Principal Perception on the Implementation of Common Core Mathematics Standards in Georgia Middle Schools: The First Three Years

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ABSTRACT

The purpose of this study was to examine the perceptions of middle school principals in South Georgia as to the first 3 years of common core standards implementation. First, I wanted to investigate the impact of professional development and teaching strategies on student achievement as measured by standardized test scores from 2013 to 2015. Second, I sought to collect the overall perception of principals regarding teacher attitudes, student performance, and principal attitudes during the 3-year period. The research methodology used was a descriptive quantitative design with an online survey as the primary mode of data collection. In addition, standardized test scores for 2013, 2014, and 2015 were obtained from the Governor's Office of Student Achievement website.

Thirteen of the 28 middle school principals surveyed responded to the online survey, a response rate of 46.4%. Results of the survey showed an increase in the number of professional development opportunities offered to teachers from the first to the third year of the implementation of the common core standards. The most common types of professional development during these years were creating constructed response items, training in using the Georgia Department of Education online resources, and technology integration. The most common teaching strategies were writing in mathematics, formative assessment, and higher-order thinking.

Emerging themes from survey responses regarding teacher attitudes included increased stress levels and concerns about having enough time to teach the standards, although over 75% agreed with the tenets of common core. The majority of principals thought they provided teachers adequate support, but were not satisfied with the support

they [principals] received from the district. The most challenging aspects of the standards implementation were time, lack of funding and appropriate curriculum resources, scheduling intervention classes, and parental support.

Correlations between professional development, teaching strategies, and test scores were not established due to limitations in the research design. Nonetheless, this research provided useful information to school and district administrators regarding professional development, teaching strategies, and most importantly, the overall principal perception during the first 3 years of common core.

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I would not have pursued this degree without the encouragement of our district's director of curriculum and instruction, Dr. Barbara Hannaford, who first planted the seed that started my journey as a graduate student. Finally, I would like to thank my husband and children for standing by my side and for overlooking our messy kitchen table.

DEDICATION

I dedicate this work to my mother who left this world too soon and who was the first to inspire me to be an educator. She knew I would pursue this career even before I did. Thank you, mamãe, for modeling resilience to all of us girls.

DEFINITION OF TERMS

Achieve, Inc. – "an independent, nonpartisan, nonprofit education reform organization dedicated to working with states to raise academic standards and graduation requirements, improve assessments, and strengthen accountability" (Achieve, 2016, para. 1).

American Diploma Project (ADP) – a network created in 2005 by Achieve, Inc. to make college and career readiness a priority in states. At the time of this study, this network included 35 states (Achieve, 2015).

Adequate Yearly Progress (AYP) – accountability measure for school districts under Title I of the No Child Left Behind Act of 2001 (GaDOE, n.d.).

Common Core Georgia Performance Standards (CCGPS) – the common core standards adopted by Georgia in 2010 and implemented in Georgia public schools in 2012.

Common Core Standards (CCS) – a set of standards in the content areas of English language arts and mathematics first conceptualized in 2008 by the National Governors Association and the Council of Chief State School Officers (CCSSO). The creation of these standards was an effort to respond to the demands of postsecondary education and further career planning (Achieve, 2008).

Constructed Response Items – test items requiring test takers to formulate an answer rather than choose from a list of possible answers. Constructed response items were of two types: short answer and essay-like (Livingston, 2009).

Criterion Referenced Competency Test (CRCT) – the end-of-course standardized test used in Georgia schools in grades one through eight. School ranking and status were based on the results of this test.

Formative Assessment – informal assessment to monitor student understanding. The goal of formative assessment was to guide the pacing of the curriculum and the type of teaching strategies teachers chose to ensure students mastered a concept (Georgia FIP, 2012).

Georgia Milestones Assessment System (GMAS) – standardized test that replaced the CRCT, first administered in the 2015.

Georgia Standards of Excellence (GSE) – the 2015 revised version of the Common Core Georgia Performance Standards.

Self-efficacy – belief of one's capability to accomplish a task. Research about school reform found that teachers with high self-efficacy were more likely to effect change than those with low self-efficacy (Gregoire, 2003; Enderlin-Lampe, 2002; Hochberg & Desimone, 2010; Saunders, 2013).

Standards for Mathematical Practices – processes and proficiencies students were expected to develop within all content and level of mathematics. The current common core standards outlined eight standards for mathematical practices.

Thinking Maps – a set of graphic organizers helping students visualize concepts. There were eight types of thinking maps, each addressing a different cognitive process (Hyerle & Yeager, 2007).

Title I – part A of the Elementary and Secondary Education Act (ESEA). Title I schools were identified as having high percentages of children from low-income families.

In addition to state funds, Title I schools received federal funds to support programs to educate their school population.

Chapter I

INTRODUCTION

The teaching of mathematics in the United States (U.S.) has undergone numerous changes in the past few decades (Balfanz & Byrnes, 2006; Herrera & Owens, 2001; Manuel, 2013; Weingarten, 2014). To some extent, these changes came about in response to the federal education law, No Child Left Behind (NCLB), followed by reports from agencies such as the National Mathematics Advisory Panel (NMAP), National Assessment of Educational Progress (NAEP), National Council of Teachers of Mathematics (NCTM), and the National Center for Education Statistics (NCES). Of immediate concern, has been the placement of American students in mathematics achievement when compared to other developed nations as seen on a report generated by the NAEP (Peterson & Lastra-Anadón, 2010), ranking the 50 states on rigor in reading and mathematics standards. According to the NAEP 2010 report, only one-third of American students in grades 4 and 8 met the NAEP's reading and mathematics standards, a small fraction considering that the U.S. is one of the most developed nations in the world.

Since the 1983 report, *A Nation at Risk*, the American K-12 mathematics curriculum has undergone substantial transformation in an effort to reclaim the ranking U.S. once held among other nations. The most recent initiative to address this problem was the standards-based movement crafted with the objective of creating uniformity across American public schools while increasing curriculum rigor. In 2012-2013,

following other states, Georgia schools phased in the Common Core Georgia Performance Standards (CCGPS) in the subjects of English Language Arts (ELA) and Mathematics. In 2015, the Georgia Department of Education (GaDOE) renamed these standards *Georgia Standards of Excellence* (GSE).

Three private agencies collaboratively developed the first draft of the Common Core Standards (CCS): the National Governors Association (NGA), the Council of Chief State School Officers (CCSSO), and the education group *Achieve*. Based on feedback to the first official publication, they adjusted the standards to provide more clarity and a smoother transition from grade to grade. In English Language arts (ELA), there was an increased "emphasis on reading and writing of technical materials, such as government documents" (Gewertz, 2010, p. 2). In mathematics, some concepts were moved across grades to allow for a more gradual progression toward high school Algebra I. According to CCS advocates, academically, these standards represented a more coherent approach to teaching these two core subjects. An equally important benefit was curriculum uniformity across the states. These standards represented a generally accepted level of quality as well as a means of comparison among schools across the nation.

The implementation of CCS brought about controversy in many states. Although the U.S. Department of Education did not initiate this movement, opponents contended that *nationalizing* the standards constituted a form of federal control over the public school system. They associated the CCS initiative with excessive testing and increased accountability measured through a complex teacher-evaluation system. Some opponents defended their position by blaming the initiative on political coercion (Powell, 2014; Richardson & Eddy, 2011; Robbins & Bauerlein, 2013). This was evidenced by President

Barack Obama's *Race to the Top* grant competition, a program giving funds to states agreeing to adopt CCS (Gewertz, 2010; Toscano, 2013) and by the concession of NCLB waivers to these states. Others claimed that nationalizing education was unconstitutional and excluded parents and local districts from the decision (Richardson & Eddy, 2011; Robbins & Bauerlein, 2013).

States had limited time to review and decide on the standards adoption before they qualified for the *Race to the Top* grant competition. The upset regarding this top-down imposition was further disturbing because it involved substantial financial support from the Bill and Melinda Gates Foundation (Toscano, 2013). Skeptics of CCS also claimed that nationalizing the standards would do little to solve the real problem in American education: *poverty.* Studies exploring the relationship between family background and educational success reported that parents' educational level and income had a strong impact on student achievement (Condron, 2011; Krashen, 2014; Perry, 2009; Toscano, 2013). In other words, just having national standards did not mean an automatic decrease in achievement gap among low and high-performing students. Historically, the achievement gap within a state has never been affected by the implementation of standards itself. Loveless (2013) found that performance variations within a state was much greater than the variation among states proving that standards alone did not increase scores on standardized tests (Loveless, 2013).

In reality, the negative implications of national standards have had more to do with *policies of implementation* than its actual *content* (Briars, 2014). No one questioned the need to raise content rigor and depth. The CCS antagonism has been rooted mainly on federal intrusion in education and the pressure to comply with political agenda in

exchange for financial rewards (Gewertz, 2010; McCluskey, 2011; Toscano, 2013), the predictable accountability system imposed by standardized testing (Krashen 2014; Powell, 2014), and the lack of freedom and individuality once held by each state (McCluskey, 2011; Richardson & Eddy, 2011). Even proponents of CCS have acknowledged the challenges of implementing such a complex reform without continued support throughout the process (Cobb & Jackson, 2011a). CCS proponents argued for the actual academic benefits of better preparing students to compete in the 21st century both nationally and internationally (Briars, 2014; Star Tribune Editorial Board, 2015).

In mathematics, the CCS movement resulted from a series of reforms dating back to the *new math* (1950-1960), the *back to basics* (1970), and the beginning of the standards movement published in the 1989 NCTM *Curriculum and Evaluation Standards for School Mathematics* (Herrera & Owens, 2001). Since then, NCTM has been a strong force in rethinking mathematics education in the U.S. by emphasizing not only rigorous content standards, but also just as importantly, the *Standards for Mathematical Practice* (Larson, 2012; NCTM, 2010). Formerly labeled *habits of mind*, these standards concentrated on developing students' abilities to think mathematically beyond rote memorization. One set of standards, *process standards*, focused on problem solving reasoning and proof, communication representation, and connections. Lastly, the *proficiency standards* specified in the National Research Council's report focused on

> adaptive reasoning, strategic competence, conceptual understanding (comprehension of mathematical concepts, operations and relations), procedural fluency (skill in carrying out procedures flexibly, accurately, efficiently and appropriately), and productive disposition (habitual

> inclination to see mathematics as sensible, useful, and worthwhile, coupled with a belief in diligence and one's own efficacy). (NGA & CCSSO, 2010, p. 6)

The implementation of CCS in schools throughout the state was affected by many factors, among them, principal leadership (Eilers & D'Amico, 2012; Hallinger & Murphy, 2013; Hope & Pigford, 2001; Koyama 2014). In the past 15 years, the role of principals has been redefined to include many responsibilities in addition to managing school operations (Hallinger & Murphy, 2013; Urick & Bowers, 2014). Today's school leaders must be skilled diagnosticians (Glanz, 2006), resilient, flexible, and reliable (Quong & Walker, 2010). Principals have been the ones charged with building a positive environment and with promoting a close network of professionals in the building by providing continuous support, especially in the midst of new reforms (Brezicha, Bergmark, & Mitra, 2015; Hallinger, 2003). They must be able to build and communicate the school vision and mission by inspiring the staff to be active participants in accomplishing these (Datnow & Castellano, 2001; Eilers & D'Amico, 2012; Hallinger, 2003; Hallinger & Murphy, 2013). Leading today's schools has been a tough balancing act between establishing a trustworthy school climate and responding to accountability demands.

Equally important to successful school reform were teacher attitudes toward new pedagogical views. Many variables played a role in how teachers responded to changes in education, including personal beliefs and the degree to which they received proper professional development to support them through the process of change (Darling-Hammond & McLaughlin, 2009; Darling-Hammond & Richardson, 2009; Hochberg &

Desimone, 2010; Lee, 2011; Porter, Fusarelli, & Fusarelli, 2015). Designing effective professional development has been crucial because it could affect teachers' self-efficacy beliefs (Sztajn, Marrongelle, & Smith, 2012). In the end, the complexity of implementing radical school reforms, such as the CCS, fell back on principal strategy: obtaining school staff buy-in to embrace the proposed change, providing timely and appropriate professional development to staff, and establishing a support system for the staff during the transition phase (Eilers & D'Amico, 2012; Hope & Pigford, 2001). Although teachers were the ones directly carrying out school reform, its success was almost entirely dependent on the careful preparation and execution of the plan, both reliant on principal leadership (Datnow & Castellano, 2001).

Purpose of the Study

The literature on school reform has highlighted principal leadership, teacher content knowledge and attitudes, and quality of professional development as the most influential elements in educational reform (Brezicha et al., 2015; Darling-Hammond & McLaughlin, 2011; Datnow & Castellano, 2001; Hallinger, 2003; Hochberg & Desimone, 2010; Hope & Pigford, 2001; Koyama, 2014; Lee, 2011; Marrongelle, Sztajn, & Smith, 2013; Masci, Cuddapah, & Pajak, 2008; Wiseman, 2012). The complexity of implementing the CCS has been evidenced by the unceasing debate over the subject content, process, and the ramifications associated with increased instructional rigor, testing, and accountability. Because the new standards did not dictate the curriculum, each school district had to devise an implementation plan to meet the specific needs of their student population and teaching staff. An investigation of the different strategies

employed by principals of middle schools and the respective outcomes would be beneficial to other schools in the same situation.

The purpose of this study was to gain an understanding of the challenges of implementing the CCS in mathematics from a principal's perspective over the three-year period the CCS have been in place. I hoped to add insight to the literature regarding the repercussions of school reforms seeking to restructure the curriculum in core subjects such as mathematics. I gathered information on the initiatives employed during the CCS implementation in South Georgia middle schools, and attempted to establish their potential effect on student achievement. I used two data collection methods to accomplish this: a survey of principal perception on implemented initiatives, teacher attitudes, student performance, and state standardized assessments of grades 6 through 8 in the selected sample.

Significance

The implementation of the CCS has been the most recent education reform in Georgia. The impact of this reform was significant because of its direct connection to accountability measures for all Georgia public schools. The repercussions for schools not meeting state mandates were of concern since they often involved school ratings and state funding. Therefore, school district leaders would benefit from comparing different initiatives and their respective outcomes. I hoped this study would provide an overall picture of what seemed to be working in Georgia middle schools regarding student performance in mathematics since the implementation of the CCS. I also expected the emergence of a theme on the types of successful initiatives to help school leaders steer

the curriculum and staff more effectively as they continued to refine the implementation of the new standards.

Research Questions

1. What were the perceptions of middle school principals in Georgia regarding the first 3 years of implementation of the CCS in mathematics?
2. What teaching strategies did principals expect teachers to use in middle school mathematics classrooms during the first 3 years of CCS?
3. What supports did principals of middle schools in Georgia provide to ensure success of the implementation of these strategies?
4. Was there a relationship between implemented initiatives (professional development and teaching strategies) and the overall percentage of students in grades 6 through 8 passing the mathematics portion of the CRCT in 2013 and 2014?
5. Was there a relationship between implemented initiatives (professional development and teaching strategies) and the percentage of students in grades 6 through 8 passing the mathematics portion of the Georgia Milestones Test in 2015?
6. Was there a relationship between principal perception and school performance in mathematics as measured by standardized tests?

Limitations of the Study

The goal of this study was to obtain the perception of Georgia middle school principals regarding the implementation of the mathematics CCS from 2013 through 2015. I only collected data from true middle schools (grades 6 through 8) in South Georgia school districts. The rationale for this choice was to reduce school demographic disparities when comparing standardized test scores. In addition, limiting the study to this

grade range ensured the types of initiatives, such as professional development, as well as teacher attitudes were similar in nature. As a result, one of the limitations of this study was that survey results did not reflect the perception of *all* principals in Georgia public schools, preventing the generalization of the findings.

Another limitation when interpreting survey responses was return rate. Nulty (2008) compared response rates for paper-based and online surveys in eight different studies and found that the average response rate for the paper-based mode was 23% higher than online versions. He reported paper-based response rate averages of 56% and online version averages of 33%. He further discussed sample error and bias as hindrances to generalizability of findings when surveys returned a low response rate (Nulty, 2008). Similarly, Guo, Kopec, Cibere, Li, and Goldsmith (2016) found web-based surveys to have lower response rates than paper-based and face-to-face survey administration. The authors posed several reasons for a lower participation on web-based surveys such as fear of frauds, privacy concerns, and possibilities of contracting computer viruses. However, they reported these rates nearly doubled with the use of cash rewards (Guo, Kopec, Cibere, Li, & Goldsmith, 2016).

A third limitation involved the change in standardized testing. For the first 2 years of Common Core, 2012-2013 and 2013-2014, Georgia middle schools used the CRCT as its end-of-grade assessment. In 2014-2015, all Georgia public schools transitioned to the GA Milestones test (GMAS). The structure and cut-scores of both tests were different. Added to this, 2015 marked the first administration and scoring of the GMAS, which made it a pilot year. These factors limited score comparisons across the 3 years of this research. However, comparisons between initiatives and scores by year were beneficial at

the school level. Finally, due to survey anonymity, relationships between test scores and principal perception could not be determined with a high degree of confidence.

Chapter II

LITERATURE REVIEW

Education in the United States

"The strength of a nation is a function of the strength of its economy, which in turn is a function of how well educated its population is" (Fabian, 2011, p. 50). Demands imposed by the rapid global growth of technology in many professional fields have made a high school diploma an accomplishment no longer sufficient to stay competitive (Achieve, 2008; Jones & King, 2012; Wallender, 2014; Watt, 2011). A college education, especially one with an emphasis in the areas of mathematics and science has been associated with a successful career and higher paying jobs in the 21st century (NMAP, 2008). These subjects have promoted the development of critical thinking and problem solving skills, both essential to preparing students for an economy that requires not only professional knowledge but also creativity and imagination at the level found worldwide (Fabian, 2011).

In the U.S., the need for educational reform was emphasized in the well-known 1983 report, *A Nation at Risk*, issued by the National Commission on Excellence in Education (NCEE), which pointed out deficiencies in K-12 American education (NCEE, 1983). The term *at risk* referred to the U.S.'s ranking in the global economy rather than on education itself (Meadows, 2007; Walberg, 1986). Since then, the performance of students in reading, mathematics and science literacy in the international arena has been scrutinized and made public by federal organizations such as the National Center for

Educational Statistics (NCES), the National Assessment of Educational Progress (NAEP), and the National Mathematics Advisory Panel (NMAP). Fabian (2011) claimed the poor ranking of American students in comparison with other developed nations has been cause for alarm considering that global competition has been steadily on the rise. He argued the outsourcing of low-end jobs has become increasingly prevalent in the past 20 years, especially in the area of information technology. The vast majority of large companies selling electronic devices has been providing customer support through third party companies located abroad (Harrison & McMillan, 2011; Tambe & Hitt, 2010).

The NCES has been the primary organization in charge of collecting, analyzing and reporting statistical data related to education in the U.S. and other countries. One of its reports has been the Program for International Student Assessment (PISA), an international test conducted every 3 years ranking the performance of 15-year-old students in reading, mathematics, and science literacy. The test has focused on a different subject every 3 years. PISA has been sponsored by the Organization for Economic Cooperation and Development (OECD), an intergovernmental organization of 34 member countries, although non-member countries have been allowed to participate on the assessments. This test has become a universal benchmark for comparison among students of all nations because it assesses not only *what* students know, but also *how* they are able to use their knowledge in a particular subject (OECD, 2013).

From 2003 to 2012, there has been little growth on the scores of American 15-year-old students in the areas of reading, mathematics, and science literacy. The performance of American students in the PISA mathematics has increased slightly, but has remained below average in comparison to the majority of the 34 OECD countries

(Fleischman, Hopstock, Pelczar, & Shelley, 2010). The latest PISA (2012) focused on mathematics with a minor emphasis in reading, science, and problem solving. The performance of American students ranked the U.S. in 26th place in mathematics, 17th in reading, and 21st in science behind top-performing countries like Shanghai-China, Singapore, Hong Kong-China, Chinese Taipei, Korea, and Japan (Munson, 2011; OECD, 2013). Interestingly, the U.S. has spent more money per student than most countries participating in the PISA and yet the scores have not reflected this spending proportionately. Analysis of the PISA 2012 results revealed that American students' strengths were mostly on less-demanding mathematical skills (OECD, 2013) and their weaknesses were directly related to higher cognitive demands involving real world problems, mathematical modeling, and geometry-related content (OECD, 2013; NMAP, 2008).

In his book *The Global Achievement Gap*, Wagner (2008) discussed the lack of connection between what students learn in schools and the expectations of them once they enter the job force. He stated the U.S. lacked in several areas: (a) the 70% high school graduation rate fell well under that of countries like Denmark, Japan, and Poland, all with rates over 90%; (b) 40% of students entering college required remedial courses; (c) 65% of college professors agreed students were not adequately taught reasoning skills or their application in new situations; and (d) employers of high school graduates stated that 50% of high school graduates were ill prepared for work. The numbers were even more troublesome for the minority subgroups. All these facts have been cause for concern since postsecondary education has been a decisive piece in 85-90% of the current, fastest-

growing, high salary jobs in the U.S. (Balfanz & Byrnes, 2006; NCAL, 2008; Tennessee Department of Education, n.d.; Wagner, 2008).

Along the same lines, in 2008, the National Commission on Adult Literacy stated that for the first time the educational level of our younger generation of Americans was lower than that of their parents (NCAL, 2008). College professors have reasoned that the 30% dropout rate in the second year of college was due to students being overwhelmed by the level of reading materials, 85% of which was expected to be completed on their own in preparation for classroom discussions (Isakson, 2014). In an interview with a group of college students, Wagner (2008) inquired whether high school had prepared them for college courses. Their response was unanimous: with the exception of mathematics, they used very little of what they learned in high school. Among other things, they wished they had spent more time on writing and research skills, which have been considered aptitudes rather than subject content knowledge (Wagner 2008). Students who practiced these competencies developed better reading and writing skills and the ability to formulate and analyze arguments, all essential in the 21st century job market (ADP, 2004; Wagner, 2008).

The poor academic performance in the global arena and status of young college students may have led some to believe the cause lay solely in the American educational system (Toscano, 2013; Turgut, 2013; Weingarten, 2014). However, Perry (2009), Condron (2011), and Krashen (2014) have found the U.S. *economic inequality* has played a significant role, one that has not been given much attention by critics of the current educational system. While the U.S. has been considered one of the wealthiest countries in the world, it has been the most economically unequal. Using results of the 2006 PISA

assessment and a coefficient of income inequality (Gini coefficient), Condron (2011) compared the performance of American students with that of 27 OECD countries. Findings revealed egalitarian countries had higher average mathematics achievement than non-egalitarian countries. His study showed a negative relationship between income inequality and average math achievement. He also found that egalitarian nations had higher percentages of students scoring at the top of the scale and lower numbers of students scoring at the bottom of the scale.

In another study, *Characteristics of Equitable Systems of Education*, Perry (2009) found that Finland and Canada, both classified as highly-performing and highly equitable countries, had low to average levels of poverty and low to average income inequality. Although these two studies emphasized the presence of other contributing factors, both stressed the important role of income inequality on student achievement and disputed the idea that schools alone were the sole culprit for low academic performance (Condron, 2011; Perry, 2009).

The U.S. has always given much attention to education. Moreover, the American educational system has been unique in that, unlike most other nations, it has been committed to educating *all* students (U.S. Department of Education, 2008). This equal opportunity for all has made the task more difficult and has demanded creative approaches to educating our students, despite the socio-economic background (Krashen, 2014; Toscano, 2013; Turgut, 2013; Weingarten, 2014). Thirty-one years after *A Nation at Risk*, the United States' educational system continued to be at risk, although we have learned from past performance and have acknowledged there was much to do to improve the educational system (U.S. Department of Education, 2008). Educational leaders

responded to the urgent warnings from these reports by launching an ambitious reform in American education – the standards movement.

The Origin of Common Core Standards

To understand the birth of the Common Core standards (CCS), one needed to be familiar with the standards-based movement. The U.S. Department of Education defined *standards* as a "set of goals for what students should know and be able to do while learning academic content" (U.S. Department of Education, n.d., Key Terms). In the 1980s and 1990s, some states adopted content standards and standards-based testing on select grade levels, but the real push for standards *and* accountability happened when President George W. Bush passed the 2001 No Child Left Behind Act (NCLB). Under this law, no matter their socio-economic background, *all* children received equal opportunities to a rigorous education with highly qualified teachers, and were eligible to participate in programs designed to serve the individual needs of special groups of students, such as students with disabilities and English language learners. (McClure, 2005; NCLB, 2004).

During that time, states held autonomy as to what standards and yearly assessments to use. These assessments consisted of criterion-referenced tests that measured student performance against the standards in grades 3 through 8. As required by the NCLB, states receiving federal funds had to report results of these assessments for each subgroup of students (race, gender, limited English proficiency, students with disabilities, and economically disadvantaged). States not meeting Adequate Yearly Progress (AYP) were subject to corrective measures (NCLB, 2004). The general belief was the implementation of standards would promote equity among schools and create a

more demanding curriculum where students would be better prepared to meet the challenges of the 21st century workforce (McClure, 2005; U.S. Department of Education, 2008).

Although the performance of students improved somewhat during this first wave of standards-based curriculum from 2003 to 2012, American students continued to perform below average on the PISA international tests. Historically, according to the 2004 report *Ready or Not: Creating a High School Diploma that Counts* by the American Diploma Project (ADP, 2004), many stakeholders including employers argued that America's high school graduates lacked basic skills, and universities claimed that remedial courses were often a necessity as high school graduates were not ready for entry-level college courses. There was a difference between being *proficient* (passing standardized tests and meeting graduation requirements) and being *prepared* to face job-related real world challenges (Achieve, 2008). In other words, the set of skills offered by U.S. schools did not align with the demands of the job force. The first considerations regarding the CCS were rooted in these concerns.

In 2008, two agencies, the National Governors Association (NGA) and the Council of Chief State School Officers (CCSSO), in collaboration with *Achieve* began discussions about the need for a more rigorous and more uniform set of standards (Achieve, 2008; CCGPS, n.d.; Porter, McMaken, Hwang, & Yang, 2011; Zancanella & Moore, 2014). *Achieve*, a non-profit, bipartisan organization worked closely with state governors and other educational leaders with the goal of aiding states in aligning their academic standards to the demands of postsecondary education and further career

planning (Achieve, 2008; Porter et al., 2011; Tennessee Department of Education, n.d.; Watt, 2011; Zancarella & Moore, 2014).

In conjunction with the Education Trust, the Thomas B. Fordham Foundation, the National Alliance of Business, K-12 and college educators, and leaders of business communities, the ADP developed its own set of core and benchmark standards (Achieve, 2008). Core standards referred to academic strands in English and mathematics deemed essential for postsecondary schooling. English strands included "proper grammar, punctuation and spelling… interpreting significant works from various genres of literature and informational materials…developing an argument, discerning the nuances of an issue by analyzing information gleaned from multiple sources and participating productively in self-directed work teams" (Achieve, 2008, p. 6). Mathematics strands included "number sense and numerical operations; algebra; geometry; data interpretation; statistics and probability; and mathematical reasoning" (Achieve, 2008, p. 6). In addition to these content standards, ADP outlined what they called ADP Benchmarks, essential skills for the 21st century professional that should be taught across core classes: research and evidence gathering, critical thinking and decision making, communication and teamwork, and media and technology.

Achieve set out to help states align their existing standards with ADP's core and benchmark standards through Alignment Institutes where they analyzed each state's set of standards for English and mathematics on "rigor, coherence, focus, specificity, clarity, accessibility, and measurability" (Achieve, 2008, p. 10). These two subjects were the focus due to their effect on all other content areas (Wallender, 2014). Using a group of experts, K-12 and university educators, and community business representatives, each

state ran their own revisions to align their standards to ADP's core standards. States also collaborated with one another during these meetings. The efforts of the 16 participating states resulted in 75% of them reaching a satisfactory final alignment rating, and thus, the ADP Core became the Common Core standards. Although, each state ended up with its own set of standards (they differed from ADP Core to some degree), they were practically uniform across participating states (Achieve, 2008).

The alignment between CCS and state standards was also investigated by an independent study using a different method, the *Surveys of Enacted Curriculum* (Porter et al., 2011). Content topics were cross-examined with different categories of cognitive demands in English/language arts (ELA) and reading and mathematics. Findings suggested a low to moderate alignment between CCS and state standards: mathematics in 14 states and ELA in 12 states. For example, in mathematics, the CCS focused more on higher levels of cognitive demand, such as *analyze, demonstrate understanding*, and *solve non-routine problems* and less on *memorize* than state standards did. Porter et al. (2011) also examined the alignment of CCS and state assessments and found it to be lower than the alignment between the two types of standards. This indicated the need to match assessments with standards further.

In the same study, Porter et al. (2011) compared CCS with those from three top performing countries in international testing: Finland, Japan, and Singapore. Ironically, in eighth grade mathematics, all three countries emphasized *performing procedures* (75% of their content standards as compared to 38% of U.S. standards), a mere level two on the list of cognitive demands. These findings were especially interesting considering that the CCS emphasized higher levels of cognitive demand than these top performing countries

yet the U.S.'s ranking in the 2012 PISA still did not reflect the seemingly more rigorous standards already in place in some states.

What did this mean for the *newly* adopted CCS? Clearly, standards alone did not seem to be the only variable causing America's lower than desirable performance in international benchmarking (Jones & King, 2012; Toscano, 2013). Among other factors, curriculum design, teacher expertise, fidelity of implementation, administration support, and student population were all contributing variables to academic performance (McClure, 2005; Larson, 2012; Schmidt & Burroughs, 2013; Toscano, 2013). Comparisons between countries failed to take into account several of these. Many countries held a longer school year; others had an educational system for a select population of students (Walberg, 1986). Moreover, in at least two studies, evidence of a correlation between economic equality and higher student achievement was found (Condron, 2011; Perry, 2009).

Common Core Standards in Georgia

Georgia along with 47 other states worked on developing the common core standards for K-12 in ELA and mathematics; these were adopted in 2010 (CCGPS, n.d.) and first implemented in 2012. The rationale behind the adoption in Georgia was that these standards would mean clearer expectations for college and career readiness, consistent goals and easier performance comparisons among states, and the possibility of sharing some of the work and resources among states. Georgia's existing standards were already somewhat close in content to common core, which made this transition smoother and not so taxing for teachers and students at least regarding *what* to teach (CCGPS, n.d.). However, the new mathematics standards differed from the former on *how* to teach

new concepts. The 5-year implementation plan in mathematics took place as follows: 2012-13, grades K-9; 2013-2014, grade 10; 2014-15, grade 11; and 2015-16, grade 12 (Anderson, Harrison, & Lewis, 2012).

Prior to CCS, Georgia schools operated under the Georgia Performance Standards (GPS) implemented in 2005, which approached content standards in a deeper manner than the previous Quality Core Curriculum (Grant, 2003). The transition from GPS to CCGPS in 2012 did not involve a drastic change in rigor, as some may have believed (GaDOE, 2010). According to the Georgia state board of education chair, the CCS were built upon the already rigorous GPS, but with added emphasis on elements of 21st century college and career readiness identified by experts in the educational and industrial fields. The CCGPS were branded as improved GPS, tailored to the more recent demands of our global economy (GaDOE, 2010). The latest revision to ELA and mathematics standards occurred in January 2015 and in February 2015, the Georgia CCS were renamed Georgia Standards of Excellence (GSE) (GaDOE, 2015).

As of 2015, textbooks thoroughly aligned with CCS have yet to be published and some school districts opted to rely on pre-common core textbooks and online resources for the first years of implementation (Cogan, Burroughs, & Schmidt, 2015; Leifer & Udall, 2014). Since the standards were first adopted, several textbook companies have attempted to publish textbooks aligned to the new standards. These materials, however, either have failed to address the standards in all areas, have included extra content not required by the standards, or have not addressed the standards with adequate depth (Cogan et al., 2015; DelGuidice & Luna, 2015; Leifer & Udall, 2014). In March 2015, *Edweek* released a report listing the alignment of 20 mathematics instructional series to

common core standards for grades K-8. A team of educators ranked the publications on focus, coherence, rigor and usability. Only one of the 20 programs aligned completely with the new standards at every grade level (Heitin, 2015).

In Georgia, the Georgia Milestones Assessment System (GMAS), first administered in 2015, replaced the former Criterion Referenced Competency Test (CRCT) (GaDOE, 2015). Students in grades 3 through 8 took the test at the end of the school year between April and May in all four academic subjects: ELA, mathematics, science and social studies. In high school, students took the end-of-course assessment in eight courses: Language Arts (Ninth Grade Literature and Composition and American Literature and Composition); Mathematics (Coordinate Algebra and Analytic Geometry); Science (Physical Science and Biology); and Social Studies (U.S. History and Economics/Business/Free Enterprise). The GMAS differed from the previous CRCT in its format and delivery method. In ELA and mathematics, the test included constructed response in addition to selected response items. A writing component was built-in within the ELA section for every grade, where students responded to a reading passage (GaDOE, 2015c). This constituted a major shift from the earlier CRCT. Up to 2014, the writing test was administered only in grades 5 (around March), and 8 (in January) separate from the end-of-grade CRCT, which usually took place in April. The test remained similar in format to the former CRCT in science and social studies (Beaudette, 2014; GaDOE, 2015c).

The GaDOE projected the administration of the new test to be entirely online with paper and pencil being a backup option (GaDOE, 2015c). In 2015, school districts were advised to start out by having 30% of students take the test online, 80% by the third year,

and 100% by year 5 (GaDOE, 2015b). Georgia school districts were under a convoluted transition period regarding not only actual classroom teaching, but also facing the challenge to re-design and update their current technology infrastructure. School districts faced the difficult task of scheduling and setting up a physical environment to allow for the state requirements of online testing (Downey, 2015). As outlined in the document *Technology Guidelines for Georgia Milestones*, schools were required to have working technology, namely laptops, desktops, tablets with operating systems and networking specifications suited to the new online testing system (GaDOE, 2015a).

Results of the first GMAS administration were released in the fall of 2015 revealing a drop in the scores across the state (GaDOE, 2015). Georgia superintendent Richard Woods attributed the lower scores to the increased rigor of the test but stated they could not be compared to the previous CRCT scores (GaDOE, 2015, September 3). Larson and Leinwand (2013) reported that the majority of state assessment results prior to CCS were inflated to some degree because standards under the NCLB were not on par with international benchmarks. The only exception was Massachusetts, which already had standards comparable to NAEP's standards prior to CCS. In 2012, Kentucky reported a drop of 20 percentage points on the mathematics state test under the new CCS when compared to its results under the old standards (Larson & Leinwand, 2013; Phillips, 2014).

Accountability attached to student performance has been in place since NCLB and became even more complex under Georgia's recently adopted Teacher and Leader Evaluation System (TKES) (Croft, Roberts, & Stenhouse, 2016; GaDOE, 2014). Under the new system, teacher evaluations were accomplished through three components:

teacher assessment on performance standards, *surveys of instructional practice* (student perception surveys), and *student growth*, the latter tied in with test scores and carrying the most weight in the evaluation (GaDOE, 2014). In the report *Georgia's Teacher Dropout Crisis*, Owens (2015) discussed results of a survey administered to Georgia teachers by the Professional Standards Commission. Survey results indicated that 44% of public school teachers left the profession within 5 years of teaching and two thirds of the teachers surveyed did not recommend the teaching profession to recent graduates. Respondents listed the emphasis on mandated tests as the top reason for teacher attrition followed by the new teacher evaluation method (TKES), more specifically how much weight student performance carried in the evaluation (Owens, 2015).

Mathematics Teaching Strategies under Common Core

Although the CCS content standards for ELA and mathematics did not diverge drastically from its predecessor GPS, expectations to perform at a significantly higher level represented a major concern in the mindset of educators and students alike (Hochberg & Desimone, 2010; Murphy & Torff, 2014; Owens, 2015). Teaching with increased rigor meant utilizing teaching strategies that may not have been in place in the classroom prior to CCS (Goldsmisth, 2001; NMAP, 2008; NCTM, 2010). Teacher expectations concerning the quality of student work had to change so that students could achieve the desired level of comprehension under the new standards (Burns, 2012; Porter et al., 2015).

In the article *What Reading Instruction Can Teach Us About Math Instruction*, Burns (2015), a retired mathematics teacher with 50 plus years of teaching experience and author of numerous books on teaching the subject, drew a parallel between the

strategies used in reading versus the strategies used in teaching mathematics at the elementary level. After polling elementary teachers during a professional-learning session, she concluded that teachers did not go deep enough when teaching mathematics as they did when teaching reading. In reading instruction, teachers reported emphasizing comprehension, making predictions, deciphering meaning from context, and making inferences, but in mathematics, they were content with simple accurate computation without further grasping the meaning of the process used. Burns' (2015) point was that students should understand the *why* of specific mathematical procedures to be able to apply the same reasoning to new situations. In other words, mastering both, skills *and* understanding should be the goal in mathematics just as it has been in reading. That was precisely what the common core standards advocated (Burns, 2015).

The CCS placed special emphasis in the area of making sense of mathematics through the eight *Standards for Mathematical Practice*. These standards were: (a) make sense of problems and persevere in solving them; (b) reason abstractly and quantitatively; (c) construct viable arguments and critique the reasoning of others; (d) model with mathematics; (e) use appropriate tools strategically; (f) attend to precision; (g) look for and make use of structure; and (h) look for and express regularity in repeated reasoning. Because these standards represented the desired characteristics of *good* mathematicians, they were embedded within the content standards and applied to all grades (Briars, 2014; Burns, 2012; NMAP, 2008; NCTM, 2010). The National Council of Teachers of Mathematics had recommended these competency standards in 1980, long before the CCS were developed (NCTM, 2010).

The charge of including these mathematical practice standards in every topic may have posed a challenge for some teachers because this had not been required in the past, although many effective teachers may have already adhered to this practice prior to the new standards (Larson, 2012). In addition, under the CCS, students were to do more than simply perform mathematical procedures correctly; students had to explain and justify their reasoning (Burns 2012; CCSSI, n.d.; Knudsen, Lara-Meloy, Stevens, & Rutstein, 2014). According to Burns (2012), teachers should allow students time to reflect and discuss with peers. While comparing their work with one another, students had the opportunity to explain and justify their thinking process. This information exchange between peers was beneficial because it exposed them to various perspectives leading to the same outcome (CCSSI, n.d.; Cobb & Jackson, 2011b; Lepak, 2014). Classrooms under common core should experience routine discussions that enrich each student's learning (Burns, 2012; Lepak, 2014; Knudsen et al., 2014). Under CCS, teachers became facilitators, listening to and supporting students' reasoning rather than checking for right answers (Wiggins & McTighe, 2007).

Cioe et al. (2015) referred to this process of *justification* as students sharing with peers the reasoning behind their answers to a problem. They argued that students often described *how* they obtained their answers rather than *why* their method worked. Stephan (2014) argued that teachers should establish rules for sharing their reasoning by holding students accountable for explaining their method and asking questions of other students' methods (Stephan, 2014). Because justifying answers was a challenge for most students, instead of simply asking *why*, teachers should use prompting questions specific to the task to encourage productive discussions (Cioe et al., 2015; Lepak, 2014; Knudsen et al.,

2014; Stephan, 2014). For example, for a question involving the discovery of a pattern, Cioe et al. (2015) preferred question prompts beginning with *why* to questions referring to *how* students know something was true.

Modeling was another strategy emphasized by the Standards for Mathematical Practice (CCGPS, n.d.). In his article *Mathematical Modeling and Pure Mathematics*, Usiskin (2015) presented several examples of mathematical modeling applied to real life situations. According to him, the power of modeling was transferability. In other words, once students have learned how to model a particular problem, they should be able to apply it in similar situations. The author provided five steps to modeling real life situations: (a) choosing a real problem; (b) finding a model for a simplified version of the problem (use assumptions to help solve); (c) solving the simplified version; (d) applying the solution back to the real-world problem; and (e) verifying the feasibility of the model in the latter (Usiskin, 2015).

English and Mousoulides (2015) proposed a similar method for solving real world problems. In both methodologies, making assumptions in the early stages of problem solving and checking the model fit in the real life situation have been declared essential (English & Mousoulides, 2015; Usiskin, 2015). This means that students should be taught how to translate problems into mathematical models and to check their feasibility in real context. When the model does not adequately *fit* the problem (does not provide a viable answer), students should persist by going back to the drawing board to adjust *faulty* areas. At this point, mathematical practice standard one – *make sense of problems and persevere in solving them* – has been exercised (Wilburne, Wildmann, Morret, & Stipanovic, 2014).

In 2012, the Institute of Education Sciences (IES) published a report with a set of recommendations for teaching problem solving in grades 4 through 8. A panel of eight university professors and mathematics consultants reviewed research-based strategies specific to the topic. The panel recommended that teachers:

> (1) prepare problems and use them in whole-class instruction; (2) assist students in monitoring and reflecting on the problem-solving process; (3) teach students how to use visual representations; (4) expose students to multiple problem-solving strategies; and (5) help students recognize and articulate mathematical concepts and notation. (Woodward et al., 2012, p. 9)

Whereas recommendations 1 and 2 could be used regularly when teaching problem solving, the authors suggested using 3 through 5 at the teacher's discretion depending on the lesson goals (Woodward et al., 2012). The authors acknowledged that teachers might already include problem solving in their lessons; however, they advised teaching problem solving as a class activity where students have time to brainstorm with teacher support as opposed to assigning these types of problems as independent assignments. The point here was to integrate problem solving as part of the *acquisition* phase of the lesson where teachers modeled specific strategies for different types of problems.

The very premise of teaching the *Standards for Mathematical Practice* rested in the fact that mastery can only be reached when connected with meaningful knowledge (Herrera & Owens, 2001; NMAP, 2008). The exponential growth of electronic devices capable of performing infinite algorithms in a fraction of the time humans were capable of has resulted in the need to elevate mathematics instruction far beyond computation and

procedural skills (Achieve, 2008; McClure, 2005). Although students should know these skills, more classroom time needed to be devoted to promoting thinking processes that machines could not perform. Teachers should encourage flexible reasoning and perseverance because real life situations often brought challenging circumstances requiring constant innovative tactics. The teaching of mathematics in American classrooms should evolve to keep up with the advancements of our global economy and maintain us in the race with proactive nations (NCTM, 2010; NMAP, 2008).

The Role of Principals in Educational Reform

The role of principals has changed radically in the past 15 years going from being primarily managerial to encompassing a variety of responsibilities beyond the operational aspect (Hallinger, 2003; Hurley, 2001). The expectations for principals of today's schools have ranged from maintaining the facilities, devising a budget, overseeing discipline, promoting professional development for staff, establishing a positive learning environment, being a liaison between the school and the community, and most importantly serving as an instructional leader (Glanz, 2006; Siu, 2008; Zepeda, 2007). As instructional leaders, principals have been expected to run schools and make decisions on each of the above with one end in mind: to promote student learning (Koyama, 2014; Quong & Walker, 2010).

Today's requirements for educational leadership are different than they used to be (Hallinger, 2003; Hurley, 2001; Siu, 2008). American schools have been preparing the workforce of the future, a future that may house jobs no one has yet fathomed (Fabian, 2011; Hallinger, 2003). Rethinking the types of instruction students have received in the past has become top priority (Achieve, 2008; Jones & King, 2012). According to Quong

and Walker (2010), principals should possess resilience, flexibility, and reliability to lead today's schools. Leading schools has required resilience and flexibility to overcome the many challenges that educational change brings about. Principals are deemed reliable when they have provided continuous support to the staff implementing and maintaining change. In stressful times, leaders should be able to think objectively about solutions that use existing resources as well as convey a sense of control in chaotic situations often accompanying change (Quong & Walker, 2010). Ultimately, principals are expected to be skilled both, in assessing and addressing critical areas of need specific to their schools (Glanz, 2006; Hallinger, 2010). Principals have been expected to not only maintain an optimum environment for learning, but also have played a key role in guiding schools through changes imposed by legislators and policymakers, a difficult balancing act at this time (Hope & Pigford, 2001; Koyama, 2014; Masci, Cuddapah, & Pajak, 2008).

The way principals go about effecting change in their schools may lead to a smooth or turbulent transition (Datnow & Castellano, 2001). Resistance to change takes place when it involves extreme deviations from established beliefs (Hope & Pigford, 2001). Generally, principals have been responsible for setting the tone and for carefully planning how change unfolds in their schools (Strickland-Cohen, McIntosh, & Horner, 2014). Some authors have described the three stages of change as initiation, implementation, and institutionalization (Hope & Pigford, 2001; Saunders, 2013). During the initiation phase, principals must communicate to the staff what is about to take place and what is expected of those directly involved. Principals should establish a clear connection between the initiative and the vision and mission of the school and should design a detailed plan of action. At this early stage, Zepeda (2007) cautioned principals to

focus on viable solutions rather than on obstacles. In essence, principals must be strategic in presenting the initiative to the faculty; being honest about the possible obstacles, while at the same time fully committing to its execution (Anderson & Shirley, 1995; Quong & Walker, 2010).

Strickland-Cohen et al. (2014) argued that support has been essential during the implementation phase because it kept teachers focused on carrying out the reform with fidelity (Strickland-Cohen et al., 2014). They found that feedback in the form of formative assessments accompanied by ongoing adjustments to the original plan should also happen in this stage. During their third stage, if change has become part of the school norm, i.e., those involved execute the new initiative with confidence as part of their daily routine, then it is said to be institutionalized. As with any newly adopted program, a final evaluation should be conducted to assess the effectiveness of the initiative, and whether it has indeed delivered the expected results (Strickland-Cohen et al., 2014). Throughout this process, principals serve a dual role of reformers and stabilizers (Masci et al., 2008). Stability can only be maintained with consistent encouragement and support of staff efforts throughout this process (Datnow & Castellano, 2001; Hope & Pigford, 2001).

With respect to the CCS initiative, other school leaders such as instructional coaches and lead teachers have been held equally responsible (Eilers & D'Amico, 2012; Hallinger, 2003; Hallinger & Murphy, 2013; Urick & Bowers, 2014). In the article *Essential Leadership Elements in Implementing Common Core State Standards*, Eilers and D'Amico (2012) discussed the critical stages of effecting complex reform. In their model, principals were responsible for the first two steps of establishing a purpose and setting priorities. The remaining four steps were staff centered: aligning personnel with

curricular needs, practicing professional discourse, encouraging risk taking, and providing feedback. Eilers and D'Amico (2012) claimed that instructional coaches and lead teachers should be involved in all phases leading to full implementation since it has been the school districts' responsibility to come up with their own curriculum to teach the new standards. The authors suggested that principals identify and assess each staff member's strengths to form expert teams for each area of need. Their argument was that involving key personnel from the start is vital in securing a collective commitment.

Sizeable reforms such as the CCS have required structure and frequent discussions among staff members and between staff and administration (Strickland-Cohen, McIntosh & Horner, 2014; Siu, 2008). Eilers and D'Amico (2012) maintained that one of the principal's tasks has been to provide opportunities for teachers to plan within and across grade levels and to participate in peer observations during the development of an adequately standards-aligned curriculum for each grade and subject. One thing to keep in mind has been allowing for safe experimentation; i.e., principals were to support the staff during risk taking associated with school reform by offering constructive feedback and helping with redirection when necessary (Eilers & D'Amico, 2012).

From the above observations, it is clear that leadership style has been a contributing factor affecting how principals lead change. Datnow and Castellano (2001) and Siu (2008) found a strong association between leadership style and school reform discourse. Educational leadership has been classified into two major categories: *instructional* leadership and *transformational* leadership (Brezicha, Bergmark, & Mitra, 2015; Hallinger, 2003). Instructional leadership has been characterized primarily by a

top-down type of leadership in which the principal controls and is directly involved in the instructional process by making sure teachers and staff carry out instruction aligned with the school mission and goals (Hallinger, 2003; Hallinger & Murphy, 2013). Prevalent in the 1980s and early 1990s, this model first became popular in those schools identified as being at risk, where a *take-charge* approach was essential for improvement (Hallinger, 2003; Hallinger & Murphy, 2013). Hallinger (2003) defined transformational leadership as a bottom-up approach in which the principal empowers the staff to accomplish the desired instructional outcome. This latter type has sometimes been associated with distributed or shared leadership, in which a group rather than an individual assume leading roles (Hallinger, 2003).

Several experts in educational leadership have described instructional leadership as one where principals clearly define and convey the school mission and goals to the staff (Hallinger, 2003; Hallinger & Murphy, 2013; Urick & Bowers, 2014). According to the authors, these types of principals supervise by being personally involved in the evaluation of curriculum and instruction and by monitoring student achievement themselves. Hallinger (2003) has described this as a first order approach – the principal takes upon himself to make decisions about instruction and to analyze corresponding student data. In this instance, instructional time has priority over other matters and the staff receives the needed professional development to meet the identified school goals. Because the principal is directly involved in the instructional process and in monitoring student performance, a close principal-teacher bond is formed as that of players on the same team (Hallinger, 2003). The common focus on instruction by teachers *and* leaders

creates a positive climate (Hallinger 2003; Hallinger & Murphy, 2013; Urick & Bowers, 2014).

On the other hand, the main objective in transformational leadership has revolved around enabling the members of the organization to set goals and develop a plan for change to happen (Hallinger, 2003). In this model, the principal's primary goal is to empower the staff to carry out the school mission by including them in decisions affecting the entire organization. Principals deliberately choose and groom different staff members to play specific leadership roles compatible with their strengths in what has been called *individualized consideration* and *intellectual stimulation* (Brezicha, Bergmark, & Mitra, 2015; Hallinger 2003; Urick & Bowers, 2014). Hallinger (2003) concluded that this high level of trust on staff potential results in a sense of belonging and purpose, which leads the staff to be wholly committed in fulfilling the school goals. Unlike the first order approach of instructional leadership, principals in the transformational leadership model do not personally monitor instruction and student performance; rather they are instrumental in gaining staff commitment to carry out the reform themselves (Hallinger, 2003).

Hallinger (2003) stated that in education, what has been popular and generally accepted as *the way* of doing things has come and gone in waves. He added that effective schools have exhibited a blend of at least these two styles. He further reasoned that at-risk schools may have benefited from a more centralized and controlling leadership style since the steps required to train personnel and delegate responsibilities in shared leadership may slow this process. Hallinger and Murphy (2013) and Hurley (2001) have claimed that it has been virtually impossible for principals of today's schools to dedicate

their time exclusively to the instructional aspects of leadership. Their argument was that expecting principals to be involved and knowledgeable about every subject at every grade level in addition to performing managerial duties was unrealistic. More often than not, classroom visits to monitor teaching and learning have taken a back seat to everyday problems needing immediate resolution (Hallinger & Murphy, 2013).

Urick and Bowers (2014) proposed a model of principal leadership centered on instruction through the collaboration of teachers and principals – the shared instructional leadership. In this model, principals provide guidance and support to expert teachers responsible for implementing instructional programs in the school (Urick & Bowers, 2014). The authors noted similarities between shared instructional leadership and transformational leadership and argued that the latter could be seen as one facet of shared instructional leadership. In reality, it is improbable that principals have utilized only one leadership style in running their schools (Hallinger, 2003). Urick and Bowers (2014) used the term *integrated* leadership when more than one style is exercised simultaneously.

The right dose of each type of leadership has been dependent on contextual factors such as demographics, staff competence and disposition, resources, school academic standing, and accountability pressures (Brezicha et al., 2015; Hallinger, 2003; Urick & Bowers, 2014). Moreover, Brezicha et al. (2015) claimed that in the course of school reform, principals must attend to yet another variable – each individual teacher's learning style. In their study, the authors found that teachers responded differently to a new program implementation to foster and increase students' social and civic engagement in an elementary school. The 20-year veteran principal shared her decision with a small group of teachers in the summer. During preplanning, the remainder of the

staff found out that the program was mandatory to the entire school. Although compliant, teachers did not have a voice in the program details or time to prepare for it adequately, and consequently some expressed resentment toward the top-down decision. Through focus group interviews, several teachers expressed discontentment with the principal's sudden implementation and invasive monitoring of the program. Had the principal chosen an individualized approach with each teacher, the acceptance and buy-in would have been greater and the program more successful (Brezicha et al., 2015).

Hallinger (2003) stated that pressures of accountability have resulted in the need for flexible leadership suitable to school context. He claimed that principals should use different governance styles according to the situation and urgency of the goals. School leaders may reduce anxiety and resistance that surfaces during new reforms when they include other stakeholders in planning and decision making, especially when these decisions involve adopting new strategies requiring teachers to get out of their comfort zone (Hallinger & Murphy, 2013; Urick & Bowers, 2014). Because change generally means uncertainty and delving into unknown territory, it is important for administrators to acknowledge the concerns of those involved (Hope & Pigford, 2001; Saunders, 2014). Members of an organization develop a strong bond that results in collaboration and mutual support when they can voice their fears and reservations about change. Regardless of leadership style, collaboration among administrators and staff has remained an essential part of successful schools (Quong & Walker, 2010).

Teacher Attitudes in Educational Reform

Whereas it has been the principal's responsibility to oversee when and how change is to take place in schools, teachers have been the ones directly involved in its

implementation at the classroom level (Charalambous & Philippou, 2010; Porter, Fusarelli & Fusarelli, 2015). Change can be a challenge for teachers and students considering learning is not a mere transfer of knowledge from educator to pupil. Rodriguez (2013) stated that "teaching is an interactive, reciprocal system in constant connection with two other systems: namely the teacher system and learner system" (Rodriguez, 2013, p. 77). Historically, during school reform, the first concern has been its effect on student performance on standardized tests with very little attention given to how teachers accept or assimilate new views to their already established beliefs (Chopin, 2013; Kaniuka, 2012).

Gregoire (2003) argued that the commitment to any fundamental change in teaching philosophy depends largely on how dissonant they are. She claimed teachers go through a complex sequence of transformations that happen *before* any change has reached the classroom. These transformations require time, a commodity frequently overlooked because of the urgency of implementation and pressure to get instant results (Charalambous & Philippou, 2010; Chopin, 2013; Main, 2012).

Several researchers have suggested that teaching philosophy and personal beliefs have played a decisive role in embracing and adopting educational reform (Gregoire, 2003; Masci et al., 2008; Saunders, 2013; Thornburg & Mungai, 2011). They have supported the view that teachers resist change because it challenges their current teaching practices and professional identity. In their view, if change is proposed, it must mean their classroom practices must be faulty or wrong. Opposition to change has been more prevalent among veteran teachers who have been through numerous short-lived

educational reforms and perhaps have become somewhat calloused to yet another top-bottom imposed reform (Chopin, 2013; Masci et al., 2008).

Gregoire (2003) discussed situations in which teachers viewed reform as either a challenge or a threat. She argued that resistance to change has been often caused by a conflict between the teacher's established teaching beliefs and new instructional practices proposed by educational reform. She described five different models of beliefs change and then proposed her own, a Cognitive-Affective Model of Conceptual Change (see Figure 1).

When faced with change, Gregoire's (2003) model suggested that teachers went through a series of self-assessment questions in the form of a dichotomy key, which decided whether they would fully embrace change or not and whether these changes would reshape their existing belief system permanently. Interestingly, this model asserted that when teachers did not view change as a threat, the level of resistance was low, assimilation/implementation happened at a superficial level, was temporary, and did not result in true conceptual change. These individuals experienced what the author called *heuristic processing*. Gregoire (2003) concluded that such teachers did not really evaluate the innovation against pre-existing beliefs at a deeper level, and ultimately, very little or no real change occurred in their teaching practices (Gregoire, 2003).

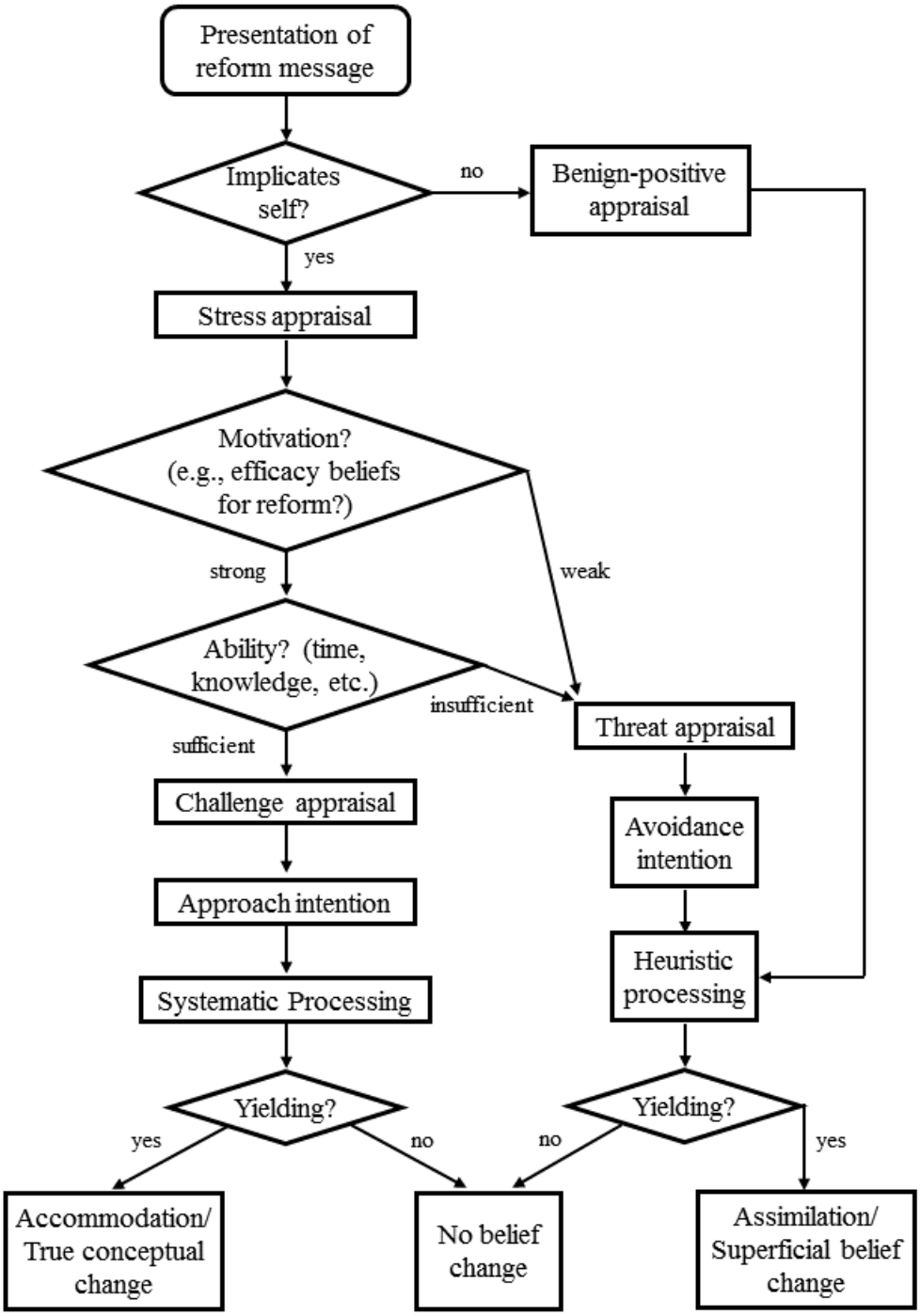

Figure 1: The cognitive-affective model of conceptual change. Reproduced from "Is it a challenge or a threat? A dual-process model of teachers' cognition and appraisal processes during conceptual change," by Michelle Gregoire, 2003, *Educational Psychology Review, 15*(2), p. 175. Copyright 2003 by Plenum Publishing Corporation with permission of Springer (see Appendix A).

On the other hand, Gregoire (2003) stated when the change represented a deviation from teachers' practices, and these teachers had high self-efficacy, they were more likely to process its elements systematically, paralleling these with their established beliefs. In this situation, teachers regard the proposed reform as a feasible possibility either because they are not satisfied with the outcome of their practices, or because the change promises to produce better results. Gregoire (2003) called this *systematic processing*, an in-depth analysis having a greater potential to result in change given the deliberate intent to perfect one's practice. In this scenario, teachers consider the change worth checking, and therefore, more of a feasible challenge than a threat.

Some scholars (Charalambous & Philippou, 2010; Enderlin-Lampe, 2002; Gregoire, 2003; Hochberg & Desimone, 2010; Saunders, 2013) have explored the critical role of self-efficacy in shaping teachers' attitudes toward reform. They found teachers with higher levels of self-efficacy to be more self-assured in risking the use of new practices because they felt confident in their ability to overcome potential obstacles. These teachers accepted change as a viable *challenge* rather than a *threat* to their identities as educators (Gregoire, 2003; Kaniuka, 2012). This same finding was confirmed by other researchers (Charalambous & Philippou, 2010; Enderlin-Lampe, 2002; Kaniuka, 2012; Saunders, 2013) suggesting that teacher's high self-efficacy is linked to high student achievement. Conversely, teachers with low self-efficacy usually felt threatened by the prospect of change and ended up resisting it or implementing it in a haphazard manner either because of inexperience or due to a lack of subject matter expertise. As a result, these teachers did not attempt to understand the pros and cons of the proposed reform and remained unaffected by it (Gregoire, 2003).

A number of other factors have negatively affected how teachers have dealt with school reform: lack of clarity about plan execution and inadequate skills/knowledge needed for implementation (Murphy & Torff, 2014; Porter et al., 2015), potential threat to students' learning and lack of support during and after implementation (Charalambous & Philippou, 2010), and concerns about time and accountability (Thornburg & Mungai, 2011). Support from administration should include appropriate professional development, necessary resources to carry out new instructional strategies, time to incorporate and practice them, constructive feedback from an expert in the field, and an understanding from all stakeholders, including parents and students, of the complexity of this transition period (Eilers & D'Amico, 2012; Hope & Pigford, 2001; Masci et al., 2008; Saunders, 2013).

Porter, Fusarelli, and Fusarelli (2015) conducted a qualitative study exploring the implementation of the CCS by surveying and interviewing several teachers and administrators in a school district in North Carolina. Two main themes emerged from the interviews: the burden the implementation process placed on teacher's personal and professional lives and the pivotal role the context of implementation played. Contextual variables included time, pacing, communication, training, and resources. Teachers reported being inundated by the many changes occurring simultaneously and lack of time to plan adequate lessons as required by the standards. They felt guilty because their families were taking the back seat due to long hours dedicated to work daily. Regarding training, teachers felt that it was either too focused on the theory behind CCS or too repetitive leaving them no time to actually accomplish practical work. In addition, the massive amount of digital resources was overwhelming, many not necessarily of good

quality, which required them to spend time evaluating and adjusting them to their needs. The conclusion was that to be effective, training should provide practical applications and sufficient time for participants to try these in a collaborative fashion (Porter et al., 2015).

Thornburg and Mungai (2011) warned against expecting too much change in a short time. In their view, the overload educators already carry coupled with conflicting beliefs from new initiatives could actually hinder implementation even when these educators seemed to be pro-reform. To reduce the negative side effects of reforms of this magnitude, school leaders should devise a support system including well-designed, ongoing professional development specifically targeting the goals of the reform and create learning communities where teachers and administrators work together toward a common goal (Fullan, 2001; Fullan, Bertani, & Quinn, 2004; Porter et al., 2015; Thornburg & Mungai, 2011).

Professional Development

Hochberg and Desimone (2010) discussed how professional development has evolved from a voluntary nature to a necessity in the accountability age. In the CCS era, professional development has taken a more comprehensive role; one involving not only content knowledge, but active teaching, authentic assessment, and reflection on prior teaching philosophies (Darling-Hammond & McLaughlin, 2011; Darling-Hammond & Richardson, 2009). The idea of teaching under the CCS focused on student inquiry, real-life problem solving, and peer discussions to promote mathematical reasoning and deeper understanding (Goldsmith, 2001).

Professional development has always been present in education and in the CCS context it has been one of the pieces that could mean success or failure (Sztajn,

Marrongelle, & Smith, 2012; Marrongelle, Sztajn, & Smith, 2013). Because teachers have been the primary acting force in implementing these standards, it has been essential to provide professional development geared toward developing instruction with an emphasis on higher order thinking and problem solving while at the same time raising student achievement (Hochberg & Desimone, 2010). The task of designing effective professional development has been nothing short of complex especially when it has sought to fulfil such major educational reform.

Garet et al. (2011) examined the impact of a 2-year long professional development on rational number topics (fractions, decimals, percent, ratio, and proportion) offered to seventh-grade teachers from 39 middle schools in the northeast, south, west, and midwest U.S. Ninety-two teachers and 2,132 seventh-grade students participated in the study totaling 118 contact hours. The control and treatment groups of teachers and students were approximately the same in numbers. Mathematics teachers were evaluated in a pre- and post-test design containing questions about *content knowledge* and *specialized knowledge* for teaching. Findings revealed no statistically significant differences between the control and treatment groups of teachers on *content knowledge* and *specialized knowledge*, although the treatment group scored higher than the control on the latter. Differences in the scores of students in both groups were not statistically significant. However, there was a positive correlation between teacher knowledge and student achievement, especially on the *fractions* and *decimals* topic. This study suggested that despite the lengthy professional development, other variables might have contributed to the success of professional development. Below is a discussion of key factors in well-designed professional development.

In the article *Scaling up Professional Development in an Era of Common Core Standards*, Marrongelle, Sztajn, and Smith (2013) found that professional development should "(a) be intensive, ongoing, and connected to practice; (b) focus on student learning and address the teaching of specific content; (c) align with school improvement priorities and goals; (d) and build strong working relationships among teachers" (Marrongelle et al., 2013, pp. 203-204). The authors further added that to prepare teachers adequately to take on a reform such as the CCS, professional development should be offered continuously and be specific to the goals of the initiative.

Marrongelle et al. (2013) also emphasized that professional development should seek to train teachers to go beyond basic skills and should focus on promoting learning of concepts in depth. For the latter to happen, teachers should be highly knowledgeable in their content and use strategies addressing the different learning styles of students (Marrongelle et al., 2013). Finally, to be effective, professional development should be in harmony with the school goals and encourage collaboration among teachers. It is critical to foster a close teacher network to ensure a supportive system throughout the reform process (Darling-Hammond & McLaughlin, 2011; Darling-Hammond & Richardson, 2009; Goldsmith, 2001; Lee, 2011).

Furthermore, Hochberg and Desimone (2010) corroborated Gregoire's (2003) argument on the importance of teachers' motivation and efficacy beliefs as decisive factors on whether teachers viewed professional development as worthy of their time. It is important, therefore, to fund professional development that is practical and tailored to the identified needs of the school district, such as the unique demographics of its student population (Darling-Hammond & McLaughlin, 2011; Hochberg & Desimone, 2010).

Marrongelle et al. (2013) listed active collaboration among teachers with time for reflection on new learning as critical in allowing teachers to feel comfortable and confident in bringing new learning to the classroom. This has been particularly true for new teachers. School reform may be intimidating to those entering the teaching profession in this time of change. Researchers (Darling-Hammond & McLaughlin, 2011; Wiseman, 2012) have stressed the need for redesigning teacher education programs to include training in specific areas of expertise, further suggesting the incorporation of professional development as part of the internship stage in these programs.

One of the obstacles to school reform has stemmed from policies either at the state or district level. Darling-Hammond and McLaughlin (2011) discussed the dissonance between educational policies and professional development for in-depth learning required by the CCS. The authors argued that as long as policies conflicted with the principles of the standards, teachers would find it difficult to be fully committed to changing their teaching strategies. According to Hochberg and Desimone (2010), accountability has had both, positive and negative effects on professional development: the first evidenced by an increase in content knowledge and pedagogy; the latter marked by increased pressure of high stakes testing coupled with more rigorous curriculum. In most school districts, teacher evaluations continue to be based on a checklist of classroom routines, a process incongruent with the principles of CCS. In other words, educators may feel conflicted and trail a fine line between compliance with CCS and the teacher evaluation system (Darling-Hammond & McLaughlin, 2011).

Guskey and Yoon (2009) conducted one of the largest meta-analyses on effective professional development and found that only nine out of 1,343 studies met the standards

set by the *What Works Clearinghouse* (WWC) for this type of research. The authors reported that no studies at the middle school or high school levels met the WWC standards. WWC has defined sound, evidence-based research as those employing true experimental designs involving pre- and post-tests establishing a relationship between professional development and student achievement. Guskey and Yoon's (2009) analysis revealed that successful professional development was delivered by outside experts in the field in the form of workshops or summer institutes, involved 30 or more contact hours, included ongoing and structured follow-up, and focused on specific subject areas (Darling-Hammond & Richardson, 2009; Guskey & Yoon, 2009). In mathematics, professional development studies have suffered from poor research design generating inconclusive results (Guskey & Yoon, 2009).

In *Supporting Implementation of the Common Core State Standards for Mathematics: Recommendations for Professional Development*, Sztajn, Marrongelle, and Smith (2012) offered nine recommendations for the successful implementation of CCS in mathematics. Four recommendations addressed professional development and included: (a) emphasize the integration of content standards and standards of mathematical practice in everyday learning; (b) design training based on features that support teacher learning; (c) build coherent programs for an extended time using knowledgeable facilitators; and (d) establish continuous assessment to measure professional development effectiveness (Marrongelle et al., 2013; Sztajn et al., 2012).

One of the goals of CCS has been to instill in students the standards for mathematical practice mentioned in the first recommendation (Burns, 2012). The second recommendation stated that to promote true learning, training should involve a substantial

number of contact hours in consistent intervals throughout the year and be delivered in different forms – face-to-face or online, combination of summer and during the year – to accommodate for teacher schedule (Marrongelle et al., 2013). Frequent sessions with meaningful work were found to increase the chances new learning become a permanent part of teachers' classroom routines. The third recommendation referred to planning ahead of time for a logical sequence of training sessions with cohesive topics, ensuring the gradual assimilation of knowledge (Darling-Hammond & Richardson, 2009; Marrongelle et al., 2013; Sztajn et al., 2012). The fourth recommendation emphasized the continuous assessment of workshops through data collection from classroom observations of teacher practices (Marrongelle et al., 2013; Sztajn et al., 2012).

Several studies in professional development research (Darling-Hammond & McLaughlin, 2011; Darling-Hammond & Richardson, 2009; Guskey & Yoon, 2009; Hochberg & Desimone, 2010; Lee, 2011) listed similar recommendations including the focus on deepening teacher's content knowledge and how students learn the subject, hands-on learning activities, alignment with school's goals and mission, collaboration among teachers, and continuance over time. These authors found the following: (a) one-shot, isolated workshops had little effect on teaching practices or on student achievement (Hochberg & Desimone, 2010); (b) merely training teachers on techniques and behaviors without rethinking conceptual understanding did not yield results (Darling-Hammond & McLaughlin, 2011; Guskey & Yoon, 2009); (c) teacher collaboration resulted in collective support facilitating change (Darling-Hammond & McLaughlin, 2011; Darling-Hammond & Richardson, 2009; Lee, 2011); and (d) a minimum of 30 hours training were

needed to improve student learning and achievement (Darling-Hammond & Richardson, 2009; Guskey & Yoon, 2009).

Implications for K-12 Mathematics Education in Georgia

In Georgia, the implementation of CCS and the new teacher and leader evaluation system took place at the same time (GaDOE, 2014). The new evaluation system was part of president Obama's *Race to the Top* initiative and included three components: teacher assessment on performance standards, surveys of instructional practice, and measures of student growth and academic achievement (GaDOE, 2014). These two initiatives happened in the midst of yet other threats to public education – the establishment of charter schools as alternatives to unsatisfactory public school performance, tax credits and exemptions for private schools, budget cuts for public schools, and increased pressure of test score outcomes from politicians down to school boards, principals, teachers and students (Croft et al., 2016).

As predicted, student performance dropped significantly in 2014, the first year of the GMAS standardized test administration (GaDOE, 2015). Not only were Georgia schools dealing with major changes in teaching practices stemmed from the CCS implementation, but they also faced the challenge of meeting new and more rigorous evaluation standards (Croft et al., 2016). As Chopin (2013) stated, no one argued that the educational system needed to undergo reform. However, the approach by state and federal legislators put educators in a difficult position by holding them accountable for student performance on a new, more rigorous test, and tying these results to teacher evaluation (Croft et al., 2016; Murphy & Torff, 2014).

Murphy and Torff (2014) elaborated on the conflict between the CCS implementation and accountability regarding teacher responsibility:

> Ironically, the standards-and-accountability model of educational reform is unaccountable; student outcomes are typically attributed to educator performance, not to the efficacy of the model. When test results are good, it is because educators functioned effectively; when results lag, it is because educators underperformed. As such, the current model of educational reform cannot fail – it can only be failed. (Murphy & Torff, 2014, p. 21)

The history of school reform in the U.S. has repeatedly brought about changes with expectations of improbable, instant results (Chopin, 2013; Gregoire, 2003; Hope & Pigford, 2001; Masci et al., 2008; Saunders, 2013). Chopin (2013) remarked that many educators have been guarded against changes because experience has taught them to be skeptical of the longevity of these reforms and educational policies have historically demanded much within an unfeasible timeline (Chopin, 2013). As a rule, it has taken schools anywhere from 3 to 5 years for small scale and 5 to 10 years for large scale initiatives (Saunders, 2013). Change takes time.

Masci et al. (2008) depicted the framework of school reforms as the *perfect storm* in which the new challenged the old. Croft et al. (2016) used the term *perfect storm* to describe the complex school reform that has taken place in most states since 2010. A variety of interwoven factors has contributed to the success or failure of school reforms (Thornburg & Mungai, 2011). Allowing educators and stakeholders sufficient time to assimilate and adapt to the new way is a critical component to the successful implementation of any reform (Hope & Pigford, 2001; Main, 2012; Thornburg &

Mungai, 2011). Program implementers, namely teachers, require time to perfect their craft especially when change entails new strategies necessitating training, practice, and most importantly, a reformulation of established beliefs (Kaniuka, 2012; Saunders, 2013).

The CCS movement promised to be the answer to many problems in the American education system. Proponents of CCS argued that high school students performing at proficient levels under CCS should be college-ready (Achieve, 2008; Briars, 2014; Jones & King, 2012; Schmidt & Burroughs, 2012). For higher education, this has meant a decrease in remedial courses and an opportunity for increased rigor on courses for freshman college students (Jones & King, 2012). The success of CCS, however, has depended largely on the attitudes of teachers and administrators, on adequate training and funding, and whether this initiative is given sufficient time to produce results (Chopin, 2013).

Chapter III

METHODOLOGY

The purpose of this study was to investigate principals' perceptions of the impact of professional development, teaching strategies, and teacher attitudes on student achievement during the first 3 years of Common Core in Georgia middle schools. The research employed a descriptive quantitative research design. According to Leedy and Ormrod (2005), this type of research involves either identifying characteristics of an observed phenomenon or exploring relationships between variables. Whether the study falls under either one of these classifications, the descriptive quantitative method investigates situations as they are, rather than observing the effects of manipulating variables or establishing causal relationships between variables (Gay, Mills, & Airasian, 2009). Fraenkel and Wallen (2008) classified quantitative research into five categories: experimental, single-subject, correlational, causal-comparative, and survey research. These methods yield results that are quantified through statistical analyses and in many cases may be generalized from a sample to a population (Creswell, 2009).

Quantitative research follows the scientific method closely beginning with a theory and data collection that either supports or disproves the theory, from which point researchers repeat the process. Creswell (2009) classified this type of research as reductionistic in that its goal is to simplify ideas into measurable variables. In this study, middle school principals completed a survey regarding their perceptions on the variables affecting the implementation of the CCS in mathematics during its first 3 years. I

narrowed these variables to types of professional development offered to teachers, teaching strategies actually used in middle school classrooms, principal perception on teacher attitudes regarding the CCS, and overall principal perception of the CCS.

The three variables listed above constituted factors affecting the implementation of CCS in mathematics, and represented the independent or manipulated variables in this study. The performance of students in grades 6 through 8 on both standardized tests, CRCT and GMAS, represented the dependent or responding variable. I used the CRCT scores in mathematics for the first 2 years of common core, 2012-2013 and 2013-2014, and the first administration of the GMAS scores for 2014-2015. The goal was to determine whether there was a relationship between test scores, implemented initiatives, teaching strategies, and the perception of principals regarding the CCS.

Within the quantitative label, this study was classified as survey research. Leedy and Ormrod (2005) defined survey research as one that gathers information about personal opinions and attitudes of one or more groups of people (Leedy & Ormrod, 2005). This type of research is common in business and educational settings where the improvement of programs depends on feedback provided by its participants. Survey research carries some generalization risks in that it is an instant snapshot of a situation; therefore, findings are specific to a particular setting at a specific time (Leedy & Ormrod, 2005).

Generalization of survey research is also dependent on response rate. There are no clear guidelines as to what is deemed an acceptable response rate, however, when over 10% of the original sample does not respond, the potential for generalizability is compromised (Fraenkel & Wallen, 2008). Response rates also depend on survey mode.

Guo et al. (2016) and Nulty (2008) have found online survey response rates to be significantly lower than paper-based surveys, with an average rate of 33% for online as opposed to 56% for paper-based. By contrast, Barrios, Villarroya, Borrego, and Ollé (2011) have found the opposite to be true, with an online response rate of 64.8% versus a 48.8% return rate for paper-based. Online surveys do carry some advantages over paper-based surveys in that they are convenient (do not require the physical act of writing and mailing surveys), are self-paced, and are private if anonymous (Farrell & Petersen, 2010).

An inevitable aspect of survey research is that it relies on self-report data, which can lead to deceiving results if participants fail to answer questions truthfully. This occurs because participants may have an inaccurate account of events and attitudes due to elapsed time or because they feel the need to protect their position or establishment. The first reason is most likely unintentional whereas the latter may stem from fear of negative exposure. Leedy and Ormrod (2005) add that another reason for distorted responses is that respondents usually take little time to choose their answers on topics that have just been presented to them (Leedy & Ormrod, 2005). Unfortunately, inaccurate responses have the power to discredit research findings. Guo et al. (2016) and Nulty (2008) contend return rates increase with the use of anonymous surveys, cash incentives, brief questionnaires, and personalized email invitations. They add that candid responses depend on participant sample and their level of interest on the topic in question.

Procedures

The GaDOE established 16 Regional Educational Services Agencies (RESA) to support public schools with implementing state-adopted educational initiatives and programs. Each RESA is assigned a number of schools based on geographic location. These agencies work closely with public schools with the objective of improving educational efforts stipulated by the state. This study investigated middle schools in 32 school districts from three different RESA areas located in South Georgia. The sample consisted solely of true middle schools, defined by the GaDOE as schools housing grades 6 through 8. Schools with different grade bands were excluded to minimize the number of variables that could affect the study outcome.

I sent a letter of informed consent to the 32 school superintendents via email to obtain permission to conduct the study (see Appendix B). The letter contained a thorough explanation of the study: purpose, benefits of participating, its voluntary nature, approximate time of completion, assurance that all answers would be anonymous, and confidentiality of information. Superintendents were asked to respond through email. Nineteen of the 32 superintendents agreed to participate in the study, which corresponded to 28 middle schools.

After the Institutional Review Board's approval (see Appendix C), I emailed the 28 middle school principals of those districts for which I had superintendent consent (see Appendix D). The email informed the principals about the details of the research, their role as participants, and provided a link to the survey. I requested surveys to be completed within 1 week of receiving the email. I sent three follow-up email reminders to all principals requesting their responses at 1 week-intervals. All participants received

weekly reminders because I was unable to distinguish respondents from non-respondents. After 5 weeks, I compiled the collected data for statistical analyses. Meanwhile, I obtained 2013, 2014, and 2015 test scores for schools I had permission to survey from the Governor's Office of Student Achievement (GOSA).

Assumptions

One of the assumptions of this study was that principals would provide honest answers to the survey questions. A second assumption involved how thoroughly participants would answer the survey questions, especially the open-ended items requesting additional information. I hoped the surveyed principals would take time to reflect on the dynamics of their schools during the implementation of CCS and would provide a fair assessment of the school standing during these transition years. A third assumption was that teachers actually implemented in their classrooms the teaching strategies the principals identified as included in professional development over the 3-year period.

Sampling Design

This study used a purposive or nonrandom sampling. Unlike random sampling, nonrandom sampling does not guarantee that every element of the population is represented in the study (Leedy & Ormrod, 2005). The population in this study included all principals of true middle schools in the state of Georgia. However, of particular interest was finding out the perception of principals in middle schools located in South Georgia as opposed to schools around metropolitan areas near Atlanta. Thus, the study only included true middle schools in three Regional Educational Services Agencies (RESAs) located in South Georgia. The GaDOE defines true middle schools those

housing grades 6 through 8. The rationale behind using only true middle schools was based on the beliefs that schools with similar grade bands were more likely to focus on similar academic endeavors, face comparable challenges related to student age, and have teachers with similar attitudes.

Sample Description

Data about participants, including contact information, school district size, school demographics, and student achievement were obtained from the GaDOE and the GOSA websites. Using the middle school criteria of grades 6 through 8, 32 school districts (58 true middle schools) from three RESAs were eligible to participate in this research. Following is a description of each RESA region.

RESA #1: This was the largest of the three agencies in the study, serving 17 counties in southeast Georgia totaling 18 school districts. As a rule, each county represented a school district with one exception, where the city had its own district. The total number of students enrolled in K-12 schools in this RESA was 81,096 in 2013-2014 (GOSA, n.d.). During this school year, the number of students enrolled in the smallest district was 1,571 whereas the largest district had an enrollment of 35,890 students. RESA #1 served 40 true middle schools housing grades 6 through 8. Four of these middle schools had a student population of less than 400 students, 11 had a student population between 400 and 625 students, 18 schools had a student population between 626 and 825 students, and seven schools had over 825 students.

Five out of the 40 middle schools had 25-50% of students receiving free or reduced lunch. Nineteen middle schools had 50-75% of students receiving free or reduced lunch. Sixteen schools had over 75% of students receiving free or reduced lunch.

These percentages represented the student subgroup labeled as economically disadvantaged (ED), which was reported by GOSA along with standardized testing data for each school district. Schools with percentages between 76-100% of students eligible for free or reduced lunch were labeled high-poverty schools whereas low poverty schools were those with no more than 25% of students eligible for free or reduced lunch (IES, n.d.). Thus, 40% of middle schools in this RESA were high-poverty schools.

RESA #2: The second largest RESA agency in this study served 11 counties and one city district. In 2013-2014, this RESA had 51,410 students enrolled in K-12 schools (GOSA, n.d.). The number of students enrolled ranged from 781 students in the smallest district to 10,103 students in the largest district. This RESA served 12 school districts and 12 true middle schools. Two of these middle schools had an enrollment of less than 400 students, two had between 400 and 625 students, six middle schools had between 626 and 825 students enrolled, and two schools had over 825 students enrolled. The percentages of economically disadvantaged students, receiving free or reduced lunch, were as follows: two middle schools had 25-50% ED students, five had 50-75% ED students, and five had over 75% ED students. Thus, 42% of the true middle schools in this RESA were high-poverty schools. I excluded three counties from this RESA because they did not have true middle schools, dropping the number of eligible school districts to nine.

RESA #3: This was the smallest agency in the study. In 2013-2014, the eight school districts in this RESA had a total enrollment of 26,510 students (GOSA, n.d.). Many schools in this RESA area did not have a traditional structure regarding grade bands. Some included sixth grade in their elementary schools, and some housed eighth grade in high school. Because this study focused on grades 6 through 8, I excluded

schools with grade ranges other than 6 through 8. As a result, three of the eight school districts did not participate in the present study. Five school districts were eligible for data collection.

Enrollment in school districts of this RESA ranged from 1,319 students in the smallest district to 7,386 students in the largest district. Three middle schools had between 400 and 625 students enrolled, one school had between 626 and 825 students enrolled, and two schools had an enrollment of over 825 students. Four schools had 50-75% of students eligible to receive free and reduced lunch, and two schools had over 75% eligible students. Therefore, 33% of middle schools participating in this study were high-poverty schools in this RESA area.

I chose to categorize the middle schools in this study by the number of students enrolled. This facilitated the process of data analyses and could potentially add to the value of the study should clear patterns concerning school size surface from survey results. The inclusion of the economically disadvantaged subgroup data served as an indicator of the poverty levels in the schools. According to a report by the Institute of Education Sciences (IES, n.d.), from 1998 through 2009, the reading scores of eighth grade students in high poverty schools were consistently around 35 points lower than those of their counterparts in low-poverty schools. In mathematics, the gap between the eighth grade scores in high and in low-poverty schools was even higher, reaching 50 points (IES, n.d.). In the present study, 23 out of the 58 middle schools (48%) fell in the high-poverty classification. A summary of the demographics data for all three RESA agencies is listed in Table 1.

Table 1

RESA Demographics

	RESA #1	RESA #2	RESA #3
Number of School Districts Eligible for Study	18	9	5
Number of True Middle Schools (grades 6-8)	40	12	6
Student Population Range per District (smallest to largest)	1,571 – 35,890	781 – 10,103	1,319 – 7,386
Student Population per School			
< 400	4	2	0
400-625	11	2	3
626-825	18	6	1
> 825	7	2	2
Number of Schools in each Economically Disadvantaged bracket:			
≤ 25% (low poverty schools)	0	0	0
26% – 50%	5 (12.5%)	2 (16.6%)	0 (0.00%)
51% – 75%	19 (47.5%)	5 (41.7%)	4 (66.7%)
> 75% (high poverty schools)	16 (40.0%)	5 (41.7%)	2 (33.3%)

Data Collection

Data collection was conducted through an online survey completed by principals of middle schools in South Georgia. Creswell (2009) described the survey design as a means of obtaining opinions and attitudes of a population by polling a sample of that population (Creswell, 2009). This method of data collection is practical and convenient because it provides reasonably quick results, especially when surveys are completed online (Farrell & Petersen, 2010). Participants in this study completed an online 39-

question survey consisting of a combination of Likert-scale items, selected response, ranking, and open-ended questions. The questions addressed seven areas: demographic profile, professional development, teaching strategies, teacher attitudes, CCS resources in mathematics, student performance, and overall principal attitudes toward the implementation process (see Appendix E).

Each participant answered the survey only one time, making this a cross-sectional survey. I chose to conduct the survey online because most administrators already manage their routine school business via computers. The simplicity and swiftness of online surveys increase the likelihood of their completion by participants who have a hectic schedule, such as principals. I first obtained permission from school superintendents in each district allowing principals of their middle schools to participate in the study. I also offered to share results of this study with the participating school districts since the information obtained through the surveys would help administrators reflect on the variables affecting the implementation of the CCS in their schools.

The data collection process consisted of two parts: perception survey and test scores for all 28 schools. I sent the 32 district superintendents an email containing a detailed description of the study: research title and goals, data collection procedure, research relevance to middle school administrators, anonymity and confidentiality assurances, and a request for their consent to survey middle school principals in the district (see Appendix B). Nineteen of the 32 superintendents agreed to let their middle school principals participate in the study, a 59% consent rate. This meant that I could only send the survey to 28 out of the 58 schools (48%) discussed in the sample description section. The superintendent consent emails were submitted to the IRB panel

for review. Upon receiving IRB approval (see Appendix C), I conducted a pilot survey with local administrators to test its logistics, such as clarity of instructions, wording of questions, and any other issues participants would experience during the survey. The pilot was successful as to the clarity of questions.

Using Valdosta State University's email system, I sent the first email invitation to the 28 principals in June 2016. The email served as a letter of informed consent and explained the following: the purpose of the study, benefits of participating, its voluntary nature, approximate time of completion, assurance that all answers would be anonymous, and confidentiality of information. In addition, I included the fact that their superintendents had agreed to let them participate and provided the survey link at the bottom of the email. At the end of 1 week, I sent the first email reminder to all principals. All principals received three subsequent reminders at 1-week intervals (Appendix D).

To ensure confidentiality of responses, I utilized the anonymous feature provided by Qualtrics, a Valdosta State University online survey instrument which I accessed using my password protected student credentials. To accomplish this, I used the option to disable IP-tracking, therefore responses could not be linked to participants. Additionally, the survey did not include a place for district or participant names. I planned to use results solely to compile overall percentages of themes emerging from survey responses. In addition, I was the only party with access to collected data in print and digital form. To maintain confidentiality of responses, I will keep all contact information, including email exchanges with superintendents and principals for 3 years in my personal laptop, which is password protected. I will also store printed data results in a sealed folder and all digital documents in a flash drive set aside for this research in my home.

The second part of data collection involved obtaining standardized test scores in mathematics for grades 6, 7, and 8 from GOSA, which are available to the public. The GOSA website stores standardized score averages per grade for each school as well as average scores per school (not grade specific). Since my interest was on grades 6 through 8, I used the latter option. GOSA provides disaggregated data by subgroups: gender, race/ethnicity, disability status, English proficiency status, economic status, and migrant status. I utilized CRCT scores for the school years of 2012-2013 and 2013-2014 and GMAS scores for 2014-2015. For each year, I obtained averages for all students and for the subgroup economically disadvantaged.

Instrumentation

The choice of an appropriate data collection instrument is extremely important because it affects how one interprets the results. Instruments must have both, validity and reliability, in order to be considered suitable for scientific research. Validity refers to the degree a test measures the topic of interest (Gay et al., 2009). Numerous factors threaten the validity of an instrument. In survey research, these include unclear question directions, ambiguous items, use of unfamiliar vocabulary to participants, and complex sentence structures. Questions of this type produce unreliable interpretation of results because participants may misunderstand them and provide false answers. In addition, data collection instruments must be reliable. Reliability involves consistency of answers by participants (Gay et al., 2009). In other words, if participants answer the same questions at different times and scores are consistent, the test or survey is said to be reliable. Reliability is measured by Cronbach's alpha, a numerical coefficient ranging from zero to one. Values closer to one indicate the test delivers consistent results.

Cronbach's alpha coefficients were acceptable for the survey questions in this study: teacher attitudes (α = .92), student Performance (α = .88), principal attitudes (α = .95), CCS resources (α = .83), and all variables (α = .96).

I was unable to find a survey from other published works addressing the objectives of this study in full. Therefore, I used three published dissertations investigating a similar topic, perceptions about Common Core standards, as references when designing the 39-question survey for this study. Three questions were adapted from Weichel (2002), four questions were adapted from Hoffman (2013), and one question was adapted from Heil (2012). To ensure instrument validity, I conducted a pilot with a few administrators from local schools. I requested and obtained feedback from these administrators regarding the alignment of the questions to the goals of this study. Their feedback consisted of minor adjustments regarding wording of questions and the addition of a couple of questions addressing principal perception. Our local administrators agreed the survey was suitable for pursuing answers to the proposed questions.

Data Analyses

I used two methods of data collection in this study: online survey administered to middle school principals and standardized test scores available from GOSA. To answer the first three research questions, I analyzed responses from the principal perception survey. Answers concerning participant and school profile, types of professional development offered during implementation, and teaching strategies were objective because they did not involve principals' opinions. On the other hand, teacher attitudes, student performance, adequacy of common core materials, and principal perception were subjective and measured using a 5-point Likert-scale (1 = strongly agree, 2 = somewhat

agree, 3 = somewhat disagree, 4 = strongly disagree, 5 = unknown). I analyzed all survey responses through frequency tables yielding percentages for each category and the median of the ratings when applicable.

The last three research questions involved using standardized test scores (CRCT and GMAS) for which I conducted statistical analyses using the Statistical Package for the Social Sciences (SPSS). For Questions 4 and 5, I conducted Oneway ANOVA to determine the relationship, if any, between the most frequent types of teaching strategies and standardized test scores for each year. I used the same procedure to determine the relationship, if any, between the most frequent types of professional development and standardized test scores for each year. Finally, to answer Question 6, I ran correlation analysis between overall principal perception and test scores by year.

For Questions 1 through 3, I made frequency tables to compare the number of teaching strategies and professional development reported by participants for 2013, 2014, and 2015. For Questions 4 through 6, I drew conclusions from statistical tests based on the interpretation of significance values derived from the Oneway ANOVA in each situation. The small sample and response rate rendered some of the research questions as inconclusive, but did provide some information as to what supports schools utilized as they implemented the CCS. A detailed explanation of the data analyses is discussed in Chapter 4.

Chapter IV

RESULTS

This study followed a descriptive quantitative research design with an online survey as the primary mode of data collection. At the end of 5 weeks, I collected responses from the online survey and exported the data from Qualtrics to Excel. Nineteen of the 32 school superintendents selected agreed to let their principals participate in this study, a consent rate of 59%. Twenty-eight middle schools from the 19 school districts were eligible based on the grade level band. Thirteen of the 28 principals completed the survey putting the response rate at 46.4%. This response rate was within the range found in the literature for online surveys (Nulty, 2008; Guo et al., 2016). The survey was divided into seven areas: participant and school profile, professional development, teaching strategies, teacher attitudes, Common Core resources and materials, student performance, and principal attitudes during the first 3 years of Common Core implementation in mathematics.

Demographics

Six respondents were male (46.2%) and seven were female (53.8%). All respondents had a degree above the Master's level; six had a specialist's degree (46.2%) and seven had a doctorate degree (53.8%). The number of years of experience as a principal for the majority of respondents was less than 5 years (46.2%). Three participants had between 6 and 10 years of experience as principals (23.1%), two had between 11 and 15 years (15.4%), and two had over 21 years of experience as principals

(15.4%). Seven respondents had been principals at the present school for less than 5 years (53.8%), five had been at the present school between 6 and 10 years (38.5%), and only one had been at the present school between 11 and 15 years (7.7%). A summary of these figures is presented in Table 2.

Table 2

Participant Profile

	Number	Percentage
Participants	13	
Male	6	46.2
Female	7	53.8
Highest degree earned:		
Specialist	6	46.2
Doctorate	7	53.8
Years of principal experience		
1-5 years	6	46.2
6-10 years	3	23.1
11-15 years	2	15.4
16-20 years	—	—
Over 21 years	2	15.4
Years of principal experience at present school		
1-5 years	7	53.8
6-10 years	5	38.5
11-15 years	1	7.7
16-20 years	—	—
Over 21 years	—	—

All schools in this study housed grades 6 through 8 and were labeled Title I schools, meaning they received supplemental funding to bridge the gap between low-income and other students. Of the 13 respondents, eight were from RESA #1 (61.5%) and five were from RESA #3 (38.5%). No principals from RESA #2 responded to the survey.

Seven of the 13 schools had 51-75% economically disadvantaged students and six had over 75% economically disadvantaged students, 53.8% and 46.2% of the respondents, respectively. The number of students in the respondents' schools had the following distribution: two schools had less than 400 students (15.4%), three schools had between 400 and 625 students (23.1%), seven schools had between 626 and 825 students (53.8%), and one school had over 825 students (7.7%). These figures along with school size distribution are organized in Table 3.

Table 3

School Profile

	Number	Percentage
Number of Students (School Size)		
< 400	2	15.4
400 – 625	3	23.1
626 – 825	7	53.8
> 825	1	7.7
Economically Disadvantaged Students		
0 – 25%		
26 – 50%		
51 – 75%	7	53.8
> 75%	6	46.2

Inferential Statistics

The first three research questions dealt with the perception of principals regarding the implementation of CCS, reported number of professional development offered during the first 3 years, and teaching strategies used during that time. Analyses involved compiling percentages for each category. The last three research questions involved

statistical analyses to establish whether relationships existed between professional development, teaching strategies, and overall perception to test scores.

Research Question 1: What were the perceptions of middle school principals in Georgia regarding the first 3 years of implementation of the Common Core standards in mathematics?

The survey explored four areas contributing to the overall perception of principals: *teacher attitudes*, *CCS resources, student performance,* and *principal attitudes*. I analyzed the questions in each area by reviewing the frequency tables in each category. I discuss areas of most agreement among respondents below.

Under *teacher attitudes*, 85% of principals agreed teachers were concerned about sufficient time to teach the CCS although the same percentage reported teachers rated the professional development for CCS as effective. Seventy-seven percent of principals agreed teacher stress levels increased with CCS implementation, although only 54% agreed the new standards led some teachers to resign or retire early. Two questions had somewhat conflicting answers: while 77% of principals thought teachers were receptive to CCS rigor and depth, only 46% agreed the majority of teachers had positive attitudes regarding its implementation. Finally, 69% reported an increase in student referral to remediation classes after CCS implementation.

Only two questions addressed the adequacy of *CCS resources* either from GaDOE or from published textbooks. Over half of the principals (54%) rated these as inadequate for teaching the new standards. The *student performance* section showed a trend: according to respondents, there was a steady decrease in the number of students referred to tutoring from 2013 to 2015. Sixty-nine percent of principals reported this increase in

2013, 54% in 2014, and 39% in 2015. However, 70% of principals reported a gap increase between low and high-performing students in mathematics since the CCS implementation. Percentages of principals reporting an increased success in ninth grade mathematics since the CCS implementation were comparable; i.e., the same percentage (39%) agreed and disagreed with this statement.

The last category, *principal attitudes*, revealed that while 77% of principals thought teacher knowledge/comfort level increased and 69% reported feeling confident about meeting staff needs, only 39% thought staff morale improved since the first year of implementation. Questions involving what principals experienced indicated 54% of principals were not satisfied with the financial support from school districts, a little over half deemed district communication as effective prior (54%) and during (62%) the CCS implementation, and only 39% reported receiving adequate professional development to oversee CCS implementation. Finally, when asked to rank the top three most challenging aspects of implementing the new standards, time to train staff adequately had the most responses for being the number one challenge. Lack of funding for professional development and curriculum resources in mathematics were tied for second place. Scheduling intervention classes for low performing students and parental support were tied for third place.

To obtain an average rating of the overall perception in each category, I recoded questions worded negatively so that all ratings would have the same meaning when interpreted, either positive or negative. After recoding, all questions with lower Likert-scale ratings (1 and 2) were associated with a positive perception. Conversely, items with higher Likert-scale ratings (3 and 4) represented a negative perception toward the

standards implementation. A rating of 5 was equivalent to *unknown*, and therefore, did not represent the highest score. The measure of central tendency used was the median because Likert-scale items are ordinal variables. A summary of these averages per category are listed in Table 4.

Table 4

Average Ratings by Category

Category	Median
Teacher Attitudes	2.81
Common Core Resources and Materials	3.00
Student Performance	3.00
Principal Attitudes	2.43

Of the four survey areas, the overall perception ratings for CCS resources and materials and student performance represented a more negative perception (*Mdn* = 3.00) than the other two areas. This meant that most principals deemed the CCS materials and resources as inadequate to address the new standards. It also meant the new standards affected the performance of students negatively, especially the low performing group. The overall perception of respondents regarding teacher attitudes was slightly negative (*Mdn* = 2.81) and corroborates with the high percentages attributed to increased teacher stress levels and teacher concerns about time to teach the standards. The most positive view came from principal attitudes. Principal perception of their own roles in the CCS implementation was more positive than the other three areas (*Mdn* = 2.43).

Research Question 2: What teaching strategies did principals expect teachers to use in middle school mathematics classrooms during the first 3 years of Common Core?

The survey listed eight teaching strategies from 2013 to 2015: use of manipulatives, mathematics modeling, real-life problem solving, higher order thinking, writing in mathematics, differentiation, formative assessment, and technology integration. Principals reported whether their teachers used these during the 3-year period. Percentages of teaching strategies used per year are listed in Table 5.

Table 5

Teaching Strategies Percentages

Teaching Strategies	2012-2013		2013-2014		2014-2015	
N = 13	Frequency	%	Frequency	%	Frequency	%
Use of manipulatives	7	54	8	62	6	46
Mathematics Modeling	7	54	7	54	9	69
Real-Life Problem Solving	7	54	8	62	9	69
Higher Order Thinking	6	46	9	69	9	69
Writing in Mathematics	4	31	9	69	10	77
Differentiation	6	46	9	69	9	69
Formative Assessment	4	31	6	46	10	77
Technology Integration	5	38	7	54	9	69
Other: Writing in all Content Areas	1	8	1	8	1	8

Overall, the percentages of principals reporting the use of the listed strategies increased from 2013 to 2015, indicating the variety of strategies was greater in the school year 2014-2015. The only exception was the use of manipulatives. The most common strategies used in 2012-2013 were use of manipulatives, mathematics modeling, and real-life problem solving. In 2013-2014, the top three strategies used were higher order thinking, writing in mathematics, and differentiation. In 2014-2015, first year of the new

test (GMAS), the most common strategies used were writing in mathematics and formative assessment. Only one respondent added a strategy not listed, writing in all content areas, for all 3 years.

Research Question 3: What supports did principals of middle schools in Georgia provide to ensure success of the implementation of these strategies?

Supports were translated into different types of professional development offered to teachers during the first 3 years of CCS. At a glance, results showed a significant percentage increase in professional development from 2013 to 2014. Percentages of professional development were comparable between 2014 and 2015 perhaps due to the approaching test change from CRCT to GMAS in 2015. In 2012-2013, the most common types of professional development were vocabulary strategies and technology integration. In 2013-2014, the top two types of professional development were incorporating constructed response items and using the Longitudinal Data System (LDS) and the Georgia Online Formative Assessment Resource (GOFAR), both managed by the GaDOE. In second place were vocabulary strategies, thinking maps, and technology integration. In 2014-2015, first year of GMAS, the leading types of professional development were using constructed response items and LDS/GOFAR training. Some respondents listed additional professional development not included on the survey list. These are listed under *other* (see Table 6).

Table 6

Professional Development Percentages

Professional Development	2012-2013		2013-2014		2014-2015	
N = 13	Frequency	%	Frequency	%	Frequency	%
Vocabulary Strategies	6	46	8	62	9	69
Thinking Maps	4	31	8	62	7	54
Technology Integration	6	46	8	62	9	69
Georgia FIP	1	8	7	54	9	69
Constructed Response	2	15	9	69	12	92
LDS & GOFAR Training	4	31	9	69	11	85
Math in the Fast Lane	2	15	1	8	2	15
Other:						
Differentiation	1	8	1	8	1	8
FAL	1	8	1	8	1	8
DOE Summer Academy	1	8	1	8	1	8
Number Talks	1	8	1	8	1	8
6 Elements of an Effective Math Lesson	1	8	1	8	1	8
Ipass Math	1	8	1	8	1	8

Note: FIP = Formative Instructional Practices; LDS = Longitudinal Data System; GOFAR = Georgia Online Formative Assessment Resource; FAL = Formative Assessment Lesson.

Research Question 4: Was there a relationship between implemented initiatives (professional development and teaching strategies) and the percentage of students in grades 6 through 8 passing the mathematics portion of the CRCT in 2013 and 2014?

Students took the CRCT test in 2013 and 2014 and the GMAS in 2015. To determine whether there was a relationship between professional development and test scores (Research Questions 4 and 5), I conducted analyses of variance (ANOVA) tests using the most common types of professional development each year (independent variable) and test scores for that same year (dependent variable). Due to the anonymity of the survey, I was unable to match test scores to the respondents' schools. Therefore, I

averaged test scores obtained from GOSA for all 28 schools primarily chosen for this study according to school size. That meant all schools from survey respondents with less than 400 students were assigned the same test score average of passing and exceeding, schools with number of students between 400 and 625 were assigned another average, schools with numbers between 625 and 825 were assigned one average, and schools with numbers greater than 825 students were assigned their own average. This approximation represented a limitation of this study, but a necessary one to preserve confidentiality of responses.

Table 7 shows test averages for each school size category. CRCT scores represent the percentage of students meeting and exceeding the standards. GMAS scores represent the percentage of students in three groups: developing, proficient, and distinguished, labels assigned by the GaDOE. While the percentages of meeting and exceeding the standards were comparable between the CRCT tests, these percentages declined seven to 13 percentage points from 2013 to 2015 as shown in Table 7.

Table 7

Standardized Test Scores per School Size

Student Population per School	CRCT Score Averages (%)		GMAS Score Averages (%)
	2012-2013	2013-2014	2014-2015
≤ 400	87.23	87.10	78.13
400-625	86.00	86.40	72.76
626-825	87.25	86.25	73.63
≥ 825	86.58	90.50	79.36

In 2013, vocabulary strategies and technology integration were the most common types of professional development according to survey respondents. Six of the 13

principals reported offering professional development in these two areas. Results of the univariate analysis of variance between professional development in vocabulary strategies and CRCT scores did not show a significant relationship, $F(1, 11) = .018$, $p = .895$. The same was observed for professional development in technology integration, $F(1, 11) = .620$, $p = .448$. In 2014, training in developing constructive response items and the use of the LDS and GOFAR platforms were the top two types of professional development; nine of the 13 principals offered these to teachers in their schools. Neither one was found to have a significant effect on test scores, $F(1, 11) = .165$, $p = .693$ and $F(1, 11) = .718$, $p = .415$, respectively.

To determine whether the total number of professional development training provided had an effect in test scores, I conducted a Oneway ANOVA for each year separately. Tables 8 and 9 show the number of schools, number of professional development, and score means for 2013 and 2014, respectively. Score means were the averages per school size as discussed earlier. Results of the Oneway ANOVA did not confirm a relationship between the total number of professional development and 2013 CRCT scores, $F(4, 8) = .239$, $p = .909$. The same was observed for 2014 CRCT scores, $F(4, 8) = .525$, $p = .721$. This meant there was no significant correlation between the number of professional development training and test scores from 2013 and 2014.

Table 8

Professional Development and 2013 CRCT Means

Number of Professional Development in 2013	Number of Schools	CRCT Mean	Standard Deviation
0	4	86.94	.63
1	3	86.82	.71
3	3	86.83	.72
4	1	86.58	—
5	2	87.25	0

Table 9

Professional Development and 2014 CRCT Means

Number of Professional Development in 2014	Number of Schools	CRCT Mean	Standard Deviation
0	2	86.32	.11
2	1	86.25	—
3	1	87.10	—
5	5	87.33	1.80
6	4	86.25	0

The second part of the question referred to teaching strategies in 2013 and 2014. In 2013, the top teaching strategies were use of manipulatives, mathematics modeling, and real-life problem solving. Seven out of the 13 respondents reported the use of these three strategies in their schools. Results of the univariate analysis of variance between each of these strategies and 2013 test scores were not significant: use of manipulatives, $F(1, 11) = .587$, $p = .46$; mathematics modeling, $F(1, 11) = .62$, $p = .448$; and real-life

problem solving, $F(1, 11) = .013$, $p = .91$. This indicated no significant differences in test scores between schools using these strategies and those not using them.

In 2014, the most common teaching strategies were higher order thinking, writing in mathematics, and differentiation. Nine of the 13 principals reported the use of these strategies in their schools. Results of the univariate analysis of variance between each of these strategies and 2014 test scores were not significant; all three strategies yielded $F(1, 11) = .863$, $p = .373$. I conducted Oneway ANOVA to determine whether the total number of teaching strategies used in each year had an effect in test scores. Tables 10 and 11 show the number of schools, number of teaching strategies, and score means for 2013 and 2014, respectively. Score means were the averages per school size as discussed earlier. Results of the Oneway ANOVA did not confirm a relationship between total teaching strategies used each year and their respective test scores, $F(6, 6) = 1.463$, $p = .328$ for 2013 data and $F(4, 8) = .615$, $p = .664$ for 2014 data. In other words, the total number of teaching strategies did not appear to influence test scores in either year.

Table 10

Teaching Strategies and 2013 CRCT Means

Number of Teaching Strategies in 2013	Number of Schools	CRCT Mean	Standard Deviation
0	5	87.00	.56
3	1	87.23	—
4	1	86.00	—
5	1	86.00	—
6	2	86.92	.47
7	1	87.25	—
8	2	87.25	0

Table 11

Teaching Strategies and 2014 CRCT Means

Number of Teaching Strategies in 2014	Number of Schools	CRCT Mean	Standard Deviation
0	3	86.30	.09
1	1	86.25	—
4	1	87.10	—
7	5	86.48	.35
8	3	87.67	2.45

There were, however, significant correlations between the number of professional development and teaching strategies used in 2013 ($r = .889$, $p < .01$) and in 2014 ($r = .728$, $p < .01$). These findings were anticipated since principals expect teachers to use new strategies learned through professional development.

Research Question 5: Was there a relationship between implemented initiatives (professional development and teaching strategies) and the percentage of students in grades 6 through 8 passing the mathematics portion of the Georgia Milestones Test in 2015?

Survey responses indicated that using constructive response items and the online resources from LDS and GOFAR were the most frequent types of professional development in 2015. Twelve principals reported offering professional development in the first; 11 principals reported professional development in the latter. There were no significant differences in the scores of those undergoing constructive response training, $F(1, 11) = .637$, $p = .442$, or those undergoing LDS and GOFAR training, $F(1, 11) = .324$, $p = .580$. To determine whether the total number of professional development had

an effect on GMAS scores, I conducted a Oneway ANOVA. Results suggested the total number of professional development received did not significantly affect GMAS scores in 2015, $F(5, 7) = .812$, $p = .577$. It is worth noting that both the GMAS data and the total professional development data violated the assumption of normality, i.e., Levene's statistic was .004, indicating that the test of homogeneity of variances for these variables was not met. Table 12 shows the number of professional development, number of schools, and score means for 2015.

Table 12

Professional Development and 2015 GMAS Means

Number of Professional Development in 2015	Number of Schools	GMAS Mean	Standard Deviation
1	1	78.13	—
3	1	73.63	—
4	2	75.44	3.80
5	3	75.25	3.59
6	4	73.41	.44
7	2	73.63	0

To establish the presence of a relationship between teaching strategies and test scores, I conducted univariate analysis of variance on the two most common teaching strategies in 2015, writing in mathematics and formative assessment, and GMAS scores. Ten principals reported their teachers used both strategies in 2015. Results showed no significant differences in scores of the 10 schools using and the three schools not using these two strategies, $F(1, 11) = .219$, $p = .649$ for both writing in mathematics and formative assessment. I ran a Oneway ANOVA to determine whether the total number of

teaching strategies used in 2015 correlated with test scores. No significant differences were found between the total number of teaching strategies used and 2015 test scores, $F(4, 8) = .180$, $p = .943$. Table 13 shows the number of teaching strategies, number of schools, and GMAS mean scores.

Table 13

Teaching Strategies and 2015 GMAS Means

Number of Teaching Strategies in 2015	Number of Schools	GMAS Mean	Standard Deviation
0	2	75.88	3.18
1	1	73.63	—
2	1	73.63	—
7	3	74.55	3.10
8	6	74.44	2.44

Although no correlations existed between scores and total number of teaching strategies in 2015, there was a significant correlation between the total number of professional development and the total number of teaching strategies used during that year ($r = .596$, $p < .05$).

Research Question 6: Was there a relationship between principal perception and school performance in mathematics as measured by standardized tests?

To answer this question, I analyzed standardized test scores for all 3 years against the three main components of the perception survey: teacher attitudes, student performance, and principal attitudes. I averaged the perception ratings for each participant in these three areas to facilitate comparisons so that there was one average for teacher attitudes, one for perception on student performance, and one for principal

attitudes. I used the non-parametric correlation coefficient, Kendall's tau-b (τ) for two reasons: the data violated assumptions of normality and the sample was too small. According to Field (2009), Kendall's tau-b is more suitable to test correlations in small samples and samples having a significant number of tied ranks. Since I had to average test scores by school size, some of the survey respondents were assigned the same test score averages if they fell into the same school size bracket. These two factors made the more commonly used Pearson's correlation unsuitable for analysis.

Correlation results indicated that teacher attitude average ratings were moderately correlated to 2013 CRCT test scores, $\tau = .508$, $p < .05$. Similarly, the average perception of principals regarding student performance was moderately related to 2013 CRCT scores, $\tau = .741$, $p < .01$. There was no significant relationship between the average ratings of principal attitudes and test scores in 2013, $\tau = .037$, $p > .05$. There was no significant relationship between the 2014 CRCT test scores and teacher attitude average ratings, $\tau = -.169$, $p > .05$, student performance average ratings, $\tau = -.399$, $p > .05$, or principal attitude ratings, $\tau = .147$, $p > .05$. The 2015 GMAS scores were moderately related to teacher attitude average ratings, $\tau = .508$, $p < .05$, but were not related to student performance average ratings, $\tau = .285$, $p > .05$, or to the principal attitude average ratings, $\tau = .221$, $p > .05$. The teacher attitudes average ratings showed a moderate correlation to student performance average ratings, $\tau = .723$, $p < .01$.

To determine whether principal and/or school characteristics affected perceptions about teacher attitudes, student performance, and principal attitudes, I ran correlation analyses using years of experience, number of students in the school, and percentage of economically disadvantaged students. I used Kendall's tau (τ) for the same reasons

discussed earlier. Results suggested that perception ratings in teacher attitudes, student performance, and principal attitudes did not significantly relate to years of experience as principals. The correlation coefficients were $\tau = .108$, $p > .05$ for teacher attitudes, $\tau = .31$, $p > .05$ for student performance, and $\tau = -.37$, $p > .05$ for principal attitudes. The number of students in schools did not seem to be related to principal opinions about student performance ($\tau = .304$, $p > .05$), and principal attitudes ($\tau = -.171$, $p > .05$). However, the number of students and teacher attitudes appeared to be borderline correlated ($\tau = .445$, $p = .05$) since the p value was right at .05. Finally, the percentage of economically disadvantaged students did not appear to relate to either one of the perception areas: teacher attitudes and student performance yielded the same correlation coefficient ($\tau = -.022$, $p > .05$), and principal attitudes ($\tau = -.149$, $p > .05$).

Summary

Survey results indicated nearly half of respondents had no more than 5 years of experience as principals. Approximately half of the schools in the survey had between 626 and 825 students in grades 6 through 8, and all schools had over 50% economically disadvantaged students. Responses suggested teachers were receptive to CCS but were concerned about having enough time to teach the standards with the intended rigor and depth. Over half of principals rated CCS resources as inadequate to address the standards. Although there was a reported decline in the number of students referred to tutoring, 70% of principals reported a gap increase between low and high-performing students in mathematics during the first 3 years of CCS. Overall, the majority of principals thought they met staff needs during this time while over half of principals did not think they received adequate professional development to implement the CCS. Time to train staff

was rated the top challenge followed by lack of funding, inadequate curriculum resources, scheduling intervention classes, and parental support.

The number of teaching strategies used in mathematics classrooms increased steadily from 2013 to 2015. Strategies such as higher order thinking, writing in mathematics, formative assessment, and technology integration were among the ones with highest percentage increases. The number of professional development opportunities offered to teachers also increased from the first to third year of CCS. Training in developing constructed response items and using the state online resources (LDS/GOFAR platform) increased the most followed by technology integration and formative instructional practices.

No significant correlations were found between types and/or number of teaching strategies and test scores in 2013 (CRCT), 2014 (CRCT), and 2015 (GMAS). No significant correlations were found between types and/or number of professional development and test scores in 2013 (CRCT), 2014 (CRCT), and 2015 (GMAS). For all 3 years, there was a significant correlation between the total number of professional development and the total number of teaching strategies used.

Perception rating averages in teacher attitudes were moderately related to test scores in 2013 and 2015 but not in 2014. Perception rating averages in student performance were moderately related to test scores in 2013 but not in 2014 or 2015. Principal attitudes were not related to test scores in any of the 3 years. Lastly, principal/school characteristics did not appear to be related to perception ratings in teacher attitudes, student performance, and principal attitudes.

Chapter V

DISCUSSION

The goal of this study was to obtain the overall perception of principals as to the first 3 years of CCS implementation in Georgia middle schools. The survey collected information about the different types of professional development and teaching strategies used in these schools for the first 3 years of CCS implementation. Principals also shared their opinions as to teacher attitudes toward the Common Core initiative, student performance on standardized tests during the 3-year period, and their own attitudes toward the CCS. Finally, I obtained test scores from the entire sample of 28 middle schools from the GOSA website in an attempt to determine whether scores correlated with teaching strategies and professional development.

The survey listed eight teaching strategies: use of manipulatives, mathematics modeling, real-life problem solving, higher order thinking, writing in mathematics, differentiation, formative assessment, and technology integration. There was a visible trend from 2013 to 2015. The frequency of each strategy appeared to increase during the three-year period, especially the following: higher order thinking and differentiation (46% to 69%), writing in mathematics and formative assessment (31% to 77%), and technology integration (38% to 69%). One reason for this increase was most likely the approaching new test format, GMAS, launched in 2015. The GMAS was designed to test the CCS, which required students to justify their thinking beyond providing the correct

answer (CCGPS, n.d.). It is understandable that schools gradually trained their teachers in these areas to ensure that students would be prepared to take the GMAS.

Technology integration was another strategy rising in numbers from 2013 to 2015. Because the survey did not specify the meaning of technology integration, it was unclear whether respondents used it to practice for state assessments, as a tool for learning, or both. The state's stipulation that a certain percentage of students take the GMAS online may have prompted schools to intensify the use of technology in the classroom to prepare students for online testing. Only one participant added a strategy to those listed in the survey, writing in all content areas. Indeed, writing in all content areas represents an extension of writing in mathematics. These strategies go hand in hand with the standards of mathematical practice, which encourage students to justify and explain in words their thinking process (Burns, 2015; NCTM, 2010).

The strategies listed in the survey were not exhaustive and it is likely that participants used additional strategies, but potentially did not respond due to the open-ended nature of the question. Barrios et al. (2011) elaborate on the lower response rate for open-ended items as compared to selected response items. The authors suggest that participants tend to scan online questionnaires quickly and avoid questions requiring written or explanatory answers (Barrios et al., 2011).

A second goal of this study was to learn about the different supports provided to teachers during the implementation of the new standards. The survey listed seven types of professional development: vocabulary strategies, thinking maps, technology integration, Georgia Formative Instructional Practices (FIP), constructed response, LDS & GOFAR training, and Math in the Fast Lane. Thinking Maps involved a set of graphic organizers

specifically designed to display certain ideas such as vocabulary definitions, term comparisons, flow maps, categories, cause-effect to name a few (Hyerle & Yeager, 2007). The LDS provided access to complete student data to educators, whereas GOFAR provided curriculum resources to teachers from lessons to test item banks addressing each standard. Math in the Fast Lane was an online mathematics resource website aligned with the CCS for grades 3 through 8.

Much like the teaching strategies, according to respondents, the frequency of professional development increased considerably from 2013 to 2014. The most popular professional development in 2015 were training in constructed response items (92%) and LDS/GOFAR training (85%). Georgia FIP, technology integration, and vocabulary strategies tied for third place (69%). Constructed response and LDS/GOFAR training appeared to have the sharpest increases from 2013 to 2015. Professional development constructed response items was inevitable since the upcoming GMAS was the first standardized test in Georgia to have open-ended questions. LDS/GOFAR's high rate was a result of the newly adopted evaluation system in Georgia schools, the College and Career Ready Performance Index (CCRPI), which awarded extra points to those schools with a certain number of clicks on their websites.

A few participants listed additional professional development in their schools: differentiation, formative assessment lessons (FAL), DOE Summer Academy, Number Talks, Six Elements of an Effective Math Lesson, and Ipass Math. Respondents did not elaborate on the details of these workshops, but the fact that some respondents mentioned these in the survey suggests that school districts devoted time and money to provide the needed supports to their teachers during the CCS implementation. Future research

seeking to establish a relationship between the use of individual classroom strategies and test scores would be beneficial to both, administrators and teachers in middle schools. It was unfortunate that this study could not establish a direct correlation between individual strategies and test scores. This would have required respondents to share their test scores in the survey, a very unlikely proposition due to the ramifications of school status exposure.

The survey portion addressing teacher attitudes: revealed that although they appeared to agree with the main tenets of the new standards, rigor and depth, nearly half of the principals reported teachers did not have a positive attitude toward the CCS. Based on principals' responses, increased stress levels (reported by 77% of principals) and concerns about having enough time to teach all the standards in depth (reported by 85% of principals) were the two main contributors to this negative attitude. From this information, we can conclude that teachers thought the CCS represented a positive change in education, but felt ill prepared to teach all standards in a school year. In fact, nearly half of respondents reported the CCS led some teachers to resign or retire early and 69% said teachers referred more students to remediation classes. Most likely, these attitudes were rooted in the fact that a great portion of the new teacher evaluation system linked teacher performance to student performance.

Regarding CCS resources, over half of principals stated these were not adequate in addressing the CCS. A recent report by Education Week (Heitin, 2016) corroborates these results stating the great majority of mathematics teachers either developed and/or selected their own materials (98%) or used materials developed and/or selected by their school district (92%), suggesting that publishing companies have yet to write textbooks

suitable to the CCS. As far as student academic performance, 69% of principals reported an increase in mathematics tutoring in 2013, 54% in 2014, and 39% in 2015. The decreasing trend may be a result of a gradual increase in the comfort level with the standards by teachers and students alike. In addition, 69% of principals observed a wider gap between the high and low performing students since the CCS implementation. One possible explanation for the increased gap is the limited time available for practicing basic mathematical skills with the transition to CCS. Historically, proficiency in basic skills has kept low performing students from progressing at the same pace as others (Baroody, Bajwa, & Eiland, 2009; Geary, 2011; VanDerHeyden & Burns, 2009).

The survey portion on principal attitudes revealed some interesting findings. When asked about meeting staff needs, 69% of principals reported feeling confident they did just that. Seventy-seven percent of them agreed that teacher knowledge and comfort level increased since the first year of CCS; however, only 39% saw an improvement in staff morale. Once again, a possible explanation for these ratings could be the pressure for acceptable student performance and its role in teacher evaluations. A little over half of respondents thought district to school communication was effective prior to (54%) and during the CCS implementation (62%). However, only 31% of principals were satisfied with the district's financial support, and only 39% thought they received adequate professional development to oversee the transition to CCS.

When asked to rank the top most challenging aspects during this period, time was rated the number one by the majority of principals, lack of funding along with curriculum resources were tied for second, and scheduling intervention classes along with parental support were tied for third. Some participants elaborated further on these challenges. The

themes revolved around time, resources, concerns about overwhelming teachers, and student performance. Below are the responses of eight principals:

"Time and resources."

"Resources and time."

"The most challenging aspect of the implementation was developing training to the teachers with little guidance and mixed messages from the DOE concerning testing expectations."

"Time and training, scheduling student in remedial or support classes during a recession and teacher shortage."

"Adjusting new teachers to the rigor."

"There are definite learning gaps due to the changes in the mathematics curriculum over the last 3 years, that students may not overcome."

"Time, always time."

"Teachers felt overwhelmed."

The second open-ended question referred to the effect of CCS on the performance of economically disadvantaged students. The emerging theme revolved around the frustrations and stress that these students and their parents experienced in facing even more difficult mathematics content. Below are the responses of six principals:

"Performance has only increased slightly, but with the scoring of what is passing, it is hard to tell."

"The ED [economically disadvantaged] students are experiencing more stress and frustration, and they have developed a strong dislike of mathematics."

"Lack of knowledge or interest by the parents and guardians of these students. If the teachers felt inadequate in presenting the material, imagine how the parents felt trying to supplement them at home."

"Increased the gap."

"It has definitely made the challenge greater for these students and has forced us to shift more resources and time to helping these students meet the standards."

"They feel more frustrated."

The recurring theme from these answers underscores the pressures educators suffer during school reform. Our educational system continues to institute major changes in a top-down fashion (Chopin, 2013) without giving school districts adequate time or funding to those who actually effect school reform. In this particular study, educators appeared to have embraced the adoption of the new standards in full, but felt unprepared and pressured to produce results in an unreasonable length of time. The lack of resources to teach these standards not only cost teachers time to learn the new standards and pedagogy associated with teaching them, but also forced them to develop their own materials. Added to this, the GaDOE implemented a new teacher evaluation system, holding teachers accountable for student performance in a brand new test format. The reported percentages of stress levels and staff morale were certainly justified in this scenario, even if the sample tested was small.

The portion of this study referring to a possible relationship between test scores, professional development, and teaching strategies revealed very few significant correlations. As mentioned in the data analyses section, survey anonymity impeded score matching to the schools of survey respondents. Therefore, although I was able to get true

score averages for each of the 28 schools from the GOSA website; I was unable to assign correct scores to each of the participants in my database. I grouped the 28 schools by number of students (school size) and used the information from question eight in the survey to sort each respondent school into one of the four groups. This method provided a way to assign test scores to each participant's school. However, it posed a considerable limitation to data analyses because several of the 13 schools in the survey were assigned the same test score averages for a particular year. This caused some of the data to deviate from the normal curve assumed in many statistical analyses. Therefore, the conclusions from analyses for Questions 4, 5 and 6 were made with some reservations.

There was a positive correlation between the total number of professional development and total number of teaching strategies in 2013, 2014, and 2015. One would expect these two to show a correlation since the goal of professional development is to enrich teachers' strategy repertoire. However, even this interpretation requires caution because the survey collected data as to principal perception and not documented classroom observations. It is likely that when principals offer professional development in certain areas, they expect teachers to use newly learned strategies in the classroom. Whether this was the case here is beyond the scope of this study.

Finally, Question 6 explored the relationship between the overall perception of principals and test scores. There was a correlation between principal perception on teacher attitudes and test scores in 2013 and 2015, but not in 2014. A correlation was found between principal perception on student performance and test scores only in 2013. Although statistical values were significant, these correlations were somewhat inconclusive due to the small sample size and the inability to match test scores to

participants' schools. Finally, in all 3 years, there was a significant correlation between principal perception on teacher attitudes and their perception on student performance.

Conclusion

Although this study had some limitations, it provided some information on the perception of principals of middle schools concerning the implementation of the CCS in mathematics. The themes emerging from survey responses are in line with what is currently taking place in Georgia schools and reflects the sentiments of educators in public schools. Educators have continued to seek ways to improve the teaching of mathematics because test scores have remained stagnant since the first administration of the GMAS (GOSA, n.d.). Future studies are needed to investigate the effectiveness of specific types of professional development on student learning and test scores. However, this would require school districts to share test scores with researchers to allow for sound statistical analyses. One way to accomplish this would be to involve local RESAs in collecting data from their schools and compare these with data from classroom observations. This study did confirm the most challenging aspect of school reform to be time and sufficient resources to comply with state demands.

Another way to improve this study would be to interview principals rather than using an online survey as a sole method of data collection. Several principals answered the open-ended questions of this survey because these questions were related to their own concerns about the new standards. I believe principals would be willing to discuss the challenges, frustrations, and ways they dealt with these during the first 3 years of CCS through personal or phone interviews. In addition, interviewing teachers would provide insight on the challenges from the classroom perspective.

Some of the survey questions could be written in open-ended rather than selected response format. This would provide exact answers rather than a range. For example, in this study, 54% of principals had between 1 and 5 years of experience. It would have been beneficial to know how many of the principals had only 1 year of experience because it would explain some of the challenges mentioned in the responses. In the professional development area, it would be helpful to know whether it was online or in person, delivered by an expert or school staff member, whether it was mandatory or voluntary. These details would give insight not only into professional development effectiveness but also into teacher attitudes. Finally, a larger sample, perhaps from different areas in Georgia would also provide a more accurate picture of what schools have gone through during the first 3 years of CCS.

REFERENCES

Achieve (2016). *About Achieve.* Retrieved from http://www.achieve.org/about-us

Achieve (2008). *Out of many, one: Towards rigorous common core standards from the ground up.* Retrieved from http://www.achieve.org

American Diploma Project (ADP) (December 10, 2004). *Ready or not: Creating a high school diploma that counts.* Retrieved from http://www.achieve.org/ReadyorNot

Anderson, K., Harrison, T., & Lewis, K. (2012). *Plans to adopt and implement common core state standards in the southeast region states* (issues & answers report, REL 2012-No. 136). Washington, DC: U.S. Department of Education, Institute of Education Sciences, National Center for Education Evaluation and Regional Assistance, Regional Educational Laboratory Southeast. Retrieved from http://ies.ed.gov/ncee/edlabs

Anderson, L. W., & Shirley, J. R. (1995). High school principals and school reform: Lessons learned from a statewide study of project re:learning. *Educational Administration Quarterly, 31*(3), 405-423. Retrieved from http://eaq.sagepub.com/

Balfanz, R., & Byrnes, V. (2006). Closing the mathematics achievement gap in high-poverty middle schools: Enablers and constraints. *Journal of Education for Students at Risk, 11*(2), 143-159. doi:10.1207/s15327671espr1102_2

Baroody, A. J., Bajwa, N. P., & Eiland, M. (2009). Why can't Johnny remember the basic facts? *Developmental Disabilities Research Reviews, 15*(1), 69-79. doi:10.1002/ddrr.45

Barrios, M., Villarroya, A., Borrego, A., & Ollé, C. (2011). Response rates and data quality in web and mail surveys administered to PhD holders. *Social Science Computer Review, 29*(2), 208-220. doi:10.1177/0894439310368031

Beaudette, P. (2014, October 1). Georgia milestones: Georgia's new standardized test. The Governor's Office of Student Achievement [e-bulletin]. Retrieved from https://gosa.georgia.gov/georgia-milestones-georgia%E2%80%99s-new-standardized-test

Brezicha, K., Bergmark, U., & Mitra, D. L. (2015). One size does not fit all: Differentiating leadership to support teachers in school reform. *Educational Administration Quarterly, 51*(1), 96-132. doi:101177/0013161x14521632

Briars, D. (2014, July). Core truths [Electronic mailing list message]. Retrieved from http://www.nctm.org/News-and-Calendar/Messages-from-the-President/Core-Truths/

Burns, M. (2012). Go figure: Math and the common core. *Educational Leadership, 70*(4), 42-46. Retrieved from https://www.ascd.org

Burns, M. (2015). What reading instruction can teach us about math instruction. *Education Week, 34*(26), 27-32. Retrieved from www.edweek.org

Charalambous, C. Y., & Philippou, G. N. (2010). Teachers' concerns and efficacy beliefs about implementing a mathematics curriculum reform: integrating two lines of inquiry. *Educational Studies in Mathematics, 75*(1), 1-21. doi:10.1007/s10649-010-9238-5

Chopin, L. H. (2013). Untangling public school governance: A proposal to end meaningless federal reform and streamline control in state education agencies.

Loyola Law Review, 59(2), 399-462. Retrieved from http://law.loyno.edu/loyola-law-review

Cioe, M., King, S., Ostien, D., Pansa, N., & Staples, M. (2015). Moving students to "the why?" *Mathematics Teaching in the Middle School, 20*(8), 485-491.

Cobb, P., & Jackson, K. (2011a). Assessing the quality of the common core state standards in mathematics. *Educational Researcher, 40*(4), 183-185. doi:10.3102/0013189X11409928

Cobb, P. & Jackson, K. (2011b). Toward an empirically grounded theory of action for improving the quality of mathematics teaching at scale. *Mathematics Teacher Education and Development, 13*(1), 6-33. Retrieved from http://www.merga.net.au/ojs/

Cogan, L. S., Burroughs, N., & Schmidt, W. H. (2015). Supporting classroom instruction: The textbook navigator/journal. *Phi Delta Kappan, 97*(1), 29-33. doi:10.1177/0031721715602233

Common Core State Standards Initiative (CCSSI) (n.d.). Mathematics Standards. Retrieved from http://www.corestandards.org/Math/

Condron, D. J. (2011). Egalitarianism and educational excellence: Compatible goals for affluent societies? *Educational Researcher, 40*(2), 47-55. doi:10.3102/0013189X114401021

Council of Chief State School Officers (CCSSO) (2015). Who we are. Retrieved from http://www.ccsso.org/Who_We_Are.html

Creswell, J. W. (2009). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches.* Thousand Oaks, CA: SAGE Publications, Inc.

Croft, S. J., Roberts, M. A., & Stenhouse, V. L. (2016). The perfect storm of education reform: High-stakes testing and teacher evaluation. *Social Justice*, *42*(1), 70-92. Retrieved from http://www.socialjusticejournal.org/

Darling-Hammond, L., & McLaughlin, M. W. (2011). Policies that support professional development in an era of reform. *Phi Delta Kappan, 92*(6), 81-92. doi:10.1177/003172171109200622

Darling-Hammond, L., & Richardson, N. (2009). Teacher learning: What matters? *Educational Leadership, 66*(5), 46-53. Retrieved from http://www.ascd.org/

Datnow, A., & Castellano, M. E. (2001). Managing and guiding school reform: Leadership in success for all schools. *Educational Administration Quarterly, 37*(2), 219-249. doi:10.1177/00131610121969307

DelGuidice, M., & Luna, R. (2015, January 12). Cut to the core: The common core controversy and the materials market. *Publishers Weekly, 292*(2), 16-17. Retrieved from http://www.publishersweekly.com/pw/by-topic/columns-and-blogs/common-core/index.html

Downey, M. (2015, July 1). Testing and technology in Georgia schools: Who will watch the watchers? [Web log post]. Retrieved from http://getschooled.blog.myajc.com/2015/07/01/testing-and-technology-in-georgia-schools-who-will-watch-the-watchers/

Eilers, L. H., & D'Amico, M. (2012). Essential leadership elements in implementing common core state standards. *Delta Kappa Gamma Bulletin, 78*(4), 46-50. Retrieved from www.dkg.org

Enderlin-Lampe, S. (2002). Empowerment: Teacher perceptions, aspirations and efficacy. *Journal of Instructional Psychology, 29*(3), 139-146. Retrieved from Academic Search Complete (Accession No. 7355568)

Fabian, N. (2011). World ranking of the U.S…. Education…NEHA. *Journal of Environmental Health*, *73*(7), 38-58. Retrieved from http://www.neha.org/JEH/

Farrell, D., & Petersen, J. C. (2010). The growth of internet research methods and the reluctant sociologist, *Sociological Inquiry, 80*(1), 114-125. doi:10.1111/j.1475-682X.2009.00318.x

Fleischman, H. L., Hopstock, P. J., Pelczar, M. P., & Shelley, B. E. (2010). *Highlights from PISA 2009: Performance of U.S. 15-year-old students in reading, mathematics, and science literacy in an international context* (NCES 2011-004). U.S. Department of Education, National Center for Education Statistics. Washington, DC: U.S. Government Printing Office. Retrieved from http://nces.ed.gov/pubsearch/

Fraenkel, J. R., & Wallen, N. E. (2008). *How to Design and Evaluate Research in Education.* New York, NY: The McGraw-Hill Companies, Inc.

Fullan, M. (2001). *Leading in a Culture of Change*. San Francisco, CA: Jossey-Bass

Fullan, M., Bertani, A., & Quinn, J. (2004). New lessons for districtwide reform. *Educational Leadership, 61*(7), 42-46. Retrieved from www.ascd.org

Garet, M. S., Wayne, A. J., Stancavage, F., Taylor, J., Eaton, M., Walters, K., & ... National Center for Education Evaluation and Regional Assistance (2011). *Middle school mathematics professional development impact study: Findings after the second year of implementation* (NCEE 2011-4024). Washington, DC: National

Center for Education Evaluation and Regional Assistance, IES, U.S. Department of Education. Retrieved from http://ies.ed.gov/ncee/

Gay, L. R., Mills, G. E., & Airasian, P. (2009). *Educational Research: Competencies for Analysis and Applications*. Upper Saddle River, NJ: Pearson Education, Inc.

Geary, D. C. (2011). Cognitive predictors of achievement growth in mathematics: A 5-year longitudinal study. *Developmental Psychology, 47*(6), 1539-1552. doi:10.1037/a0025510

Georgia Department of Education (GaDOE) (2010). *Common Core Georgia Performance Standards.* Retrieved from http://archives.doe.k12.ga.us/DMGetDocument.aspx/CCGPSJuly8.pdf?p=6CC6799F8C1371F6538E425D6722145B3F25DDC7CA674A057392A682351E2925

Georgia Department of Education (GaDOE) (2015, September 3). *First Georgia milestones test results released.* Retrieved from https://www.gadoe.org/External-Affairs-and-Policy/communications/Pages/PressReleaseDetails.aspx?PressView=default&pid=371

Georgia Department of Education (GaDOE) (n.d.). *Georgia formative assessment practices* (FIP). Retrieved from www.gadoe.org/GeorgiaFIP

Georgia Department of Education (GaDOE) (April, 2015c). *Georgia milestones assessment system.* Retrieved from http://www.gadoe.org/Curriculum-Instruction-and-Assessment/Assessment/Pages/Georgia-Milestones-Assessment-System.aspx

Georgia Department of Education (GaDOE) (2015). *Georgia standards of excellence (GSE)*. Retrieved from https://www.georgiastandards.org/Georgia-Standards/Pages/default.aspx

Georgia Department of Education (GaDOE) (January, 2015b). *New system test coordinator's mid-year presentation*. Retrieved from http://www.gadoe.org/Curriculum-Instruction-and-Assessment/Assessment/Pages/default.aspx

Georgia Department of Education (GaDOE) (2014). *Teacher keys effectiveness systems* (TKES). Retrieved from http://www.gadoe.org/School-Improvement/Pages/default.aspx

Georgia Department of Education (GaDOE) (March, 2015a). *Technology guidelines for Georgia milestones, Version 1.2*. Retrieved from http://www.gadoe.org/Curriculum-Instruction-and-Assessment/Assessment/Documents/Technology%20Guidelines%20for%20GaDOE%20Assessments%20Version%201.2.pdf

Gewertz, C. (2010, June). Final version of core standards assuages some concerns. *Education Week, 29*(33), 18-19. Retrieved from www.edweek.org

Glanz, J. (2006). *What Every Principal Should Know about Instructional Leadership*. Thousand Oaks, CA: Corwin Press.

Goldsmith, L. T. (2001). Spheres of influence: Supporting mathematics education reform. *National Association of Secondary School Principals, NASSP Bulletin, 85*(623), 53-65. doi:10.1177/019263650108562307

Governor's Office of Student Achievement (GOSA) (n.d.). *Report Card*. Retrieved from http://gosa.georgia.gov/report-card

Grant, C. (2014, October 8). Education Reform. *New Georgia Encyclopedia*. Retrieved from http://www.georgiaencyclopedia.org/articles/education/education-reform

Gregoire, M. (2003). Is it a challenge or a threat? A dual-process model of teachers' cognition and appraisal processes during conceptual change. *Educational Psychology Review, 15*(2), 147-179. doi:1040-726X/03/0600-01470/0

Guo, Y., Kopec, J. A., Cibere, J., Li, L. C., & Goldsmith, C. H. (2016). Population survey features and response rates: A randomized experiment. *American Journal of Public Health*, *106*(8), 1422-1426. doi:10.2105/AJPH.2016.303198

Guskey, T. R., & Yoon, K. S. (2009). What works in professional development? *Phi Delta Kappan, 90*(7), 495-500. doi:10.1177/003172170909000709

Hallinger, P. (2003). Leading educational change: Reflections on the practice of instructional and transformational leadership. *Cambridge Journal of Education, 33*(3), 329-351. doi:10.1080/0305764022000122005

Hallinger, P., & Murphy, J. F. (2013). Running on empty? Finding the time and capacity to lead learning. *NASSP Bulletin, 97*(1), 5-21. doi:10.1177/0192636512469288

Harrison, A., & McMillan, M. (2011). Offshoring jobs? Multinationals and U.S. manufacturing employment. *Review of Economics & Statistics, 93*(3), 857-875. Retrieved from http://www.mitpressjournals.org/loi/rest

Heil, S. M. (2012). *Principal and parent perceptions of how implementing common core state standards affects schools and accountability* (Doctoral dissertation). Available from ProQuest Dissertations and Theses database. (UMI No. 3548523)

Heitin, L. (2015, March 4). Most math curricula found to be out of sync with common core [online forum]. Retrieved from http://www.edweek.org/ew/articles/2015/03/04/most-math-curricula-found-to-be-out.html

Heitin, L. (2016, April 19). The search for common core curricula: Where are teachers finding materials? [online forum]. Retrieved from http://blogs.edweek.org/edweek/curriculum/2016/04/common_core_curricula_teacher_materials.html

Herrera, T. A., & Owens, D. T. (2001). The "new new math?" Two reform movements in mathematics education. *Theory Into Practice, 40*(2), 84-92. Retrieved from http://www.jstor.org/stable/1477269

Hochberg, E. D., & Desimone, L. M. (2010). Professional development in the accountability context: Building capacity to achieve standards. *Educational Psychologist, 45*(2), 89-106. doi:10.1080/00461521003703052

Hoffman, W. (2013). *Principal perceived preparedness to lead the implementation of the common core* (Doctoral dissertation). Available from ProQuest Dissertations and Theses database. (UMI No. 3604581)

Hope, W. C., & Pigford, A. B. (2001). The principal's role in educational policy implementation. *Contemporary Education, 72*(1), 44-47.

Hurley, J. (2001). The principalship: Less may be more. *Education Week, 20*(37), 37-39. Retrieved from www.edweek.org

Hyerle, D., & Yeager, C. (2007). *Thinking Maps: A Language of Learning*. Cary, NC: Thinking Maps, Inc.

IBM Corp. (2013). IBM SPSS Statistics for windows, version 22.0. Armonk, NY: IBM Corp.

Institute of Education Sciences (IES) (n.d.). 2010 Spotlight. High-poverty public schools. National Center for Educational Statistics. Retrieved from http://nces.ed.gov/programs/coe/analysis/2010-index.asp

Isakson, M. B. (2014). Opinion shaper: The common core state standards are what we need. *National Council of Teachers of Mathematics*, Retrieved from http://www.heraldextra.com/news/opinion/utah-valley/opinion-shaper-the-common-core-state-standards-are-what-we/article_29e94e19-dcef-50a0-8409-efbdcc6547d9.html

Jones, A. G., & King, J. E. (2012). The common core state standards: A vital tool for higher education. *Change, 44*(6), 37-43. doi:10.1080/00091383.2012.706529

Kaniuka, T. S. (2012). Toward an understanding of how teachers change during school reform: Considerations for educational leadership and school improvement. *Journal of Educational Change, 13*(3), 327-346. doi:10.1007/s10833-012-9184-3

Knudsen, J., Lara-Meloy, T., Stevens, H. S., & Rutstein, D. W. (2014). Advice for mathematical argumentation. *Mathematics Teaching in the Middle School, 19*(8), 494-500.0

Koyama, J. (2014). Principals as bricoleurs: Making sense and making do in an era of accountability. *Educational Administration Quarterly, 50*(2), 279-304. doi:10.1177/0013161X13492796

Krashen, S. (2014). The common core. A disaster for libraries, a disaster for language arts, a disaster for American education. *Knowledge Quest, 42*(3), 37-45.

Larson, M. R. (2012). Will CCSSM matter in ten years? Reflect and discuss. *Teaching Children Mathematics, 19*(2), 108-115. Retrieved from http://www.jstor.org/stable/10.5951/teacchilmath.19.2.0108

Larson, M. R., & Leinwand, S. (2013). Prepare for more realistic test results. *The Mathematics Teacher, 106*(9), 656-659. Retrieved from http://www.jstor.org/stable/10.5951/mathteacher.106.9.0656

Lee, J. O. (2011). Reach teachers now to ensure common core success. *Phi Delta Kappan, 92*(6). 42-44. doi:10.1177/003172171109200609

Leedy, P. D., & Ormrod, J. E. (2005). *Practical Research: Planning and Design*. Upper Saddle River, NJ: Pearson Prentice Hall

Leifer, R., & Udall, D. (2014). Support the common core with the right instructional materials. *Phi Delta Kappan, 96*(1), 21-26. doi:10.1177/0031721714547857

Lepak, J. (2014). Enhancing students' written mathematical arguments. *Mathematics Teaching in the Middle School, 20*(4), 212-219.

Livingston, S. A. (2009, September). Constructed-response test questions: Why we use them; how we score them. *Research and Development Connections, 11*. Retrieved from www.ets.org

Loveless, T. (2013). The common core initiative: The chances are slim at best – and here's why. *Educational Leadership, 7*(4), 60-63. Retrieved from www.ascd.org

Main, L. F. (2012). Too much too soon? Common core math standards in the early years. *Early Childhood Education Journal, 40*(2), 73-77. doi:10.1007/s10643-011-0484-7

Manuel, J. T. (2013). Introduction: Education reform past, present, and future. *The Councilor: A Journal of the Social Studies, 74*(2), 1-5. Retrieved from https://ojcs.siue.edu/ojs/index.php/jicss/

Marrongelle, K., Sztajn, P., & Smith, M. (2013). Scaling up professional development in an era of common state standards. *Journal of Teacher Education, 64*(3), 202-211. doi:10.1177/0022487112473838

Masci, F. J., Cuddapah, J. L., & Pajak, E. F. (2008). Becoming an agent of stability: Keeping your school in balance during the perfect storm. *American Secondary Education, 36*(2), 57-68. Retrieved from http://www.ashland.edu/academics/education/ase/

McClure, P. (2005). Where standards come from. *Theory Into Practice, 44*(1), 4-10. doi:10:1207/s1543042tip4401_2

McCluskey, N. (2011, June 22). Coming soon: The federal department of standardized minds. Freeman: Ideas on Liberty [serial online]. Retrieved from https://fee.org/articles/

Meadows, L. (2007). Looking back: A nation at risk and national standards. *The Science Teacher, 74*(8). Retrieved from www.nsta.org

Munson, L. (2011). What students *really* need to learn. *Educational Leadership, 68*(3), 10-14. Retrieved from www.ascd.org

Murphy, A. F., & Torff, B. A. (2014). Standards and accountability in conflict. *Delta Kappa Gamma Bulletin: Impact of Educational Reforms, 80*(4), 19-22. Retrieved from https://www.dkg.org/content/bulletin-summer-2014

National Commission on Adult Literacy (NCAL) (2008). Reach higher America: Overcoming crisis in the U.S. workforce. *Council for Advancement of Adult Literacy.* Retrieved from http://www.nationalcommissiononadultliteracy.org/report.html

National Council of Teachers of Mathematics (NCTM) (2010). *Making it happen - A guide to interpreting and implementing common core state standards for mathematics*. Retrieved from https://www.kansasprojectsuccess.org/system/files/95/original/NCTM%20Document%20Making%20It%20Happen%20Common%20Core%20Standards.pdf?1309461005

National Governors Association Center for Best Practices & Council Chief State School Officers (NGA & CCSSO) (2010). *Common core state standards for mathematics*. Retrieved from https://eboard.eboardsolutions.com/meetings/Attachment.aspx?S=1262&AID=245076&MID=15932

National Mathematics Advisory Panel (NMAP) (2008). *Foundations for Success: The final report of the national mathematics advisory panel* (Contract No. ED04CO0082/0001). Washington, DC: U.S. Department of Education

No Child Left Behind (NCLB) (2004). *Executive summary: Archived information*. U.S. Department of Education. Retrieved from http://www2.ed.gov/print/nclb/overview/intro/execsumm.html

Nulty, D. D. (2008). The adequacy of response rates to online and paper surveys: What can be done? *Assessment & Evaluation in Higher Education, 33*(3), 301-314. doi:10.1080/02602930701293231

Organization for Economic Cooperation and Development (OECD) (2013). *Lessons from PISA 2012 for the United States - Strong performers and successful reformers in education*, OECD Publishing. Retrieved from http://dx.doi.org/10.1787/9789264207585-en.

Owens, S. J. (2015). Georgia's teacher dropout crisis: A look at why nearly half of Georgia public school teachers are leaving the profession. Retrieved from https://www.gadoe.org/External-Affairs-and-Policy/communications/Pages/PressReleaseDetails.aspx?PressView=default&pid=408

Perry, L. (2009). Characteristics of equitable systems of education. A cross-national analysis. *European Education, 41*(1), 79-100. doi:10.2753/EUE1056-4934410104

Peterson, P. E., & Lastra-Anadon, C. (2010). State standards rise in reading, fall in math. *Education Next, 10*(4), 12-16. Retrieved from http://educationnext.org/journal

Phillips, G. W. (2014, September 18). International benchmarking: State and national education performance standards. *American Institutes for Research.* Retrieved from http://www.air.org/resource/international-benchmarking-state-and-national-education-performance-standards

Porter, A., McMaken, J., Hwang, J., & Yang, R. (2011). Common core standards: The new U.S. intended curriculum. *Educational Researcher, 40*(3), 103-116. doi:10.3102/0013189X11405038

Porter, R. E., Fusarelli, L. D., & Fusarelli, B. C. (2015). Implementing the common core: How educators interpret curriculum reform. *Educational Policy, 29*(1), 111-139. doi:10.1177/0895904814559248

Powell, D. (2014). Politics are crushing the standards. *Education Week, 33*(36), 34-34. Retrieved from www.edweek.org

Quong, T., & Walker, A. (2010). Seven principles of strategic leadership. *International Studies in Educational Administration, 38*(1), 22-34. Retrieved from http://www.cceam.org/

Richardson, C. J., & Eddy, C. M. (2011). The mathematical argument: Proponents and opponents of a standardized core. *American Educational History Journal, 38*(2), 277-288. Retrieved from http://www.infoagepub.com/

Robbins, J., & Bauerlein, M. (2013, April 16). The common core state standards: Two views. *National Association of Scholars* [Online forum]. Retrieved from http://www.nas.org/articles/

Rodriguez, V. (2013). The potential of systems thinking in teacher reform as theorized for the teaching brain framework. *Mind, Brain, and Education, 7*(2), 77-85. doi:10.1111/mbe.12013

Saunders, R. (2013). The role of teacher emotions in change: Experiences, patterns and implications for professional development. *Journal of Educational Change, 14*(3), 303-333. doi:10.1007/s10833-012-9195-0

Schmidt, W. H., & Burroughs, N. A. (2013). How the common core boosts quality and equality. *Educational Leadership, 70*(4), 54-58. Retrieved from www.ascd.org

Siu, W. (2008). Complexity theory and school reform. *National Association of Secondary School Principals, NASSP Bulletin, 92*(2), 154-164. doi:10.1177/0192636508320890

Star Tribune Editorial Board (2015, February 4). Why common core makes the grade [online forum]. Retrieved from http://www.startribune.com/opinion/editorials/290852271.html

Stephan, M. (2014). Establishing standards for mathematical practice. *Mathematics Teaching in the Middle School, 19*(9), 532-538.

Strickland-Cohen, K., McIntosh, K., & Horner, R. H. (2014). Effective practices in the face of principal turnover. *Teaching Exceptional Children, 46*(3), 19-25. Retrieved from Academic Search Complete (Accession No. 93360933)

Sztajn, P., Marrongelle, K., & Smith, P. (2012). *Supporting implementation of the common core state standards for mathematics: Recommendations for professional development*. The William and Ida Friday Institute for Educational Innovation. North Carolina State University College of Education. Retrieved from http://hub.mspnet.org/index.cfm/24233

Tambe, P. B., & Hitt, L. M. (2010). How offshoring affects IT workers. *Communications of the ACM, 53*(10), 62-70. doi:10.1145/1831407.1831426

Tennessee Department of Education (n.d.). *The common core state standards: History and fact sheet.* Retrieved from http://state.tn.us/sbe/FAQ_Page/Common_Core_Facts_History.pdf

Thornburg, D. G., & Mungai, A. (2011). Teacher empowerment and school reform. *Journal of Ethnographic & Qualitative Research, 5*(4), 205-217. Retrieved from http://www.cedarville.edu/academics/education/

Toscano, M. (2013). The common core: Far from home. *Academic Questions, 26*(4), 411-428. doi:10.1007/s12129-013-9389-9

Turgut, G. (2013). International tests and the U.S. educational reforms: Can success be replicated? *The Clearing House, 86*(2), 64-73. doi:10.1080/00098655.2012.748640

U.S. Department of Education (2008). *A nation accountable: Twenty-five years after A Nation at Risk*, Washington, D.C. Retrieved from http://www.ed.gov/rschstat/research/pubs/accountable/

U.S. Department of Education (n.d.). *College- and career-ready standards: Key terms*. Retrieved from http://www.ed.gov/k-12reforms/standards

U.S. National Commission on Excellence in Education (1983). *A nation at risk: The imperative for educational reform: a report to the Nation and the Secretary of Education, United States Department of Education*. Washington, D.C.: The Commission.

Urick, A., & Bowers, A. J. (2014). What are the different types of principals across the United States? A latent class analysis of principal perception of leadership. *Educational Administration Quarterly, 50*(1), 96-134. doi:10.1177/0013161X13489019

Usiskin, Z. (2015). Mathematical modeling and pure mathematics. *Mathematics Teaching in the Middle School, 20*(8), 476-482.

VanDerHeyden, A. M., & Burns, M. K. (2009). Performance indicators in math: Implications for brief experimental analysis of academic performance. *Journal of Behavioral Education*, *18*(1), 71-91. doi:10.1007/s10864-009-9081-x

Wagner, T. (2008). *The Global Achievement Gap*. New York, NY: Perseus Books Group.

Walberg, H. J. (1986). What works in a nation still at risk. *Educational Leadership, 44*(1), 7-10. Retrieved from www.ascd.org

Wallender, J. (2014). The common core state standards in American public education: Historical underpinnings and justifications. *The Delta Kappa Gamma Bulletin, 80*(4), 7-11. Retrieved from http://www.deltakappagamma.org

Watt, M. G. (2011). The common core state standards initiative: An overview. Retrieved from ERIC database (ED522271)

Weichel, M. W. (2002). *Nebraska public high school principals' perceptions of how state standards impact schools* (Doctoral dissertation). Available from ProQuest Dissertations and Theses database. (UMI No. 3044995)

Weingarten, R. (2014). International education comparisons: How American education reform is the new status quo. *New England Journal of Public Policy, 26*(1), 1-10. Retrieved from https://archive.org/details/newenglandjour151john

Wiggins, G. P., & McTighe, J. (2007). What is the teacher's job when teaching? *Schooling by design: Mission, action, and achievement*. Alexandria, VA: Association for Supervision and Curriculum Development.

Wilburne, J. M., Wildmann, T., Morret, M., & Stipanovic, J. (2014). Classroom strategies to make sense and persevere. *Mathematics Teaching in the Middle School, 20*(3), 144-151.

Wiseman, D. L. (2012). The intersection of policy, reform, and teacher education. *Journal of Teacher Education, 63*(2), p. 87-91. doi:10.1177/0022487111429128

Woodward, J., Beckmann, S., Driscoll, M., Franke, M., Herzig, P., Jitendra, A…. (2012). *Improving mathematical problem solving in grades 4 through 8: A practice guide* (NCEE 2012-4055). Washington, DC: National Center for Education Evaluation and Regional Assistance, Institute of Education Sciences, U.S. Department of Education. Retrieved from http://ies.ed.gov/ncee/wwc/publications_reviews.aspx#pubsearch/

Zancarella, D., & Moore, M. (2014). The origins of the common core: Untold stories. *Language Arts, 91*(4), 273-279. Retrieved from Academic Search Complete (Accession No. 95091499)

Zepeda, S. (2007). *The Principal as Instructional Leader: A Handbook for Supervisors*. Larchmont, NY: Eye on Education.

APPENDIX A:

Springer Permission for Use of Figure 1

PERMISSION LETTER

August 8, 2016

Springer reference

Educational Psychology Review
June 2003, Volume 15, Issue 2, pp 147-179
First online:
Is It a Challenge or a Threat? A Dual-Process Model of Teachers' Cognition and Appraisal Processes During Conceptual Change
Michele Gregoire
DOI 10.1023/A:1023477131081
Print ISSN 1040-726X
Online ISSN 1573-336X
Journal number: 10648

Material to be used: Figure 1

Your project

Requestor: Suraya Walker
suwalker@valdosta.edu
swalker@charlton.k12.ga.us
University: Valdosta State University
Purpose: Dissertation/Thesis

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APPENDIX B:

Email to Superintendents – Request for Consent

From: Suraya Walker
VSU Doctoral Student
Email: suwalker@valdosta.edu
Phone: (912) 276-0418

Request for Research Approval

Dear Superintendent,

My name is Suraya Walker and I am a doctoral student at Valdosta State University. I am currently working on a dissertation topic that I believe will be of interest to you and middle school principals in your district. The title of the dissertation is *Principal Perception on the Implementation of Common Core Standards in Mathematics in Georgia Middle Schools.*

I plan to survey middle school principals in schools located in three RESA areas in southeast Georgia. The survey will include questions about professional development, teacher attitudes, and overall principal perception concerning the first three years of common core standards in grades 6-8. As a middle school mathematics teacher, I believe the results of this study will provide practical knowledge to middle school administrators and teachers as we continue to refine our implementation strategies.

I am requesting your permission to survey middle school principals in your district. A high participation rate is vital in giving meaning to survey results. The survey will be completed entirely online and all answers will be anonymous. Participation is strictly voluntary and carries no foreseeable stress or psychological, social, physical, or legal risks to yourself or your administrators. **The survey will not be conducted until after the GMAS test.**

If you are willing to grant me permission to survey middle school principals in your district, please communicate your approval in reply to this email, including your email signature (name, title, school district, etc.).

Thank you in advance for your support and cooperation. If you have any questions about this study, please feel free to contact me at suwalker@valdosta.edu or at 912-276-0418.

Sincerely,

Suraya Walker
Math & Science, Grades 5-8 Gifted
Bethune Middle School
285 Little Phoebe Church Road
Folkston, GA 31537

APPENDIX C:

Institutional Review Board Approval Form

Institutional Review Board (IRB)
for the Protection of Human Research Participants

PROTOCOL EXEMPTION REPORT

PROTOCOL NUMBER: 03359-2016 **INVESTIGATOR:** Ms. Suraya Walker

PROJECT TITLE: Principal Perception on the Implementation of Common Core Mathematics Standards in Georgia Middle Schools: The First Three Years

---

INSTITUTIONAL REVIEW BOARD DETERMINATION:

This research protocol is **exempt** from Institutional Review Board (IRB) oversight under Exemption Categories **3 & 4.** You may begin your study immediately. If the nature of the research project changes such that exemption criteria may no longer apply, please consult with the IRB Administrator (irb@valdosta.edu) before continuing your research.

ADDITIONAL COMMENTS/SUGGESTIONS:

Although not a requirement for exemption, the following suggestions are offered by the IRB Administrator to enhance the protection of participants and/or strengthen the research proposal:

☐ ***If this box is checked, please submit any documents you revise to the IRB Administrator at irb@valdosta.edu to ensure an updated record of your exemption.***

Elizabeth W. Olphie *6/13/16*

Elizabeth W. Olphie, IRB Administrator Date

Thank you for submitting an IRB application.
Please direct questions to irb@valdosta.edu or 229-259-5045.

Revised: 06.02.16

APPENDIX D:

Email Invitations to Principals

First email to principals sent on 6/20/16

Dear Principal,

Good Morning! I have received permission from your superintendent to email you requesting your contribution to my research. Details follow below:

You are being asked to participate in a survey research project entitled ***"Principal Perception on the Implementation of Common Core Standards in Mathematics in Georgia Middle Schools,"*** which is being conducted by ***Suraya Walker,*** a doctoral student at Valdosta State University. This survey is anonymous. No one, including the researcher, will be able to associate your responses with your identity. Your participation is voluntary. You may choose not to take the survey, to stop responding at any time, or to skip any questions that you do not want to answer. You must be at least 18 years of age to participate in this study. Your completion of the survey serves as your voluntary agreement to participate in this research project and your certification that you are 18 or older.

Questions regarding the purpose or procedures of the research should be directed to ***Suraya Walker*** **at 912-276-0418,** or email **suwalker@valdosta.edu.** This study has been approved by the Valdosta State University Institutional Review Board (IRB) for the Protection of Human Research Participants. The IRB, a university committee established by Federal law, is responsible for protecting the rights and welfare of research participants. If you have concerns or questions about your rights as a research participant, you may contact the IRB Administrator at 229-333-7837 or irb@valdosta.edu.

Please click on the link below to access the survey.

https://valdosta.co1.qualtrics.com/SE/?SID=SV_8vVcWMWyaykvrPD

Thank you for taking a few minutes of your busy schedule. Your help is greatly appreciated.

Suraya Walker
VSU Doctoral Student
and
Math & Science Teacher (Grades 5-8 Gifted)
Bethune Middle School / Charlton County
285 Little Phoebe Church Road
Folkston, GA 31537
912-496-2360

Email Reminder #1 sent on 6/27/16

Dear Principal,

Last Monday, 6/20/16, you received an e-mail message asking you to complete an online survey as part of my doctoral research on ***"Principal Perception on the Implementation of Common Core Standards in Mathematics in Georgia Middle Schools."*** If you have filled out the survey, thank you!

If you have not had a chance to take the survey yet, I would appreciate 15 minutes of your time to complete it. Please read the original message below for the research details.

This message has gone to *everyone* in the selected sample population. Since no personal data is retained with the surveys for reasons of confidentiality, I am unable to identify whether or not you have already completed the survey.

To take the survey, click on:
https://valdosta.co1.qualtrics.com/SE/?SID=SV_8vVcWMWyaykvrPD

Original Message from 6/20/16:

You are being asked to participate in a survey research project entitled ***"Principal Perception on the Implementation of Common Core Standards in Mathematics in Georgia Middle Schools,"*** which is being conducted by ***Suraya Walker,*** a doctoral student at Valdosta State University. This survey is anonymous. No one, including the researcher, will be able to associate your responses with your identity. Your participation is voluntary. You may choose not to take the survey, to stop responding at any time, or to skip any questions that you do not want to answer. You must be at least 18 years of age to participate in this study. Your completion of the survey serves as your voluntary agreement to participate in this research project and your certification that you are 18 or older.

Questions regarding the purpose or procedures of the research should be directed to ***Suraya Walker*** at **912-276-0418,** or email **suwalker@valdosta.edu.** This study has been approved by the Valdosta State University Institutional Review Board (IRB) for the Protection of Human Research Participants. The IRB, a university committee established by Federal law, is responsible for protecting the rights and welfare of research participants. If you have concerns or questions about your rights as a research participant, you may contact the IRB Administrator at 229-333-7837 or irb@valdosta.edu.

Thank you so much for your time!

Best regards,

Email Reminder #2 sent on 7/6/16

Dear Principal,

I need your help. Two weeks ago, you received a request to contribute to my research ***"Principal Perception on the Implementation of Common Core Standards in Mathematics in Georgia Middle Schools."*** As you probably know, a greater response rate will enable me to paint a more accurate picture of principal perception on the above topic. I believe as educators, we will benefit from the insight gained through this research. Should you wish to receive a summary of the results, please do not hesitate to email me at suwalker@valdosta.edu.

Please disregard this email if you have already completed the survey. I am unable to track those who already responded because the survey is anonymous. If you have not had a chance to take the survey yet, I would greatly appreciate 15 minutes of your time to complete it.

To take the survey, click on:
https://valdosta.co1.qualtrics.com/SE/?SID=SV_8vVcWMWyaykvrPD

Again, thank you so much for your time!

Best regards,

Email Reminder #3 (Last) sent on 7/14/16:

Dear Principal,

At the risk of becoming repetitive, I am sending you one last email invitation to participate in my research ***"Principal Perception on the Implementation of Common Core Standards in Mathematics in Georgia Middle Schools."*** Since the population in this study is limited to South Georgia middle schools, your perspective is extremely important.

If you have already completed the survey, please accept my sincere thanks. If you have not had a chance to complete it, I hope you consider taking 10-15 minutes of your time to do so. Due to the anonymity of this survey, I am unable to track whether you have or not responded.

To take the survey, please click on:
https://valdosta.co1.qualtrics.com/SE/?SID=SV_8vVcWMWyaykvrPD

Thank you so much for your time!

Respectfully,

APPENDIX E:

Online Survey

Dear Principal,

You are being asked to participate in a survey research project entitled ***"Principal Perception on the Implementation of Common Core Standards in Mathematics in Georgia Middle Schools,"*** which is being conducted by ***Suraya Walker,*** a doctoral student at Valdosta State University. This survey is anonymous. No one, including the researcher, will be able to associate your responses with your identity. Your participation is voluntary. You may choose not to take the survey, to stop responding at any time, or to skip any questions that you do not want to answer. You must be at least 18 years of age to participate in this study. Your completion of the survey serves as your voluntary agreement to participate in this research project and your certification that you are 18 or older.

Questions regarding the purpose or procedures of the research should be directed to ***Suraya Walker*** **at 912-276-0418,** or email **suwalker@valdosta.edu.** This study has been approved by the Valdosta State University Institutional Review Board (IRB) for the Protection of Human Research Participants. The IRB, a university committee established by Federal law, is responsible for protecting the rights and welfare of research participants. If you have concerns or questions about your rights as a research participant, you may contact the IRB Administrator at 229-333-7837 or irb@valdosta.edu.

Principal Perception on the Implementation of Common Core Standards in Mathematics in Georgia Middle Schools

Profile:

1. Gender: ☐ Male ☐ Female

2. Highest degree earned: ☐ Bachelor's ☐ Master's ☐ Ed.S. ☐ Doctorate

3. Years of experience as a principal:
   ☐ 1-5 years ☐ 6-10 years ☐ 11-15 years ☐ 16-20 ☐ 21+ years

4. Years of experience as a principal at this school:
   ☐ 1-5 years ☐ 6-10 years ☐ 11-15 years ☐ 16-20 ☐ 21+ years

5. Title I school: ☐ yes ☐ no

6. RESA area:
   ☐ First District RESA ☐ Coastal Plains RESA ☐ Okefenokee RESA

7. Grade levels in your school: _____

8. Number of students in your school (grades 6-8): _____

9. Percentage of economically disadvantaged students (based on free and reduced lunch data):
   ☐ 0-25% ☐ 26-50% ☐ 51-74% ☐ 75-100%

The following questions refer to the implementation of the Mathematics Common Core Standards during the first three years in your school.

Professional Development:

The next two questions refer to professional development during the first 3 years of common core implementation. Please include any professional development your mathematics teachers attended.

10. Check as many as apply for each year:

2012-2013	2013-2014	2014-2015
☐ Vocabulary Strategies	☐ Vocabulary Strategies	☐ Vocabulary Strategies
☐ Thinking Maps	☐ Thinking Maps	☐ Thinking Maps
☐ Technology Integration	☐ Technology Integration	☐ Technology Integration
☐ Georgia FIP – Formative Assessment Practices	☐ Georgia FIP – Formative Assessment Practices	☐ Georgia FIP – Formative Assessment Practices
☐ Developing Constructed Response Questions	☐ Developing Constructed Response Questions	☐ Developing Constructed Response Questions
☐ Longitudinal Data System (LDS) GOFAR Training	☐ Longitudinal Data System (LDS) GOFAR Training	☐ Longitudinal Data System (LDS) GOFAR Training
☐ Math in the Fast Lane	☐ Math in the Fast Lane	☐ Math in the Fast Lane

11. Please list any **additional** professional development your mathematics teachers attended:

2012-2013: _____

2013-2014: _____

2014-2015: _____

Teaching Strategies:

The next two questions refer to the teaching strategies your mathematics teachers used during the first 3 years of common core implementation.

12. Check as many as apply for each year:

2012-2013	2013-2014	2014-2015
☐ Use of Manipulatives	☐ Use of Manipulatives	☐ Use of Manipulatives
☐ Mathematics Modeling	☐ Mathematics Modeling	☐ Mathematics Modeling
☐ Real-Life Problem Solving	☐ Real-Life Problem Solving	☐ Real-Life Problem Solving
☐ Higher Order Thinking	☐ Higher Order Thinking	☐ Higher Order Thinking
☐ Writing in Mathematics	☐ Writing in Mathematics	☐ Writing in Mathematics
☐ Differentiation	☐ Differentiation	☐ Differentiation
☐ Formative Assessment	☐ Formative Assessment	☐ Formative Assessment
☐ Technology Integration	☐ Technology Integration	☐ Technology Integration

13. Please list any **additional** teaching strategies your mathematics teachers used:

2012-2013:_____

2013-2014: _____

2014-2015: _____

Use the 5-point scale below to indicate the extent to which you agree or disagree with each statement.

Teacher Attitudes:

14. Teachers were receptive to the increased rigor and depth of the mathematics common core standards.

☐ strongly agree ☐ somewhat agree ☐ somewhat disagree ☐ strongly disagree ☐ unknown

15. Teachers' stress level increased as a result of the common core implementation in mathematics.

☐ strongly agree ☐ somewhat agree ☐ somewhat disagree ☐ strongly disagree ☐ unknown

16. Teachers thought the professional development was effective in preparing them to teach the common core standards in mathematics.

☐ strongly agree ☐ somewhat agree ☐ somewhat disagree ☐ strongly disagree ☐ unknown

17 The common core initiative led some teachers to resign/retire early:

☐ strongly agree ☐ somewhat agree ☐ somewhat disagree ☐ strongly disagree ☐ unknown

18. Due to the new test format, teachers reported spending more time preparing students for the test than teaching the content:

☐ strongly agree ☐ somewhat agree ☐ somewhat disagree ☐ strongly disagree ☐ unknown

19. Teachers expressed concerns about having enough time to teach the standards in depth as required:

☐ strongly agree ☐ somewhat agree ☐ somewhat disagree ☐ strongly disagree ☐ unknown

20. Teachers assigned more students to remediation classes after the common core implementation.

☐ strongly agree ☐ somewhat agree ☐ somewhat disagree ☐ strongly disagree ☐ unknown

21. Over 75% of teachers had positive attitudes regarding the implementation of the mathematics common core standards:

☐ strongly agree ☐ somewhat agree ☐ somewhat disagree ☐ strongly disagree ☐ unknown

Common Core Resources in Mathematics:

22. The resources provided by the Georgia Department of Education were sufficient to effectively implement the mathematics common core standards:

☐ strongly agree ☐ somewhat agree ☐ somewhat disagree ☐ strongly disagree ☐ unknown

23. Teachers thought the common core materials from textbook publishers were adequate resources to teach the mathematics common core standards:

☐ strongly agree ☐ somewhat agree ☐ somewhat disagree ☐ strongly disagree ☐ unknown

Student Performance:

24. In **2012-2013** (first year of common core), the number of students referred to in-school or after-school tutoring in mathematics increased.

☐ strongly agree ☐ somewhat agree ☐ somewhat disagree ☐ strongly disagree ☐ unknown

25. In **2013-2014** (second year of common core), the number of students referred to in-school or after-school tutoring in mathematics increased when compared to the previous year.

☐ strongly agree ☐ somewhat agree ☐ somewhat disagree ☐ strongly disagree ☐ unknown

26. In **2014-2015** (third year of common core), the number of students referred to in-school or after-school tutoring in mathematics increased when compared to the previous year.

☐ strongly agree ☐ somewhat agree ☐ somewhat disagree ☐ strongly disagree ☐ unknown

27. The achievement gap between the low-performing and high-performing students in mathematics has increased since the common core implementation.

☐ strongly agree ☐ somewhat agree ☐ somewhat disagree ☐ strongly disagree ☐ unknown

28. Our former eighth grade students have been more successful in their 9th grade mathematics classes since the common core implementation.

☐ strongly agree ☐ somewhat agree ☐ somewhat disagree ☐ strongly disagree ☐ unknown

Overall Perception:

29. The overall staff morale has improved since the first year of the common core implementation.

☐ strongly agree ☐ somewhat agree ☐ somewhat disagree ☐ strongly disagree ☐ unknown

30. Teacher knowledge and comfort level have increased since the first year of implementation.

☐ strongly agree ☐ somewhat agree ☐ somewhat disagree ☐ strongly disagree ☐ unknown

31. I am confident that I met the needs of my staff during the common core implementation in mathematics.

☐ strongly agree ☐ somewhat agree ☐ somewhat disagree ☐ strongly disagree ☐ unknown

32. My school district communicated effectively with my school ***prior*** to the common core implementation.

☐ strongly agree ☐ somewhat agree ☐ somewhat disagree ☐ strongly disagree ☐ unknown

33. My school district communicated effectively with my school ***during*** the common core implementation.

☐ strongly agree ☐ somewhat agree ☐ somewhat disagree ☐ strongly disagree ☐ unknown

34. I am satisfied with the financial support from my district office during the common core implementation.

☐ strongly agree ☐ somewhat agree ☐ somewhat disagree ☐ strongly disagree ☐ unknown

35. I received adequate professional development to oversee the common core implementation in my school.

☐ strongly agree ☐ somewhat agree ☐ somewhat disagree ☐ strongly disagree ☐ unknown

36. Using the numbers 1-3, with #1 representing the biggest challenge, please rank the top 3 challenges of implementing the mathematics common core standards in your school:

_____ Lack of funding for professional development

_____ Teacher attitudes

_____ Time to adequately train staff

_____ Scheduling intervention classes for low performing students

_____ Technology training for staff and students in preparation for the GA Milestones

_____ Curriculum resources in mathematics

_____ Parental support

37. How has the implementation of the common core in mathematics affected the performance of economically disadvantaged students?

38. What were the most challenging aspects of implementing the mathematics common core in your school?

39. Please share any additional comments about mathematics instruction during the first three years of common core.

Parts of the survey were adapted from (questions 14, 16-19):

Weichel, M. W. (2002). *Nebraska public high school principals' perceptions of how state standards impact schools* (Doctoral dissertation). Available from ProQuest Dissertations and Theses database. (UMI No. 3044995)

Questions 31-34:

Hoffman, W. (2013). *Principal perceived preparedness to lead the implementation of the common core* (Doctoral dissertation). Available from ProQuest Dissertations and Theses database. (UMI No. 3604581)

Question 35:

Heil, S. M. (2012). *Principal and parent perceptions of how implementing common core state standards affects schools and accountability* (Doctoral dissertation). Available from ProQuest Dissertations and Theses database. (UMI No. 3548523)