every four years. The TIMSS provides a comparison for students in the U.S. to students in other countries (NCES, n.d.).

CHAPTER 2: REVIEW OF THE LITERATURE

Why do we have to learn math? What are we going to use it for? These questions are common in the math classroom. The National Council of Teachers of Mathematics (NCTM, 2004) affirms that

> in today's world, we are bombarded with data that must be absorbed, sorted, organized, and used to make decisions. The underpinnings of everyday life, such as making purchases, choosing insurance or health plans, and planning for retirement, all require mathematical competence. Business and industry need workers who can solve real-world problems, explain their thinking to others, identify and analyze trends in data, and use modern technology. (p. 2)

Based on this position, learning math is of considerable importance for the future of our students. Education provides the pathway and the responsibility is shared by many including federal and state governments, math organizations, local educational agencies, schools, and teachers. In this study, students in Richmond County as a whole are lagging behind the state's proficiency average meaning that students are not on grade level as they move to the next math course. The local educational agency has implemented a math intervention program with the goal that all students achieve proficiency at the end of each grade level. In this dissertation, the program will be evaluated; and based on the results, recommendations will be made to improve the effectiveness of the program in the district. In order to evaluate a program to improve student achievement in mathematics, it is important to understand the many facets of mathematics. The literature review will begin with a history of mathematics in education followed by the research of mathematics reform efforts. An overview of mathematics instruction will provide information of teacher pedagogy and classroom practices. The literature review will conclude with information on gender and ethnicity with regards to achievement in mathematics, the I mpact of using computer-assisted instruction, specific information about the Classworks™ program, and the impact that fidelity has on implementation of programs.

History of Mathematics in Education

In a study reported by the Carnegie Institute, Griffiths and Cahill (2009) emphasized the importance of learning math by declaring the following:

> American students need to know more than they typically learn in today's schools, and they need complex skills that enable them to apply their knowledge. Mathematics and science are essential parts of the foundational knowledge that all students need to acquire, and learning in those disciplines enables students to acquire skills and understanding that are increasingly essential to their ability to succeed in higher education and in careers. All students need a sophisticated working knowledge of math and science; their schools must not fail them in this. (p. v)

This mindset has not always been the belief. In the early 1900s, William Heard Kilpatrick, a math education professor at Columbia University, believed that only a few students should be afforded the opportunity to take math in high school. In 1915, the National Education Association's Commission on the Reorganization of Secondary Education requested that Kilpatrick complete a study of mathematics. As a result, the committee made up of educators including principals, superintendents, a university math department head, and an educational methods professor and void of any mathematicians, presented the paper, *The Problem of Mathematics in Secondary Education*, to the commission discounting the need for math courses in high school for all or even most students. The few select recommended to take math in high school were those that would pursue a career in a mathematical field (Department of the Interior, 1920). It was recommended that math content in grades seven through nine be a review of math taught in earlier grades and be "within easy reach of the pupils which can prove its worth by actual service in common life outside of school" (Department of the Interior, 1920, p. 22). The paper was published by the Bureau of Education within the Department of the Interior in 1920.

Kilpatrick's view that math should be taught only to those who needed it for practical means supported progressive education, a popular movement that dominated this era (Klein, 2003). In the book, *William Heard Kilpatrick: Trail Blazer in Education,* Tenenbaum (1951) described Kilpatrick's belief about math education:

> Mathematics had little in it to serve the needs and interests of children, or for that matter grownups. It was a game and a puzzle. The only way that its traditional teaching could be defended was on the basis of the old faculty psychology, namely, that aspects of the mind could be trained and sharpened, and this resultant keener mind would be ready to serve the individual whenever the need arose. (p. 102)

The view that math or any other subject had "special disciplinary powers" (p. 102) was denounced by another influential leader that Kilpatrick studied under, Edward L. Thorndike (Tenenbaum, 1951). Thorndike completed several experiments in1901 based on the transfer of information from the specific setting where learning took place to a more inclusive setting where the information would be applied. He concluded that the "experiment showed on the whole a meager transfer effect" (Woodworth, 1952, p. 213). Thorndike, who was psychologist, believed that the selection of subjects taught in schools, to include math, could only be justified based on the intrinsic value to the student (Woodworth, 1952).

In response to this attack on the field of math, the Mathematical Association of America appointed a committee of mathematicians, teachers, and administrators to counteract the 1920 report. Although delayed by World War I, the report was eventually released in 1923 and titled, *The Reorganization of Mathematics for Secondary Educat*ion (Klein, 2003). The report recommended that the curriculum in grades seven through nine include arithmetic, algebra, geometry, and trigonometry. In grades 10 through 12, the committee reported that

> some attention should be given to the pupil's future educational needs including as far as possible those forms of mathematics that have the most important application for the modern world. Consequently certain material will be included that is not usually given in secondary school courses, as for example, material concerning the calculus. (Windsor, Blair, Crathorne, Brown, & Schorling, 1923, p. 124)

In addition, some material in preparation for college was recommended (Windsor et al., 1923). Despite the comprehensive nature of this report of 625 pages versus Kilpatrick's report consisting of 24 pages, Kilpatrick's report was published. David Eugene Smith, a mathematics professor who worked with Kilpatrick at Teachers College, denounced that Kilpatrick authored his report exclusively of the committee and that the Commissioner of Education, a friend of Kilpatrick's, published the report (Klein, 2003). The National Council of Teachers of Mathematics (NCTM), a respected and influential organization today, was founded in 1920 due to much influence by the Mathematical Association of America. The platform by which this organization was created advocated for values of mathematics and math teachers as an integral part in reform efforts (Klein, 2003).

During the 1930s, progressivism as inspired by Kilpatrick was the dominant philosophy in education. Educators were responsible for determining what was taught in the classroom based on students' interests and needs rather than subject content (Ravitch, 2000). This holistic approach of integrating subjects in elementary school became part of The Activity Movement (Ravitch, 2000). Ravitch described this movement:

> Students were encouraged to engage in activities and projects built on their interests. Studies were interdisciplinary, and academic subjects were called upon only when needed to solve a problem. Students built, measured, and figured things out, while solving real-life problems, like how to build a playhouse or a pet park or a puppet theater. Decision making, critical thinking, cooperative group learning: it was an integral part of the activity movement. (Ravitch, n.d., para. 8)

Because teachers in high school received their degrees in specific subjects, they were resistant to this integration (Ravitch, 2000). By mid-1940, another reform effort called the Life Adjustment Movement was published as a result of recruits entering the Army lacking basic math skills. This movement strongly recommended that high schools provide math courses "that focused purely on practical problems such as consumer buying, insurance, taxation, and home budgeting, but not on algebra, geometry, and trigonometry" (Klein, 2003, p. 5), although many high schools continued teaching academic subjects. Because of an increase in technological advances, the end of the 1940s came with much criticism to the public school system for failing to recognize the importance of math education (Cremin, 1961). From 1909 to 1955, enrollment in algebra and geometry in high school decreased from 57% to 25% and 31% to 11%, respectively. These decreases occurred despite increased enrollment in schools (Jones & Coxford, 1970).

In response to the criticism of public education, the New Math Movement emerged throughout 1950s and included a myriad of publications. It began with the University of Illinois appointing a Commission on School Mathematics. This group, under the leadership of Max Beberman, a math professor who believed in a conceptual and logical understanding of math rather than memorizing and continuously practicing procedures and skills, published a series of math textbooks. This series was supported by the Carnegie Corporation and the U.S. Office of Education (Bossé, 1995). The first group to recommend math curriculum was the Commission on Mathematics, a group of high school teachers, math professors, and mathematicians appointed by the College Entrance Examination Board as a means to better prepare students for college (Bossé, 1995).

Although the New Math Movement was underway, it was not widely accepted until 1957 when Russia launched Sputnik, the first satellite to enter space. This event took America by surprise and caused much concern that other countries might be advancing at a faster pace (Denning, 1983). As a result of the humiliation to America, the National Defense Act was passed in 1958 and was followed by contributions from multiple organizations in relation to math curriculum (Klein, 2003). The School Mathematics Study Group established by the American Mathematical Society released math programs for both junior and high schools

(Wooton, 1965). The NCTM released recommendations in 1959, the first of many documents published that provided support for math education. Many other groups contributed to this era: the Ball State Project, the University of Maryland Mathematics Project, the Minnesota School Science and Mathematics Center, and the Greater Cleveland Mathematics Program (Wooton, 1965).

The New Math era came to an end in the early 1970s. The movement was extreme and a major shift from the progressive movement that it replaced (Ravitch, 2000). According to Klein (2003), "There were instances in which abstractness for its own sake was overemphasized to the point of absurdity" (p. 7). An extreme form of progressive education would move to the forefront. Schools implemented a model based on the book *Summerhill*, written by A. S. Niell. This book became a required reading in over 600 universities by 1970. In this model, students would determine what and when they would learn (Ravitch, 2000). This led to the Open Education Movement, a movement that was detrimental to students who lacked sufficient resources characteristic of poor and minority children (Delpit, 1986). By the mid-1970s, states began to require basic skills competency exams as a requirement for graduation. Although this requirement helped to keep the Open Education Movement under control, the basic skills exams failed to promote high standards (Ravitch, 2000).

In 1980, a report released by the presidential commission for education indicated low expectations and enrollment in advanced math and science courses. Subsequently, two reports were released, *An Agenda for Action* by the NCTM, and *A Nation at Risk* by a commission appointed by the U.S. Secretary of Education (NCTM, 1980; Denning, 1983). The report by NCTM "called for new directions in mathematics education which would later be codified in 1989 in the form of national standards" (Klein, 2003, p. 9). This report received little consideration and was overpowered by the report, *A Nation at Risk*, released in 1983 (NCEE, 1983).

Mathematics Reform of Standards in Education

Math reform efforts have been a focus for many years. According to the report, *A Nation at Risk*, released in 1983 by the NCEE, the American people had become complacent and accepted mediocrity with regards to educational performance. The concern that other countries were surpassing the U.S. was communicated with clarity. Based on the data, American students were falling far behind other countries The report, *A Nation at Risk*, was comprehensive and included 26 years of data (Denning, 1983). The report conducted by the committee at the request of the Secretary of Education was remarkable because of the detailed account of the state of our country with respect to education, in addition to how well it conveyed the importance of educational reform. Math was specifically addressed in the recommendations. Higher level math content and a minimum of three years required to graduate from high school was included in the report. Prior to high school, the curriculum should provide a means to achieve these goals (Denning, 1983). This report made a mark in history and is often referred to as a milestone in education.

The educational reform effort recommended by the NCEE in 1983 was not mandated by the federal government. In the U.S. Constitution, education is not included as a responsibility of the federal government. Historically, the power was given to the states to make policy and to reform education. North Carolina was at the forefront of accountability when it established the ABCs of Education in 1996 requiring testing in grades three through eight (Clotfelter, Ladd, & Vigdor, 2009). To provide accountability for all states, the federal government increased its role when Congress passed the No Child Left Behind Act in 2001, a piece of legislation that provided incentives and penalties to schools based on performance increasing accountability for education (No Child Left Behind [NCLB], 2002). DiMaria (2007) noted that since its passage, "school districts and teachers have been under greater scrutiny, held to a higher standard, and are more accountable than ever" (p. 23). More recently, the federal government became even more involved in driving educational reform by providing opportunities for states to apply for Race to the Top (RttT) grants. One of the criteria required states to administer national assessments as part of its accountability model. As a result, states adopted the Common Core State Standards, a set of common standards aligned to the national assessments. This increased involvement by the federal government was due to continued concerns that education in the U.S. failed to maintain standards and student academic performance indicative of other countries.

The Common Core State Standards were not the first national standards to be developed. The NCTM, founded in 1920, is the largest math organization in the world. Its mission is to ensure that students are provided the highest quality of math education (NCTM, 2013). In 1989, the council released the *Curriculum and Evaluation Standards for School Mathematics* (NCTM, 1989), one of three documents that is referred to as a landmark trio of mathematics standards designed to improve teaching and learning (Martin & Speer, 2009). The second publication, *Professional Standards for Teaching Mathematics*, was released in 1991 (NCTM, 1991) followed by *Assessment Standards for School Mathematics* in 1995 (NCTM, 1995). The latest set of standards, *Principles and Standards for School Mathematics,* was developed by the council and released in 2000 as a continued effort to refine and improve the standards (NCTM, 2000). Development of new curriculum in the U.S. was driven by the Third International Mathematics and Science Study (TIMSS) of 1995 that presented detailed data comparing the United States to Japan and Germany. The study found that the traditional curriculum was repetitive and included too many topics. Because of the numerous topics, there was little time to concentrate on depth of the content (Schmidt, McKnight, & Raizen, 1997). As the mathematics standards were developed and refined over time, the intention was to develop a deeper and more concentrated curriculum. Although the council did not directly release the Common Core State Standards, they support the math standards and have been an integral part of reviewing and providing detailed input during the development of the standards (NCTM, 2010).

Standards-based instruction is not detrimental to student achievement and often enhances problem solving and reasoning skills for students (Fuson, Carroll, & Drueck, 2000). In a lengthy study in California, six districts with high percentages of economically disadvantaged (56–78%) and immigrant students (27–44%) implemented the 1991 curriculum that had been labeled as inadequate. This curriculum was taught through the end of the 1998 school year. Four of the six cohort groups then moved to the new curriculum that had the characteristics of a quality curriculum. The other two cohort groups continued with the old curriculum as the control districts. All students were assessed with standardized achievement tests at the end of the 1998 school year and continued with the assessment each year through the 2002 school year. The performance of the four cohort groups that adopted the new curriculum was considered statistically superior to the two control groups. The rate of improvement was eight percentile points per year for the five year span as compared to the control group at 1.8 percentile points (Hook, Bishop, & Hook, 2007).

According to James Hiebert (1999), “The evidence indicates that the traditional curriculum and instructional methods in the United States are not serving our students well” (p. 13). Although the traditional curriculum has not resulted in an improvement to student achievement, research shows that reformed mathematics curricula is no less effective, but could result in a somewhat positive effect. As stated in a paper funded by U.S. Department of Education, "The movement led by NCTM to focus math instruction more on problem solving and concepts may account for the gains over time on NAEP, which itself focuses substantially on these domains" (Slavin & Lake, 2008, p. 482).

Over the past few decades, the number of students following the career paths for math, science, and engineering steadily decreased. In addition, more than half of the students completing a doctoral degree in science and engineering are foreign and many leave the country once they receive their degree (Vigdor, 2013). This information creates a sense of urgency in mathematical reform. Mathematical standards are important. Standards provide a roadmap for educators while maintaining consistency among the content taught at each grade level. National standards allow students to be competitive from state to state and be equally prepared for colleges across the nation. Assessing students using national assessments provides an avenue to monitor academic achievement in the U.S. However, standards alone do not ensure mastery of content and skills. The delivery of standards provided through instruction determines student success in mathematics.

Mathematics Instruction

In the book, *Mathematics Teaching Today*, the writers as part of the National Council of Teaching Mathematics make a powerful statement (NCTM, 2007):

> More than curriculum standards documents are needed to improve student learning and achievement. Teaching matters. Therefore, exploring what goes on in mathematics classrooms is essential to identifying issues and looking for opportunities for improvement. (p. 3)

It is not solely the standards but how the standards are implemented by the teacher as part of the instruction. The National Commission on Mathematics and Science Teaching for the 21st Century submitted a report to Richard Riley, Secretary of Education in 2000 stating, "the most powerful instrument for change, and therefore the place to begin, lies at the very core of education—with teaching itself" (U.S. Department of Education, 2000, p. 5). Student learning is dependent on the opportunities that are provided for them. Achievement data supports that students are learning how to solve simple calculations and memorize vocabulary rather than being able to solve more complex problems that requires them to support their answers with reasoning, the latter of which they have few opportunities (Stigler & Hiebert, 1997). In 1995, the Third International Mathematics and Science Study (TIMSS) found that teaching in the U.S. centered around how to perform various procedures rather than developing concepts, as was found with teachers in Japan and Germany indicating that teachers in the U.S. had lower expectations for their students (U.S. Department of Education, 1998). In eighth-grade math, 78% of the mathematical concepts covered were stated or demonstrated by the teacher rather than being explained or developed for a deeper understanding. Students were spending 96% of the time allotted for working math problems, referred to as seatwork, practicing procedures that they had been shown how to perform by the teacher. Students were not given the opportunity to explain the process for solving problems. The structure of the lessons from the U.S. teachers was strikingly consistent in that the lessons included two phases: acquisition and application (Stigler & Hiebert, 1997). In the text, *Adding It Up: Helping Children Learn Mathematics*, a researcher involved with a set of studies funded by the National Science Foundation in the 1970s who observed math classrooms was quoted as saying,

> In all math classes I visited, the sequence of activities was the same. First, answers were given for the previous day's assignment. The more difficult problems were worked by the teacher or a student at the chalkboard. A brief explanation, sometimes none at all, was given of the new material, and problems were assigned for the next day. The remainder of the class was devoted to working on the home-work while the teacher moved about the room answering questions. The most noticeable thing about math classes was the repetition of this routine. (Center for Education, 2001, p. 48)

Although there is a push to reform classroom instruction to provide opportunities for more complex and critical thinking that will help students reach a greater depth of thinking, this traditional structure continues to be common in schools (Hiebert, 1999). In a 1999 follow-up TIMSS study, it was found that there was no single approach to teaching mathematics in the countries exhibiting higher achievement. The authors of the study concluded that teaching is complex and that there was much to be discovered about the connections between teaching and learning (Hiebert, Morris, & Glass, 2003). Therefore, it is crucial that mathematics teachers be meticulous in the choices they make when planning instruction for students (NCTM, 2007).

Although the research is limited, there have been various studies on instructional practices in mathematics classrooms. In a study in 1980, teachers with contrasting teaching styles were observed and compared for effectiveness. Teachers who allowed for less seatwork and more direct instruction and discussion were more effective based on common assessments (Evertson, Emmer, & Brophy, 1980). These teachers asked more process and product questions, engaged students in more problem solving, presented information more clearly, asked more high-level questions, and seemed more enthusiastic. The teachers who were deemed more effective monitored students more efficiently, therefore resulting in fewer disruptions due to student behavior. They appeared more confident and encouraged student input. Teachers who were deemed less effective spent only one-fourth of the class period presenting information and participating in discussion. Students spent over half of the class period completing seatwork. There were more behavioral disruptions, both minor and severe, although classrooms were not considered out of control. Teachers in these classes had more one-on-one interactions with students about procedures, and those interactions were more likely to be student generated because of the length of time for seatwork. It is important to note the similarities among the teachers. All teachers used direct instruction and class discussion with varying amounts of individual seatwork. There was little if any small group work and most of the class was devoted to content-related activities. Teachers were proficient in their content knowledge and their classrooms were attractive. Slow learners were given similar attention among all teachers (Evertson et al., 1980). The more effective teachers were better classroom managers keeping students engaged by consistently enforcing classroom procedures. This structure minimized disruptions that in turn provide more instructional time. Students were held to higher expectations while being encouraged and supported throughout the learning process. This study is evidence that creating environments in classrooms that foster interactive relationships between students and teachers and resulting in more positive culture. As Evertson et al. (1980) stated, "Effective teaching is not the mastery of a few key skills; it is the orchestration of a great many skills into a coherent system that meets the needs of the class" (p. 177).

In another study that focused on at-risk students, two methods of instruction were compared. One group of remedial students were taught in a more traditional approach with guided instruction and standard word problems while the other group received contextualized or real world problems from a videodisk program. Both groups were given a word problem assessment and a contextualized problem assessment. While both groups improved significantly on the word problem assessment, only the students who were taught with the contextualized problem improved on the contextualized problem assessment. This study indicated that at-risk students can learn higher-level problem solving skills when given the opportunity; however, there were limitations to the study. The researchers suggest that future studies should use at least four rather than two groups with teachers rotating between groups to reduce possible teacher effects (Bottge & Hasselbring, 1993).

The fear of math coupled with math anxiety should be considered when planning math instruction. In a study that focused on the elimination of the fear of math, students were provided a more hands-on approach to learning math. They attended a math lab once a week where they received more individualized instruction. In the lab, there were two areas: a computer area that provided additional practice, and a hands-on area where students were exposed to higher-level problem solving exercises. In addition to this instruction experience for students, parents were given the opportunity to be involved. Monthly tours were provided and parents were often asked to sit with their children to see the new approaches to learning math. Family Math Night was held once a month to give parents information and assistance in helping their children with math while at home. The data showed that students' growth on achievement tests improved by an average of two to eight months when compared to the data of previous students. Teachers also indicated a noticeable difference in the students who had been a part of this instructional practice all year as opposed to new students (Tankersley, 1993). The study suggests that the students' fear of math can be eliminated if the appropriate environment is created.

Math anxiety can begin as early as fourth grade and can be attributed to reducing student confidence in the math classroom (Scarpello, 2010). Students can develop a "fatalistic attitude" (Morris, 1981, p. 413), meaning they have become convinced that they cannot be successful at math. Because of this mindset, these students tend to avoid math and are ultimately "cut off from full participation in our increasing technological society" (Morris, 1981, p. 413). Often adults who exhibit math anxiety have had a negative experience with math at a younger age (Morris, 1981). Elementary teachers often lack confidence in teaching math content that may lead to this increase in anxiety among their students (Scarpello, 2010). This lack of confidence can be attributed to the teacher's level of content knowledge. In a 1990 study involving pre-service teachers and their knowledge of certain math skills, Ball found that approaches to determining solutions to the problems was shaped by the participants' self-confidence. The individuals in the study had difficulty providing the reasoning behind the concepts for solving problems. It also suggested that their knowledge revolved around rules and lacked the ability to provide the meaning needed to think critically and apply the mathematical skills (Ball, 1990). Teacher education programs rarely focus on mathematical content and the level of understanding it takes to teach it effectively. It is assumed that this information comes from other experiences such as before college, general education courses, or from teaching itself. This is a dangerous assumption. Knowing how to move teachers to a level of understanding needed to teach math effectively is crucial to student success (Ball, 1990).

There are many facets to mathematical instruction and it is difficult to identify specific teaching practices that are effective in every classroom. However, math content knowledge and mathematical understanding are critical skills needed for math teachers. Teachers in the U.S. have a deficiency of "sound mathematical understanding and skill" (Ball, Hill, & Bass, 2005, p. 14). No one would argue that teaching math requires content knowledge; however, the question is how much knowledge (Hill & Ball, 2009). Research over the past 40 years focused on comparing student achievement to teacher certifications and/or the number of math courses completed. It was found that there was very little correlation between these comparisons when considering student achievement in kindergarten through eighth grade (Hill & Ball, 2009; Thames & Ball, 2010). Other studies concentrated on a combination of content and process skills needed for the teaching profession (Shulman, 1986). This focus goes beyond the measures used in a math course or for basic math skills. It includes the ability to use graphics and provide explanations about rules and procedures to students and to analyze student work to provide feedback to assist students in the learning process (Hill, Rowan, & Ball, 2005). A group of researchers began observing classrooms to identify commonalities among instruction. They described their observations:

> As we made progress identifying and describing teaching tasks, we began to appreciate the demands of ordinary teaching. We saw the mathematical understanding involved in posing questions, interpreting students' answers, providing explanations, and using representations. We saw it in teachers' talk and in the language they taught students to use. We realized that the capacity to see the content from another's perspective and to understand what another person is doing entails mathematical reasoning and skill that are not needed for research mathematics or for bench science. (Hill & Ball, 2009, p. 69)

From these observations, the Mathematical Knowledge for Teaching instrument was developed. This instrument includes both specialized knowledge needed for teaching and the mathematical tasks of teaching that are common in the approaches to instruction. It has been given to large numbers of teachers and based on the data obtained has been determined to be a predictor of student outcomes (Hill & Ball, 2009).

In a 2005 study, first- and third-grade mathematics teachers were assessed using the instrument, Mathematical Knowledge for Teaching. This type of assessment might include how to explain terms and concepts to students, interpreting and analyzing student work, using representations and graphics in classroom instruction, and providing examples of concepts, algorithms, or proofs. The purpose of this study was to "demonstrate the independent contribution of teachers' mathematical knowledge for teaching to student achievement" (Hill et al., 2005, p. 373). Data were collected from two cohorts of students, one of which was studied beginning in kindergarten through the third grade. The second cohort was studied beginning in first grade and followed through the end of the fifth-grade year. Students were given a pretest and posttest each year. Data collected from teachers included a log that recorded the amount of time set aside for math instruction, the mathematical content, and the instructional practices for a given day. Teachers were also asked to complete questionnaires regarding educational background, participation in professional development, involvement in school improvement efforts, and the teaching of language arts and math. Also included in the questionnaires were five to 12 items that measured the content knowledge and processes for teaching math in the classroom. In both first and third grade, the results indicated a positive correlation between the teachers' mathematical knowledge and student achievement (Hill et al., 2005).

Math standards are important in that they provide consistency and guidance of what needs to be taught at each level; however, standards alone do not ensure student achievement. Teachers provide the pathway for student learning. Student achievement is directly related to the teacher's commitment to mastering pedagogical practices and building capacity for the skill set needed to ensure effectiveness in the classroom. This requires more than providing procedures for solving problems and allotting time for practice. Students need to be able to think critically and solve complex math problems. Effective instruction includes keeping students actively engaged in standards-based productive lessons, motivating students by providing relevance to the content and skills, and focusing on mastery rather than delivery of the content. Students who master content will be less likely to have a fear or anxiety for math and more likely to be successful in math as adults. Due to all of the variables that effect student learning in math; instructional practices, learning experience in each classroom, fear and anxiety of math, teacher content knowledge, students will continue to need intervention. Classworks™ is an intervention program that aims to improve mathematical thinking.

Gender

According to Gibbs (2010), "gender patterns in early childhood are inconsistent with the conventional claim that boys dominate in math-related skills in childhood" (p. 555). In a 2003 review of the TIMSS study, it was determined that fourth-grade boys outperformed girls; although in 1995, the TIMSS data indicated that there was not a significant difference between genders. Overall, there was no measurable improvement in boys or girls from 1995 – 2003 as seen in Figure 7. On the contrary, eighth grade boys and girls improved by a margin of 12 points over this period and boys outperformed girls as shown in Figure 8. (Gonzales et al., 2004).

In 2011, TIMSS data continued to show fourth-grade boys outperforming girls; however, there was no significant difference with eighth-grade students (Provasnik et al., 2012). Internationally, there was no evidence to determine that boys outperform girls in either review. It varied by country of origin (Nosek et al., 2009). In a study of 40 different countries, it was found that there was a direct correlation between equality and the gender gap. According to Guiso, Sapienza, and Zingales (2008), "gender gap scores disappear in countries with a more gender-equal culture" (p. 1164). Studies conducted in the U.S. supporting the notion that males outperform females in math were misleading. The studies failed to include populations that were representative of the nation (Hedges & Nowell, 1995). The amount of research supporting only slight differences in effect sizes between males and females in relation to math ability is a more convincing argument. In 2008, a group of researchers obtained statistical gender and grade level data from 10 states along with the results on the individual state assessments designed to meet the No Child Left Behind requirements. These states represented the nation as a whole because of the diversity of the populations and the average scores on the NAEP (Hyde, Lindberg, Linn, Ellis, & Williams, 2008). Of the over seven million students assessed, the differences in gender

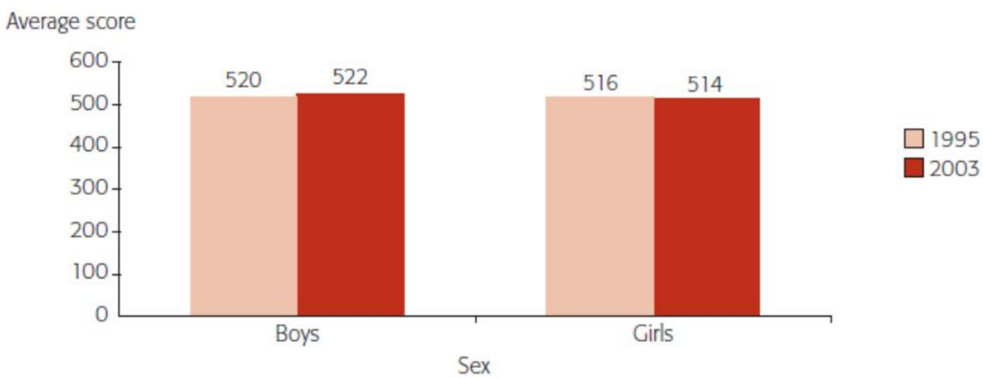


Figure 7. Average math scores of U.S. fourth graders by gender based on TIMSS data from 1995 – 2003 (Gonzales et al., 2004).

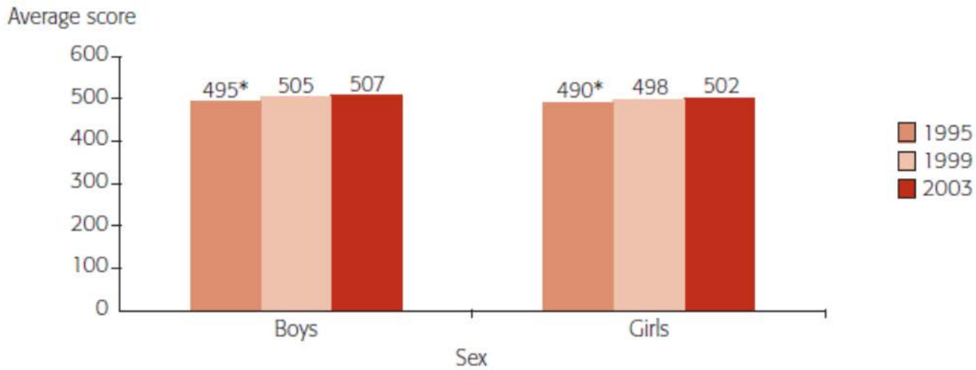


Figure 8. Average math scores of U.S. eighth graders by gender based on TIMSS data from 1995 – 2000 (Gonzales et al., 2004).

were “trivial” (p. 494), according to Hyde et al. (2008). There was an unfortunate and disappointing limitation to this study. The researchers were unable to use the state assessments to determine gender differences in higher-level questioning. The state assessments had few if any questions in this range. In order to continue the study, the researchers reverted to NAEP results, and again found only small differences (Hyde et al., 2008). In an attempt to replicate this study, Scafidi and Bui (2010) analyzed cohort group data from the National Educational Longitudinal Study (NELS) administered in 1988, 1990, 1992, and 1994. The results showed similarities in performance of males and females (Scafidi & Bui, 2010). Hyde and Linn (2006) recommend a focus on the similarities rather than differences in math performance based on gender. This on-going emphasis on gender differences is reported as one of the major contributing factors to the stereotype that males outperform females in math (Hyde et al., 2008; Nosek et al., 2009). In general, teachers, parents, and female students believe that math is more of a male quality than a female quality (Cavanagh, 2008). According to the National Science Foundation (2013), there is an underrepresentation of women in math-related courses, degrees, and careers. Women make up only 25% of doctoral degrees in physical science and 15% in engineering, both of which require significant math skills (NSF, 2013). Ceci and Williams (2007) noted in the article, “Why Aren’t More Women in Science: Top Researchers Debate the Evidence,” that a group of colleagues lead by Jacquelynne Eccles concluded that Eccles adds

> the main source of gender differences in entry into physical science and engineering occupations is not gender differences in either math aptitude or sense of personal efficacy to succeed at these occupations, rather it is a gender difference in the value placed on different types of occupations. Furthermore, our results suggest that these differences begin influencing educational decisions quite early in life. (p. 209)

and “that these differences reflect, at least to some extent, inaccurate stereotypes about physical science and engineering that lead some young women and men to reject these careers for the wrong reasons" (p. 209). In a study of math-gender stereotypes in students from first to fifth grade, it was suggested that this "stereotype develops early and differentially influences boys' versus girls' self-identification with math prior to ages at which differences in math achievement emerge" (Cvencek, Meltzoff, & Greenwald, 2011, p. 773).

Research data does not support the idea that boys outperform girls in math. This stereotype is a significant factor contributing to the minimal number of females taking higher level math courses and choosing math-related careers. Just recently the evaluator attended a conference relating to school accreditation. The presenter, who was a male, made a comment that supported this stereotype. This is an ideal example of individuals involved in education conveying the gender stereotype to the public. It is important for educators and anyone involved in education to be informed of this stereotype and to communicate it to students and parents in order to change this belief. This program evaluation will include a review of data based on the gender of students who participated in Classworks™. After the initial analysis of the effect of Classworks™ on math end-of-grade test scores for all students, a comparison of males and females will be conducted.

Ethnicity

According to Simms (2012), "An achievement gap between Black and White students has been documented consistently at all education levels" (p. 23). Simms (2012) also states that

> this pervasive Black-White achievement gap has severe long-term consequences because it perpetuates historical racial differences in socioeconomic status where socioeconomic is generally measured through a three-pronged approach: educational attainment, income, and occupational status. (p. 23)

Not only does this gap exist with Black students, but also with Hispanic students (Clotfelter et al., 2009). Specifically related to math, NAEP scores show a difference between White and Hispanic students in fourth grade and eighth grade of 21 and 29 points, respectively, on the 2003 test administration (Dimaria, 2007). Although a gap exists between Black and White students based on NAEP scores, the gap has narrowed during the time frame of 1996 and 2003 from 34 to 27 points with fourth-grade students and from 41 to 36 with eighth-grade students (DiMaria, 2007). In spite of this improvement, only 13% of Black students and 19% of Hispanic students score at or above proficiency compared to 47% of White students in 2005 (Slavin & Lake, 2008). In a North Carolina study in 2009, the gap between Black, Hispanic, and American Indian compared to White students is comparable to the national gap. In this particular study, North Carolina standardized test scores were disaggregated. It was found that the gap between Hispanic and American Indian when compared to White students is smaller and decreases with age (Clotfelter et al., 2009). For Hispanic students, Reardon and Galindo also found that this narrowing of the gap between White and Hispanic students occurs from kindergarten through fifth grade (Reardon & Galindo, 2009).

The achievement gap has been narrowed over time. This is favorable, given that it has been a focal point for years. It should remain as one of the issues at the center of education in order to eventually close the gap between ethnic groups. Closing the gap will provide an equitable opportunity for all students to be successful and have a better opportunity to obtain their goal of socio-economic status. In this program evaluation, the data will be analyzed to determine whether or not or to what degree an achievement gap exists among students who participated in the Classworks™ program.

Computer-Assisted Instruction

Computers are a natural part of life for our students. It is often said that using computers is an innate behavior for our students because they were born in an era fully integrated with technology whereas many educators have transformed their lifestyle to include technology. For most educators, using technology is a learned behavior with vast degrees of variance. Although the terminology of using innate versus learned is not scientifically acceptable, it gives an understanding to the difference in how students and educators perceive technology. There are adults who have absolutely no interest in using technology and for the most part have not been adversely affected by this lack of use. However, for our students it is inevitable that they utilize technology and the resources provided from it in order to be successful in today's society and in the future. As stated by Guha and Leonard (2002), "No job is void of technology use" (p. 41).

Technology has become an integral part of education. There is no question that technology is vital to preparing our students to be college and career ready. It is used for communication, collaboration, and convenience. Teachers depend on it for resources when developing lessons and improving content knowledge and pedagogy. Students use it to assist with assignments in lieu of outdated textbooks. They access resources, collaborate with their teacher and peers, and submit assignments through online learning management systems. The integration of technology has increased so rapidly over the past two decades that schools have had a difficult time keeping up with the advancements. Funding creates a barrier to providing technology that is current. Because technological trends change so quickly, it is difficult to have staff that is adequately trained to implement the new and innovative products. The products are diverse and abundant. Often districts and schools are filled with various types of technology with little to no consistency. The superintendent of Richmond County Schools placed a freeze on school purchases for technology because of this inconsistency and inefficiency. He elected to contract with a research company to perform an audit of all technology in the district. A task force of central office staff, principals, teachers, students, and parents were appointed to develop a plan based on information from the audit and recommendations by the research company. This plan will provide a process that is more efficient as we continue to integrate technology. In our district, we strive to provide a learning environment that maximizes student achievement, and this learning environment includes computer-based instruction. The research shows in general that computer-based instruction has a positive effect on mathematics (Kulik, 2003; Schacter 2001; Sivin-Kachala, 1998) when compared to conventional instruction. The evaluation of Classworks™ will help determine if this computer-based program aligns with research particularly in relation to the students in Richmond County who participated in the program.

Computer-Assisted Instruction (CAI) is "the ability to identify children's strengths and weaknesses and then give them self-instructional services designed to fill in gaps. This type of instruction is almost always used as supplemental to classroom instruction" (Slavin & Lake, 2008, p. 17). Schools and districts generally purchase computer software products rather than develop their own. These products are often used for tutoring. Because students work at their own pace to master skills as they move through the levels, they are less likely to be embarrassed and more likely to build confidence when solving math problems (Cosenza, 2009; Guha & Leonard, 2002). This increased confidence may reduce the fear and anxiety that is often a barrier for math learners.

Programs are often evaluated because funding sources are in some way connected to the outcome of the program. In this program evaluation of Classworks™, the intended outcome is to see an increase in student achievement. The purpose of requiring evaluations is to help reduce and hopefully eliminate wasting funds on programs that are not effective in helping students. Unfortunately the research completed based on these mandates has often been completed by individuals who never entered the building. Therefore, this research is basically a condition to continue to receive funding rather than an opportunity to determine the quality of the program and make needed improvements. The results are reported with statistical analyses that are difficult for the average individual to understand (Fitzpatrick et al., 2011). Although it is important to review and discuss the research as part of this dissertation, schools and districts should consistently and routinely evaluate their own methods used for the purpose of increasing student achievement, because what works in one environment may or may not work in another environment.

The U.S. Department of Education contracted with a research consultant in 2003 to study the effectiveness of reading and math software products resulting from mandates of the No Child Left Behind Act (Campuzano, Dynarski, Agodini, Rall, & Pendleton, 2009; Slavin & Lake, 2008). This two-part study was conducted during the 2004–2005 and 2005–2006 school years. For the purposes of this dissertation, only the math portion will be discussed. The focus for the math software products was sixth-grade mathematics and Algebra I. In the study, random sampling was used to assign the software products to teachers in the same school who voluntarily agreed to participate. The findings of the first year indicated that there was no significant difference in test scores between the classes that were randomly assigned to use the products and those that did not use the products (Dynarski et al., 2007). During the second year, the test scores were statistically significant. For sixth-grade mathematics, the effect was negative and corresponded to a student dropping from the 50th percentile to the 44th percentile. In Algebra I, the reverse was reported. The results corresponded to a student increasing from the 50th percentile to the 56th percentile. Although it appears that the sixth-grade math software evaluated for this study was ineffective, a cautious approach should be taken when drawing conclusions because of limitations of the study. As previously mentioned, participation was voluntary. Some teachers may have elected to use or not to use the software for the second year based on moving from one grade level to another or because of leaving a particular school. The analysis only includes teachers who used the software for both years. There were no observations or interviews of these teachers with regard to whether they changed implementation of the product from the first to the second year (Campuzano et al., 2009). This qualitative type of data using teacher or stakeholder input is vital to increasing the accuracy of the data and providing a more comprehensive study. As part of the evaluation of Classworks™ for Richmond County, stakeholders will participate by providing information of program fidelity at each implementation site.

In 2007–2008, a study was conducted to evaluate a web-based tutoring system designed to improve problem-solving skills and test taking strategies. The program was purchased for the purpose of preparing students for the statewide math exam. The participants were 125 fourth graders from three schools in rural Massachusetts. The design included pretests and posttests. Based on the results, there was a significant difference between the assessments, with 70% of students showing improvement (Maloy, Edwards, & Anderson, 2010). Although this article is peer reviewed, it is important to note that all three authors work for the same university and one of them engineered the program. This could compromise the credibility of the study for some individuals who are looking for evidence that computer-assisted instruction is effective. Although there was no determination as to whether students performed better on the statewide exam as a result of participation in the intervention software, the study does provide evidence of an increase in student learning based on the pretests and posttests.

In another study on math intervention, third graders in a suburban school with high percentages of minority and English as second language students were more engaged in a computer-based intervention when compared to a paper-pencil intervention program. Both programs had been used at this school for four years and test scores had increased overall. Due to budgetary reasons, only one program would be purchased for the next school year. The cost of each program was projected to be more than $50,000, a significant amount of money for a school to invest. Because there was no way to determine which program may have caused the increase in test scores, the study was conducted based on observations of student engagement during the interventions (Cosenza, 2009). Many of the computer-based intervention programs are designed to capture the interest of students with color and animations, and it is believed that this results in longer periods of engagement as was evidenced by the study (Guha & Leonard, 2002).

In another study, engagement based on gender was examined. Female students logged more total time than males. Males moved rapidly through the program and failed to utilize a tutor resource, but rather chose to guess, which resulted in more incorrect attempts at answering problems. Females were more meticulous, requesting more assistance from the software program. This program was web-based, which is similar to the Classworks™ program being evaluated in this dissertation. It also provides customized instruction. The data showed an average improvement of 20% from the pretest to the posttest. Students attempted more problems on the posttest indicating that students may have learned new ways to work problems, although the answer may not have been correct (Arroyo, Walles, Beal, & Woolf, 2004).

In 2007, a review of research that included computer-assisted instruction was conducted by Robert Slavin and Cynthia Lake of John Hopkins University. The review included 38 studies of research on elementary math programs. In all studies, the control group did not use technology as part of instruction. Instead, the instructional practices were more traditional, such as the use of textbook as a primary resource. According to this review, because of the large numbers of studies, “computer-assisted instruction is the most extensively studied of all approaches to math reform” (Slavin & Lake, 2008, p. 22). Of the studies reviewed, most reported a positive effect which directly supports a previous review of technology products by Kulik in 2003. However, it is important to note that many of the programs reviewed no longer exist. Of those programs that are available, there is not enough evidence to support recommending one over the other (Slavin & Lake, 2008). This information reiterates the importance of a continuous data-driven approach to programs that have been purchased within a district.

Computers are a part of daily life; therefore, it comes as no surprise that Computer-Assisted Technology such as Classworks™ enhances student learning. Using technology allows for a more individualized experience for the student. Students utilize technology as part of their natural world. Because of the advances in technology and deficiencies in student learning, programs have been developed, advertised, and sold by various vendors. Purchasing a program is a practical and convenient avenue for school districts. However, it is crucial for these programs to be monitored and evaluated for quality. Classworks™ will be evaluated to inform the district of its effectiveness with the students of Richmond County and provide implications and recommendations for continued use of the program.

Classworks™

Classworks™ is a program designed to provide intervention for students in elementary and middle schools. According to Owens (2013), it is in “full alignment to the Common Core State Standards” (p. 7) and it “provides guidance and support to ensure all students meet the expectations of Common Core State Standards” (p. 9). The program provides feedback on the performance of students based on the standards for individual students (see Figure 9) and for individual teacher classes (see Figure 10).

There is an increasing emphasis on using technology to enhance learning in the classroom of today and preparing students for the "rigor and challenges of life" (Owens, 2013, p. 11). The Classworks™ program exceeds the traditional multiple-choice assessments by helping students learn skills in various ways and encouraging the idea that there is more than one way to solve problems. There is also an emphasis on application, an important skill needed to be successful (Owens, 2013).

The Common Core State Standards provide a set of goals that students need to achieve for each grade level in order to be successful as they move on to subsequent grade levels and courses. Students not on grade level are expected to learn the deficits more quickly to meet those goals requiring additional intervention by teachers (Owens, 2013). Owens (2013) states, "Classworks™ provides individualized instruction to ensure that all students are performing at grade level and the achievement gap is closed. By offering learning at a deep level, Classworks™ units prepare students to exceed in grade level content and beyond" (p. 3).

Classworks™ was one of the computer-assisted instruction products chosen for review by Slavin and Lake (2008). There were two studies examined. Both studies took place in elementary schools. The results of one study showed a significant increase from the pretest to the posttest; however, the study only included a total of 30 students randomly assigned to two groups. Both groups received similar math instruction with one group receiving one hour of Classworks™ per week for 14 weeks. In order to determine teacher attitudes in regards to the program, a questionnaire was developed and administered to two teachers. Both teachers responded positively about the computer-assisted program. One teacher felt that Classworks™

Instruction Results by State Standards
Common Core State Standards Math Grade 5

Classworks

Report on: 5th Grade
Detailed Performance of Each Student – Mathematics

ST 1: Number and Operations

Student	Standard NBT.5.A	Average Score	Total Time
Allen, James		98%	01:20:04
Coleman, Sydney		94%	00:32:26
Fargo, Jimmy		58%	00:12:48
Williams, Derek		87%	01:24:32
	Average Score	**84%**	**03:29:32**

Key:
- Assigned
- Not Proficient (0% - 64%)
- Borderline (65% - 74%)
- Proficient (75% - 84%)
- Highly Proficient (85% - 100%)

Note. Graphic obtained from Curriculum Advantage, Inc. (2014b).

Figure 9. Example of a report generated by the Classworks™ program to show individual student achievement on a particular math standards.

Instruction Results by State Standards
Common Core State Standards Math Grade 5

Classworks

Report on: Mr. Anderson's 5th Grade Class
Overall Performance by Strand – Mathematics

NBT.5.A Number and Operations: Understand the place value system.	**Average Unit Score**	**# of Students**
NBT.5.1. Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and 1/10 of what it represents in the place to its left.	84%	4
AVERAGE SCORE	84%	

MD.5.A Measurement and Data: Convert like measurement units within a given measurement system.	**Average Unit Score**	**# of Students**
MD.5.1. Convert among different-sized measurement units within a given measurement system, and use these conversions in solving multi-step, real-world problems.	77%	9
MD.5.2. Make a line plot to display a data set of measurements in fractions of a unit. Use operations on fractions for this grade to solve problems involving information presented in line plots.		10
MD.5.3. Recognize volume as an attribute of solid figures and understand concepts of volume measurement.	74%	8
MD.5.4. Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units.	68%	7
AVERAGE SCORE	76%	

G.5.A Geometry: Graph points on the coordinate plane to solve real-world and mathematical problems.	**Average Unit Score**	**# of Students**
G.5.1. Use a pair of perpendicular number lines to define a coordinate system.	62%	9
G.5.2. Represent real-world and mathematical problems by graphing points in the first quadrant of the coordinate plane.		3
AVERAGE SCORE	59%	

Note. Graphic obtained from Curriculum Advantage, Inc. (2014b).

Figure 10. Example of a report generated by the Classworks™ program to show class performance on particular math standards.

provided a “reinforcement of skills and concepts taught in the classroom” (Patterson, 2005, p. 17). Both teachers agreed that the program should be a resource that supplements teacher instruction. One teacher recommended more time be allotted for Classworks™. Finally, one of the teachers expressed the advantage of individualized instruction and the ability to create a curriculum that supports certain goals for the student (Patterson, 2005). Slavin and Lake (2008) reviewed a study completed by Jane Whitaker as the second Classworks™ study. The study was designed to determine the impact on student achievement. Students participated in the Classworks™ program for two sessions each week for 45 minutes, although one of the sessions was dedicated to the reading portion of the program. Standardized test data were analyzed from 2002–2003, prior to implementation of Classworks™. The analysis included gender, ethnicity, socio-economic status, and proficiency levels. Following implementation, an analysis of 2003–2004 test data was conducted and compared to another elementary school that used traditional math instruction. Overall, there was very little impact on student achievement according to the results of the study; however, when considering the amount of time students participated in Classworks™ program, the results changed. Students who had a high time-on-task outperformed other students, suggesting that Classworks™ could have a positive impact on student achievement if students spend more time using the program (Whitaker, 2005). This study implies that the procedures for implementation and the fidelity by which these procedures are followed are important components of a program evaluation.

As allocations of money continue to decrease for education, it is important now more than ever before to be frugal in making decisions about resources to support student learning. This study originated because of the high cost of the Classworks™ program in addition to the continued decrease of funding for education; however, as educators we should always ensure that we are making good decisions when student learning is at stake.

Program Fidelity

According to Munter, Wilhelm, Cobb, and Cordray (2014), “One of the purposes of educational research is to rigorously evaluate curricular and instructional programs to assess whether they are effective in supporting students’ learning and achievement” (p. 83). When evaluating programs, the fidelity by which the program is implemented should be a factor considered in the study. Fidelity, sometimes referred to as integrity, pertains to the degree of conformity to guidelines and procedures outlined in the program (Gresham, Gansle, Noell, Cohen, & Rosenblum, 1993; Moncher & Prinz, 1991). In the article, *A Conceptual Framework for Implementation Fidelity* (2007), Carroll et al. (2007) note,

> This variable may not only moderate the relationship between an intervention and its outcomes, but its assessment may also prevent potentially false conclusions from being drawn about an intervention’s effectiveness. It may even help in the achievement of improved outcomes. (p. 2)

Program fidelity is recognized as an integral part of implementing intervention programs. The Institute of Education Sciences governed by the U.S. Department of Education provides funding grants for new intervention programs or improvement of existing intervention programs intended to produce beneficial outcomes for students. As part of the application requirements, a plan for fidelity of implementation of the program must be included in the research grant proposal, along with a method for measurement (NCES, 2014a).

Research shows that it is not common to include fidelity in program studies. Dane and Schneider examined approximately 4,500 abstracts of studies evaluating prevention programs for specific criteria including program fidelity. Of the 162 selected, only 39 had specific procedures for documenting fidelity and of those, only 13 of the studies analyzed the variations of fidelity in the programs implemented (Dane & Schneider, 1998). The researchers convey that the "outcome research in this literature may be compromised by these omissions" (Dane & Schneider, 1998, p. 36). More recently, O'Donnell (2008) reviewed 23 studies designed to compare fidelity of the programs to the outcome. Core curriculum interventions were analyzed in grades kindergarten through 12th grade. Only five of the studies included methods for specifically measuring fidelity quantitatively. This was a required component of the criteria established by O'Donnell for the review. The findings "consistently showed statistically significantly higher outcomes when the program was implemented with fidelity" (p. 50). Based on the study, O'Donnell recognized that in order to conduct rigorous studies of curriculum interventions, "researchers need to better understand how to define, conceptualize, and measure fidelity of implementation—the lack of which has been a longstanding problem in K–12 curriculum intervention research" (p. 54).

Program fidelity is a necessary component of a program evaluation. The structure and procedures used when implementing the program can have an impact on the results. Failure to report variations in implementation may cause the outcome of the program to be misconstrued. Classworks™ has been implemented at multiple schools in both the elementary and middle school settings in Richmond County School District. The program evaluation study of Classworks™ will investigate implementation practices at each school.

CHAPTER 3: METHODOLOGY

The methodology chapter describes the details of the study which include the purpose of the study, a description of the program to be evaluated, the design of the study, and the method for collecting evaluation information. This chapter will also describe the setting of the school district where the study is to take place, participants, and the study questions.

Purpose and Background

As was discussed in previous chapters, the Richmond County School District remains below the state average on the math End-of-Grade tests that include students in grades three through eight for 10 consecutive years. The district selected and purchased the Classworks™ web-based program as a means for intervention. The purpose of the study is to evaluate the program to determine which students benefit the most from the Classworks™ program. Proficiency levels on the end-of-grade state assessment of elementary and middle school students who participated in the program will be analyzed to determine changes in achievement after participation in the program. Factors of gender and ethnicity will be studied to determine if various groups of students benefit more than others as a result of participating in the program. This study will examine the results of the North Carolina End-of-Grade tests for students who participated in the Classworks™ program for the 2011–2012 and 2012–2013 school years. Program fidelity will be included as a component.

Description of the Classworks™ Program

The Classworks™ program was developed in 1993 by Curriculum Advantage, Inc. It is an online instructional and assessment program that was developed to help students become critical thinkers and independent learners. The company states that "Classworks™ provides the flexibility to customize a solution for the specific needs of schools or districts. Classworks™

can help you elevate student engagement and performance" (Curriculum Advantage, Inc., 2014f, para. 3). The program utilizes computer-based, individualized instruction that is designed to support at-risk students and assist them to achieve grade level proficiency (Curriculum Advantage, Inc., 2010).

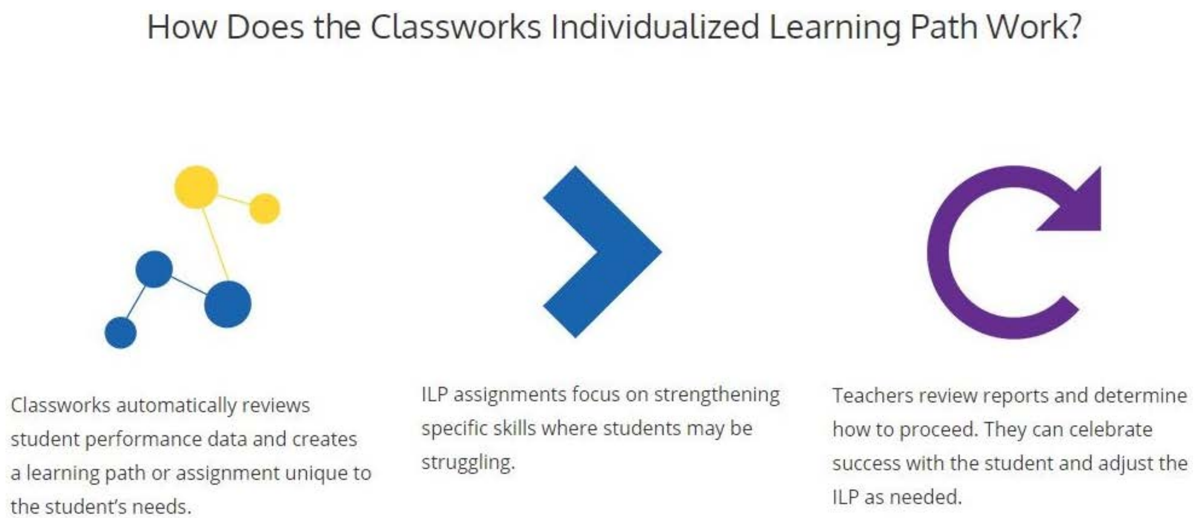
The program is designed for students in grades kindergarten through ninth grade. There are approximately 85 units per subject for each grade level. Each unit includes direct instruction, instructional practice activities, formative assessment, review, and performance tasks as described in Figure 11 by Curriculum Advantage, Inc. (2014c).

Curriculum Advantage, Inc. attributes the success of Classworks™ to the individualized instruction provided by the program. Student performance is continually assessed and from these data, the program designs lessons based on areas in need of improvement. Figure 12 shows this process that also includes a component that provides feedback for teachers, as indicated in Figure 13.

Classworks™ provides recommendations based on the grade level of the student. For a student who is up to one grade level behind, the recommendation is one session per week for 45 minutes, whereas a student two grade levels behind academically needs two sessions for 45 minutes per week (M. Boyd, personal communication, December 22, 2014). Of schools that have implemented Classworks™ into their schedule, the minutes of student engagement in the program each week varies. In Texas, third graders in one elementary school spend an hour each week on the program (Patterson, 2005), while another elementary school where fifth and sixth graders participate allows for 90 minutes each week (Curriculum Advantage, Inc., 2011a). An elementary school in Florida provide two sessions each week of 30 minutes (McRae, 2009). An elementary school in South Carolina followed the guidelines by providing a 45-minute session

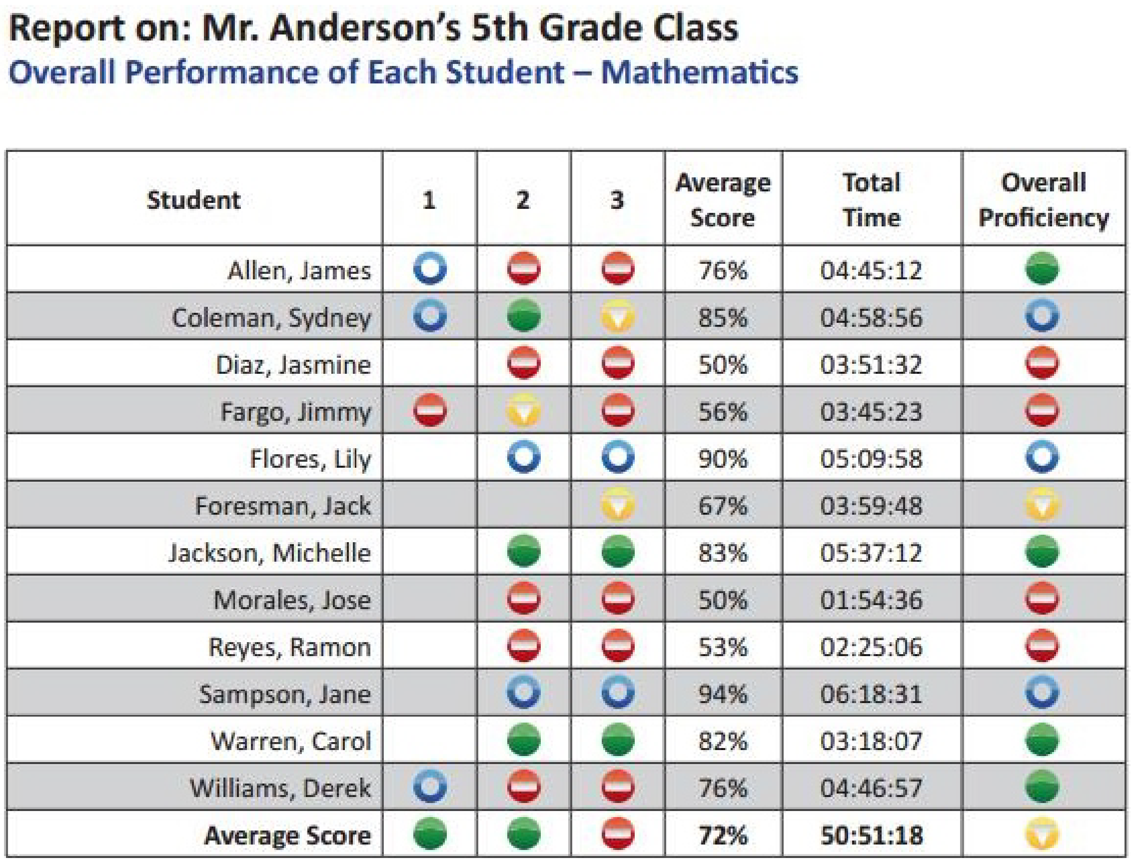
Note. Graphic obtained from Curriculum Advantage, Inc. (2014c).

Figure 11. Graphic image from Classworks™ illustrating the components of a unit of instruction.



Note. Graphic obtained from Curriculum Advantage, Inc. (2014d).

Figure 12. Graphic image from Classworks™ illustrating process of individualized student instruction.



Report on: Mr. Anderson's 5th Grade Class

Overall Performance of Each Student – Mathematics

Student	1	2	3	Average Score	Total Time	Overall Proficiency
Allen, James				76%	04:45:12	
Coleman, Sydney				85%	04:58:56	
Diaz, Jasmine				50%	03:51:32	
Fargo, Jimmy				56%	03:45:23	
Flores, Lily				90%	05:09:58	
Foresman, Jack				67%	03:59:48	
Jackson, Michelle				83%	05:37:12	
Morales, Jose				50%	01:54:36	
Reyes, Ramon				53%	02:25:06	
Sampson, Jane				94%	06:18:31	
Warren, Carol				82%	03:18:07	
Williams, Derek				76%	04:46:57	
Average Score				**72%**	**50:51:18**	

Note. Graphic obtained from Curriculum Advantage, Inc. (2014e).

Figure 13. Example of report generated by the Classworks™ program designed to inform teachers of the overall progress for each student.

each week for students they identified as being on the bubble. These students include those who scored just below proficiency on the state assessment (Curriculum Advantage, Inc., 2011b). Lastly, a middle school in North Carolina also provided 45 minutes each week for students in sixth through eighth grades that scored below proficiency on the North Carolina End-of-Grade test (Curriculum Advantage, Inc., 2011c).

Design of the Study

This study will use the Participant-Oriented Evaluation approach to evaluate the Classworks™ program. Participatory approaches began with mandates from Congress and government agencies for the purpose of determining if goals and objectives were achieved from programs endorsed by the government. The information obtained from these studies was provided for policy makers. Unfortunately, the mandated research was neither authentic, nor was it used to determine quality of programs or to make improvements. In fact, many researchers never entered the building where the evaluations were taking place. Because of the increase in the number of organizations that argued for a human element to be part of the evaluation process, a new focus emerged that recommended firsthand experience with activities, settings, and involvement of stakeholders to include program participants, staff, and managers in the evaluation process (Fitzpatrick et al., 2011).

Several evaluation theorists have contributed to today's models. Robert Stake was the first theorist who provided an insight into participatory evaluation with regard to the field of education. Stake (1967, 1973, 1975) proposed the countenance model and responsiveness approach model that altered the thinking of evaluators and provided principles that guided the evolution of the process. Egon Guba and Yvonna Lincoln contributed further when they published two books, *Naturalistic Inquiry* (1985) and *Fourth-Generation Evaluation* (1989).

They emphasized the importance of moving away from the traditional model that included abstract quantitative methods and more towards qualitative and naturalistic methods that include interviews, observations, and case studies. This view would give stakeholders a more active role by gathering their views and values and then working together to inform and determine next steps with regards to the program being evaluated (Guba & Lincoln, 1985, 1989).

Participatory evaluation is currently defined in two ways. Jean King (2005) defines it as "an overarching term for any evaluation approach that involved program staff or participants actively in decision making and other activities related to the planning and implementation of evaluation studies" (p. 291). In the article, "The Case for Participatory Evaluation," Cousins and Earl (1992) define this approach as "applied social research that involved a partnership between trained and practice-based decision makers, organization members with program responsibility, or people with a vital interest in the program" (p. 399). The definitions are considered broad, confusing, and tend to overlap with other evaluation approaches (Cousins & Whitmore, 1998; Cullen, 2009; O'Sullivan & D'Agostino, 2002). According to King, the most important misconception is "the belief that any involvement of program staff or participants, including simply collecting data from them makes something a participatory evaluation; and the view that any evaluation that uses qualitative methods is participatory" (as cited in Fitzpatrick et al., 2011, p. 200). In this study, the administrators of the Classworks™ program in the schools will participate in the study. Their participation will be accomplished through interviews that address program implementation and insights they can provide in relation to the program. The superintendent was directly involved at the beginning of the discussions about evaluating the program. He defined the questions of the study and his vision for the purpose.

Cousins and Whitmore (1998) further categorize the contemporary participatory approach into two categories, one of which directly corresponds to the program being evaluated in this study. The practical participatory evaluation (P-PE) involves primarily managers (Cousins & Whitmore, 1998). This type of evaluation is used to improve use and encourage learning and change by the organization. The long-term goal is to build capacity and to create a learning environment that makes use of information for planning and improvement (Fitzpatrick et al., 2011). In this particular program evaluation, the Superintendent of the district is directly involved along with other stakeholders including the Associate Superintendent of Curriculum and Instruction, principals, and assistant principals. The evaluation is formative (Cousins & Earl, 1992) in that it will provide information for program improvement.

Method for Collection of Evaluative Information

The design of program evaluations was strongly debated throughout the 70s, 80s, and 90s. The debate was centered on whether methods for conducting program evaluations should be quantitative or qualitative. Currently, experts in the area of program evaluations agree that using one method, quantitative or qualitative, may not always be suitable but rather a combination of the methods (Fitzpatrick et al., 2011). The primary focus should not be on the methods but rather the evaluation questions followed by determining the method necessary to answer the answer the questions (Chelimsky, 2007; Schwandt, 2007). According to the text, *Program Evaluation: Alternative Approaches and Practical Guidelines*:

> Our recommendations are not for a type of method, but for choices that make sense for the evaluation questions to be answered and the context of the study. Typically, these are mixed methods because few questions can be answered by only one strategy. (Fitzpatrick et al., 2011, p. 384)

The mixed methods approach has been defined as having both a quantitative and qualitative component (Creswell, 2009). However, Jennifer Green (2005) defines the mixed methods approach in a more simple manner: “Mixed methods evaluation involves the planned use of two or more different kinds of empirical designs or data gathering and analysis tools in the same study or project” (p. 215). This description is less rigid and eliminates the emphasis on the quantitative-qualitative controversy.

This program evaluation will be conducted using a mixed methods approach. The two methods selected are both descriptive in nature. Descriptive designs are common in education because the study questions are often descriptive in nature. One example of questions that correspond directly with this program evaluation is:

> Questions concerning program delivery: Were key pieces of the program delivered as planned? With the intended quality and duration? These differences in implementation should be described, for a variety of reasons, including to learn what did happen, to determine whether the model was delivered accurately so that evaluations of outcomes would actually be a test of the model, and to identify successful adaptations that might be used in subsequent deliveries of the program. (Fitzpatrick et al., 2011, p. 387)

As part of the program evaluation for Classworks™, the study questions include questions relating to program delivery and to the degree of fidelity with implementation. The program is being implemented at multiple sites in the district and the degree of consistency is questionable. The descriptive method will be used to examine this portion of the program as a case study. It will be qualitative in nature “to attain that depth of description and understanding” (Fitzpatrick et al., 2011, p. 391). Fitzpatrick et al. (2011) describe Robert Yin’s (2009) view of case studies as “a preferred method to establishing causality in evaluations because their absence of control and their attention to context make their results more applicable to the real world” (p. 405). The information for the case study will be obtained through surveys and interviews with administrators of the Classworks™ program, those individuals responsible for scheduling and implementing the program within the school day. The surveys will be administered before the interviews to help actuate the interview process and provide deeper conversations. They will consist of open-ended, short-answer responses and will be administered through an online survey tool. Participants will receive notification by email that will explain the purpose of the survey and the instructions for completion. Prior to administration, an expert panel will review and interpret the survey questions to establish construct validity. The surveys and interviews will be provided for the stakeholders of this Participant-Oriented Evaluation; that is, those individuals responsible for implementing the program. The participants will be assured that their responses will be confidential and that their participation is voluntary.

Survey Questions

1. Did you receive training for the implementation of the Classworks™ Program?
2. Was adequate support provided for implementation of Classworks™ in your school?
3. What did you find as challenges with the implementation of Classworks™ in your school?
4. Did you implement the Classworks™ program with fidelity in your school?
5. Briefly describe the scheduling process for implementing the math portion of Classworks™ in your school including selection of students, sessions per week, minutes per session, and the time of day (i.e. during electives, intervention block, etc.) that students attended the session.
6. Based on your observations, did Classworks™ have an impact on students' math skills?
7. List any positive behaviors that you observed while students were engaged in the program.
8. List any negative behaviors that you observed while students were engaged in the program.

Interview Questions

1. Describe the procedures in scheduling the Classworks™ program in your school, including when students participate and the amount of time and number of sessions per week.
2. What is the selection process for participation of students in the Classworks™ program?
3. What are the hurdles with implementation of the Classworks™ program?
4. What is your overall opinion of the Classworks™ program?
5. Is there anything you want to share about Classworks™ that we didn't discuss today? On what do you based your response?

The second method utilized in the study is descriptive statistics. Salkind (2011) defines descriptive statistics as a method "used to organize and describe the characteristics of a collection of data" (p. 8). This method will be used to address the study questions centered on student achievement in relation to state assessments for the groups of students who participated in the Classworks™ program in the selected schools in Richmond County. Existing data will be used.

One concern with participant-oriented evaluations occurs when providing results and conclusions of the study to those individuals not directly involved in the study, such as the local school board. Because the evaluators are stakeholders, there may be a question of credibility of the analysis and results due to possible bias. The stakeholders involved in the study purchase, deliver, and/or manage the program. There may be a question of subjectivity when the individuals directly involved with a program participate in the study (Fitzpatrick et al., 2011). To increase credibility of the program evaluation, it is important to note that currently the lead evaluator is void of any connection to the implementation, purchase, or management of the program; therefore, bias will be minimized. Analysis of student participation in Classworks™ and performance on end-of-grade tests will not be subjective because of the quantitative nature of this analysis. Another concern deals with the popularity of the participatory approach. Educational organizations want to improve performance and have shown an increase in interest to complete their own evaluations. Although this reasoning is positive, it can take years of training and practice for evaluators to possess the qualities needed to consistently evaluate programs (Dahler-Larsen, 2006). Although this concern is valid, it is of significance to consider that the lead evaluator has a background and experience in evaluating data in both an educational setting and laboratory setting.

It is important to note the changes in curriculum and assessments in the state of North Carolina during the course of the implementation of Classworks™. During the 2012–2013 school year, the End-of-Grade state assessment changed to reflect the new Common Core curriculum. The cutoff scores to determine proficiency changed dramatically from the 2011–2012 to the 2012–2013 school year. Another change in relation to data in North Carolina is the strict use of the Education Value-Added Assessment System (EVAAS) managed by SAS Institute, Inc. The reports available during the 2011–2012 school year are different from the reports available during the 2012–2013 school year.

Setting and Participants

This study will be conducted in Richmond County, a rural school district consisting of 7,700 students located in North Carolina. There are seven elementary schools, four middle schools, and four secondary schools. The Classworks™ program was implemented in two of the elementary schools and three of the middle schools during the first year. There are approximately 765 students in the two elementary schools and approximately 1,066 in the three middle schools. During the second year, the program was implemented in three elementary schools that comprised approximately 1,360 students and all four middle schools with a total enrollment of approximately 1,757.

Study Questions

The goal of this study is to answer the following study questions at the completion of the study:

1. What impact did the Classworks™ program have on proficiency levels of elementary students on the North Carolina End-of-Grade mathematics assessment as a result of participation in the program during the 2011-2012 and 2012-2013 school years when compared to the individual student's prior year score?
2. What impact did the Classworks™ program have on proficiency levels of middle students on the North Carolina End-of-Grade mathematics assessment as a result of participation in the program during the 2011-2012 and 2012-2013 school years when compared to the individual student's prior year score?
3. Are there any variations based on gender for elementary students as a result of participation in the Classworks™ program during the 2011-2012 and 2012-2013 school years?
4. Are there any variations based on gender for middle students as a result of participation in the Classworks™ program during the 2011-2012 and 2012-2013 school years?

5. Are there any variations based on ethnicity for elementary school students as a result of participation in the Classworks™ during the 2011-2012 and 2012-2013 school years?
6. Are there any variations based on ethnicity for middle school students as a result of participation in the Classworks™ during the 2011-2012 and 2012-2013 school years?

Summary

In summary, the purpose of this program evaluation is to determine the effectiveness of the Classworks™ program at participating elementary and middle schools in 2011-2012 and 2012-2013. During the first year, two elementary schools and three middle schools implemented Classworks™ with three elementary and four middle schools participating the second year. Students who participated in the math intervention program were determined by their performance on the state math end-of-grade test. The aim of the study is to provide review of students' math scores and information regarding program implementation and fidelity of implementation. Although descriptive statistics will be used to analyze quantitative data, interviews will provide information regarding program fidelity to support and explain the resulting end-of-grade test scores. The superintendent requested an evaluation of the Classworks™ program; therefore, the evaluation of the math portion of the program will be analyzed to determine its effectiveness on student math achievement in grades three through five and grades six through eight.

The program evaluation method was selected as the most appropriate design and includes both quantitative and qualitative components. It is a Participant-Oriented Evaluation involving stakeholders in the evaluation process and is identified more specifically as a practical participatory evaluation that targets improvement of program utilization. This model intends to inform school officials and guide decision making for the future.

CHAPTER 4: RESULTS AND RECOMMENDATIONS

The purpose of this study was to evaluate Classworks™, a program implemented in the Richmond County School District as an intervention to improve math achievement. The study included elementary schools and middle schools that participated in the Classworks™ program during the school years of 2011-2012 and 2012-2013. Three sources of data were obtained for this evaluation. Surveys were administered to individuals who were responsible for program implementation. After reviewing the responses to the surveys, interviews were conducted to further investigate the fidelity by which the program was implemented. The third source of data included North Carolina End-of-Grade assessment data for students who participated in the program. The data were analyzed and grouped by elementary and middle school. The evaluator used this information in an effort to answer the following questions:

1. What impact did the Classworks™ program have on proficiency levels of elementary students on the North Carolina End-of-Grade mathematics assessment as a result of participation in the program during the 2011-2012 and 2012-2013 school years when compared to the individual student's prior year score?
2. What impact did the Classworks™ program have on proficiency levels of middle students on the North Carolina End-of-Grade mathematics assessment as a result of participation in the program during the 2011-2012 and 2012-2013 school years when compared to the individual student's prior year score?
3. Are there any variations based on gender for elementary students as a result of participation in the Classworks™ program during the 2011-2012 and 2012-2013 school years?

4. Are there any variations based on gender for middle students as a result of participation in the Classworks™ program during the 2011-2012 and 2012-2013 school years?
5. Are there any variations based on ethnicity for elementary school students as a result of participation in the Classworks™ during the 2011-2012 and 2012-2013 school years?
6. Are there any variations based on ethnicity for middle school students as a result of participation in the Classworks™ during the 2011-2012 and 2012-2013 school years?

The need for this program evaluation was critical because a comprehensive evaluation of this program had not been completed in the school district. Due to substantial cuts in funding and the cost of the program, it was important to determine if the program was improving state standardized test results for students in grades three through eight.

This study focused on the impact of the Classworks™ program on the proficiency levels from end-of-grade tests for students who participated in the program. The evaluator also examined the fidelity as a necessary component of the program evaluation. Structures and procedures are key elements for implementation of the program that can have an impact of the results. Failing to report these variations may cause the outcome of the study to be misconstrued.

A review of the literature revealed a change in mindset of the importance of learning math skills that dated back to the early 1900s. At that time, it was believed that it was unnecessary for all students to take math at the high school level. Throughout the years, various organizations, mathematicians, and math educators contributed to changing that mindset and as a result, standards were developed as a guide for the subject matter needed to prepare students for the future. A study by the Carnegie Institute reported that higher level math skills were needed for higher education and careers (Griffiths and Cahill, 2009). Educators understand that students learn at different rates and in different ways. Math instruction differs from classroom to classroom and students have varying skill levels. Computer-assisted programs were designed as intervention tools to help improve student math skills and in general, these programs have had a positive effect (Kulik, 2003; Schacter, 2001; Sivin-Kachala, 1998). This program evaluation was designed to determine if one of these programs, Classworks™, had an impact on student achievement.

Data Overview

The data for this chapter is derived from three sources: surveys, interviews, and student assessment data. Surveys were administered to individuals involved with implementation of the program. The surveys were designed to help deepen the conversations during the interviews. The surveys and interviews provided information about program fidelity, a component of the study that may have an impact on the outcome of the program. This information provided professional opinions and input concerning implementation of the program to include scheduling and selection of students who participated in the program, hurdles that interfered with implementation, and the overall impact of the program on student achievement. Student assessment data from the North Carolina End-of-Grade test were analyzed. The end-of-grade proficiency scores for students who participated in the program were compared to the previous year to determine if there was an improvement. The analysis included elementary and middle schools as separate groups. For students who improved their proficiency level on the End-of-Grade tests, comparisons within the sub-groups of gender and ethnicity were completed. The qualitative data from the surveys and interviews along with the quantitative data from test results provided an insight to the overall impact of the program. From this information, recommendations were completed to inform school officials of the impact of the Classworks™ program on student achievement and to guide decision making for the future.

Evaluation Model

A program evaluation was determined to be the most appropriate method for this study. The Participant-Oriented Evaluation was conducted using a mixed methods approach that included both qualitative and quantitative data which was descriptive in nature. This approach to program evaluations emerged from various organizations that recommended firsthand involvement of stakeholders in the process due to previous studies which were deemed ineffective stemming from outside agencies performing program evaluations (Fitzpatrick et al., 2011). Providing stakeholders a more active role in the evaluation process affords an opportunity for gathering their opinions and values concerning the program (Guba & Lincoln, 1985, 1989). In this study, the results obtained from stakeholders gave insight to the fidelity of the program. Data and information from the Classworks™ program evaluation will be provided to decision makers in the district for the purpose of supporting problem of practice solutions that will guide future decisions by the school system leadership.

In order to describe the problem of practice, it is important to understand the underlying cause of the problem. Students in the Richmond County School district consistently lag behind the state average on the math End-of-Grade tests in grades three through eight (Public Schools of North Carolina, 2012b). Therefore, they are not learning math at a level that is necessary for them to be successful in future mathematical coursework. In North Carolina, schools are required to administer a math End-of-Grade standardized assessment to students in grades 3–8 (Public Schools of North Carolina, 2012c). Students who score a level three or higher on the assessment are considered to be proficient in math for that particular school year. Proficiency on the state standardized test determines whether or not a student is considered on grade level (Public Schools of North Carolina, 2014). In order to address the problem indicating that students in Richmond County Schools were not learning math at an adequate level, the school district purchased the Classworks™ program as an intervention method to improve academic achievement.

Data Collection and Analysis

Results were derived from two sources. Survey questions were completed by individuals who were involved in implementation of the Classworks™ program. Following the surveys, interviews provided additional information concerning program implementation. In addition, assessment data from the North Carolina End-of-Grade test were analyzed. The first data set was derived from the 2011-2012 school year and the second from the 2012-2013 school year. A comparison of proficiency data on the End-of-Grade test was performed. The data included the proficiency level before and after participation in the program.

Qualitative data. Administrators who were responsible for implementing the program in their schools were asked to complete a survey and participate in interviews to determine fidelity of the program implementation. The results from the surveys and interviews were intended to document facets of program implementation and professional opinions of those directly involved with the program. The intention for obtaining the qualitative data was to support, clarify, and explain the quantitative data from the assessments tests. Survey questions contained training, support, and challenges relating to implementation of the program including the scheduling process and opinions of fidelity, student behavior and student achievement. The survey was sent to 14 individuals involved with implementing the Classworks™ program in their elementary or middle school. Those surveyed were asked to respond to open-ended, short- answer questions.

Four individuals (29%) completed the survey. Two of the four individuals were affiliated with elementary schools (50%) and the other two with middle schools (50%).

Survey questions relating to training and implementation. The first two items addressed training and support for implementing Classworks™. Both elementary and middle school responses indicated that training was provided; however, with regards to support, only one middle school response indicated that adequate support was provided as illustrated in Figure 14.

When asked if the Classworks™ program was implemented with fidelity, the two middle schools and one elementary school responded that they did implement the program with fidelity. Respondents were asked to describe challenges to implementing the program. Those challenges are listed below:

- Implementing the program with fidelity
- Students did not like to be taken from their electives to attend Classworks™ and saw it as a punishment.
- Scheduling student access for the recommended times per week to interact with the program
- The representative was located in Eastern NC, and it was difficult for the individual to meet our immediate needs.
- During meetings with the Classworks™ liaisons, many promises were made about offering various types of support to teachers and interventionists. This included access to our district representative and professional development. On one occasion, we asked teachers to be "Champion" teachers with promises of professional development that never came.

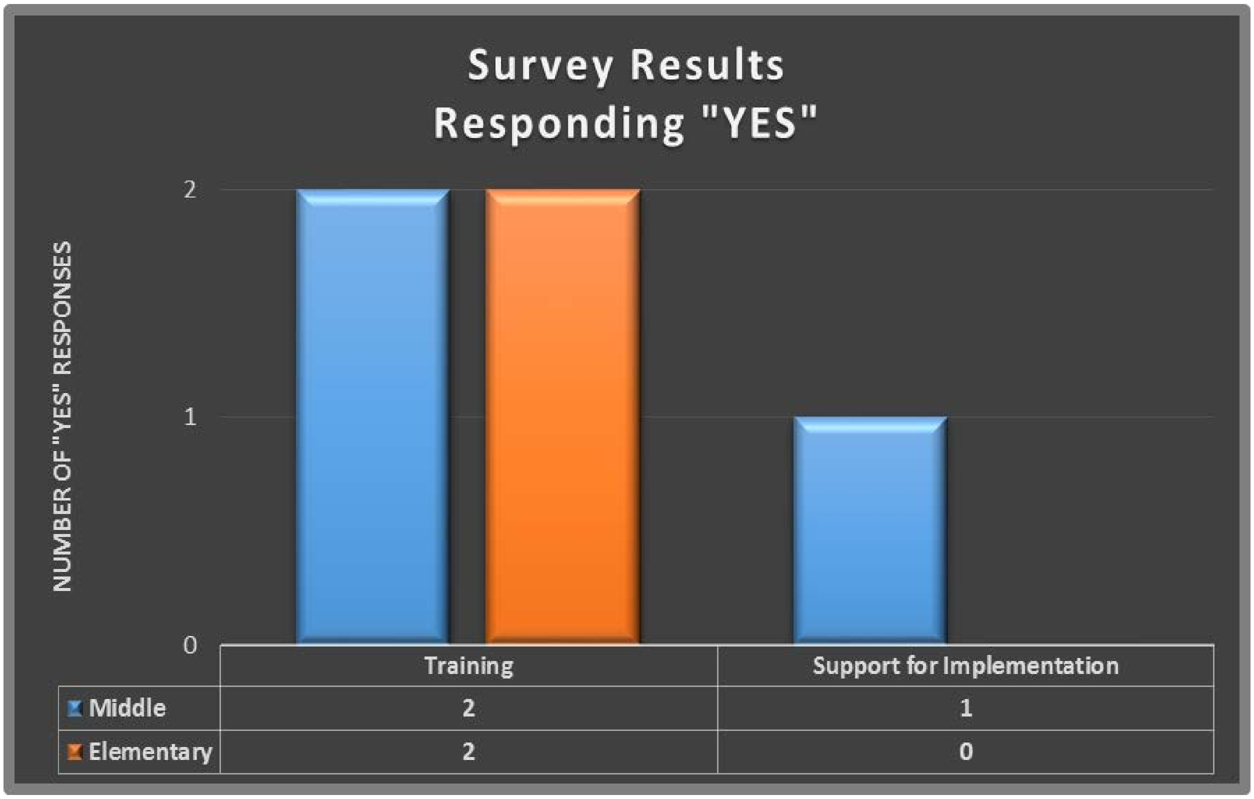


Figure 14. Survey results for individuals who responded as yes to survey questions pertaining to training and support for the implementation of Classworks™.

Respondents were asked to share their scheduling strategies for placing students in Classworks™ during the school day. In middle school, one respondent indicated that the sessions occurred three to five times per week for 40 to 45 minutes. Students attended during electives and intervention periods. The second middle school stated that students attended during electives and did not elaborate. In the elementary schools, the responses varied. One response stated that students may have attended during computer lab time, intervention time, and/or in a pull-out setting while the other elementary school provided 45-minute intervention blocks where Classworks™ was used as part of this time.

Survey questions relating to student achievement and student behavior. Respondents were asked to respond based on their observations of the program as to their opinion whether or not Classworks™ had an impact on the math skills of students. The middle schools agreed that it did have an impact while the elementary schools concluded that if there was an improvement, it was negligible. Lastly, the survey involved questions that pertained to student behavior observed during engagement in the program, both positive and negative (see Figure 15).

Interviews relating to program implementation. Question #1 and #2 addressed scheduling Classworks™ during the school day.

Elementary schools scheduled students for Classworks™ during either an intervention block of time or during computer lab time. Intervention blocks varied from 30 to 45 minutes per session five days a week; however, Classworks™ made up three out of the five days. Students who participated during their “specials” class, computer lab, attended for a period of 45 minutes one day each week. There were other opportunities for participation such as in the classroom after completing assigned work, as a station in the regular classroom, or in a pull-out session.

Positive Behaviors
Students were able to work at their own pace and interventions were specifically designed to target the weak area(s) for the individual students.
It helped students focus.
Students enjoyed being on the computer and playing the games. They were typically well-behaved, but they were also well-managed.
It was another resource to support students with the common core at a time when resources were limited during the transition.
Negative Behaviors
Some students did not take the program seriously and clicked through which resulted in repeating modules and at times affected the fidelity of the program.
Some students rushed through the program.
Students would frequently click through the assignments to get to the end. They had to be monitored closely to prevent this from happening.
Children who were not closely supervised while working on computers frequently went through the program clicking answers without spending the time to problem solve or read thoroughly.

Figure 15. Positive and negative behaviors as reported from surveys.

The student selection process varied; students in third grade only, the lowest 14 or 15 students based on results from the Universal Screener, students who were not proficient based on the Universal Screener, and teacher input.

Middle schools varied with regards to scheduling students for participation. All schools scheduled students during encore classes but with varying amounts of time. The variations were: four days a week with 45-minute sessions, five days a week with 45- minute sessions, and two days a week with 45-minute sessions. Another variation of scheduling was arranging Classworks™ as part of the rotation of students on a team for one particular grade level due to staffing issues. In other words, Classworks™ was scheduled as a core class. Selection of students varied considerably. The selection process was as follows:

- Level twos on End-of-Grade test and teacher request.
- All students in the sixth grade.
- Students in seventh and eighth grade who scored low on the Universal Screener administered by the program.
- Universal screener and EVAAS probability.
- Students who did not have any other form of support services.

Questions numbers three, four, and five pertained to hurdles for implementing the program, overall opinions of the program, and any additional information that the individual provided during the interview. One hurdle that was common throughout the interviews was the lack of buy-in and teacher connectedness. The program was scheduled and monitored by administrators without teachers being actively involved. There were pockets of teacher input and participation but without any consistency. Other hurdles communicated were as follows:

- Focus from the district varied

- Overwhelmed with district initiatives coupled with changes in the standards
- Lack of success for students caused them to become impatient
- Decreased student focus after a period of time especially in situations where it was scheduled every day of the week
- Time constraints with trying to schedule Classworks™ in the school day
- Teacher assistants monitored the program and lacked content knowledge.
- Not enough staff was assigned at the school level to insure effective implementation.
- Training was not consistent throughout the school district.
- Lack of continuous support from the company providing the program.
- Change in staff at the company caused a break down in training

The overall opinions along with additional information provided by the respondents are as follows:

- The program was not operated with fidelity. If it had been, gains could have been greater.
- It was a good program that determined where students were and how they were progressing.
- The universal screener was wonderful but needed to be incorporated at the beginning, middle, and end of the program.
- There were so many things going occurring at the onset of the program including a change in the curriculum that had adverse effects on implementation practices.
- There needs to be complete buy-in from all individuals including the district, administrators, and teachers to ensure complete fidelity.

- At the time of implementation, the data from Classworks™ did not match the data used by the district. Classworks™ had not updated to the Common Core Standards.
- The features were positive and it provided immediate feedback for students.
- Reports generated from the program were sent consistently to administrators and the individuals facilitating the lab. One additional positive feature was the phone application for reporting.
- There was value in the program but it was only as good as the follow up.

Summary of survey and interviews. The surveys provided an avenue for obtaining information that could be discussed more thoroughly during interviews. Responses to the survey questions revealed conflicting opinions pertaining to fidelity of the program. While all surveys indicated that training was provided, only one response alluded to adequate support for implementation. Scheduling students in Classworks™ during the school day varied with all responses. Students exhibited both positive and negative behaviors in relation to participating in Classworks™. The individualized instruction allowed students to work on specific areas of weakness while working at their own pace. They enjoyed working on the computer and playing the games in the program. This atmosphere motivated students which typically resulted in good behavior allowing an opportunity for academic improvement. Responses to the survey questions about negative behaviors were consistent. Some students would click through the modules just to get to the end. They were unmotivated and did not want to participate in the program. The information gleaned from the surveys overwhelming indicated a need to further investigate fidelity of program implementation as a focus for the interviews.

During the interviews, specific information about scheduling and student selection was discussed. The elementary schools varied considerably with scheduling the program. Some students would attend once a week while others attended three days a week affecting the amount of time students participated in the program. The schools also had variations in the way they selected students. All individuals interviewed stated that teacher recommendations were considered; although, additional criteria varied. Some decisions were based on data collected from the universal screener while others selected all students in one grade level. The middle schools had some similarities in that they scheduled students during encore classes for the most part with the exception of one. At that particular school, one of the grade levels attended Classworks™ as part of their academic rotation while the other grade levels attended during encore classes. The differences among middle schools with regards to scheduling was the number of sessions per week. While all of the encore sessions were 45 minutes, the number of days varied at each school. The student selection process for middle schools was similar to the selection process for elementary schools. Overall, the implementation procedures among the schools were incomparable.

The responses among the individuals interviewed regarding difficulties with program implementation were similar. Scheduling was the overarching factor due to time constraints and integrating the program during the school day. One particular point that continued to be evident based on the interviews was the number of changes being made in relation to district and state initiatives. They felt that everyone was overwhelmed during this time due in part to the adopting of the Common Core State Standards and all of the particulars that came with this major shift in curriculum. Interviewees communicated the inconsistencies of a common focus for all parties involved with the program. Overall, the individuals interviewed agreed that Classworks™ was a beneficial program for students because it incorporated individualized instruction and provided immediate feedback; however, they emphasized a need for a common focus, buy-in by all involved, and consistent monitoring and evaluation of procedures for implementation and results.

Quantitative data. Student assessment data were collected from elementary and middle schools in the Richmond County School District for the 2011-2012 and 2012-2013 school years. During the 2011-2012 school year, three middle schools and two elementary schools participated in the Classworks™ Program. The following year, 2012-2013, an additional middle school and an elementary school participated. Student assessment data from North Carolina End-of-Grade tests were collected for the elementary schools and included grades three through five and for the middle schools that included grades six through eight. The data analysis includes all students who participated in the program who had an End-of-Grade test score. Of those who improved, a comparison within the sub-groups of gender and ethnicity was performed. For the quantitative analysis, elementary schools were grouped together and middle schools were grouped together. Therefore, the results for the 2011-2012 and 2012-2013 school years were reported separately as follows:

- Proficiency levels in elementary schools
- Comparison of ethnic groups in elementary schools
- Comparison of gender in elementary schools
- Proficiency levels in middle schools
- Comparison of ethnic groups in middle schools
- Comparison of gender in middle schools

Elementary schools. During the 2011-2012 school year, 63 elementary school students with End-of-Grade test data participated in the Classworks™ program. Third grade students who participated were not included in the analysis due to not having an end-of-grade test at the completion of second grade; therefore, no data was available for comparison. As illustrated in figure 16, there were 44 (70%) students whose proficiency levels remained the same as the previous year while nine students improved by at least one proficiency level (14%). More specifically, eight students improved by one proficiency level and one improved by two proficiency levels. Ten (16%) students dropped by one proficiency level.

Students who improved their proficiency level were compared based on ethnicity and gender. The ethnicity groups included Black, White, and Hispanic. Of those students who improved, four (44%) students were Black, four (44%) were White, and one (1%) was Hispanic. Regarding gender, five (56%) students were female and four (44%) were male. Figures 17 and 18 depict this information.

During the 2012-2013 school year, 42 elementary students with End-of-Grade test scores participated in Classworks™. Of those students, 22 (52%) students' proficiency levels remained the same as the previous year. One student increased by one (2%) proficiency level and 19 (45%) students decreased. There were 16 students who decreased by one proficiency level and three students by two levels (see figure 19).

Figures 20 and 21 illustrate ethnicity and gender of proficiency level increase for the 2012-2013 school year. The one student that improved was a White male.

Middle schools. During the 2011-2012 school year, 336 middle school students with End-of-Grade test data participated in the Classworks™ program. Of the 336 students, 187 (56%), remained unchanged when comparing their proficiency level to the previous year. The number of students who increase by at least one level was 85 (25%). Six of those students increased by two proficiency levels. A total of 64 (19%) dropped by at least one proficiency level (see Figure 22).

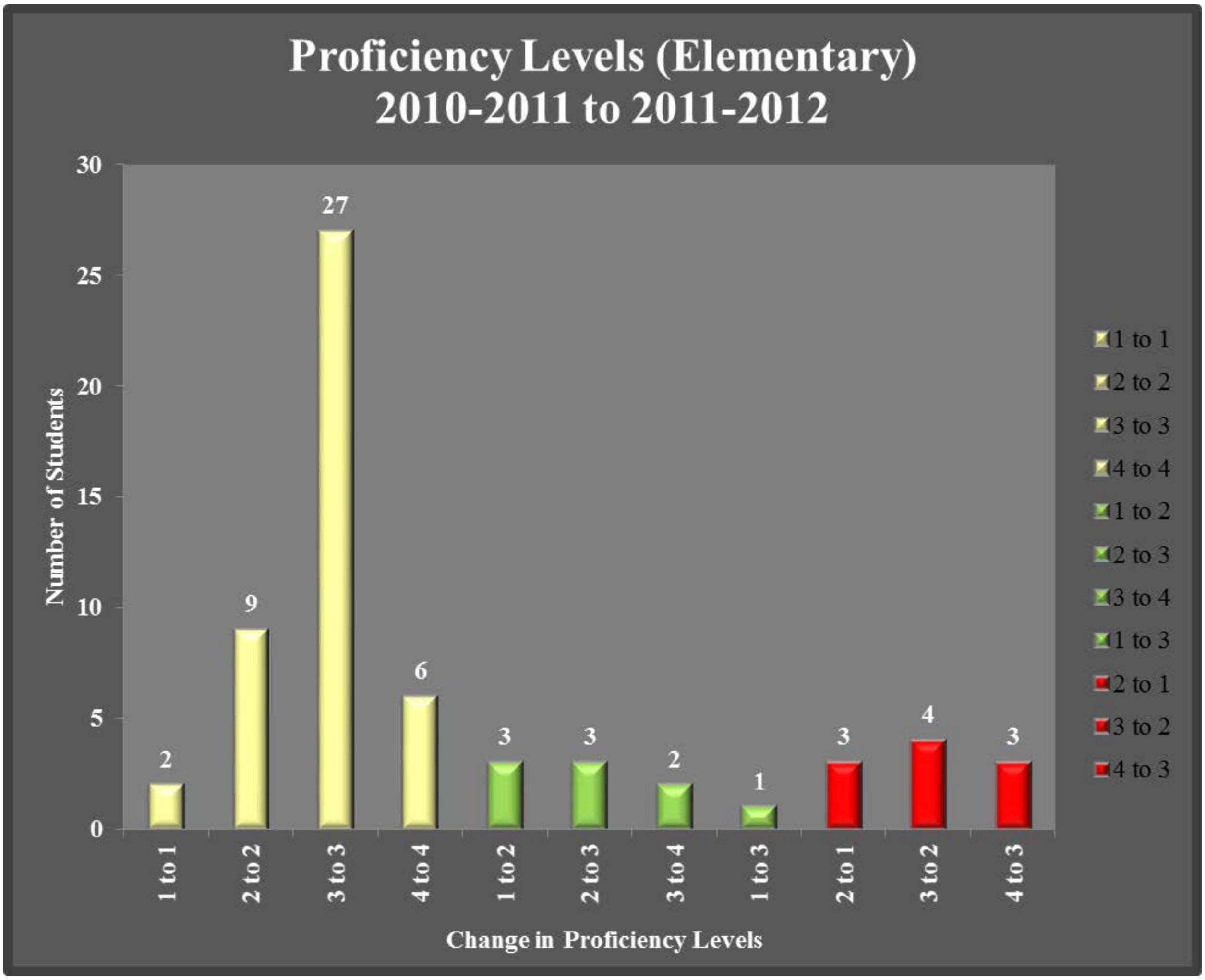


Figure 16. Proficiency levels of elementary students who participated in Classworks™ during the 2010-2011 school year.

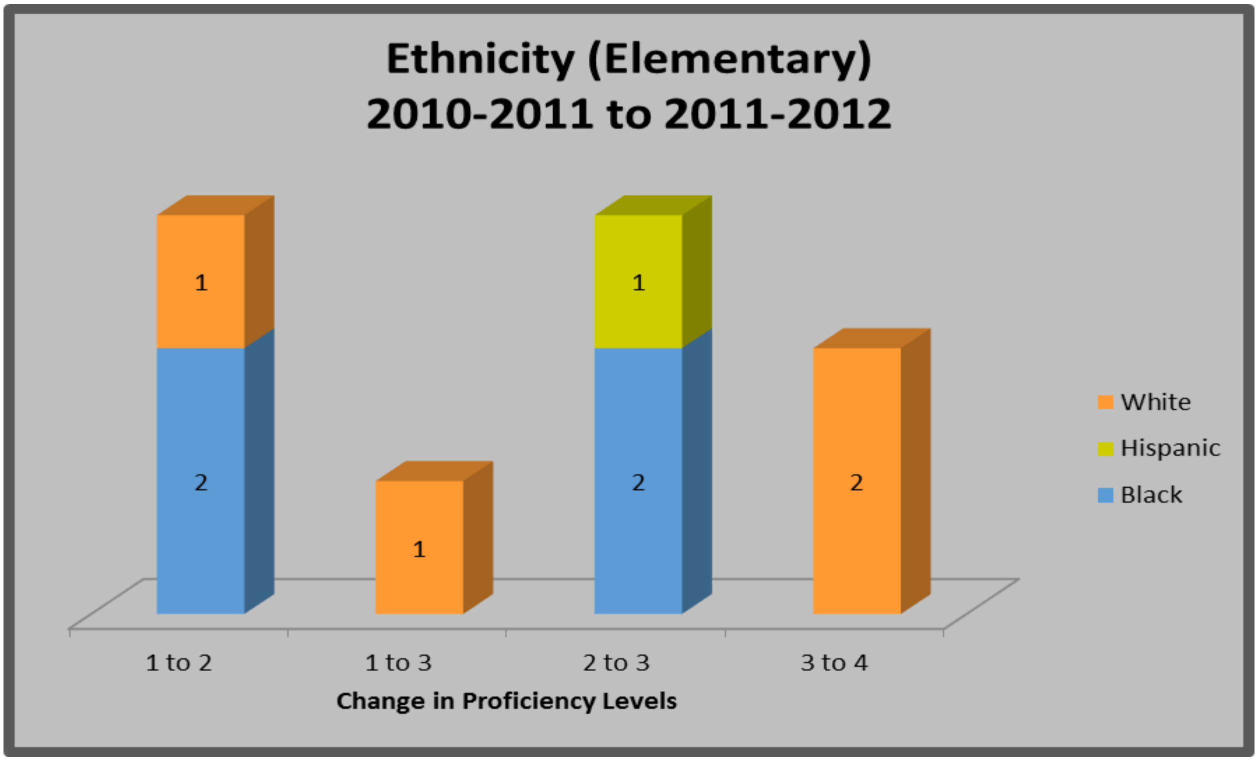


Figure 17. Proficiency levels of students who improved following participation in Classworks™ during the 2011-2012 school year disaggregated by ethnicity.

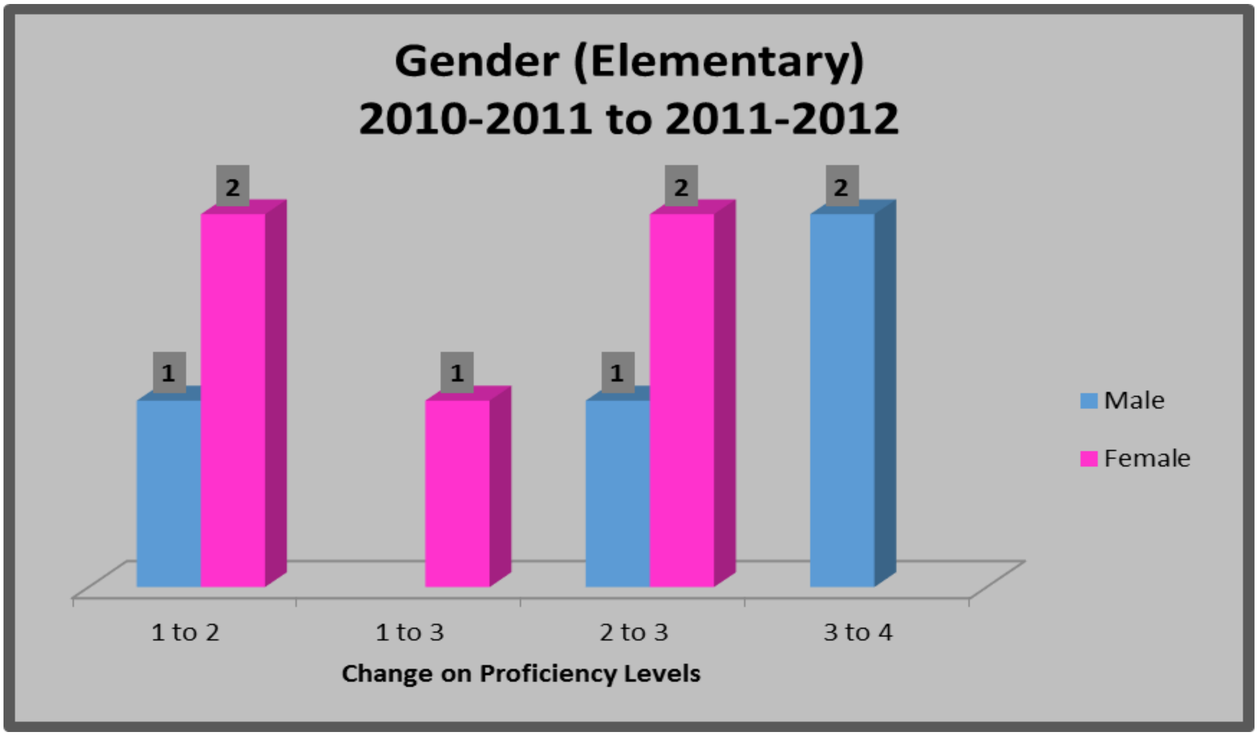


Figure 18. Proficiency levels of students who improved after participation in Classworks™ for the 2011-2012 school year disaggregated by gender.

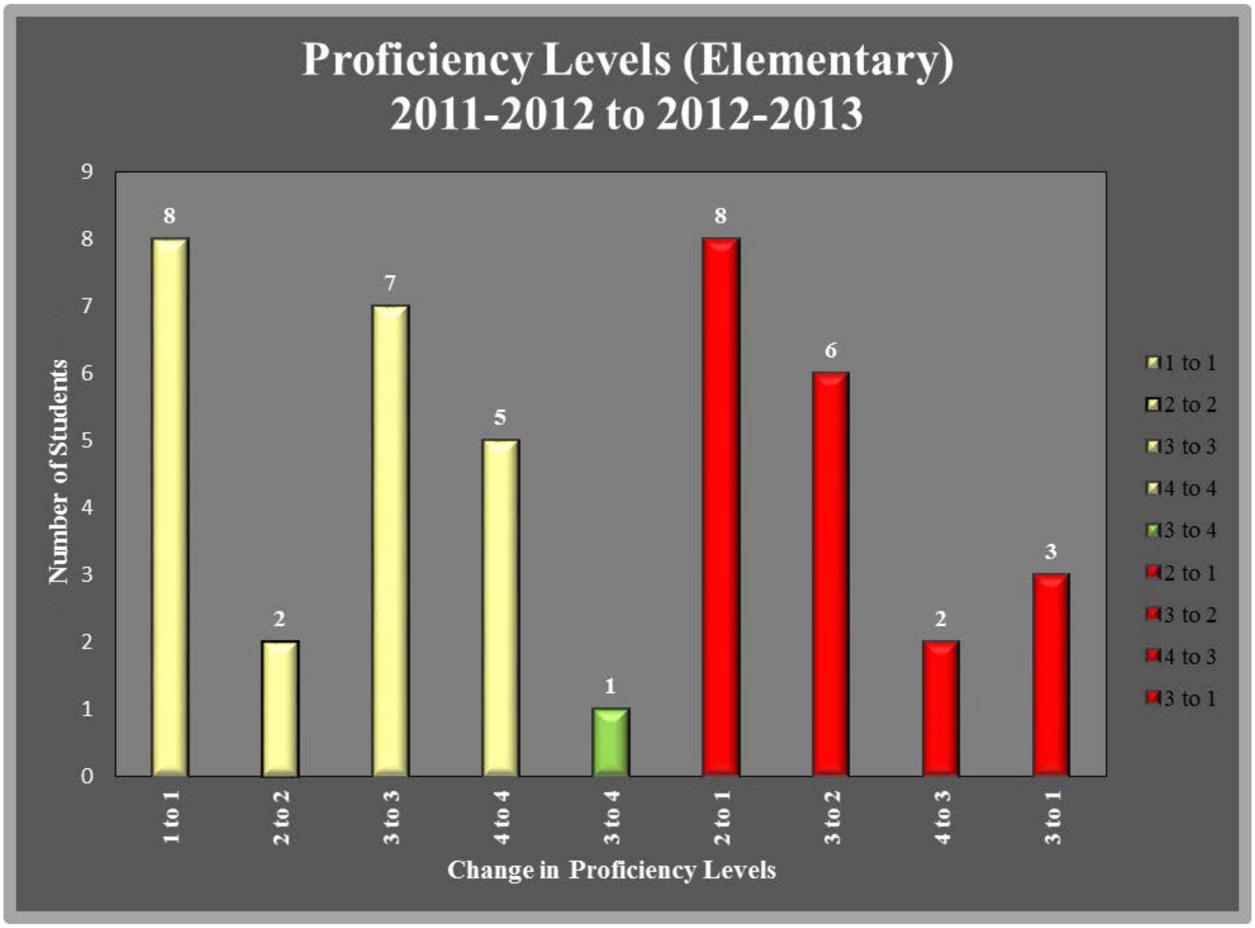


Figure 19. Proficiency levels of elementary students who participated in Classworks™ during the 2012-2013 school year.

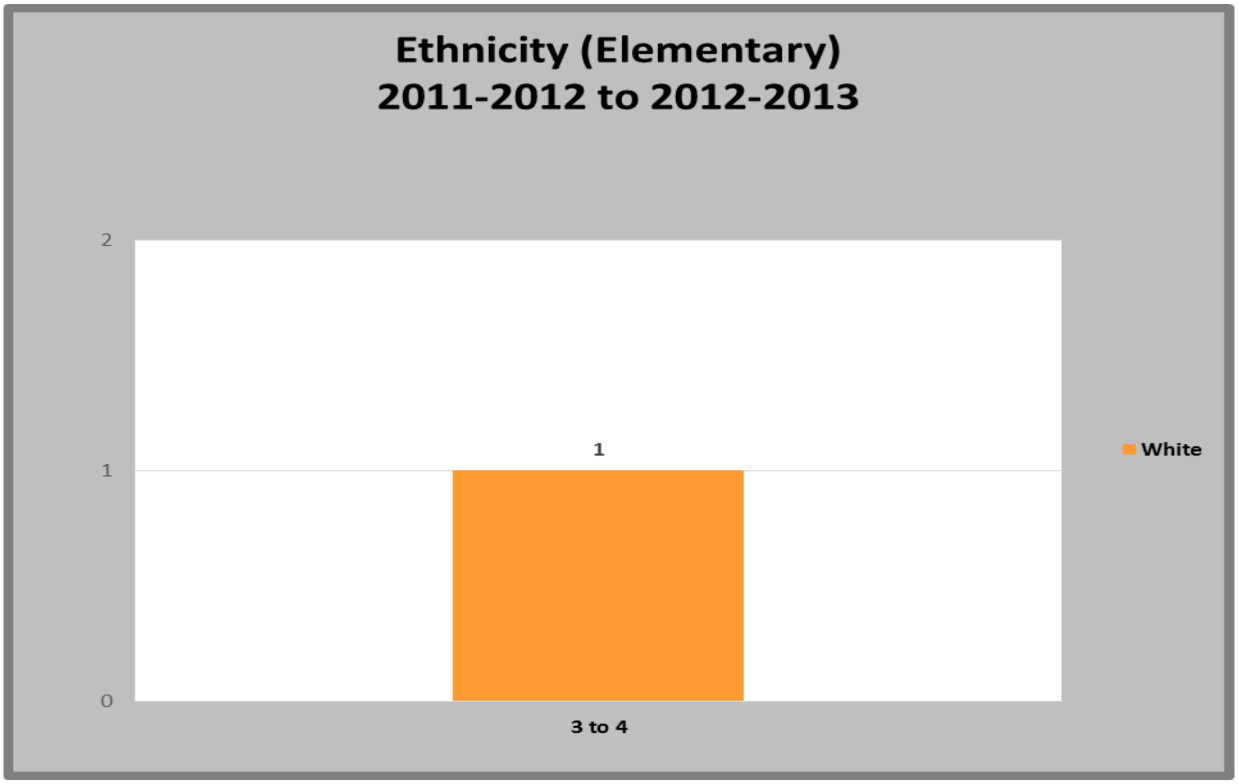


Figure 20. Disaggregated ethnicity data for proficiency level increase following participation in Classworks™ for the 2012-2013 school year.

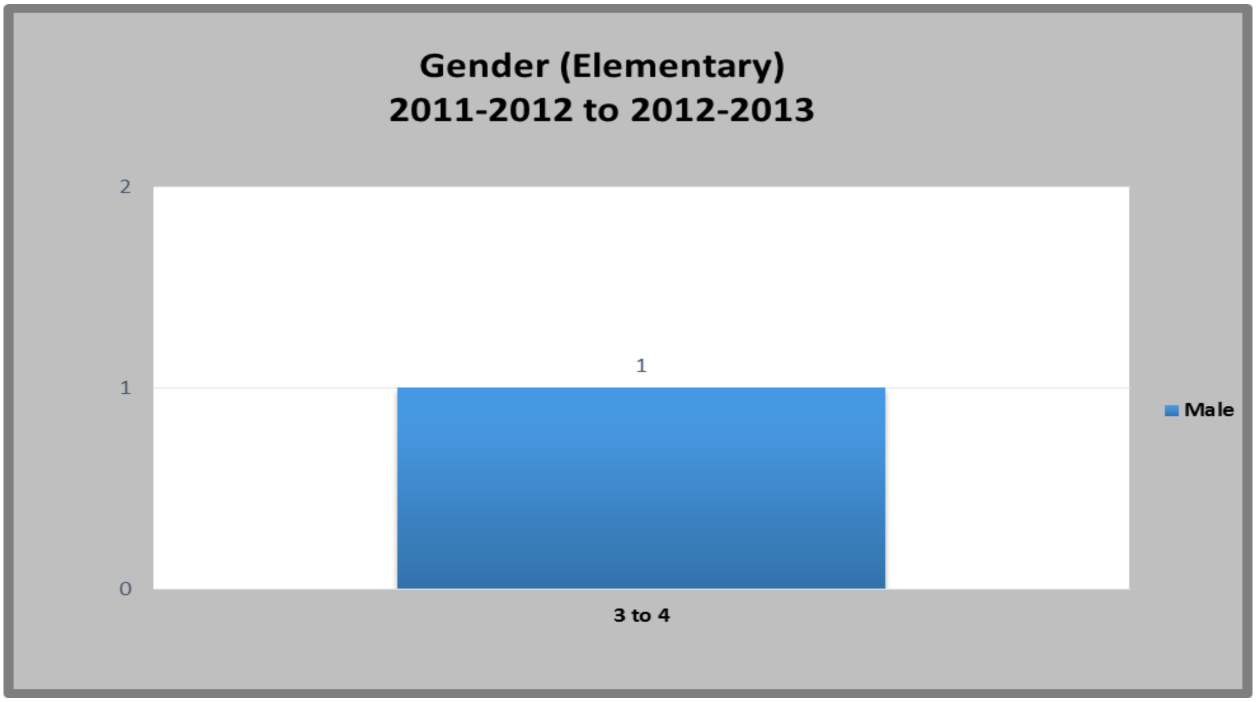


Figure 21. Disaggregated gender data for proficiency level increase following participation in Classworks™ for the 2012-2013 school year.

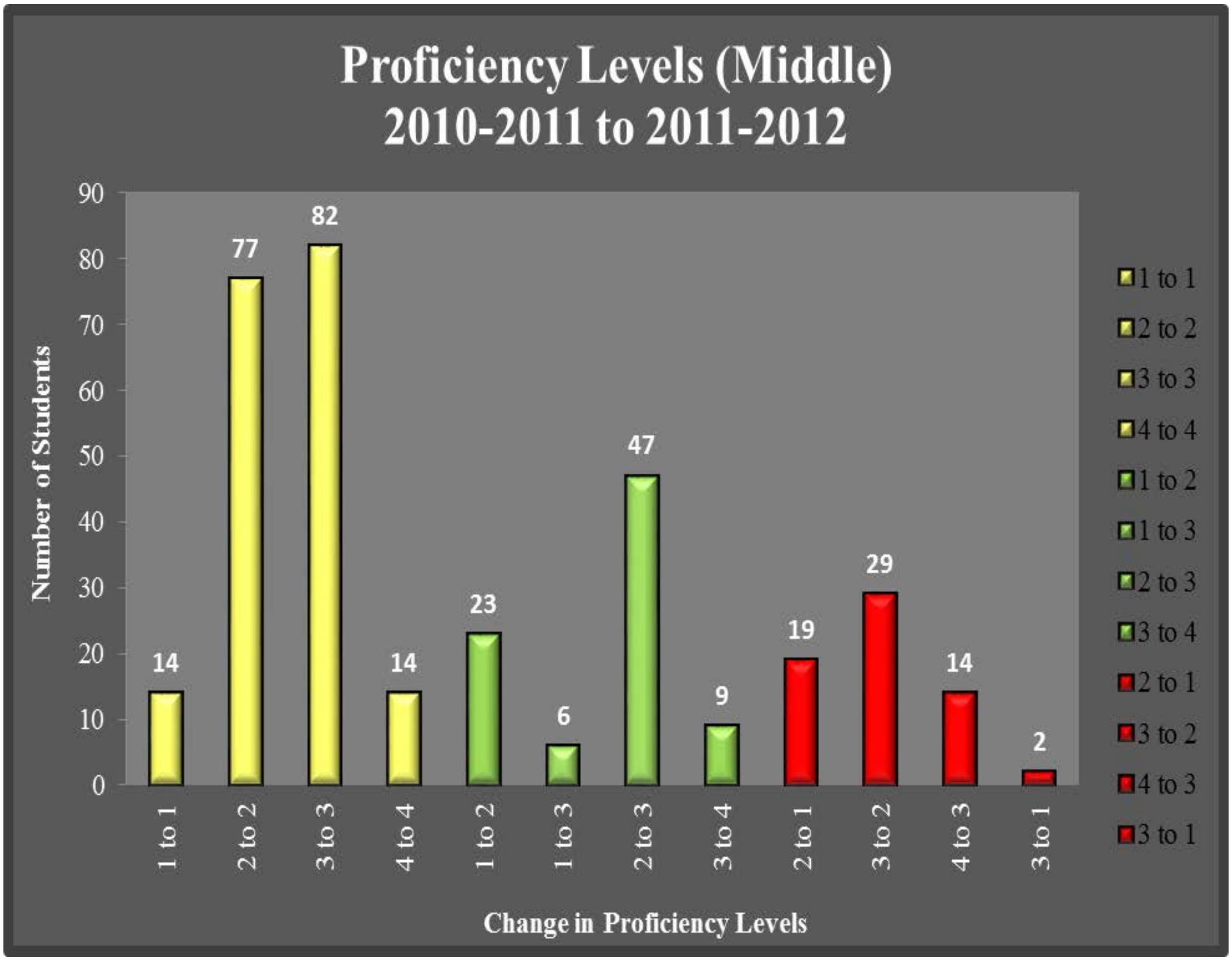


Figure 22. Proficiency levels of middle school students who participated in Classworks™ during the 2011-2012 school year.

As with elementary, students who increased their proficiency level were compared based on ethnicity and gender. Figures 23 and 24 depict this disaggregated data. Of those who improved, 38 (48%) were Black, 33 were White (41%), and nine were Hispanic (11%). Students who increased by two proficiency levels were comprised of four Black students and one White student. When comparing male to female students, 50 (59%) males and 35 (41%) females increased their proficiency levels.

During the 2012-2013 school year, 400 middle school students with end-of-grade test scores participated in the Classworks™ program. The number of students who scored the same proficiency level as the previous year was 85 (21%). Five (1%) students improved. Of the 400 students who participated, 289 (72%) decreased by at least one proficiency level. Some students decreased by two and three levels, 106 (27%) and 4 (1%), respectively. Figure 25 illustrates this data.

The number of Black versus White students who increased proficiency levels for the 2012-2013 school year were equal; however, males outperformed females four to one. Figures 26 and 27 displays this information.

The purpose of this program evaluation of Classworks™ stemmed from an on-going trend that students in the Richmond County School District remained below the state average on the math End-of-Grade test. The superintendent requested an analysis of proficiency data of students who participated in the program. The need for this evaluation was necessary due to the fact that a comprehensive evaluation had not been completed by the school district. As part of this Problem of Practice program evaluation for Richmond County School District , the results and recommendations would be provided to the superintendent. This information obtained was intended to inform school officials and to guide decisions in the future.

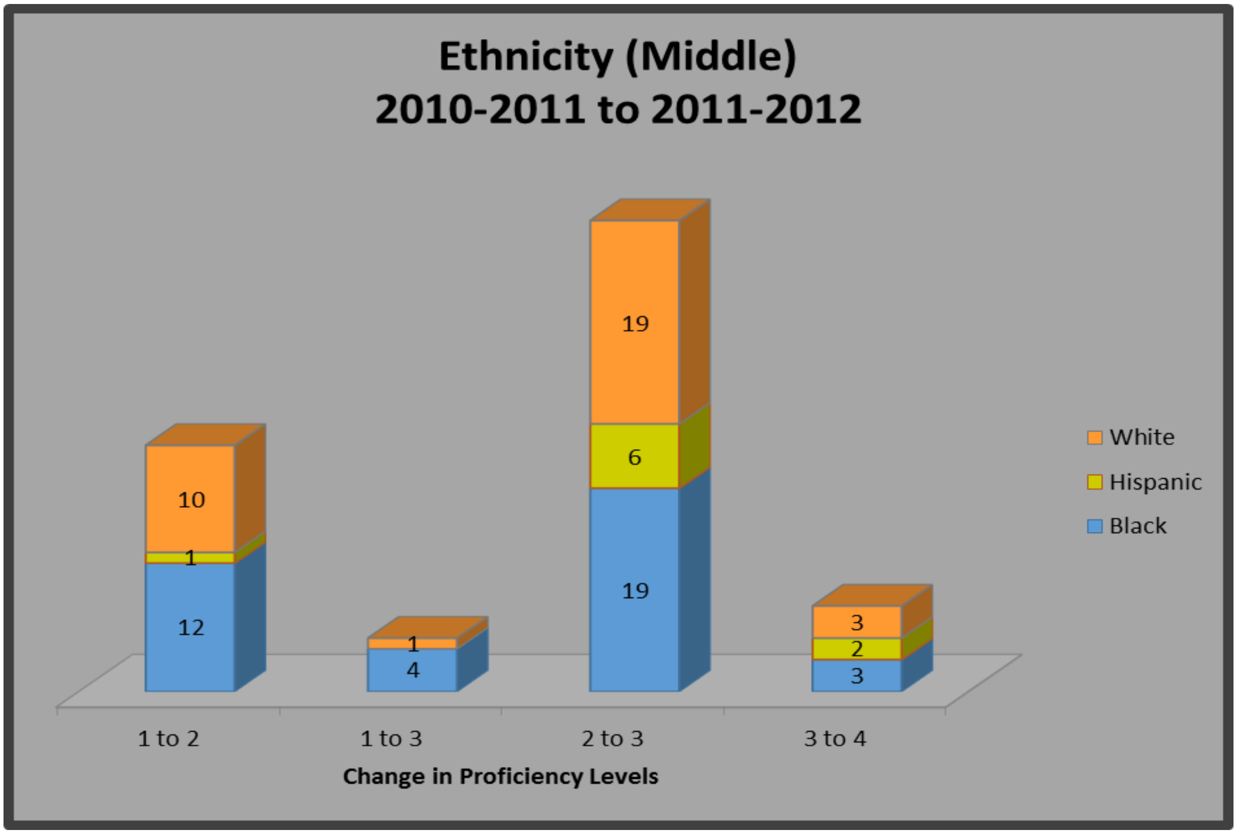


Figure 23. Disaggregated ethnicity data for proficiency level increase following participation in Classworks™ for the 2011-2012 school year.

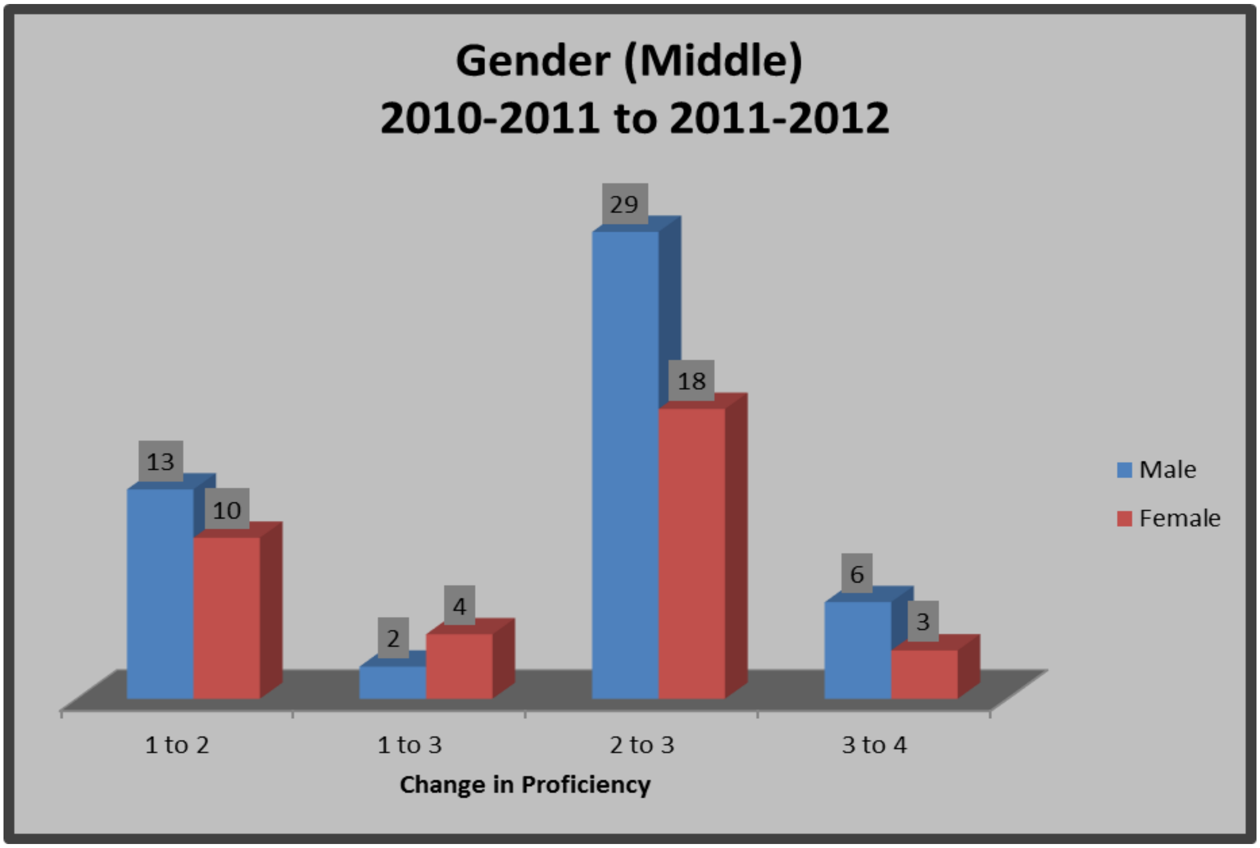


Figure 24. Disaggregated gender data for proficiency level increase following participation in Classworks™ for the 2011-2012 school year.

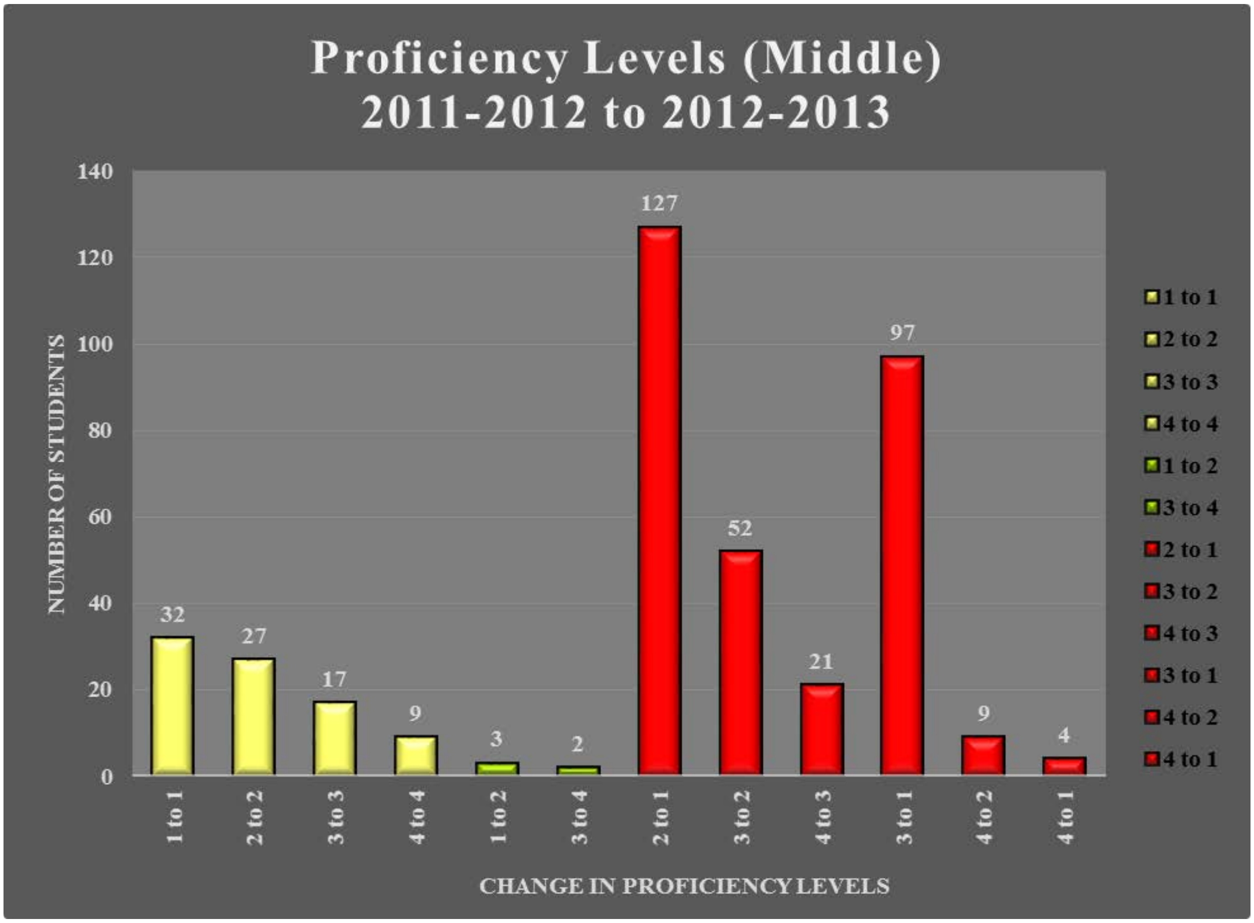


Figure 25. Proficiency levels of middle school students who participated in Classworks™ during the 2012-2013 school year.

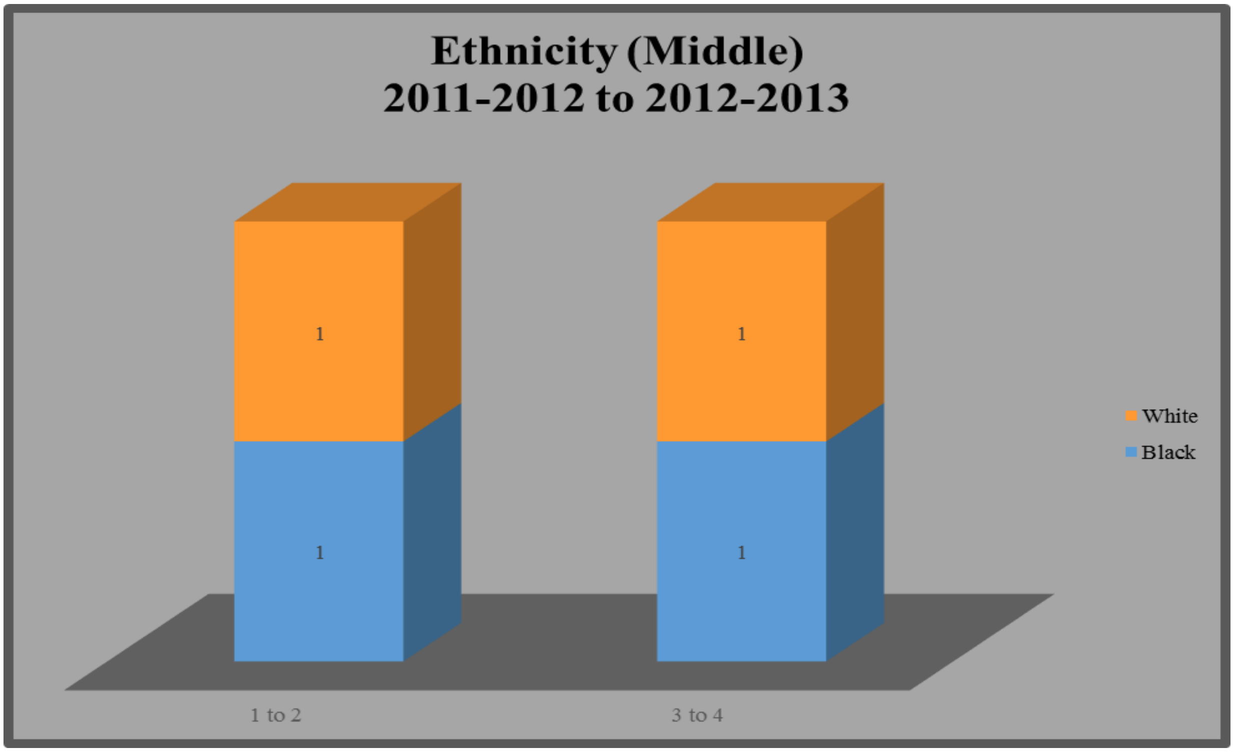


Figure 26. Disaggregated ethnicity data for proficiency level increase following participation in Classworks™ for the 2012-2013 school year.

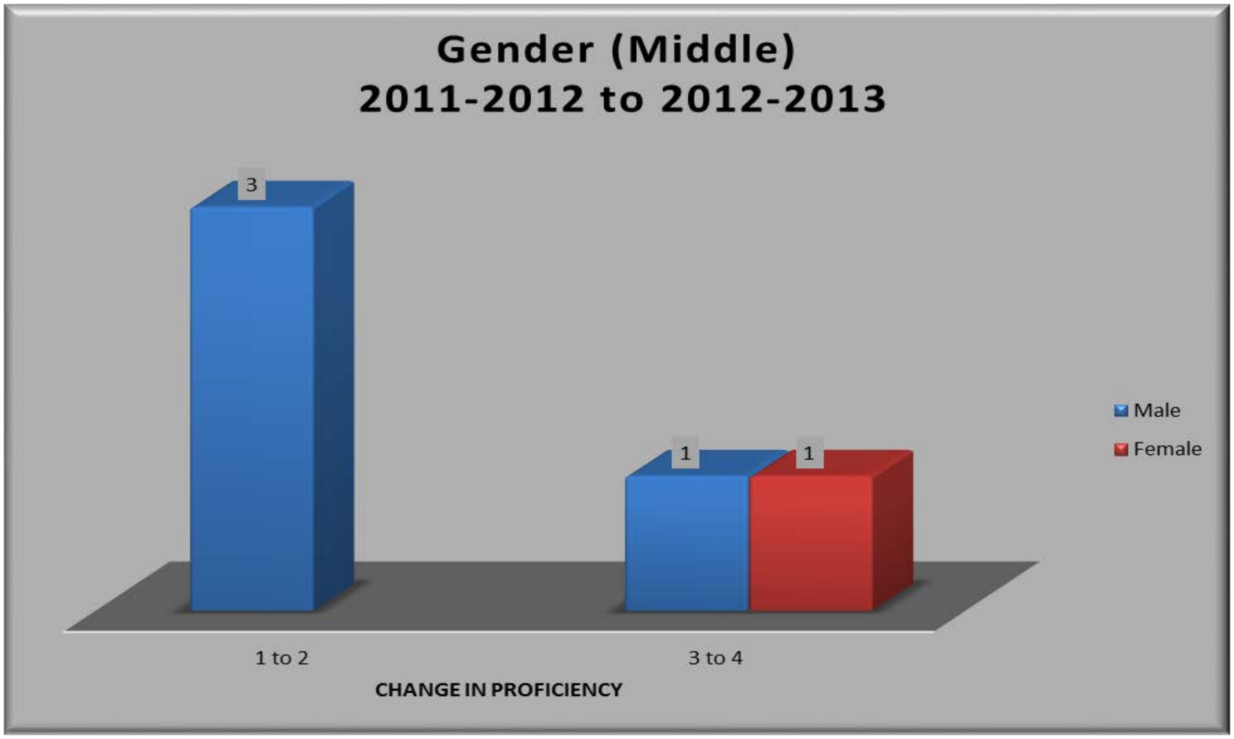


Figure 27. Disaggregated gender data for proficiency level increase following participation in Classworks™ for the 2012-2013 school year.

The conclusions for this program evaluation are based on information relating to the degree of fidelity of implementation among schools and an analysis of the impact of Classworks™ participation on End-of-Grade test scores. In addition, dissagregated data for ethinity and gender were included. It is important to note that during the time frame of this program evaluation, North Carolina adopted the Common Core State Standards. The 2012-2013 end-of-grade test reflected the change in curriculum; thus, a new test was administered. According to the North Carolina Department of Public Instruction, "The Common Core State Standards are more rigorous than North Carolina's earlier standards" (Public Schools of North Carolina, n.d.d.). Due to the administration of a more rigorous assessment, scores on standardized tests across the state dramatically decreased. In the interest of being fair to Classworks™, the conclusions from the quantitative data will not reflect 2012-2013 end-of-grade test data.

Conclusions

1. Based on the survey, three of the four schools indicated that they implemented the program with fidelity; however, in response to the question relating to challenges of implementing the program: program fidelity, negative student behaviors, lack of support, and scheduling were expressed, all of which have an impact on fidelity. Furthermore, a more in-depth discussion of fidelity occurred during the interviews. It was evident based on those conversations that the program as a whole was not implemented with fidelity.
2. The overall opinion of the program was positive and administrators agreed that if implemented with fidelity, participation in the program would improve student achievement.

3. The greatest improvements in proficiency levels occurred during the 2011-2012 school year for both elementary and middle schools. The Common Core State Standards and new state assessments were implemented during the 2012-2013 school year. This change had a substantial impact on student achievement levels. It is the opinion of this evaluator that the change in curriculum overshadowed any effect of Classworks™ on End-of-Grade test scores.
4. Middle school students had the greatest gains in student achievement as measured by the End-of-Course test. During the 2011-2012 school year, 25% of middle school students who participated in the program had an increase in proficiency level; whereas, only 14% of elementary school students improved.
5. With regards to ethnicity in elementary schools, there were slight differences between Black and White students; however, the data revealed a slight advantage for Black students. The overall population of students who participated in the program were 30% Black and 37% White. The results of proficiency gains were equal; therefore, in actuality, during the 2011-2012 school year, Black students made larger gains. Hispanic students did not perform well. The overall population was 27% and only 1% were included with the group of students that improved.
6. In the middle schools, the percentage of Black versus White students that participated in the program was 40% and 38%, respectively. Of those that improved 48% were Black and 41% were White. Although, both groups improved in alignment with the overall population, Black students improved at a higher rate. Hispanic students made up 11% of the students who improved. The overall population of Hispanic students participating in the program was 13%; therefore, the difference is negligible.

7. When comparing gender of elementary schools, females outperformed males. The overall population of males and females in Classworks™ was 56% and 44%, respectively. The data for the 2011-2012 school year indicated just the opposite. Of those who improved, 44% were male and 56% were females.
8. In relation to gender of middle school students, males (59%) slightly outperformed females (41%) when comparing the students who improved to all students who participated in the program. In the 2011-2012 school year, the overall population of males and females were 55% and 45%, respectively.
9. The results of the study relating to gender supports the literature. The stereotype that males outperform females begins early in elementary school; however, any differences in test scores emerge later. In the study, females outperformed males in elementary school; however, the middle school data showed the reverse. The negative impact of this stereotype on females becomes worse as students progress through school.

Recommendations

1. The Classworks™ program was implemented by the district at various schools. Administrators were given flexibility in scheduling the number of sessions in a week and the amount of time allotted during each session along with the selection of students. Due to the variations in scheduling and selection of students, it is difficult to determine the degree of fidelity and how it impacts the results in student achievement. Guidelines should be developed that provide more consistency with implementation.

2. There needs to be complete buy-in from all educational stakeholders: the company, district leadership, administrators, and teachers. It was reported that there was a disconnect with teachers and that the main parties involved were administrators and students. Classworks™ is a tool of intervention and it would be more effective if teachers were directly involved with analyzing student data and determining the structure of the individualized instruction for their students.
3. Teachers need to be directly involved with their students who are participating in Classworks™. They are the best resource for determining the areas of weakness when developing the program for each individual student.
4. Based on the study, Hispanic students did not improve in elementary school when compared to other races; however, they did well in middle school. A focus and additional resources should be provided for Hispanic students in elementary school to improve this deficit which could be related to a language barrier.
5. Professional development and support should be continuous when implementing programs in order to ensure quality. Teachers should be fully trained on the features and benefits of the program prior to full implementation.
6. Teachers need to be trained to analyze data for individual students. By analyzing data, teachers can determine if the program is helping their students and make adjustments as needed based on this information.
7. Professional development should be provided in relation to gender-based stereotypes in math to help eliminate the detrimental effect on famale students.
8. A monitoring and evaluation plan should be developed in conjunction with the district office, school administrators and the company. The plan should be on-going to

ensure complete fidelity and improved student academic achievement as a result of participation in the program.

9. North Carolina Public Schools and the General Assembly need to generate clean, consistent data that can be compared from year to year in order for teachers, administrators, and districts to continuously improve instruction.
10. For future studies, the addition of growth data would be beneficial in strenthening the program evaluation by providing more consise data for drawing conclusions.

Executive Summary

In summary, the Classworks™ program, an intervention program designed to improve math skills in grades three through eight, appears to have a positive impact on student achievement. The level of improvement is based on the degree of fidelity by which the program is implemented. Based on proficiency scores on the 2011-2012 North Carolina End-of-Grade test, middle school students showed more improvement than elementary school students. In both elementary and middle schools, Black students improved more than White students. Hispanic students in middle schools improved at a steady rate along with the other sub-groups; however, their representation in elementary schools was low. In relation to gender, girls outperformed boys in elementary school with the reverse result in middle school. The 2012-2013 data were inconclusive due the change in North Carolina curriculum and administration of a new, more rigorous end-of-grade assessment. Test scores across the state decreased significantly. In all fairness to Classworks™, the impact of the program on end-of-grade test scores cannot be determined due to these changes. For future studies, the addition of growth data would strengthen the program evaluation by providing a clearer understanding of the data and the impact on academic achievement.

Through qualitative surveys and interviews of administrators designed to assess professional opinions of the program, it was indicated that the overall opinion of the program was positive. Administrators agreed that the program would be successful if implemented with complete fidelity. Their opinions provided valuable insight to the impact that Classworks™ could have on student achievement.

Although participation in the Classworks™ program appears to have a positive impact on student achievement, it is believed that the impact could be greater with an improved structure for implementation. Development of guidelines for implementation and adherence to those guidelines would strengthen fidelity of the program. Professional development for administrators and teachers should be consistent and continuous. Teachers need to be directly involved in monitoring their students' progress and providing input to fully utilize the individualized nature of the program. Finally, developing a monitoring and evaluation plan that is on-going will ensure effectiveness of the program and maximize the use of resources provided by the district.

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APPENDIX A: SURVEY QUESTIONS

1. Did you receive training for the implementation of the Classworks™ Program?
2. Was adequate support provided for implementation of Classworks™ in your school?
3. What did you find as challenges with the implementation of Classworks™ in your school?
4. Did you implement the Classworks™ program with fidelity in your school?
5. Briefly describe the scheduling process for implementing the math portion of Classworks™ in your school including selection of students, sessions per week, minutes per session, and the time of day (i.e. during electives, intervention block, etc.) that students attended the session.
6. Based on your observations, did Classworks™ have an impact on students' math skills?
7. List any positive behaviors that you observed while students were engaged in the program.
8. List any negative behaviors that you observed while students were engaged in the program.

APPENDIX B: INTERVIEW QUESTIONS

1. Describe the procedures in scheduling the Classworks™ program in your school, including when students participate and the amount of time and number of sessions per week.
2. What is the selection process for participation of students in the Classworks™ program?
3. What are the hurdles with implementation of the Classworks™ program?
4. What is your overall opinion of the Classworks™ program?
5. Is there anything you want to share about Classworks™ that we didn't discuss today? On what do you based your response?

APPENDIX C: 2010-2011 TO 2011-2012 ELEMENTARY EOG DATA

10-11 Grade	10-11 Ethnicity	10-11 Sex	10-11 Math Level	11-12 Math Level	11-12 Grade	11-12 Ethnicity	11-12 Sex
3	B	F	1	1	4	B	F
3	H	M	1	1	4	H	M
3	W	F	1	3	4	W	F
3	W	M	2	1	4	W	M
3	W	M	2	1	4	W	M
3	B	F	2	2	4	B	F
3	I	M	2	2	4	I	M
3	H	F	2	2	4	H	F
3	B	M	2	2	4	B	M
3	B	F	2	2	4	B	F
3	B	M	2	2	4	B	M
3	H	M	2	2	4	H	M
3	B	M	2	3	4	B	M
3	B	F	2	3	4	B	F
3	B	M	3	2	4	B	M
3	B	M	3	2	4	B	M
3	W	M	3	2	4	W	M
3	H	M	3	3	4	H	M
3	H	F	3	3	4	H	F
3	I	F	3	3	4	I	F
3	B	M	3	3	4	B	M
3	B	F	3	3	4	B	F
3	B	M	3	3	4	B	M
3	W	F	3	3	4	W	F
3	I	M	3	3	4	I	M
3	H	F	3	3	4	H	F
3	W	M	3	3	4	W	M
3	H	M	3	3	4	H	M
3	H	M	3	3	4	H	M
3	W	F	3	3	4	W	F
3	B	F	3	3	4	B	F
3	W	F	3	3	4	W	F
3	W	F	3	3	4	W	F
3	W	F	3	3	4	W	F
3	W	M	3	3	4	W	M
3	W	F	3	3	4	W	F

3	W	M	3	3	4	W	M
3	H	F	4	3	4	H	F
3	W	F	4	3	4	W	F
3	W	F	4	3	4	W	F
3	W	M	4	4	4	W	M
3	B	M	4	4	4	B	M
3	H	M	4	4	4	H	M
4	B	F	1	2	5	B	F
4	B	F	1	2	5	B	F
4	W	M	1	2	5	W	M
4	H	M	2	1	5	H	M
4	W	M	2	2	5	W	M
4	B	M	2	2	5	B	M
4	H	F	2	3	5	H	F
4	W	F	3	2	5	W	F
4	A	F	3	3	5	A	F
4	H	F	3	3	5	H	F
4	H	M	3	3	5	H	M
4	B	F	3	3	5	B	F
4	B	M	3	3	5	B	M
4	H	M	3	3	5	H	M
4	H	F	3	3	5	H	F
4	W	M	3	4	5	W	M
4	W	M	3	4	5	W	M
4	W	M	4	4	5	W	M
4	H	M	4	4	5	H	M
4	W	M	4	4	5	W	M
5	B	M	1	1	6	B	M

APPENDIX D: ELEMENTARY EOG DATA 2011-2012 to 2012-2013

12-13 Grade	12-13 Ethnicity	10-11 Sex	11-12 Math Level	12-13 Math Level	11-12 Grade	11-12 Ethnicity	11-12 Sex
4	W	F	1	1	3	W	F
4	H	F	1	1	3	H	F
4	W	M	1	1	3	W	M
4	B	F	1	1	3	B	F
4	W	M	1	1	3	W	M
4	B	M	1	1	3	B	M
4	W	F	1	1	3	W	F
4	W	F	2	1	3	W	F
4	W	F	2	1	3	W	F
4	B	F	2	1	3	B	F
4	W	M	2	1	3	W	M
4	W	M	2	1	3	W	M
4	W	F	2	1	3	W	F
4	B	F	2	1	3	B	F
4	W	M	2	1	3	W	M
4	B	M	2	2	3	B	M
4	W	M	2	2	3	W	M
4	H	M	3	1	3	H	M
4	B	F	3	1	3	B	F
4	H	F	3	1	3	H	F
4	H	M	3	2	3	H	M
4	H	F	3	2	3	H	F
4	B	M	3	2	3	B	M
4	W	M	3	2	3	W	M
4	W	M	3	2	3	W	M
4	W	M	3	2	3	W	M
4	A	F	3	3	3	A	F
4	B	F	3	3	3	B	F
4	W	F	3	3	3	W	F
4	H	M	3	3	3	H	M
4	H	M	3	3	3	H	M
4	W	F	3	3	3	W	F
4	W	M	3	3	3	W	M
4	W	F	3	4	3	W	F
4	B	M	4	3	3	B	M
4	W	F	4	3	3	W	F

4	W	F	4	4	3	W	F
4	W	F	4	4	3	W	F
4	W	F	4	4	3	W	F
4	W	M	4	4	3	W	M
4	H	F	4	4	3	H	F
5	M	M	1	1	4	M	M

APPENDIX E: MIDDLE EOG DATA 2010-2011 to 2011-2012

10-11 Grade	10-11 Ethnicity	10-11 Sex	10-11 Math Level	11-12 Math Level	11-12 Grade	11-12 Ethnicity	11-12 Sex
5	B	F	1	1	6	B	F
5	B	M	1	1	6	B	M
5	B	F	1	1	6	B	F
5	W	M	1	1	6	W	M
6	W	F	1	1	6	W	F
5	W	M	1	2	6	W	M
5	B	F	1	2	6	B	F
5	B	F	1	2	6	B	F
5	B	M	1	2	6	B	M
5	B	F	1	2	6	B	F
5	W	M	1	2	6	W	M
5	B	M	1	2	6	B	M
5	W	M	2	1	6	W	M
5	W	M	2	1	6	W	M
5	W	F	2	1	6	W	F
5	W	M	2	1	6	W	M
5	I	M	2	1	6	I	M
5	H	F	2	1	6	H	F
5	W	F	2	2	6	W	F
5	H	F	2	2	6	H	F
5	B	M	2	2	6	B	M
5	B	M	2	2	6	B	M
5	B	F	2	2	6	B	F
5	H	F	2	2	6	H	F
5	W	M	2	2	6	W	M
5	B	F	2	2	6	B	F
5	W	F	2	2	6	W	F
5	I	M	2	2	6	I	M
5	W	F	2	2	6	W	F
5	I	F	2	2	6	I	F
5	B	M	2	2	6	B	M
5	W	M	2	2	6	W	M
5	B	F	2	2	6	B	F
5	B	M	2	2	6	B	M
5	W	F	2	2	6	W	F

5	B	M	2	2	6	B	M
5	B	M	2	3	6	B	M
5	H	F	2	3	6	H	F
5	I	M	3	1	6	I	M
5	B	F	3	2	6	B	F
5	B	M	3	2	6	B	M
5	H	M	3	2	6	H	M
5	H	M	3	2	6	H	M
5	W	M	3	2	6	W	M
5	H	M	3	2	6	H	M
5	B	M	3	2	6	B	M
5	W	M	3	2	6	W	M
5	W	F	3	2	6	W	F
5	B	M	3	2	6	B	M
5	W	M	3	2	6	W	M
5	I	M	3	2	6	I	M
5	B	F	3	2	6	B	F
5	B	M	3	2	6	B	M
5	W	M	3	2	6	W	M
5	W	F	3	2	6	W	F
5	H	F	3	2	6	H	F
5	H	M	3	2	6	H	M
5	B	F	3	2	6	B	F
5	B	F	3	2	6	B	F
5	B	F	3	2	6	B	F
5	W	M	3	3	6	W	M
5	W	F	3	3	6	W	F
5	W	M	3	3	6	W	M
5	B	M	3	3	6	B	M
5	W	M	3	3	6	W	M
5	B	M	3	3	6	B	M
5	I	M	3	3	6	I	M
5	H	M	3	3	6	H	M
5	H	F	3	3	6	H	F
5	H	M	3	3	6	H	M
5	H	M	3	3	6	H	M
5	H	F	3	3	6	H	F
5	B	M	3	3	6	B	M
5	B	F	3	3	6	B	F
5	H	M	3	3	6	H	M
5	W	M	3	3	6	W	M

5	B	M	3	3	6	B	M
5	B	F	3	3	6	B	F
5	B	M	3	3	6	B	M
5	M	M	3	3	6	M	M
5	W	F	3	3	6	W	F
5	I	M	3	3	6	I	M
5	W	M	3	3	6	W	M
5	B	M	3	3	6	B	M
5	W	F	3	3	6	W	F
5	W	F	3	3	6	W	F
5	W	F	3	3	6	W	F
5	W	M	3	3	6	W	M
5	I	M	3	3	6	I	M
5	B	F	3	3	6	B	F
5	I	M	3	3	6	I	M
5	W	F	3	3	6	W	F
5	W	F	3	3	6	W	F
5	W	F	3	3	6	W	F
5	W	M	3	3	6	W	M
5	W	F	3	3	6	W	F
5	I	F	3	3	6	I	F
5	B	M	3	3	6	B	M
5	B	F	3	3	6	B	F
5	B	M	3	3	6	B	M
5	W	M	3	3	6	W	M
5	B	F	3	3	6	B	F
5	I	F	3	3	6	I	F
5	B	F	3	3	6	B	F
5	B	M	3	3	6	B	M
5	B	F	3	3	6	B	F
5	I	F	3	3	6	I	F
5	W	M	3	4	6	W	M
5	B	F	3	4	6	B	F
5	B	M	4	3	6	B	M
5	W	M	4	3	6	W	M
5	H	M	4	3	6	H	M
5	W	M	4	3	6	W	M
5	B	F	4	3	6	B	F
5	H	F	4	3	6	H	F
5	W	F	4	3	6	W	F
5	W	F	4	3	6	W	F

5	W	M	4	3	6	W	M
5	I	M	4	3	6	I	M
5	I	F	4	3	6	I	F
5	H	F	4	3	6	H	F
5	B	F	4	3	6	B	F
5	B	M	4	4	6	B	M
5	H	F	4	4	6	H	F
5	H	M	4	4	6	H	M
5	W	M	4	4	6	W	M
5	I	M	4	4	6	I	M
5	W	M	4	4	6	W	M
5	W	M	4	4	6	W	M
5	W	M	4	4	6	W	M
5	W	M	4	4	6	W	M
5	W	M	4	4	6	W	M
5	W	M	4	4	6	W	M
5	W	M	4	4	6	W	M
5	W	M	4	4	6	W	M
6	W	F	1	1	7	W	F
6	I	F	1	1	7	I	F
6	W	M	1	1	7	W	M
6	B	M	1	1	7	B	M
6	I	F	1	1	7	I	F
6	B	M	1	2	7	B	M
6	B	F	1	2	7	B	F
6	W	M	1	2	7	W	M
6	W	F	1	2	7	W	F
6	W	F	1	2	7	W	F
6	W	F	1	2	7	W	F
6	W	M	1	2	7	W	M
6	H	M	1	2	7	H	M
6	B	F	1	3	7	B	F
6	B	F	1	3	7	B	F
6	B	F	2	1	7	B	F
6	B	F	2	1	7	B	F
6	B	M	2	1	7	B	M
6	B	F	2	1	7	B	F
6	W	M	2	1	7	W	M
6	W	M	2	1	7	W	M
6	H	F	2	1	7	H	F
6	B	M	2	2	7	B	M

6	B	M	2	2	7	B	M
6	B	M	2	2	7	B	M
6	B	M	2	2	7	B	M
6	B	F	2	2	7	B	F
6	B	M	2	2	7	B	M
6	W	M	2	2	7	W	M
6	B	M	2	2	7	B	M
6	B	F	2	2	7	B	F
6	B	F	2	2	7	B	F
6	W	F	2	2	7	W	F
6	B	F	2	2	7	B	F
6	H	F	2	2	7	H	F
6	B	M	2	2	7	B	M
6	M	F	2	2	7	M	F
6	W	F	2	2	7	W	F
6	W	M	2	2	7	W	M
6	W	F	2	2	7	W	F
6	B	F	2	2	7	B	F
6	B	M	2	2	7	B	M
6	B	F	2	2	7	B	F
6	B	F	2	2	7	B	F
6	H	F	2	2	7	H	F
6	H	F	2	2	7	H	F
6	W	M	2	2	7	W	M
6	B	F	2	2	7	B	F
6	B	M	2	2	7	B	M
6	W	F	2	2	7	W	F
6	B	M	2	2	7	B	M
6	H	M	2	2	7	H	M
6	W	F	2	2	7	W	F
6	B	M	2	2	7	B	M
6	W	F	2	2	7	W	F
6	W	M	2	3	7	W	M
6	B	F	2	3	7	B	F
6	W	M	2	3	7	W	M
6	B	M	2	3	7	B	M
6	B	F	2	3	7	B	F
6	B	M	2	3	7	B	M
6	B	F	2	3	7	B	F
6	H	M	2	3	7	H	M
6	H	F	2	3	7	H	F

6	W	M	2	3	7	W	M
6	W	M	2	3	7	W	M
6	W	M	2	3	7	W	M
6	W	M	2	3	7	W	M
6	W	M	2	3	7	W	M
6	B	M	2	3	7	B	M
6	W	M	2	3	7	W	M
6	W	F	2	3	7	W	F
6	W	F	2	3	7	W	F
6	B	F	2	3	7	B	F
6	W	M	2	3	7	W	M
6	B	M	2	3	7	B	M
6	M	M	2	3	7	M	M
6	I	F	2	3	7	I	F
6	H	M	2	3	7	H	M
6	W	F	2	3	7	W	F
6	B	M	2	3	7	B	M
6	W	M	2	3	7	W	M
6	B	F	2	3	7	B	F
7	W	M	2	3	7	W	M
6	W	F	3	1	7	W	F
6	B	M	3	2	7	B	M
6	B	F	3	2	7	B	F
6	B	M	3	3	7	B	M
6	W	F	3	3	7	W	F
6	W	M	3	3	7	W	M
6	M	F	3	3	7	M	F
6	W	F	3	3	7	W	F
6	I	M	3	3	7	I	M
6	B	F	3	3	7	B	F
6	W	F	3	3	7	W	F
6	W	F	3	3	7	W	F
6	B	M	3	4	7	B	M
7	B	M	1	1	8	B	M
7	I	M	1	1	8	I	M
7	W	M	1	1	8	W	M
7	B	M	1	2	8	B	M
7	B	M	1	2	8	B	M
7	W	M	1	2	8	W	M
7	W	F	1	2	8	W	F
7	B	M	1	2	8	B	M

7	B	M	1	2	8	B	M
7	B	F	1	2	8	B	F
7	W	F	1	2	8	W	F
7	I	F	1	3	8	I	F
7	B	F	1	3	8	B	F
7	W	M	1	3	8	W	M
7	B	M	1	3	8	B	M
7	W	M	2	1	8	W	M
7	B	F	2	1	8	B	F
7	W	M	2	1	8	W	M
7	W	M	2	1	8	W	M
7	W	F	2	1	8	W	F
7	W	M	2	1	8	W	M
7	H	M	2	2	8	H	M
7	B	M	2	2	8	B	M
7	W	F	2	2	8	W	F
7	B	M	2	2	8	B	M
7	W	M	2	2	8	W	M
7	B	M	2	2	8	B	M
7	B	F	2	2	8	B	F
7	W	F	2	2	8	W	F
7	B	M	2	2	8	B	M
7	W	M	2	2	8	W	M
7	W	M	2	2	8	W	M
7	W	M	2	2	8	W	M
7	B	F	2	2	8	B	F
7	B	F	2	2	8	B	F
7	B	M	2	2	8	B	M
7	B	F	2	2	8	B	F
7	W	M	2	2	8	W	M
7	B	F	2	2	8	B	F
7	B	F	2	2	8	B	F
7	B	M	2	2	8	B	M
7	W	F	2	2	8	W	F
7	W	M	2	2	8	W	M
7	B	M	2	2	8	B	M
7	B	F	2	2	8	B	F
7	W	M	2	2	8	W	M
7	I	F	2	2	8	I	F
7	W	F	2	3	8	W	F
7	W	M	2	3	8	W	M

7	B	M	2	3	8	B	M
7	B	M	2	3	8	B	M
7	W	M	2	3	8	W	M
7	W	F	2	3	8	W	F
7	B	F	2	3	8	B	F
7	B	M	2	3	8	B	M
7	B	M	2	3	8	B	M
7	H	M	2	3	8	H	M
7	W	M	2	3	8	W	M
7	B	M	2	3	8	B	M
7	I	F	2	3	8	I	F
7	W	F	2	3	8	W	F
7	B	M	2	3	8	B	M
7	B	F	2	3	8	B	F
7	H	F	2	3	8	H	F
7	W	F	3	2	8	W	F
7	B	M	3	2	8	B	M
7	H	F	3	2	8	H	F
7	W	M	3	2	8	W	M
7	B	M	3	2	8	B	M
7	H	M	3	2	8	H	M
7	B	F	3	3	8	B	F
7	W	F	3	3	8	W	F
7	H	F	3	3	8	H	F
7	H	M	3	3	8	H	M
7	B	F	3	3	8	B	F
7	I	F	3	3	8	I	F
7	B	F	3	3	8	B	F
7	B	F	3	3	8	B	F
7	H	M	3	3	8	H	M
7	B	M	3	3	8	B	M
7	H	F	3	3	8	H	F
7	W	F	3	3	8	W	F
7	W	F	3	3	8	W	F
7	W	M	3	3	8	W	M
7	B	M	3	3	8	B	M
7	H	M	3	3	8	H	M
7	B	M	3	3	8	B	M
7	H	M	3	3	8	H	M
7	W	M	3	3	8	W	M
7	H	M	3	3	8	H	M

7	H	F	3	3	8	H	F
7	W	F	3	3	8	W	F
7	W	F	3	3	8	W	F
7	B	M	3	3	8	B	M
7	W	M	3	3	8	W	M
7	H	M	3	3	8	H	M
7	B	M	3	4	8	B	M
7	W	F	3	4	8	W	F
7	I	M	3	4	8	I	M
7	H	M	3	4	8	H	M
7	H	M	3	4	8	H	M
7	W	F	3	4	8	W	F
7	W	M	4	3	8	W	M
7	B	M	4	4	8	B	M

APPENDIX F: MIDDLE EOG DATA 2011-2012 to 2012-2013

12-13 Grade	12-13 Ethnicity	10-11 Sex	11-12 Math Level	12-13 Math Level	11-12 Grade	11-12 Ethnicity	11-12 Sex
6	B	M	1	1	5	B	M
6	B	F	1	1	5	B	F
6	B	M	1	1	5	B	M
6	W	F	1	1	5	W	F
6	H	M	1	1	5	H	M
6	W	M	1	1	5	W	M
6	B	M	1	1	5	B	M
6	I	F	1	1	5	I	F
6	B	M	1	1	5	B	M
6	B	M	2	1	5	B	M
6	B	F	2	1	5	B	F
6	W	F	2	1	5	W	F
6	H	M	2	1	5	H	M
6	W	F	2	1	5	W	F
6	B	M	2	1	5	B	M
6	B	F	2	1	5	B	F
6	B	F	2	1	5	B	F
6	I	M	2	1	5	I	M
6	H	F	2	1	5	H	F
6	W	M	2	1	5	W	M
6	B	M	2	1	5	B	M
6	W	M	2	1	5	W	M
6	W	M	2	1	5	W	M
6	W	F	2	1	5	W	F
6	B	F	2	1	5	B	F
6	B	M	2	1	5	B	M
6	B	M	2	1	5	B	M
6	M	M	2	1	5	I	M
6	W	F	2	1	5	W	F
6	B	F	2	1	5	B	F
6	W	M	2	1	5	W	M
6	W	F	2	1	5	W	F
6	W	M	2	1	5	W	M
6	B	M	2	1	5	B	M
6	H	F	2	1	5	H	F

6	W	M	2	1	5	W	M
6	W	M	2	1	5	W	M
6	B	M	2	1	5	B	M
6	W	F	2	1	5	W	F
6	B	M	3	1	5	B	M
6	W	M	3	1	5	W	M
6	I	M	3	1	5	I	M
6	W	F	3	1	5	W	F
6	B	M	3	1	5	B	M
6	W	M	3	1	5	W	M
6	B	F	3	1	5	B	F
6	W	M	3	1	5	W	M
6	B	M	3	1	5	B	M
6	W	M	3	1	5	W	M
6	I	F	3	1	5	I	F
6	B	F	3	1	5	B	F
6	W	M	3	1	5	W	M
6	H	M	3	1	5	H	M
6	W	M	3	1	5	W	M
6	W	F	3	1	5	W	F
6	H	M	3	1	5	H	M
6	W	F	3	1	5	W	F
6	M	F	3	1	5	M	F
6	W	M	3	1	5	W	M
6	W	M	3	1	5	W	M
6	B	M	3	1	5	B	M
6	I	M	3	1	5	I	M
6	W	F	3	1	5	W	F
6	W	F	3	1	5	W	F
6	B	F	3	1	5	B	F
6	W	F	3	1	5	W	F
6	W	M	3	1	5	W	M
6	B	M	3	1	5	B	M
6	W	M	3	1	5	W	M
6	B	F	3	1	5	B	F
6	W	M	3	1	5	W	M
6	W	F	3	1	5	W	F
6	B	M	3	1	5	B	M
6	B	F	3	1	5	B	F
6	W	F	3	1	5	W	F
6	W	F	3	1	5	W	F

6	W	F	3	1	5	W	F
6	I	M	3	1	5	I	M
6	W	F	3	1	5	W	F
6	B	M	3	1	5	B	M
6	B	M	3	1	5	B	M
6	W	M	3	1	5	W	M
6	M	F	3	1	5	M	F
6	B	F	3	1	5	B	F
6	M	F	3	1	5	M	F
6	W	F	3	1	5	W	F
6	W	M	3	1	5	W	M
6	W	F	3	1	5	W	F
6	W	M	3	1	5	W	M
6	W	M	3	1	5	W	M
6	W	M	3	1	5	W	M
6	B	M	3	1	5	B	M
6	W	F	3	1	5	W	F
6	W	F	3	1	5	W	F
6	H	F	3	1	5	H	F
6	W	F	3	1	5	W	F
6	B	M	3	1	5	B	M
6	H	F	3	1	5	H	F
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6	W	F	3	2	5	W	F
6	I	F	3	2	5	I	F
6	W	M	3	2	5	W	M
6	H	M	3	2	5	H	M
6	W	M	3	2	5	W	M
6	B	M	3	2	5	B	M
6	W	F	3	2	5	W	F
6	W	F	3	2	5	W	F
6	W	F	3	2	5	W	F
6	W	F	3	2	5	W	F
6	W	M	3	2	5	W	M
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6	W	F	3	2	5	W	F
6	W	M	3	2	5	W	M
6	H	F	3	2	5	H	F
6	W	M	3	2	5	W	M
6	B	F	3	2	5	B	F

6	M	M	3	2	5	M	M
6	B	F	3	2	5	B	F
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6	W	F	3	2	5	W	F
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6	W	F	3	3	5	W	F
6	H	F	3	3	5	H	F
6	H	M	3	3	5	H	M
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6	W	M	4	1	5	W	M
6	W	F	4	2	5	W	F
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6	W	F	4	3	5	W	F
6	W	F	4	3	5	W	F
6	W	F	4	3	5	W	F
6	I	F	4	3	5	I	F
6	W	F	4	3	5	W	F
6	W	M	4	3	5	W	M
6	H	M	4	3	5	H	M
6	B	F	4	3	5	B	F
6	W	F	4	4	5	W	F
6	W	M	4	4	5	W	M
6	H	M	4	4	5	H	M
7	W	F	1	1	6	W	F
7	B	M	1	1	6	B	M

7	W	M	1	1	6	W	M
7	B	M	1	1	6	B	M
7	B	M	1	1	6	B	M
7	B	M	1	1	6	B	M
7	B	M	1	1	6	B	M
7	B	M	1	1	6	B	M
7	I	M	2	1	6	I	M
7	B	F	2	1	6	B	F
7	B	M	2	1	6	B	M
7	W	F	2	1	6	W	F
7	W	M	2	1	6	W	M
7	B	M	2	1	6	B	M
7	B	M	2	1	6	B	M
7	B	M	2	1	6	B	M
7	W	F	2	1	6	W	F
7	B	M	2	1	6	B	M
7	B	M	2	1	6	B	M
7	B	F	2	1	6	B	F
7	B	F	2	1	6	B	F
7	B	M	2	1	6	B	M
7	M	F	2	1	6	M	F
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7	B	M	2	1	6	B	M
7	B	F	2	1	6	B	F
7	B	F	2	1	6	B	F
7	W	F	2	1	6	W	F
7	B	M	2	1	6	B	M
7	B	F	2	1	6	B	F
7	W	F	2	1	6	W	F
7	B	M	2	1	6	B	M
7	W	M	2	1	6	W	M
7	B	F	2	1	6	B	F
7	B	F	2	1	6	B	F
7	H	F	2	1	6	H	F
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7	W	F	2	1	6	W	F
7	B	M	2	1	6	B	M
7	W	M	2	1	6	W	M
7	W	F	2	1	6	W	F
7	I	M	2	1	6	I	M
7	M	M	2	1	6	M	M

7	B	F	2	1	6	B	F
7	B	F	2	1	6	B	F
7	B	M	2	1	6	B	M
7	W	F	2	1	6	W	F
7	I	M	2	1	6	I	M
7	B	M	2	1	6	B	M
7	B	F	2	1	6	B	F
7	B	M	2	1	6	B	M
7	W	F	2	2	6	W	F
7	B	M	2	2	6	B	M
7	W	M	2	2	6	W	M
7	B	F	2	2	6	B	F
7	A	M	2	2	6	A	M
7	B	M	2	2	6	B	M
7	B	M	3	1	6	B	M
7	B	M	3	1	6	B	M
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7	W	M	3	1	6	W	M
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7	W	F	3	1	6	W	F
7	W	M	3	1	6	W	M
7	B	F	3	1	6	B	F
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7	B	F	3	1	6	B	F
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7	W	M	3	2	6	W	M
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7	W	M	3	2	6	W	M
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7	W	M	3	2	6	W	M
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7	H	M	3	3	6	H	M
7	W	M	3	3	6	W	M
7	W	F	3	3	6	W	F
7	W	M	3	3	6	W	M
7	B	M	3	3	6	B	M
7	H	F	3	3	6	H	F

7	B	F	3	3	6	B	F
7	B	M	3	3	6	B	M
7	W	M	3	4	6	W	M
7	W	F	4	2	6	W	F
7	W	M	4	4	6	W	M
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7	B	F	4	4	6	B	F
7	H	F	4	4	6	H	F
7	H	M	4	4	6	H	M
7	B	M	4	4	6	B	M
8	W	F	1	1	7	W	F
8	B	F	1	1	7	B	F
8	I	M	1	1	7	I	M
8	W	F	1	1	7	W	F
8	B	F	1	1	7	B	F
8	B	M	1	1	7	B	M
8	B	M	1	1	7	B	M
8	B	F	1	1	7	B	F
8	B	M	1	1	7	B	M
8	B	F	1	1	7	B	F
8	W	F	1	1	6	W	F
8	B	M	1	1	7	B	M
8	M	M	1	1	7	M	M
8	H	F	1	1	7	H	F
8	W	M	1	1	7	W	M
8	B	M	1	2	7	B	M
8	I	M	1	2	7	I	M
8	W	M	1	2	7	W	M
8	B	F	2	1	7	B	F
8	I	F	2	1	7	I	F
8	B	F	2	1	7	B	F
8	I	M	2	1	7	I	M
8	W	F	2	1	7	W	F
8	W	M	2	1	7	W	M
8	B	F	2	1	7	B	F
8	W	F	2	1	7	W	F
8	B	M	2	1	7	B	M
8	B	F	2	1	7	B	F
8	W	F	2	1	7	W	F
8	B	M	2	1	7	B	M
8	W	M	2	1	7	W	M

8	W	F	2	1	7	W	F
8	W	F	2	1	7	W	F
8	H	F	2	1	7	H	F
8	H	M	2	1	7	H	M
8	B	M	2	1	7	B	M
8	W	F	2	1	7	W	F
8	W	F	2	1	7	W	F
8	B	F	2	1	7	B	F
8	B	M	2	1	7	B	M
8	W	F	2	1	7	W	F
8	B	M	2	1	7	B	M
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8	B	M	2	1	7	B	M
8	B	M	2	1	7	B	M
8	B	M	2	1	7	B	M
8	B	M	2	1	7	B	M
8	W	M	2	1	7	W	M
8	I	M	2	1	7	I	M
8	B	M	2	1	7	B	M
8	W	M	2	1	7	W	M
8	W	F	2	1	7	W	F
8	W	F	2	1	7	W	F
8	W	M	2	1	7	W	M
8	B	M	2	1	7	B	M
8	W	F	2	1	7	W	F
8	B	F	2	1	7	B	F
8	W	F	2	1	7	W	F
8	B	F	2	1	7	B	F
8	B	M	2	1	7	B	M
8	B	M	2	1	7	B	M
8	B	M	2	1	7	B	M
8	B	M	2	1	7	B	M
8	B	M	2	1	7	B	M
8	W	F	2	1	7	W	F
8	M	M	2	1	7	M	M
8	B	F	2	1	7	B	F
8	B	M	2	1	7	B	M
8	I	M	2	1	7	I	M
8	W	M	2	1	7	W	M
8	B	F	2	1	7	B	F
8	A	F	2	1	7	A	F

8	W	F	2	2	7	W	F
8	W	F	2	2	7	W	F
8	I	M	2	2	7	I	M
8	B	M	2	2	7	B	M
8	I	F	2	2	7	I	F
8	W	M	2	2	7	W	M
8	I	M	2	2	7	I	M
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8	B	F	2	2	7	B	F
8	B	M	2	2	7	B	M
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8	W	F	3	1	7	W	F
8	I	M	3	1	7	I	M
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8	W	F	3	1	7	W	F
8	W	F	3	1	7	W	F

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8	W	F	3	1	7	W	F
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8	B	F	3	2	7	B	F
8	I	M	3	2	7	I	M
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8	B	M	3	2	7	B	M
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8	W	M	3	2	7	W	M
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8	W	M	4	1	7	W	M
8	H	M	4	1	7	H	M
8	W	F	4	2	7	W	F
8	B	M	4	2	7	B	M
8	H	F	4	2	7	H	F
8	H	M	4	2	7	H	M
8	W	M	4	3	7	W	M
8	W	F	4	3	7	W	F
8	H	F	4	3	7	H	F
8	B	F	4	3	7	B	F
8	W	M	4	3	7	W	M
8	W	F	4	3	7	W	F
8	W	F	4	3	7	W	F
8	W	M	4	3	7	W	M
8	M	M	4	3	7	M	M
8	A	F	4	3	7	A	F

APPENDIX G: LETTER OF SUPPORT

Richmond County Schools
Post Office Drawer 1259
Hamlet, North Carolina 28345

Dr. George E. Norris
Superintendent

Phone: (910) 582-5860
FAX: (910) 582-7921

November 8, 2012

Dr. William A. Rouse, Chairperson
East Carolina University
Department of Educational Leadership
College of Education - 210 Ragsdale Building
Mailstop: 515
Greenville, NC 27858

Dear Dr. Rouse:

I am writing this letter in support of Pam Patterson and Jacque Gregory completing a program evaluation on Classworks for the Richmond County School District. This program has been implemented both at the elementary level as well as the middle school level. It is a web-based curriculum resource for mathematics, language arts, reading, and elementary science. The program provides a differentiated learning environment for students by featuring an individualized learning path based on universal screening results. The district has invested a substantial amount of money in this program and my goal is to ensure that it is utilized to the greatest potential. My interest for the study would be to focus on those students who benefit the most from the program.

I will also agree to serve on the dissertation committee. I understand that I will need to be approved by the university to serve in this capacity. I look forward to receiving future information on this process. If you have any questions or comments, please feel free to contact me at 910-582-5860 or by email at georgenorris@richmond.k12.nc.us.

Sincerely,

George E. Norris

George E. Norris, Ed.D.
Superintendent

APPENDIX H: IRB APPROVAL LETTER

EAST CAROLINA UNIVERSITY
University & Medical Center Institutional Review Board Office
4N-70 Brody Medical Sciences Building · Mail Stop 682
600 Moye Boulevard · Greenville, NC 27834
Office **252-744-2914** · Fax **252-744-2284** · **www.ecu.edu/irb**

Notification of Initial Approval: Expedited

From: Social/Behavioral IRB
To: Pamela Patterson
CC:
Jim McDowelle
Date: 5/27/2015
Re: UMCIRB 15-000769
A Program Evaluation of Classworks

I am pleased to inform you that your Expedited Application was approved. Approval of the study and any consent form(s) is for the period of 5/27/2015 to 5/26/2016. The research study is eligible for review under expedited category # 5, 7. The Chairperson (or designee) deemed this study no more than minimal risk.

Changes to this approved research may not be initiated without UMCIRB review except when necessary to eliminate an apparent immediate hazard to the participant. All unanticipated problems involving risks to participants and others must be promptly reported to the UMCIRB. The investigator must submit a continuing review/closure application to the UMCIRB prior to the date of study expiration. The Investigator must adhere to all reporting requirements for this study.

Approved consent documents with the IRB approval date stamped on the document should be used to consent participants (consent documents with the IRB approval date stamp are found under the Documents tab in the study workspace).

The approval includes the following items:

Name	Description
Interview Questions.docx	Interview/Focus Group Scripts/Questions
Norris letter of support	Additional Items
Patterson Dissertation IRB submission.doc	Study Protocol or Grant Application
Survey Cover Letter	Consent Forms
Survey Questions.docx	Surveys and Questionnaires

The Chairperson (or designee) does not have a potential for conflict of interest on this study.