TEACHERS' CONCEPTIONS OF SUCCESSFUL ELEMENTARY MATHEMATICS PEDAGOGICAL PRACTICES WITH AFRICAN AMERICAN STUDENTS

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ABSTRACT

This study investigated elementary school teachers' conceptions of their beliefs and expectations of African American students, their pedagogical practices, and the rationale for choosing the pedagogical practices for grades 3 through at Star Maker Elementary. The researcher employed a mixed methodology. The Math Teacher of African American Students Inventory (MT-ABSI) served as the quantitative method. Frequency analysis was employed to analyze the survey. Qualitative methods included two focus group interviews and lesson plans analysis. The researcher employed thematic coding to analyze the qualitative methods. Although the results from the MT-ABSI indicated that teachers had low level beliefs and expectations of their African American elementary students' ability in mathematics, the teachers professed to have high beliefs and expectations and communicate them to their students by using real world experiences in their mathematics classes, providing extra help outside of the mathematics class, and expressing their expectations verbally and non verbally. Further results of the survey indicated that teachers professed to implement some best practices in mathematics classroom than other. These best practices included the use of manipulatives and informing students of state standards. Overall, this is in agreement with the focus group interviews and lesson plans with special emphasis on differentiating instruction, professional development, and lesson plans cycle. There rationale for choosing the pedagogical practices included building background, learners' preference, and reinforcement and advancement of skills.

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CHAPTER I:

INTRODUCTION

In the United States, elementary school teachers usually teach all core subjects: reading, language arts, mathematics, science, and social studies. Elementary teachers are expected to be knowledgeable about these subject areas and to be abreast of pedagogical practices that exemplify best practices within the subjects. These pedagogical practices and the content knowledge teachers used were taught in their pre-service content methods classes and through in-service professional development activities. Through effective classroom use of pedagogical practices and with the teacher's sufficient content knowledge, students are expected to learn and be proficient at all subjects. Students then are expected to demonstrate their proficiency on state achievement testing to determine how well they have learned the core subject matter (Parkay, Anctil, & Hass, 2006).

The National Council of Teachers of Mathematics (NCTM) has emphasized the importance of mathematics education for every student. The vision of NCTM is that all students experience high quality mathematics instruction, through a rich curriculum, knowledgeable teachers, and with adequate technology. The *Principles and Standards of School Mathematics* are statements emphasizing the basis of a high quality mathematics education for every student regardless of race, gender, socioeconomic status, or disability/ability. The principles include equity, curriculum, assessment, teaching, learning, and technology. If these principles are in place in every school, then schools should develop a high quality mathematics program (NCTM, 2000).

Teaching is one of NCTM principles. Effective mathematics teaching is a complex task for teachers. It requires understanding of several factors. These factors include knowledge of students and of how students learn, what they need to learn, and how to challenge them to extend learning (Griffith & Griffith, 2007; NCTM, 2000). Effective mathematics teaching also includes a deeper understanding of mathematical knowledge, an understanding of students as learners, and an understanding of pedagogical strategies best suited for their learners (NCTM, 2000).

For African American students, teaching in mathematics education is an on-going issue. African American and whites continuously have an achievement gap in state and nationwide assessments (Berry, 2003). Researchers have shown that the achievement gap is an indicator of the instruction given to many African Americans, especially in the concepts of problem solving and reasoning (Berry, 2003; Malloy, 1997). African American students are not experiencing the instructional practices recommended by NCTM (Ladson-Billings, 1997; Williams & Lemons-Smith, 2009). African American students have been found to be less likely to receive standards based instruction and less likely to solve problems using reasoning and non-routine strategies (Berry, 2003; Malloy, 1997). When implementing technology in the mathematics classroom, teachers of African American students use technology to emphasize drill and practice, whereas, teachers of white students use technology for simulation, demonstration, and application of concepts (Lubienski & Crockett, 2003). African Americans are more likely to be taught using worksheets and memorization of facts. Also, African American students are less likely to use the calculator during mathematics instruction and assessments (Berry, 2003). Many teachers of African American students water down the curriculum because they feel their students will not understand the concepts being taught (Berry, 2003; Ladson-Billings, 1997; Moody, 2004).

African Americans students, also, are more likely to be placed in low ability mathematics classrooms. As the enrollment of African American students increases in a school, the amount of high ability mathematics classes decreases. Schools where the majority of students are African American have less extensive and less demanding mathematics and offer fewer chances for students to take courses that will lead them to college (Ladson-Billings, 1997).

Teachers' beliefs about their students can greatly affect their students' success. African American students are more likely to have teachers with negative beliefs about their ability in mathematics (Good & Brophy, 2008; Strutchens, 2008). These negative beliefs may stem from past experiences, examination of school records, and interactions with older siblings and parents. These past experiences with African American students may cause teachers to have low expectations, ineffective teaching, and the reinforcement of racial stereotypes (Strutchens, 2008).

Statement of the Problem

Despite NCTM's call for effective teaching in the mathematics classroom, African American students' mathematics NAEP scores continue to lag behind those of white students in the elementary grades. An increase in scores, however, was identified in National Association of Educational Progress (NAEP) results over several years. This suggests that there are teachers with sufficient mathematics pedagogical content knowledge (MPCK) who are successfully instructing African American students in mathematics. In order to understand what such teachers are doing, more research is needed in such areas as teachers' conceptions of the successful pedagogical practices with African American elementary students in mathematics and their rationale for using those practices (Ladson-Billings, 2009 & 1997).

Purpose of the Study

The purpose of the study was three-fold. First, this study examined teachers' beliefs and expectations about African American students' ability at mathematics at an elementary school. Second, this study examined the pedagogical practices teachers use to successfully teach mathematics to African American students. Third, this study examined teachers' rationales for using specific pedagogical practices to support African American students in mathematics.

Significance of the Study

The study contributes to the professional knowledge base regarding the practices and mathematics pedagogical content knowledge of teachers of African American elementary school students. As it identifies the rationales espoused by teachers for their pedagogical practices in teaching mathematics to African American elementary students, this study may identify specific practices that can be further investigated by researchers. In identifying teachers' rationale for choosing specific pedagogical practices, their belief about their African America students can be determined. Therefore, teachers' beliefs can be linked to their practices.

Research Questions

This research study investigated the following overarching question: what is the relationship between teachers' expectations of elementary grades African American students and teachers' practices and planning in mathematics? From this overarching question, three sub-questions were investigated:

1. What beliefs and expectations about African American students' ability in mathematics at the elementary school do teachers ascribe to;
2. What pedagogical practices do teachers incorporate in their lessons that cause their African Americans to become successful in mathematics; and

3. What rationale do teachers use for selecting specific pedagogical practices to support African American students in mathematics?

Methods

This study was both quantitative and qualitative methods to investigate the research question. In this study, teachers were given a questionnaire and were interviewed. Teachers' lesson plans, furthermore, were analyzed to examine the relationship between teachers' expectations of their African American students and their practice as demonstrated in their planning.

Assumptions

The following assumptions were made about the participants of this study:

1. The participants are highly qualified elementary teachers as defined by No Child Left Behind (NCLB);
2. The participants are knowledgeable of the mathematics state course of study for their grade level; and
3. The participants are successful teachers of mathematics.

Definitions of Terms

Adequate Yearly Progress (AYP): A status used to measure whether a school has obtained all goals for the current school year (NCLB, 2001).

African Americans: A person having origins in any of the Black racial groups of Africa. It includes people who indicate their race as "Black, African Am., or Negro" or report entries such as African American, Kenyan, Nigerian, or Haitian (retrieved from http://quickfacts.census.gov, 2011).

Conceptions: A specific meaning attached to teaching and learning phenomena which are claimed to mediate a teacher's viewpoint of their teaching context (Devlin, 2006)

Content Knowledge: Knowledge, understanding, skills, and dispositions that students learn (Piccolo, 2008).

Culturally Responsive Teaching: Teaching minority group or immigrants students the same curriculum as other students in a way that is familiar to the students' culture (Good & Brophy, 2008, Ladson-Billing, 2009).

General Pedagogical Knowledge: Broad principles and strategies of classroom management and organization that appear to transcend subject matter (Shulman, 1987).

Lesson Plans (LP): The primary organizational structure of the instructional process (Sullivan, 2003).

Mathematical Learning: The understanding of the concepts of mathematics by actively building new knowledge from prior knowledge and experiences (NCTM, 2000).

Pedagogical practices: Strategies and approaches to engage students in knowledge (Jenlink & Jenlink, 2005).

Professional Development (PD): Continuing development of teaching through presentation of theory, modeling or demonstration, practice, open-ended feedback, and coaching (Good & Brophy, 2008).

Teacher's Beliefs: A composition of one's theories about universal phenomena, one's interpretations of environmental occurrences as perceived by his/her senses, and one's mental constructs that are based on those theories and interpretations (Howse, 2006)

Teacher Expectations: Inferences that teachers make about the future academic achievement of students (Cooper & Good, 1987).

Summary

This study consists of five chapters. Chapter I is the introduction to the study. This chapter also includes the statement of the problem, the purpose of the study, the assumptions, limitations, and definition of terms. Chapter II is a review of professional literature related to this study. Chapter III includes the background of the study, the research design and methodology. Chapter IV gives the analysis of the data and the results of the study. Chapter V discusses the research findings. The implication and recommendation for further study of this topic are included in Chapter V as well.

CHAPTER II:

REVIEW OF THE LITERATURE

Teachers should provide a challenging and supportive classroom environment that will support mathematics learning through pedagogical decisions. It also will allow students to communicate mathematically, to encourage thinking and problem solving, and to discuss solutions and strategies with one another (NCTM, 2000). This chapter reviews the literature to the problem under investigation. It is divided into the following sections: pedagogical practices, teacher beliefs, and lesson plan analysis.

Pedagogical Practices

According to Shulman (1987), there are several categories of knowledge base that teachers use: content knowledge, general pedagogical knowledge, curriculum knowledge, pedagogical content knowledge, knowledge of learners and their characteristics, knowledge of educational context, and knowledge of educational end, purpose, and values. General pedagogical knowledge is the methods and strategies used to understand any topic, problems, or issues organized, modeled, and adapted to the diverse interest and abilities of learners and presented for instruction (Shulman, 1987). Ball and Bass (2000) have elaborated on pedagogical knowledge. Pedagogical knowledge is based on three elements: 1) what a teacher needs to know; 2) how they have to know it; and 3) how to help students learn to use it. Teachers not only have to provide content knowledge; teachers should provide opportunities to show how students how to use the knowledge.

Mathematics teachers need both mathematics content knowledge and pedagogical content knowledge to teach the subject with understanding (Ball & Bass, 2000). Mathematics pedagogical content knowledge (PCK) is the blending of both mathematical content and pedagogy. Pedagogical content knowledge consists of representations of analogies, illustrations, examples, explanations, and demonstrations so that the content is clarified for understanding (Piccolo, 2008). The National Council of Teachers of Mathematics believes that effective mathematics teaching includes understanding what students know or need to know and understand. This includes teachers whose mathematics PCK enables them to use a variety of practices such as discourse, technology, and learning through problem solving and knowing the background of their learners to insure appropriate instructional methods (NCTM, 2000).

Mathematics PCK is quite dependent upon the school setting, especially in urban elementary schools. According to Good and Brophy (2008), urban schools are schools located in a metropolitan area often consisting of a culturally diverse population, with high levels of poverty, and exposed to crime. Students in urban school may represent various cultural backgrounds. It is important that teachers use mathematical PCK that includes cultural sensitivity. Teachers, who are successful at teaching in urban schools, choose pedagogical practices that involve cultural sensitivity, excellence, and equity (Malloy, 1998; Good & Brophy, 2008). Problem centered-learning, mathematical communication, cooperative learning, and bridging cultural into learning are examples of effective pedagogical practices and are further discussed below.

Problem Centered Learning

The National Council of Teachers of Mathematics (NCTM) emphasizes the importance of problem solving in the mathematics classroom. According to NCTM (2000), problem solving

should be integrated in the five content areas of mathematics (numbers and operations, algebra, geometry, data analysis and probability, and measurement) instead of being taught in isolation. Problem solving allows students to build new mathematical knowledge; solve problems that arise in mathematics and in other contexts; apply and adapt a variety of appropriate strategies to solve problems; and monitor and reflect on the process of mathematical problem solving (NCTM, 2000).

In order for students to become proficient at problems solving, both procedural knowledge and conceptual understanding are equally vital (Cook, 2001; Fuson, Kalchman, & Bransford, 2009). Students with too little procedural knowledge do not become competent and efficient at problem solving. Students with too little conceptual understanding do not become competent at procedural understanding. Students need a balanced approach to enhance learning in order for them to be successful at mathematics.

The problem with teaching mathematics through problem solving is with the teachers themselves (Cook, 2001; Fuson, Kalchman, & Bransford, 2009; Sakshaug & Wohlhuter, 2010). Teachers tend to teach in the same manner as they have been taught. In order to change the way teachers instruct, primary concepts underlying a central area in mathematics need be clear to the teacher. Teachers' prior experiences with problem solving may hinder their ability to teach it. Teachers' prior experiences with problem solving typically involve solving word problems that were not connected to their everyday lives (Trafton & Midgette, 2002). A problem solving structure that captures students' interests and challenges their intellects in endorsed by NCTM:

> A problem-centered approach to teaching mathematics uses interesting and well-selected problems to launch mathematical lessons and engage students. In this way, new ideas, techniques, and mathematical relationships emerge and become the focus of discussion. Good problems can inspire the exploration of important mathematical ideas, nurture persistence, and reinforce the need to understand and use various strategies, mathematical properties, and relationships. (NCTM, 2000, p. 182)

There is research that supports teacher's success in using problem solving by being taught how to implement problem solving in the classroom (Jong et al., 2010; Sakshaug & Wohlhuter, 2010). In their research, Sakshaug and Wohlhuter (2010) investigated how a group of teachers learned how to develop lessons involving mathematics problem solving through a graduate level methods class. Through this class, teachers were expected to become better problem solvers, implement problem solving in the classroom, and engage in action research involving problem solving. The participants for this research study included 41 teachers in a five-week course during the summer session. Five teachers were pre-kindergarten and kindergarten teachers, one middle school Spanish teacher, one secondary mathematics teacher, one science teacher, seven without classroom assignments, and 26 elementary school teachers. The class was divided into two parts. The first hour was devoted to problem solving, and the other hour was devoted to decomposing the instructor's approach. Follow-up discussions were based upon the course reading, which included the *Principles and Standards of School Mathematics* (NCTM, 2000) and *Children are Mathematical Problem Solvers* (Sakshaug, Olson, & Olson, 2002). Teachers also were required to do action research assignment in their classroom or with accommodation for teachers without classrooms. Teachers were asked to select problems from the reading to prose to their students. Primary data collection included teachers' notes and reflections about their action research project. After posing the problem, teachers were required to respond to the prompts (Sakshaug & Wohlhuter 2010):

1. why I chose this problem;
2. children worked: alone or with others;
3. what I did to present the problem;
4. what the children did when they were solving the problem;

5. what the children learned;

6. what surprised me;

7. what I would do differently if I taught this problem again; and

8. how the problems were like/unlike what the authors reported in the class text.

The researchers then responded to the teachers' reflections and allowed for discussion during the class session. Teachers' final reflections about the class content and components served as another source of data. As a result of this research study, teachers were more comfortable with teaching problem solving and were confident in their students' ability to succeed with problem solving.

Cooperative Learning

Along with problem-based instruction, cooperative learning is a research-based strategy in mathematics education. Cooperative learning is the instructional use of small groups to allow students to work together to enhance their learning (Johnson & Johnson, 1999). Cooperative learning allows students the opportunity to work collaboratively to provide students feedback (Good & Brophy, 2008). NCTM endorses the use of cooperative learning in the mathematics classroom as young as preschool. Cooperative learning allows students to work together to hear different ways of thinking and refine the way in which one explains their ideas.

There is research on the advantages of cooperative learning (Bossert, 1988; Good & Brophy, 2008; Slavin, 1990; Steven & Slavin, 1995). First, cooperative learning strengthens students' reasoning through stimulating higher order thinking skills. Second, cooperative learning strengthens students' tolerance of others opinions. Third, cooperative learning increases the amount of time for students to rehearse information. Fourth, cooperative learning increases student engagement and socialization skills.

The achievement outcomes of three research based mathematics reform in elementary mathematics were investigated by Slavin and Lake (2008). One approach is a change in mathematics curricula in which there is utilization of alternative mathematics (Slavin & Lake, 2008). Criteria for the curriculum change analysis is the alternative textbook use of higher order thinking skills, problem solving, improved sequencing of objective, and the use of manipulatives. The second approach is computer-assisted instruction (CAI) (Slavin & Lake, 2008). Students were given main instruction through their regular textbooks and time was allowed for additional practice using computers. Students were diagnosed using the computer assessment to determine their mathematics level. Then regular mathematics practices were set by the computer based upon their mathematical level. A third mathematics approach examined was an instructional process in which there is a focus on instructional practices and classroom management strategies (Slavin & Lake, 2008). The approach for this analysis included within class cooperative grouping, the amount of instructional time, the ability to motivate students, the ability to engage in the thinking process, and the ability to accommodate students' needs. Additional requirements included extensive professional development and continual support for teachers.

The researchers identified 87 approaches to fit the parameters for this meta-analysis. From the 87 approaches - 13 studies of mathematics curriculum, 38 CAI, and 36 instructional processes, 36 approaches were selected. Categories were derived to describe the strength for each approach. The categories included strong evidence of effectiveness, moderate evidence of effectiveness, limited evidence of effectiveness, and insufficient evidence of effectiveness. There were several instructional processes that included cooperative learning programs were categorized as having strong evidence of effectiveness: Classwide Peer Tutoring (CWPT), Peer-Assisted Learning Strategies (PALS), Student Teams-Achievement Division (STAD), and TAI

Math. The fifth program was a classroom management and motivation model, the Missouri Mathematics Project (Slavin & Lake, 2008). Only one program for the CAI approach was categorized as having moderate evidence of effectiveness. No mathematics curriculum approaches were categorized as having strong evidence of effectiveness or having moderate evidence of effectiveness (Slavin & Lake, 2008).

Based upon Slavin's (1978, 1990) previous studies on cooperative learning, Vaughan (2002) investigated the effects of cooperative learning on achievement and attitude among students of color. He conducted a 12-week, single group pre-test/post-test research study in Bermuda. Twenty-one fifth grade students of color participated in the research study. One week prior to the study, students were taught cooperative learning procedures that would enable them to participate in the research study. Parents were also informed about the cooperative learning procedures that would take place during their mathematics classes. Measurement instruments included the California Achievement Test (CAT) and Peterson's (1978) Attitude Towards Mathematics Scale for grade 4-6 students. Cooperative learning served as the treatment for the study. Differences were measured by comparing pretest and posttest scores using one-factor analysis. Vaughan found a significant difference in pretest and posttest scores. There was a statistically significant difference found in students' attitudes towards mathematics as well. These findings support the view that cooperative learning can have a positive impact on student achievement and attitude as supported by Good and Brophy (2008) and Slavin (1990).

Communication

Communication in the mathematics classroom is an essential component of the mathematics education (NCTM, 2000). Communication allows students to share mathematical ideas clearly through oral or written language. The NCTM (2000) clearly defines the

Communications Standards in the *Principles and Standards of School Mathematics*. Instructional programs that promote communication enable students to

1. Organize and consolidate their mathematical thinking through communication;
2. Communicate their mathematical thinking coherently and clearly to peers, teachers, and others;
3. Analyzed and evaluate the mathematical thinking and strategies of others;
4. Use the language of mathematics to express mathematical ideas precisely. (NCTM, 2000, p. 60)

Vygotsky (1978) has posited that the importance of language for psychological tool in problem solving. The effects of teaching children mathematical language to solve problems were investigated by Mercer and Sam (2006). The researchers conducted a study with 406 children and 14 teachers in a school located in Milton Keynes, United Kingdom. The study was conducted in 2002, 2003, and 2004. The design included a pre-test, intervention, and post-test with comparison to school matched with similar background as the control group. The school participating in the intervention included seven teachers and 210 students in Year 5 (ages nine and ten). The intervention group participated in an intervention program called Thinking Together. The key feature of Thinking Together was two-fold: (a) to raise children's ability to use spoken language as a way for thinking together, and (b) to enable students to use language as tool for thinking collectively and individually (Mercer & Sam, 2006). Data collection included pre- and post-video recording lessons, post-audio recorded interviews with teachers, pre and post intervention tests of children's knowledge and understanding of mathematics and science. The Standard Attainment Task (SAT) for Key Stage 2 served as the knowledge based assessment. This assessment is given to students in England, Wales, and Northern Ireland. The researchers

found that the children in the intervention classes improved their math assessment scores significantly more than those in the control classes. These results support the belief that intervention was effective in improving children's mathematics abilities. The intervention involved improving students' language and discourse in mathematics.

The effects of mathematics discourse through math-talk learning community were investigated by Hufferd-Acke, Fuson, and Sherin (2004). The Math-Talk Learning Community is a learning community in which individuals assist each other in learning mathematics by engaging in meaningful mathematical discourse (Hufferd-Ackle, Fuson, & Sherin). In a year-long case study analysis of a teacher and her Latin students in an urban elementary school, researchers used observations and interviews to collect data on the teacher's and her class' growth and development of discourse during mathematics. The data results show that the teacher involved in the case study grew in four trajectories of instruction: (a) questioning, (b) explaining mathematic thinking, (c) sources of mathematical ideas, and (d) responsibility for learning from the lowest level of teacher guided discourse to student guided discourse. This study supports research that allowing for mathematical discourse develops students' thinking and reasoning skills (NCTM, 2000).

Effective mathematics instruction enables students to use mathematics to solve problem. Effective mathematics instruction allows students to actually do mathematics through problem based instruction, cooperative learning, and communication.

Bridging Students' Culture to Learning

Mathematics is one of the greatest cultural and intellectual achievements of humankind, and citizens should develop an appreciation and understanding of that achievement, including it aesthetic and even recreational aspects (NCTM, 2000). Culture can shape students' educational

experience. Culture is the knowledge, beliefs, and values acquired by groups (Malloy & Malloy, 1998; Moses-Snipes, 2005). Students' culture is multidimensional (Malloy & Malloy, 1998). First, culture is learned through home. Next, culture is extended to the community. Then, as students become exposed to media, their cultural knowledge is extended to different cultures. The extent of using African culture with African American on student achievement on selected geometry topics was investigated by Moses-Snipes (2005). She used a quasi-experimental design to study four classes of fifth grade students in mathematics achievement at a public elementary school in a southeastern city (Moses-Snipes). Classes were assigned by coin toss to determine which group would be the control or treatment group. The Mathematics With Culture (MWC) is the treatment group and the Mathematics Without Culture (MWOC) is the control group. The research assessments included pre-test and post-test instruments. The pre-assessment instrument was used to determine students' knowledge of geometry concepts. The data were analyzed using descriptive statistics by using the change in scores obtained by the pre and post assessments. The highest individual score was 75% made by a student in the MCW group. The lowest individual score was made by one student from each group. Seventy-five percent of students in the MWC group scores improved at least ten from the pre- to post-assessment. This study supports the conclusion that students' achievement score increased as they learned about African culture. Culture can be effective instructional strategy in the mathematics classroom.

Effects of culturally-based teaching on student performance in elementary mathematics were studied by Lipka, Hogan, Webster, Yanez, Adams, Clark, and Lacy (2005). The researchers conducted a case study based upon the implementation of the Math in a Cultural Context (MCC) series. MCC is a supplemental mathematics series developed by researchers, a core group of Yup'ik elders, and teachers in response to the growing threat to their culture and

language. Two to three meetings a year were held from 1995 to 2002 to develop the supplemental mathematics curriculum.

Teachers were selected based on the criterion that their students had better than average improvement in their students' assessments. From classroom observations, the researchers identified classrooms that (a) were actively engaged and communicated mathematically; (b) showed evidence of problem solving; and (c) made mathematics connections with local community (Lipka et al., 2005). Observations were videotaped then analyzed and transcribed using Transana. Keywords were generated through Transana. Videotapes were also analyzed by two retired Yup'ik teachers, researchers, and sometimes tribal elders. This was necessary to gain an insider's perspective on what is taking place in the classroom and how this connected to cultural norms.

From the videotaped analysis, several factors seemed characteristic of the MCC teaching. Important factors include a non-threatening classroom environment, relationship between teacher and students and between themselves, harmony, and students taking ownership of their learning. Important behaviors visible in the videotaped included working together, going down to their level, and not forcing students. Evelyn Yanez, one of the teachers, commented about not forcing the students to learn:

When I was teaching, I would begin teaching the whole class. Then the ones that were ready to learn would learn from me what I was teaching. These kids that learned could then become teachers of the other kids in the class when they were ready to learn. So, even though I started with the whole group, only those who were ready to learn, learned; and then they became teachers to the ones that were not ready when I was teaching the whole group (Lipka, 2005).

The benefits of culturally-relevant mathematics in urban schools were investigated by Ensign (2003). She conducted a research study in two urban elementary schools in Connecticut. Second, third, and fifth grades were the targeted for this study. These two schools were chosen because of their involvement in the Comer School Development Program. The Comer School Development Program places strong support on child development. Although the program was in place, these two schools continued to struggle academically and needed help.

Ensign used students to document how mathematics was used outside of the school experiences. The term "culturally connected math" was developed to denote mathematics that is connected to the culture of students (Ensign, 2003). Teachers were actively involved in implementing students' personal mathematics experiences. They were allowed to shape the methods that best suited their students' needs. Students were involved with writing problems based upon their experiences and were involved with solving each other problems. Parents were involved by helping their children with writing mathematics problems from their experiences. This relationship helped to strengthen the home-school relationship. Ensign posited several benefits from this research study. First, students developed multistep and sophisticated problems to solve. Second, students became aware of how much mathematics they used outside of the classroom. Third, students stayed on task during mathematics class and were interested in solving their own personal math problems rather than those in the textbook. Fourth, teachers were better able to understand their students. The use of culturally relevant mathematics supports the beliefs that successful teachers use students real life situations to legitimate parts of the curriculum and they encourage "social relations that communal, interdependent, equitable and just" (Ladson-Billings, 1992).

The effectiveness of integrated the experiences of African American students in to their mathematics instruction was investigated by Sheppard (2011). The researcher conducted a study using interpretative data from a group of eight undergraduate prospective teachers. These teachers were engaged in a mentor program under the direction of the local university that assisted African American students in elementary mathematics. Data sources included journal entries and written papers from the participants. The researcher concluded that the prospective teachers' experiences yielded several pedagogical findings (a) involving the experiences of African American engendered a commitment to their students as learners and demonstrated the effectiveness of using students' prior knowledge as a bridge to new learning; (b) the teachers embodied central elements of effective teaching as described by NCTM; and (c) the prospective teachers integrated students experiences without compromising grade level rigor (Sheppard).

Bridging students' culture into the mathematics classroom can be beneficial to students. Through culturally relevant curriculum, ethnomathematics, and students' real world problems, students can discover how mathematics is related to their world. In some instances, the mathematics from students' culture and daily lives are more explicit than textbook examples. Bridging students' culture, furthermore, can positively affect mathematics achievement.

Teacher Beliefs Affect Expectations

Teacher expectations and beliefs can have a causal effect on student learning. There are two types of expectation effects: the self-fulfilling prophecy effect and sustaining expectation effect (Good & Brophy, 2008). The self-fulfilling prophecy effect is the original expectation of an individual becoming true because of the teacher's preconceived notion about the student. The preconceived notion can be based upon direct or indirect contact with that student or others like the student. The teacher's behaviors towards the student will warrant that expectation. The

sustaining expectation effect occurs when a teacher's preconceived expectations of students are based upon that student's prior behaviors. The teachers' feelings and behaviors are determined by direct or indirect contact with the student. Researchers have conducted studies on how teacher expectations can effect student achievement.

Jussim, Robustelli, and Cain (2009) discussed Rosenthal and Jacobson's (1968) research, the Pygmalion study. Pygmalion study suggests that teacher expectations may produce self-fulfilling prophecy by examining how teacher expectation will influence students' scores based upon an intelligence test. Teachers were told that the intelligence test would identify students who were "likely to bloom." In reality, however, the students were assigned randomly that labeled. Researchers readministered the intelligence tests one year later. Results show that the student labeled "likely to bloom" scored higher IQ scores than the control group. The only thing that differed was the teacher's knowledge of the students' label. As a result of the research design, Rosenthal and Jacobson (1968) concluded that teacher expectation creates self-fulfilling prophecy. Although Jussim, Robustelli, and Cain (2009) agreed with Rosenthal and Jacobson findings, there were some concerns about the results. First, no IQs were found to have decreased from the likely to bloom group. Second, although the IQ scores increase drastically from time, the score did not vary drastically between control group and likely to bloom group. Third, IQ scores between grade for control group and likely to bloom group were inconsistent. Fourth, the intelligence test used in the research study yielded scores between 0 and 200. Jussim, Robustelli, and Cain (2009) have suggested the Pygmalion study's findings were more modest than reported.

The key elements responsible for the success of Hunter Elementary were investigated by Ponder, Webb, and Trawick (2003) using a case study structure. Hunter Elementary is a school located in North Carolina. The population of students was approximately 400 students. Eighty-

five percent of the student body participated in the free or reduced lunch program. Ninety-one percent of the students are members of an ethnic minority. Children speak 20 different languages at home, which means for one in every five students, English is not their first language (Ponder, Webb, & Trawick, 2003). Hunter Elementary has been designated by the state of North Carolina as a Lighthouse school because of the academic success despite the school demographics. Data collection methods included transcripts of interviews, observations in class, and grade level planning sessions. Artifacts included observation logs, transcripts from interviews, lesson plans, curricular documents, and notes from grade level meetings. From the artifacts, codes were developed and four themes emerged: (a) Time to Shine, (b) Together We Can, (c) First Things First, and (d) Whatever It Takes. Theme one, "Time to Shine," includes educating the whole child and meeting state academic goals. The participants believe that they provided lessons that included real world experiences. These experiences motivated and excited their students. Theme two, "Together We Can," is the school's motto and the unifying vision of the school (Ponder, Webb, & Trawick, 2003). This vision communicates the beliefs associated with responsibility, relationship, and efficacy of all stakeholders. Theme three, "First Things First," is the constant language that certain priorities are shared throughout the school community. The priority language communicated throughout the school includes communal sense of purpose, high expectations, focused curriculum, assessment, and instruction, student engagement, success for all, and building meaningful relationships. Theme four is "Whatever It Takes." It is the support system necessary to continue student growth and improvement. Ponder, Webb, and Trawick support the belief that having high expectation can have a positive effect on students' academic success. Having high expectations can positively affect student motivation. Teachers with high

expectations are able to motivate students to become successful through meaningful learning experiences (Good & Brophy, 2008; Jamar & Pitt, 2005; Moody, 2004).

The effects of collective efficacy on student achievement were investigated by Goddard, Hoy, and Hoy (2003). The theoretical framework for this study was based on the Bandura's (1977) view of collective efficacy as a powerful construct that is associated with student achievement. The researchers developed the Collective Efficacy Scale to test predictions about collective teacher efficacy and student achievement in urban schools. The population for this study included the elementary schools in a large urban school district located in a Midwestern state. Fifty schools were randomly selected; however, 47 schools agreed to participate in the research study. Participation in this study involved the researchers coming to the schools to survey the faculty. A total of 452 teachers completed and returned the survey and 99% of the surveys were used. Data collection included information from both teachers and students. Student information obtained included student achievement in reading and mathematics and demographic information. Student achievement information was based upon the 7th edition of the Metropolitan Achievement Test. The Metropolitan Achievement Test is given in the second, third, and fifth grades. The sample size of students for this study is 7,016. This information was obtained from the central office of the district. Data obtained from the teachers was the survey that was administered by the researchers. The hypothesis test results showed that collective teacher efficacy is a significant indicator of student achievement in both reading and mathematics. The collective teacher efficacy is greater than any degree of school's demographics for both reading and mathematics. The findings are consistent with the results of Bandura's study that collective efficacy was significantly and positively associate with student achievement at the school level.

For low income and minority students, especially African American students, research has shown how low expectations have played an adverse effect in student achievement (Ladson-Billing, 1994; Delpit, 1994; Flores, 2007; Haberman, 1991). Low expectations have been demonstrated through watered down curriculum, low assessment and placement of minority groups based upon stereotypes, exaggerated focus on behavioral management, the disproportionate representation of minority students in low level tracked mathematics classrooms, and the dismissal of students whose language and interaction differ from mainstream population (Remillard, 2000).

The role of classroom context in moderating the relationship between child ethnicity and teacher expectations was investigated by McKown and Winstein (2008). The authors completed three research studies over a ten-year period. The sample sizes for Study 1 and Study 2 included 640 children in 30 urban classrooms and 1,232 children in 53 urban classrooms respectively. The goal of both studies was to test three hypotheses: (a) more children report that teachers favor high achievers over low achievers, the more children will perceive teachers expectations; (b) the more ethnically mixed classroom is, the more child ethnicity will be related to teachers expectations; (c) classroom demographics mix and child-perceived differential teachers treatment are different classroom characteristics and that teacher bias will be greatest in highly diverse classrooms (McKown & Weinstein, 2008). The goal of Study 3 was to estimate the contribution of teacher expectations to the end of the year achievement gap in high and low bias classrooms (McKown & Weinstein, 2008). Data methods for Study 1 and Study 2 included ethnicity reports obtained from school, prior state achievement records and the results from The Teacher Treatment Inventory (TTI), and classroom diversity. TTI was administered to determine

students perceived differential teacher treatment (PDT). Both Study 1 and Study 2 results support the following:

1. The higher the classroom diversity and the higher the PDT, the more biased are the teacher expectations;
2. Teacher biases are greatest in highly diverse, high PDT classrooms;
3. In low diversity classrooms, high PDT was associated with teacher expectation that favored European American and Asian American students; and
4. In low diversity classrooms, low PDT classrooms, teachers expected more of African American and Latino students than their equally achieving European and Asian American peers.

Study 3 results support that high bias classrooms, teacher expectation are associated with greater achievement discrepancy between children from stereotyped and non-stereotyped ethnic groups for year-end assessments. In low bias classrooms, teacher expectations are insignificant contribution to the achievement discrepancy between children from stereotyped and non-stereotyped ethnic groups for year-end assessments.

Teacher expectations affect student learning. Teachers with high expectations motivate students, and subsequently those students become successful learners. School wide collective efficacy can positively impact teacher expectations for their students to learn and lead to positive student achievement. Teachers of urban low-income African American students are more likely to have low expectations which are evident in their pedagogical practices.

Mathematics Teachers

Mathematics teachers' beliefs about students' ability can shape students' understanding of mathematics through the experience provided by them (NCTM, 2000). Students'

understanding of concepts, their ability to use mathematics to problem solves, and their efficacy and disposition towards mathematics are sharpened by the instruction experienced at school (NCTM, 2000). Through effective experiences, teachers are able to make mathematics understanding attainable by all students. These effective practices include knowledge of students, understanding mathematics, a supportive learning environment, and appropriate pedagogical practices (NCTM, 2000).

In a longitudinal study, Bailey (2010) investigated the effectiveness of sustained standard based professional learning on second and third grade teachers' content and pedagogical knowledge in mathematics. A project development team was formed to plan and design professional development during five days per summer for three years. The professional development activities were centered on NCTM *Principles and Standards* and National Association of Education of Young Children (NAEYC) standards. Thirty teachers from nine experimental schools sites were participants in the study. Schools were chosen based upon their participation in the free and reduce lunch program. Each teacher agreed to participate in the professional development activities for three summers that included a mandatory three to five day professional development and to collaborate with in focus groups session throughout the school year. The participants were expected to develop and submit sample lessons and interactive homework assignments, and incorporate standard based strategies in their mathematics curriculum.

Data collection included both qualitative and quantitative methods. Quantitative designs are the Improving Teacher Quality and the South Carolina Teacher Quality surveys. The analysis yielded significant differences in pre and posttest content knowledge and pedagogical practice. Of the teachers, 38% indicated they felt equipped to implement standard based

instruction and interactive homework on the pretest, and 78% indicated they felt equipped to implement standards based instruction and interactive homework on the posttest. Teachers believe they were better equipped to implement standard based mathematics instruction and interactive homework. These results are supported by previous studies. Teacher quality can affect students' mathematical success (Ladson-Billings, 1994; Flores, 2007; Haberman, 1991). Teacher quality is measured by experience and qualifications. A disproportionate number of teachers in urban predominately African American schools are taught by the least prepared teachers (Flores, 2007). These schools serve predominately low-income minority students with limited resources.

Mathematics teachers not only participate in continuous professional development. Experienced and highly qualified teachers are caring. This is especially true for successful teachers of African American students. In an interview with two African American students who are successful in mathematics, Moody (2004) posited those students' success was because of caring teachers. After being placed in a lower level mathematics in third grade, Ashley, a college student at the time of the interview, had an unsure attitude about mathematics. "I felt bad because I knew it was the lowest class. Everybody used to say, that's the lowest class and Ms Carter teaches the lowest, class" (Moody, 2004, p. 54). Ashley was placed in Ms. Carter's class. Ms. Carter was the teacher for the lower level mathematics class. When Ashley entered the lower mathematics class, Ms. Carter saw potential in Ashley. Ms. Carter gave Ashley more attention and extra help in mathematics. As a result, Ashley received all A's in mathematics. Ashley also had two caring mathematics teachers in the sixth and seventh grades that believed in her and took the time to help and encourage her. The seventh grade teacher even encouraged Ashley to take an algebra placement test. The placement test was used to determine if she could take Algebra I

in her eighth grade year. Ashley believed that Ms. Carter and two other caring teachers helped her believe that African Americans can be successful at mathematics. Shelia, the other African American student, had caring mathematics educators as well. Her teachers were female African American mathematicians, which was important to Shelia's beliefs and attitudes about success in mathematics. Shelia believes that these teachers served as nurturers and supporter for her (Moody, 2004, p. 55):

> She's the only black female teacher that taught me at [this black university] and I often compare her to my mother because they are so much alike. She would always be there to just encourage me. When I had a class I just didn't think I could make it, I would just go sit in her office and say look, what's going on, tell me what to do and she was always there. She was good support in undergraduate [school], really good support.

As a result of the research study, Moody concludes that African American students who are successful in mathematics have caring teachers. Caring teachers are supportive, encouraging, and nurturing. They show their support by believing in their student's ability at mathematics and having high expectations (Moody, 2004).

Expert mathematics teachers can greatly impact student achievement. These teachers continuously seek improvement in their educational practices through teacher through professional development (NCTM, 2000). According to the National Staff Development Council (NSDC, 2005) meaningful professional development should deepens educator's content knowledge, provide research based strategies to aid students in meeting rigorous academic goals, and prepare teachers to use diver types of classroom assessments (2005). Along with continuous professional development, experienced and high quality teachers of mathematics have a caring, nurturing, and supportive attitude.

Rationale

The rationale for instructional practices and curriculum material affects what is taught and learned (Hameyer 2007). Rationale for an instructional strategy is referred to as the reasons and benefits for selecting instructional strategies to teach a particular concept (Burnett, 1999). Instructional strategies determine the method teachers may choose to achieve learning objectives. These instructional strategies are selected based upon the purpose and rationale to effectively teach concepts.

The effectiveness of learning new curriculum material on teacher learning and rationale for instructional practices was investigated by Collopy (2003). The study involved the researcher observing and interview two upper elementary teachers' implementation of the Investigation curriculum. Although eight teachers agreed to pilot the *Investigation* curriculum for their school district, two teachers agreed to participant in this study. The teachers were given a two-day professional development on the new curriculum. The researcher completed 41 observations and 28 interviews from October to May of one academic year. Teachers were not given any on-going professional development concerning the *Investigation*; therefore, learning and implementation was based on the teachers' own interpretation. The researcher found that one teachers' rationale for instructional practices changed during the course of the school year and the other teachers' rationale remain the same. The researcher concluded that teachers' interaction with the new curriculum material may have caused the difference in rationale. The teacher whose rationale changed believes the teacher note and dialogue boxes, two aspects of the Investigations curriculum, guided her through her own learning and implementation of the materials. The teacher whose rationale remain the same saw the teacher's notes and other content for teachers as not relevant for an experienced teacher who may be confident her

knowledge of mathematics. Rationale for instruction practices can be determine by their interaction with curriculum material.

Lesson Plan Analysis

Teachers have many decisions to make regarding instructional strategies and techniques to reach all students. Factors such as curriculum mandates, public accountability of students' mastery and implementation of research-based strategies can influence teachers' decisions. Teachers also take into account their diverse learners needs regarding students and theory, content knowledge, and pedagogical content knowledge in order to successfully teach their students. Teachers develop lesson plans in order to successfully address students need, curriculum mandates, and instructional strategies.

Developing clearly written lesson plans is essential (Edigar, 2004). When developing lesson plans there are several things to consider. They include

1. Objectives are clearly written;
2. Learning opportunities develop the objectives; and
3. Assessment procedures match what have been taught.

In order to define the decision making processes of teacher, Little (2003) has developed the instructional decision making process. The instructional decision making process is a proactive 8-cycle process used for mathematics teachers used when making decisions (see Figure 1). Little (2003) posited that this process can be used in diverse settings, grade levels, and classrooms.

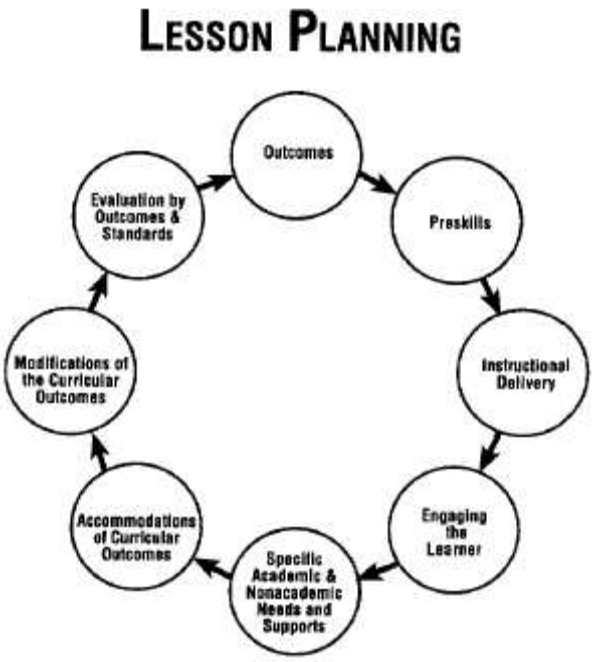

Figure 1. Proactive 8-cycle process used for mathematics teachers used when making decisions.

Panauk, Stone, and Todd (2002) investigated the process of implementation of the Four Stages of Lesson Planning strategy (objective, homework, developmental activities, and mental mathematics) as a part of a multi-faceted project, the Middle School Mathematics Initiative. The Four Stages of Lesson Planning is a "framework for planning instruction was developed to shape and to structure the complex process of lesson planning" (p. 810). The first stage, objective, comprises of six level hierarchy of increasing complexity based on Bloom's taxonomy. The six components of the objective stage include knowledge, comprehension, application, analysis, synthesis, and evaluation. The homework stage is a form of assessment based upon the objective. During the homework stage, students are expected to practice the mathematics learned during the objective state. The developmental activities stage involves teachers designing lessons around a central idea, which is developed and expanded by a variety of methods. The activities must be planned in concurrence with prior learned vocabulary, procedures, rules, and

concepts (Panauk, Stone, & Todd, 2002, p. 813). The student metal representation stage involves connecting the new knowledge to prior knowledge.

This study sought to identify patterns and trends of implementing the Four Stages of Lesson Planning (FSLP) with three middle school teachers. Data analyzed and collected include teacher surveys, semi-structured interviews, teachers' written lesson plans, and field notes of observed lessons. Teachers participating in this study were enrolled in an intensive training in mathematics content and on the implementation of the FSLP. The results of the cross case analysis show that FSLP process allows teachers to plan lesson with more structure. Furthermore, assigning homework with this FSLP allows for them to anticipate problem student may arise. Part of the homework stage involved teachers completing the homework problems as a part of the planning stages.

Summary

The review of the literature suggests that there are several factors to teaching elementary mathematics to African American students. These factors include effective mathematics instruction, teacher expectations, bridging students' culture into mathematics learning, and experienced teachers. Teachers develop lesson plans as a framework for shaping the context of their instruction. These factors are evident in their lesson plans.

Effective mathematics instruction is a complex task. NCTM (2000) emphasizes the belief that effective mathematics instruction that builds conceptual understanding, is child centered, and challenging. The review of the literature suggests problem-based instruction, cooperative learning, communication, and bridging students' culture are effective instructional approaches.

Teacher expectations can have a causative effect on student learning. Self-fulfilling prophecy effects and sustaining expectation effect can be exhibited directly or indirectly by

teachers' feelings and behaviors. The review of the literature suggests that collective school wide high expectations and collective efficacy can be determining factors of successful schools.

Through the review of the literature, research has shown there are elementary mathematics teacher of African American students (Ladson-Billings, 2009; Moody, 2004). These teachers participate in ongoing professional development and are caring supportive teachers. There are, however, limitations to past studies. These limitations include how these teachers belief and the relationship between their beliefs and lesson effect planning; and how their rationale for choosing pedagogical practices effect planning.

CHAPTER III:

METHODOLOGY

The research design for this study incorporated both qualitative and quantitative methods. This study investigated nine teachers of African American students. It included a survey, focus group interviews, and teachers' lesson plans. Triangulation is the use of three or more data sources to verify and clarify interpretations (Bause & Mayer, 1998), so the use of diverse instrumentation allowed for triangulation.

Setting of the Study

The study was conducted in an elementary school (grades K through 6) located in a southeastern state. Star Marker school (pseudonym) was selected because of demonstrating consistently high academic based on students' performance on the Alabama Reading and Mathematics Test (ARMT). Table 1 displays ARMT mathematics subtest scores for 2009-10 and 2010-11 school years for levels IV (percentage of students exceeding the standard) and level III (percentage of students meeting the standard).

Table 1

ARMT Mathematics Subtest Scores

	2011		2010	
Grade	Level IV	Level III	Level IV	Level III
Third	56%	28%	69%	24%
Fourth	72%	18%	71%	23%
Fifth	66%	27%	40%	48%

The student body at Star Maker Elementary was 93% African American, 5% whites, and 2% Hispanic. Students eligible for the free or reduced- price lunch program are 87% of the school's population. During the 2010-2011 school year, the average daily attendance at Star Maker Elementary was 976 students. This included 135 kindergarteners, 138 first graders, 155 second graders, 124 third graders, 150 fourth graders, 131 fifth graders, and 143 sixth graders. There are 56 teachers and support staff, three administrators, one counselor, and one media specialist at this school. Other specialists included two reading coaches and one mathematics teacher.

Star Marker Elementary School is located in an urban city of 28,416 people. The population is 70% African American, 29% white, 1% Hispanic Latin origin, and less than 1% of Asian origin. According to the U.S. Census (2006), the median household income is $23,000 with 27% of the city's population living below the poverty level; and the median value of owner-occupied housing units is $56,500.

The school system serves approximately 3,500 students in five elementary schools, one middle school, one alternative school, and one high school. The elementary schools serve kindergarten through 6th grade. Star Maker Elementary has the largest student body amongst all the elementary schools. The middles school serves grades seven and eight. The high school serves 9th through 12th grade.

Population and Sample

As stated above, Star Marker Elementary was selected for this study because of the consistent success at teaching African America students as relates to state testing results. Participants in this study were teachers from Star Maker Elementary in grades three through five. These grades were selected because of state mandated participation in the statewide assessments.

Teachers at Star Maker Elementary were selected for this study because of their commitment to ongoing professional development in mathematics and their teacher's positive beliefs about their students. There were six teachers each in third, fourth, and fifth grades. Therefore, there was a possible pool of 18 from the total teacher population of Star Maker Elementary to select for this research study.

Participants for this study were selected based upon several criteria. First, participants were teachers from grades three through five because of their students' participation on state testing. Second, participants were chosen based upon years of teaching experience. Teachers with at least five years of teaching experience were recruited for this research study. Third, participants were chosen based upon continuous professional development in elementary mathematics. Fourth, participants were selected based upon their willingness to participate in the research project. Based upon those four criteria, nine participants were selected, therefore, purposively rather than randomly. Table 2 shows the descriptive statistics for the participants who completed the survey.

Table 2

Participants who Completed MT-ASBI

Variable	Category	N	Percentage
Gender	Male	1	7.7
	Female	12	92.3
Age	21-30	3	23.1
	31-40	6	46.2
	41-50	2	15.4
	51-60	2	15.4
Race	Black	12	92.3
	White	1	7.7
Years	4-6	3	23.1
	7-9	1	7.7
	10-12	6	46.2
	16+	3	23.1
Highest Degree	BS/BA	4	30.8
	Master's	7	53.8
	Ed Specialist	2	15.4
	PhD/ Ed.D	0	0.0

Permission for the Study

Permission to conduct the study was requested and granted by the Institutional Review Board (IRB) superintended, and participating school's principal prior to this study. Before data collection, participants were given consent forms (see Appendix A). The consent form explained the study in detail. Teachers were assured that their participation was strictly voluntary and results will remain confidential.

Data Collection Procedure

Table 3 shows the sequence of data collection, the relevant research question, and data analysis. Multiple data sources included a survey (see Appendix B), interviews (see Appendix C), and lesson plan analysis (see Appendix D).

Table 3

Sequence of Data Collection

Data Collections	Relevant Research Question	Data Source	Data Collection	Data Analysis
Week 1	1 and 2	Survey	Week 1	Frequency Analysis
Week 2	1, 2, and 3	Focus Group Interview	Week 2	Themes and Assertions
Week 3	1, 2, and 3	Lesson Plan Analysis	Weeks 3-7	Lesson Plan Analysis

Three data sources were used in this study. Data sources for this research project included *Math Teachers of African American Students Beliefs Instrument* (MT-ASBI) (Howse, 2006), focus group interviews, and lesson plan analysis. All three data sources were used to address the overarching research question. Triangulation of sources validated the qualitative data. Audiorecorded focus group interviews were conducted before the lesson plans analysis. The researcher assured the participants of their confidentiality and obtained consent to audio record the interviews. Audiorecorded interviews are beneficial (Weiss, 1994). They allow the researcher to attend to the respondent allowing for the full essence of the interview to be captured.

Survey Instrument

During the spring 2012 semester, participants were given the *Math Teachers of African American Students Beliefs Instrument (*MT-ASBI) (Howse, 2006). The MT-ASB consists of 40 declarative statements to which participants must respond to the various levels of agreement in the Likert scale (see Appendix B). The statements were based upon views expressed by NCTM. Wiersma (2000) refers to this as a form of validation that establishes *content-validity*. The Cronbach's alpha was calculated using Statistical Package for the Social Sciences (SPSS) for internal consistency among the items on the survey instrument by Howse. The standardized item was $\alpha = .765$ indicating the survey is reliable (Wiersma, 2000). Participants respond to 40 statements. The statements yield five indices: (a) Math Belief Index (MBIX), (b) Best Practice Index (BPIX), (c) General Student Learning Index (GSLIX), (d) Student Comparative Index (SCIX), and (e) Beliefs about African American Index (BAAIX) (Howse, 2006). The following is a description of each index (Howse, 2006):

- MBIX: Measures the consistency of the responses with the views of mathematics that are endorsed by NCTM as indicated by ten of the survey items.
- BPIX: Measures the self-proclaimed frequency of the use of the best practices in the teaching of mathematics as outline by the Education Alliance as indicated by seven of the survey items.
- GSLIX: Measures the consistency of responses with the view of mathematics learning that are endorsed by NCTM as indicated by five of the survey items.
- SCIX: Measures the degree to which the responder agrees that the performance of African American students is comparable to that of other students as indicated by six of the survey items.

- BAASIX: Measures the degree to which response reflects positive views regarding African American students and their mathematical performance as indicated by eighteen of the survey items.

Focus Group Interviews

Focus group interviews were conducted during the fall of 2012. The focus group interviews were used to determine the relationship between the participants' expectations of African American students and their practices and planning of mathematical instruction. The interview protocol (see Appendix C) questions were based upon the literature review and the survey. The questions were used to guide the researcher to ask questions in a way to make it easy for the participants to provide evidence for the research question (Weiss, 1994).

There were two interview sessions. Teachers informed the researcher of their preferred date to participate in the focus group interviews. Focus group interview one included three teachers (participants) and one moderator (researcher). Focus group interview two included six teachers (participants) and one moderator (researcher). The first interview session initially had four teachers. However, one teacher had a scheduling conflict and switched to the second focus group interview. Table 4 shows the descriptive statistics for the participants who participated in the focus group interview by grade level, years of experience, highest degree, and focus interview group session. The interviews were conducted two afternoons after school hours. The environment was comfortable and seating in a circle to encourage discussion. The interviews were approximately 45 and 60 minutes. The interviews were audio recorded and transcribed.

Table 4

Participants of Focus Group Interview

Grade Level	Years Experience	Highest Degree	Focus Group Interview Session
Third Grade	16+	Master's	1
Fifth Grade	4-6	Master's	1
Fourth Grade	10-12	Bachelors	1
Math Teacher	10-12	Ed. Specialist	2
Fifth Grade	10-12	Master's	2
Third Grade	16+	Master's	2
Fourth Grade	16+	Master's	2
Third Grade	5-9	Master's	2
Fifth Grade	10-12	Ed. Specialist	2

The recordings were transcribed after the focus group interviews. After the transcription, responses were sorted into one of three categories. These categories are based upon the literature review: (a) teachers' beliefs and expectations, (b) pedagogical practices, (c) rationale. After sorting responses in the categories, the researcher further sorted each category into more specific themes (Hanna & McKenzie, 2007). The researcher used peer-debriefing techniques to ensure the validity of the data collection. Peer debriefing requires the researcher to work together with one or several peers who hold and impartial viewpoint of the study (Zhang & Wildemuth, 2009). The peer examined the audiorecorded transcript and provided feedback to the transcribed and code data. Debriefing meetings were held three times via email to discuss findings using the

coding directions (see appendix D). Focus group interview are useful several reasons (Hanna & McKenzie, 2007). They include the following:

1. To generate rich information through the sharing personal experiences and perspective in a way;
2. Provides information directly from individuals who are invested in the issue or hold expert knowledge about a topic;
3. Provides a representation of diverse opinions and ideas; and
4. Provides a relatively low cost efficient way to generate a great deal of information.

Lesson Plans Analysis

Lesson plans were analyzed during the winter of 2012 after the focus group interviews. Categories were developed based on the literature review which are the same used to analyze the focus group interviews. Components from the lesson plan were placed in the categories. Through further analysis, characteristics of each category were grouped together. From these characteristics, themes were developed. Peer-debriefing techniques were used to ensure the validity of the data collection. A peer was given directions to analyze the lesson plans in the same manner. Appendix E includes the detailed directions given to the peer via email, and three meetings were held to discuss the data. Content analysis is a systematic method of data analysis in which the researcher quantitatively analyzes the content in a document (Glanz, 2003; Neuendorf, 2002). Table 5 displays the sequence of content analysis of lesson plans for each grade level.

Table 5

Sequence of Content Analysis of Lesson Plans

Grade Level	Week
Grade 3	3-4
Grade 4	5-6
Grade 5	6-7

The data collection for this research study included a survey, focus group interview, and lesson plans analysis. To investigate the first and second research questions, all three data sources were utilized. To investigate the third research question, the research used the focus group interviews and lesson plans. The researcher employed descriptive statistics through frequency analysis to analyze the surveys. To analyze the focus group interviews and lesson plans, the research employed thematic coding based upon the literature review in the previous chapters. Through thematic coding, categories were developed and themes emerged for each category. To ensure reliability of the categories and theme, the researcher employed peer-debriefing techniques to analyze lesson plans as well as the focus group interview transcripts (Zhang & Wildemuth, 2009). The following chapter discusses the data results for each research question.

CHAPTER IV:

RESULTS OF THE STUDY

The study examined teachers' beliefs about and expectations of African American elementary students' ability in mathematics. The study investigated teachers' pedagogical practices and rationales for using specific pedagogical practices to support African American students in mathematics. The researcher used a conceptual framework to categorize the emerging themes in the data. This chapter discusses the analysis of the data collected from three sources: surveys, focus group interviews of the participants, and teacher lesson plans. Due to the small sample size (less than 30), the researcher is not able to generalize the findings beyond this study.

The following research questions were investigated:

1. What are teachers' beliefs and expectations about African American elementary students' ability in mathematics;
2. What pedagogical practice do teachers incorporate in their lessons that encourage their African Americans students' success in mathematics; and
3. What rationale do teachers use for selecting specific pedagogical practices to support African American students in mathematics?

The *Math Teachers of African American Students Beliefs Instrument* (MT-ASBI) (Howse, 2006) was given to 18 teachers to address the first and second research questions. Thirteen teachers returned the questionnaire, which was a 72% response rate.

The first item on the MT-ASBI allowed participants to define mathematics. Each participant was placed in one of three categories based upon their definition of mathematics. The

mathematics definition categories are Instrumentalist, Platonist, and Problem Solving views. The three categories are characterized by the following (Howse, 2006):

1. Instrumentalist view of mathematics as a collection of rules, symbols, patterns, and algorithms that we use to solve practical problems;
2. Platonist view of mathematics as a set of absolute, formal, and perfect ideas that exit in the universe and is discovered and not created; and
3. Problem solving view of mathematics as a continually expanding field of human creation and invention, in which patterns are generated and is distilled into knowledge.

Participants were placed in one of the three *mathematics definition* categories described above based upon their answer to item one in the MT-ASBI. Table 6 indicates that, of the 13 participants, 7 (or 53.8%) ascribed to the platonist's view, 5 (or 38.5%) ascribed to the instrumentalist's view, and one (or 7.7%) ascribed to the problem solver's view (Howse, 2006). The majority of the teachers were Platonists, who believed that mathematics is a static set of absolute, formal, and perfect ideas existing in the universe, which is discovered but not created. Howse (2006) described three levels of mathematics definitions. The lower level is instrumentalist. The middle level was platonist. The higher level was problem solver. This result indicates that these teachers ascribe to the mathematics definition that is considered middle level (Howse, 2006). One teacher ascribed to a problem solving definition of mathematics which is the highest level identified by Howse.

Table 6

Mathematics Definitions Categories

Mathematics Beliefs Categories	Number of Participants	Percent
Platonist	7	53.8
Instrumentalist	5	38.5
Problem Solver	1	7.7

In addition to being placed in mathematics definition categories, teachers were asked about their nature of mathematics. The nature of mathematics was based upon teachers' response on question two in the MT-ASBI. The nature of mathematics includes three statements about the purpose of mathematics: (1) mathematics is a collections of universal ideas and patterns that students must discover in order to be successful (2) mathematics is a social phenomenon that can only be learned from human interaction with the environment and with others, and (3) mathematical knowledge is individual construct; thus, what is mathematically valid for one person may not be mathematically valid to other. Table 7 indicates, of the 13 participants, one (or 7.7%) believes the first nature of mathematics, two (or 15.4%) believes the second nature of mathematics, and ten (or 76.9%).

Table 7

Nature of Mathematics

Nature of Mathematics	Number of Participants	Percent
1. Mathematics is a collection of universal ideas and pattern that students must discover in order to be successful.	1	7.7
2. Mathematics is a social phenomenon that can only be learned from human interaction with the environment and with others	2	15.4
3. Mathematical knowledge is individual construct, thus, what is mathematically valid for one person may not be mathematically valid to other.	10	76.9

The teachers' beliefs about the *nature of mathematics* were measured using *Mathematics Beliefs Index* (MBIX). The MBIX included items three through ten on the MT-ASBI. Teachers' responses to ten of the survey items were used to measure their conception of the nature of mathematics. The MBIX scale was indexed between 2 and 10 where 2 indicated a "strongly disagree" response to the item and 10 indicated a "strongly agree" response. A statistical description of the MBIX results is given in Table 8 using frequency distribution.

Table 8

Mathematics Beliefs Index Summary

MBIX Items	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
3. Math can be thought of as a language in which students are to communicate.	8	0	1	0	4
4. Students should justify their solutions, thinking, and conjectures in a single way.	8	2	0	0	3
5. In grades K-5, computation should precede word problems.	7	2	2	0	2
6. Learning math is a process in which students absorb information	4	6	2	0	1
7. Math should be taught as concepts, skills, and algorithms.	2	3	5	0	3
8. Children enter kindergarten with considerable mathematics experiences	5	4	1	0	3
9. Mathematics teachers show students the exact way to respond to math questions.	7	3	3	0	0
10. To solve problem you have to be taught the right procedure.	5	5	1	0	2

The teachers' pedagogical practices in the elementary mathematics classroom were measured using the Best Practice Index (BPIX). The BPIX included items 11 through 17 from the MT-ASBI. Teachers' responses to 8 survey items from the MT-ASBI were used to measure their usage of best practices in their elementary mathematics class. The BPIX was indexed between 2 and 10 where a 2 indicated as "never" and 10 indicated as "always." A statistical description of the BPIX score is given in Table 9 using frequency analysis.

Table 9

Best Practice Index Summary

BPIX Items	Never	Rarely	Sometimes	Often	Always
11. I integrate the use of manipulatives.	0	3	2	0	8
12. I use pre-assessment instruments to gauge students' mathematical understanding.	0	7	1	0	5
13. I allow students to maintain journals, give written reports, and give written interpretation.	1	6	3	0	3
14. I encourage students to talk to each other about their problem solving techniques.	0	4	4	0	5
15. I use activities that require students to use graphic calculators and computer technology.	2	2	8	0	1
16. I prompt students to clarify and justify their mathematical responses.	0	6	3	0	4
17. I inform student of Alabama's state standards, benchmarks, and grade level expectations	1	3	0	0	9

The teachers' beliefs about African American students and their performance in the elementary mathematics classroom were measured using the *Beliefs About African American Students Index* (BAASIX). The BAASIX included items 23 through 40. Teachers' responses to 18 survey items from the MT-ASBI were used to measure their conceptions of the African American elementary students. The BAASIX was indexed between 2 and 10 where 2 indicated a "strongly disagree" and 10 indicated a "strongly agree." A statistical description of the BAASIX score is given in Table 10 using frequency distribution.

Table 10

Beliefs About African American Students Index

BAASIX Items	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
23. African Americans are mathematically literate as other students.	5	1	5	0	2
24. The level of parental support for African American students is less than that of other students.	5	4	3	0	1
25. The prior mathematical knowledge of African American students is less than that for other students.	7	2	3	0	1
26. Considering the students that I have taught, there is a performance gap between African American students and white students.	5	3	4	0	1
27. African American students have the same level of motivation and focus as other students in my class.	5	4	4	0	0
28. African American students are as comfortable at mathematical discussions as my other students.	1	8	3	0	1
29. Poor mathematical performance of African American students can be attributed to socio economic factors.	4	7	1	0	1
30. Difficulties in mathematical learning for African American students are largely result of cultural inconsistencies between home and school.	2	6	4	0	1
31. High performing African American students are more likely than marginal African American students to have parents that hold a high school diploma or college degree.	7	0	2	0	4
32. When African American students have difficulty with mathematics, it is often the results of poor study habits.	4	2	6	0	1

Table 10 continued

BAASIX Items	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
33. Considering the African American students that I have taught, most of them have positive attitudes towards mathematic.	3	7	2	0	1
34. Any deficiencies in mathematical performance of African American students are due more to failure of the educational system than to themselves	3	4	4	0	2
35. Peer acceptance, social activities, or extracurricular activities often outweigh academic performances for African American students.	4	6	0	0	3
36. Many African American students seem to do better when they are allowed to work in groups based on performance level.	4	7	1	0	1
37. Generally, African American students tend to respond well to open-ended questions.	3	4	4	0	2
38. African American students are more successful at activities that are based on memorization.	6	4	3	0	0
39. I find that African American students perform better when they are aware of the Alabama State standards benchmarks and grade level expectations.	2	3	7	0	1
40. The factors that contribute to the marginal performance of most African American students are beyond the teacher's control.	4	3	5	0	1

Research Question One

Research question one investigated "What are teachers' beliefs and expectations about African American elementary students' ability at mathematics?" The following description discusses the results in regards to research question one using data from MT-ASBI, focus group interviews, and teachers' lesson plans. The researcher employed frequency analysis statistics to analyze the MT-ASBI. The researcher employed thematic coding to analyze focus group interviews and teachers' lesson plans.

Math Teachers of African American Students' Beliefs Instrument

The teachers were placed into three *math definition categories and nature of mathematics categories* as described above. The MBIX score for each nature of mathematics category was compared. Table 11 is a description of the mean score for each question under the MBIX for each nature of mathematics category. One teacher professed that the nature of mathematics was *a collections of universal ideas and patterns that students must discover to be successful*. The teacher's mean score for questions 4, 5, 6, and 8 had a low mean score that indicated a strongly disagree response with those items. The teacher's means score for questions 3 and 9 indicate a disagree response with those items. For question 7, the teacher indicated a neutral response with that item. For item 10, the teacher indicated a strongly agree response with the statement.

Table 11

Mean Score for MBIX for the Nature of Mathematics Categories

Item	1. Mathematics is a collection of universal ideas and pattern. Mean Score (N)	2. Mathematics is a social phenomenon that can only be learned from human interactions. Mean Score (N)	3. Mathematics knowledge is individually constructed. Mean Score (N)
3. Math can be thought of as a language in which students are to communicate.	4.00 (1)	7.00 (2)	6.00 (10)
4. Students should justify their solutions, thinking, and conjectures in a single way.	2.00 (1)	3.00 (2)	4.60 (10)
5. In grades K-5, computation should precede word problems.	2.00 (1)	7.00 (2)	3.80 (10)
6. Learning math is a process in which students absorb information repeated practices and reinforcement	2.00 (1)	4.00 (2)	4.40 (10)
7. Math should be taught as concepts, skills, and algorithms.	6.00 (1)	7.00 (2)	5.60 (10)
8. Children enter kindergarten with considerable mathematics experiences.	2.00 (1)	7.00 (2)	4.60 (10)
9. Good mathematics teachers show students the exact way to respond to math questions that will be tested on.	4.00 (1)	3.00 (2)	3.40 (10)
10. To solve problem you have to be taught the right procedure.	10.00 (1)	3.00 (2)	4.00 (10)

The nature of *mathematics as a social phenomenon that can only be learned from human interactions with the environment and with another* was ascribed by two teachers. The teachers' means scores for questions 4, 9, and 10 mean score were 3.00 which indicated a low level of agreement with those statements. Question 6 means score was 4.00 indicated a neutral response to the statement. Questions 3, 5, 7, and 8 mean scores were 7.00 indicated agree or strongly agree responses to these statements. The third nature of mathematics category mathematics knowledge is individually constructed; thus, what is mathematically valid for one person may not be mathematically valid for another was ascribed by 10 teachers. The means score for questions 5 and 9 were 3.80 and 3.40 respectively. This indicated a low level of agreement with these statements. Questions 4, 6, and 10 indicated "disagree" responses with means scores of 4.60, 4.40, and 4.00 respectively. Questions 3 and 5 indicated a neutral response to the statement with means scores of 6.00 and 5.60 respectively. The results indicate that teachers' beliefs about mathematics are not based upon the nature of mathematics they ascribed to. Furthermore, teachers' have low level of mathematics beliefs.

The BAASIX was used to determine the level of teachers' belief about their African American students' ability in mathematics. Table 12 indicates the means score for the BAASIX for each nature of mathematics category.

Table 12

Mean Score for BAASIX for the Nature of Mathematics Categories

Items	1. Mathematics is a collection of universal ideas. M(N)	2. Mathematics is a social phenomenon that can only be learned from human interactions. M(N)	3. Mathematics knowledge is individually constructed. M (N)
23. African Americans are mathematically literate as other students.	6.00 (1)	4.00 (2)	6.10 (10)
24. The level of parental support for African American students is less than that of other students.	4.00 (1)	4.00 (2)	4.20 (10)
25. The prior mathematical knowledge of African American students is less than that for other students.	6.00 (1)	2.00 (2)	4.00 (10)
26. Considering the students that I have taught, there is a performance gap between African American students and white students.	6.00 (1)	6.00 (2)	3.80 (10)
27. African American students have the same level of motivation and focus as other students in my class.	6.00 (1)	2.00 (2)	4.00 (10)
28. African American students are as comfortable at mathematical discussions as my other students.	6.00 (1)	3.00 (2)	2.00 (10)
29. Poor mathematical performance of African American students can be attributed to socio economic factors.	4.00 (1)	3.00 (2)	4.20 (10)
30. Difficulties in mathematical learning for African American students are largely result of cultural inconsistencies between home and school.	6.00(1)	3.00 (2)	5.00 (10)
31. High performing African American students are more likely than marginal African American students to have parents that hold a high school diploma or college degree.	4.00 (1)	7.00 (2)	6.20 (10)

Table 12 continued

Items	1. Mathematics is a collection of universal ideas. M(N)	2. Mathematics is a social phenomenon that can only be learned from human interactions. M(N)	3. Mathematics knowledge is individually constructed. M (N)
32. When African American students have difficulty with mathematics, it is often the results of poor study habits.	2.00 (1)	4.00 (2)	5.20 (10)
33. Considering the African American students that I have taught, most of them have positive attitudes towards mathematical learning.	2.00 (1)	3.00 (2)	4.80 (10)
34. Any deficiencies in mathematical performance of African American students are due more to failure of the educational system than to any characteristics of the schools themselves.	2.00 (1)	5.00 (2)	5.40 (10)
35. Peer acceptance, social activities, or extracurricular activities often outweigh academic performances in terms of their importance to African American students.	10.00 (1)	7.00 (2)	3.80 (10)
36. Many African American students seem to do better when they are allowed to work in groups based on performance level.	2.00 (1)	3.00 (2)	4.40 (10)
37. Generally, African American students tend to respond well to open-ended questions that allow them to express personal mathematical thought processes in their own words.	2.00 (1)	4.00 (2)	5.60 (10)
38. African American students are more successful at activities that are based on memorization of formulas and algorithms.	2.00 (1)	2.00 (2)	4.00 (10)
39. I find that African American students perform better when they are aware of the Alabama State standards benchmarks and grade level expectations for each competency or skill that is addressed in class.	6.00 (1)	7.00 (2)	6.00 (10)

Table 12 continued

Items	1. Mathematics is a collection of universal ideas. M(N)	2. Mathematics is a social phenomenon that can only be learned from human interactions. M(N)	3. Mathematics knowledge is individually constructed. M (N)
40. The factors that contribute to the marginal performance of most African American students are beyond the teacher's control.	6.00 (1)	6.00 (2)	4.20 (10)

One teacher ascribes to the nature of mathematics as being a collection of universal ideas and patterns that students must discover in order for them to be successful. This teacher's BAASIX indicated that he/she had a neutral response about the Africa Americans' mathematics ability for items 23, 25, 26, 27, 28, 30, 39, and 40. This teacher indicated a strongly disagree or disagree response for items 24, 29, 31, 32, 34, 36, 37, and 38. The teacher strongly agreed with items 42, peer acceptance, social activities, or extracurricular activities often outweigh academic performances in terms of their importance to African American students.

Two teachers ascribed to the nature of mathematics of mathematics is a social phenomenon that can only be learned from human interactions with the environment and with one another. The teachers disagreed with items 23, 24, 25, 27, 28, 29, 30, 32, 33, 36, 37, and 38. The teachers had neutral responses to items 26, 34, and 40. They also had agree response to items 31, 35, and 39

Ten teachers ascribed to the nature of mathematics as a knowledge that is individually constructed, thus, what is mathematically valid for one person may not be mathematically valid for another. The teachers strongly disagreed or disagree with items 24, 25, 26, 27, 28, 29, 33, 35,

38, and 40. The teachers had neutral response to items 23, 30, 31, 32, 34, 37, and 39. There were no agree or strongly agree mean score response to any of the items.

Focus Group Interviews

In addition to the surveys, focus group interviews were used to identify teachers' beliefs and expectations about their African American students' ability in mathematics. From the 13 returned surveys, 9 teachers agreed to participate in the focus group interview. Two focus group interviews took place during the fall semester.

The interview protocol included 10 items. Through open coding, themes emerged and were placed in one of three categories. The three categories were derived from the literature (see Chapter II). The three categories included are expectations and beliefs, pedagogical practices, and rationale. The first category was related to the first research question that focused on expectations and beliefs. During both interviews, teachers discussed their beliefs and expectations about their African American elementary students' abilities at mathematics. From the focus group interviews themes emerged in beliefs and expectations. These themes included (a) using real life situations in mathematics, (b) building caring relationships, and (c) expressed beliefs and expectations.

Teachers posited that their beliefs and expectations are centered on using students' real life situations in the mathematics classroom. Teachers in both focus group interviews said that using real life situations can increase students' mathematics ability. These teachers feel that one's ethnic background does not make a difference in his or her learning; however, students will understand mathematics more if it involves their lives, making connections from the concrete to the abstract in mathematics.

> Third Grade Teacher: My belief is that the children are capable of learning if we us real life situations. I firmly believe that we have to get things that really mean something to them in order for them to get it. (First focus group interview)
>
> Math Teacher: I can't say that there would be a difference in the belief that I have in teaching or the approach for teaching mathematics because of the race of the students. I found that the approach for understanding has been to relate it as close to real world experiences as possible. Because it sometimes is very abstract, so therefore, we have to give them concrete uh examples or real world examples in order for them to be able to make connections. (Second focus group interview)
>
> Third Grade Teacher: No matter what your race is…. I believe that's very important because like teachers make [math] more real for them…(Second focus group interview)

Teachers suggested that their beliefs and expectations enabled them to build relationships with their students. Teachers reported that they built relationships with their student by providing student assistance at various times each day. They provided tutoring for students outside of the mathematics classroom. In both focus group interviews, teachers discussed their willingness to tutor students during breakfast and their students' physical education period with the physical education teachers' consent. They also stated that they had provided one-on-one conferences with their students. The one-on-one conferences allowed students to discuss difficulties they were having in mathematics.

> Third Grade Teacher: I found that our African American students are very hesitant to say in front of others I don't get it. So I like to isolate them. So they are more willing to tell me they don't want don't understand when they don't understand. But one on one is better that I feel.
>
> Fourth Grade Teacher: In order for that to work. You know so I think that and I do agree totally because I like to have a lot of one on one private conversations with students and they will open up to you first of all to let you know how they are struggling. (First focus group interview)
>
> Fifth Grade Teacher Two: It almost not enough time to work with your struggling students. I mean I have to catch mine when they first get there after breakfast. And even if it's just doing basic math facts cause that's where most of the struggler are. I let them chose whether they want to give up PE. (Second focus group interview)

Lastly, teachers discussed that their beliefs and expectations of their African American elementary students' ability at mathematics were communicated to others both verbally and non-verbally. Verbal communication included saying the mathematics objective during the lesson and providing one-on-one conferences to set goals with their students. Teachers said that non-verbal communication included writing the expected outcome or objective on the board and displaying students' progress on data boards.

> Fourth Grade Teacher: Just not to fool them you know. Have your course of study objective on the board. Let them know what you expect them to learn…(First focus group interview).
>
> Third Grade Teacher: Let them set their own goals. Let them try to meet their own goals as far as mathematics is concern (First focus group interview).
>
> Third Grade Teacher: They have to take the Easy CBM three times a year. They are well verse with strategic, intensive, and benchmark. And they know what they goals are for everyone to benchmark. They know everyone must make progress, positive progress and move in the correct directions… (Second focus group interview)

Lesson Plans Analysis

Lesson plans were analyzed using content analysis to examine teachers' beliefs and expectations about African American elementary students' in mathematics. Teachers were asked for three sample mathematics lesson plans. At Star Marker Elementary, grade levels create common mathematics lesson plans for use across grade the classes; therefore, teachers for each grade level have the same lesson plans. Furthermore, Star Maker Elementary has adapted the Strategic Lesson Plan Template. The Strategic Lesson Plan Template includes several components: (1) daily outcome, (2) before, during, after strategies, and (3) open ended questioning. The daily outcome element from the Strategic Lesson Plan Template was examined to address research question one. The daily outcome component is an "I can" statement that

students are expected to be able to do and is expressed in student friendly language. Daily outcome components are given in Table 13 for each grade level.

Table 13

Daily Outcome Component by Grade Level

Grade Level	Third	Fourth	Fifth
Daily Outcome	I can compare and order numbers I can identify ordinal numbers I can identify and write numerals in standard, expanded, and word form. I can round whole numbers and add and subtract them to the thousands place.	I can add and subtract whole numbers I can model 10 to 1 relationship among place value positions in the base ten number system. I can find things that come in arrays	I can be able to write decimals in standard, word and expanded form. I can multiply fraction and simplify as needed. I can multiply decimals. I can divide decimals. I can learn how to solve problems involving discounts and sales tax.

The "I can" statements stated in the lesson plans are evidence of the teachers' expectations and beliefs of students' performance in elementary mathematics.

Research Question Two

Research question two investigated "What pedagogical practices do teachers incorporate in their lesson that encourage their African American elementary students' success in mathematics?" The following description discusses the results in regards to research question two using data from MT-ASBI, focus group interviews, and teachers' lesson plans. The researcher employed descriptive and inferential statistics to analyze the MT-ASBI. The researcher employed open coding to analyze focus group interview and teachers' lesson plans.

Math Teachers of African American Students' Beliefs Instrument

The teachers indicated usage of best practices in the teaching of mathematics was measured by the *Best Practice Index* (BPIX). The BPIX is based upon teachers' responses to seven survey items. The scale was indexed between 2 and 10 where 2 indicated "never" as a response and 10 indicated "always" as a response (Howse, 2006). Teachers indicated a high level use of best practice for several survey items. For item 11, *I integrate the use of manipulatives into my classroom*, three teachers (or 23.1%) indicated rarely, two teachers (or 15.4%) indicated sometimes, eight teachers (or 61.5%) indicated always using manipulatives into classroom activities. Table 14 is a descriptive of the mean score for each survey item in the BPIX. For item 17, *I inform students of Alabama's state standards, benchmarks, and grade level expectations, related to the skills and concepts addressed in class*, one teacher (or 7.7%) indicated never, three teachers (or 23.1%) indicated rarely, and nine (or 69.2%) indicated always response to informing their student to state standards and benchmark. For three survey use items, teachers indicated a mid- level use of best practice. For survey item 12, *I use pre-assessment instruments to gauge students' mathematical understanding*; item 13, *I allow students to maintain journals, give written reports, and give written interpretation of mathematical concepts*; item 14, *I encourage students to talk to each other about their problem solving techniques*; and 16, *I prompt students to clarify and justify their mathematical response,* more teachers indicated they rarely use these best practices. For item 15, *I use activities that require students to make use of graphic calculators and computer technology,* more teachers indicated sometime using graphic calculators and computer technology. According to the BPIX of the MT-ASBI, teachers preferred some best practice more than others. Table 14 is a description of the mean frequency score for the BPIX that supports the findings.

Table 14

BPIX Mean Frequency Score

Items	Mean Frequency Score
11. I integrate the use of manipulatives into classroom activities.	8.00
12. I use pre-assessment instruments to gauge students' mathematical understanding.	6.46
13. I allow students to maintain journals, give written reports, and give written interpretation of mathematical concepts.	5.69
14. I encourage students to talk to each other about their problem solving techniques.	6.92
15. I use activities that require students to make use of graphic calculators and computer technology.	5.38
16. I prompt students to clarify and justify their mathematical responses.	6.31
17. I inform students of Alabama's state standards, benchmarks, and grade level expectations, related to the skills and concepts addressed in class.	8.00

Focus Group Interviews

In addition to the surveys, focus group interviews were used to identify pedagogical practices teachers incorporate in their lesson that encourage their African American elementary students' successes in mathematics. From the 13 returned surveys, 9 teachers agreed to participate in the focus group interview. Two focus group interviews took place during the fall semester.

The interview protocol included 10 items. Through open coding, themes emerged and were placed in one of three categories. The three categories were derived from the literature (see Chapter II). The first category has been discussed above. The second category was related to the

second research question, which was focused on pedagogical practices related to the success of African American students in elementary mathematics. The three themes identified in the pedagogical practices category included (a) differentiated instruction, (b) professional development, and (c) the lesson plan cycle.

Teachers said they used pedagogical practices that are based on differentiated instruction. Differentiated instruction involves teachers providing instruction based on student's learning styles and needs. Teachers reported using practices that were hands-on and included different strategies as opposed to teaching the algorithm. Teachers used center activities and small group instruction for struggling learners. For their more advanced learners, teachers reported allowing students to peer tutor other students, use mathematics websites such as Study Island, do mathematics projects, and do problems from the next level. Also, a Response to Intervention (RTI) time has been implemented for all students. Teachers stated that their school has a common RTI time from 2:00 pm to 2:30 pm daily. During that time, students' learning is extended for the advanced learner or remediated for the struggling learner.

> Fourth Grade Teacher: I try to pull in as many hands-on types of activities and teach different strategies as oppose to making a child feel like that there is only one way that you can come to an answer. (First focus group interview struggling learners)

> Third Grade Teacher: Sometimes the student need to know so it good to use the manipulative if possible…you teach individual so you know some people can go with traditional algorithm. Some people need the concrete manipulatives… (Second focus group interview struggling learners)

When teaching advance learners, teachers reported using extension activities to challenge their learners. The fourth grade teacher from the first focus group interview uses research type projects. Fifth grade teacher in the first focus group interview explained how she used a game to extend learning.

> Fifth Grade Teacher: We play Crypto in order to teach the order of operations early. They have those little cards and will have five numbers on there, a target number and they have actually created the equation through. Not only get the answer but create the equation. It's really challenging. (First focus group interview on advance learners)

Teachers from the second focus group interview posited using center activities for their advanced learners. Third and fourth grade teachers from the first focus group interview reported using games and computer games during center activities. Fifth grade teacher from the second focus group interview uses extension activities differently.

> Fifth Grade Teacher One: I try to encourage mine to think they are going to the middle school is a big thing so I have one or two problem from the next grade level book. I tell them there are your challenge question problems. If they master a certain and maybe you can go on work on those and they love that (Second focus group interview advance learners).

Teachers reported that pedagogical practices were based upon their professional development that has sharpened their mathematics teaching. Teachers from both focused group interview have participated in the Great Metropolitan Mathematics Partnership (a pseudonym). Great Metropolitan Mathematics Partnership (GMMP) is a consortium of school systems and local universities that provides professional development services to improve mathematics instruction. Two professional development topics provided are Patterns and Number Talks. Teachers discussed the being involved in several professional opportunities offered by GMMP.

> Fifth Grade Teacher: A few years back a group of teachers we had GMMP training. We were trained in GMMP we had 2 years of GMMP training each summer. It really reshaped the thinking of the teachers who were involved as oppose when it come to math. (First focus group interview)

> Third Grade Teacher: Yes, yes, that is also (in audible) Number talks (Teacher 2 and Teacher 3 yes) I love number talks because Number Talks actually taught us how to talk about math. Many times before Iwent to that workshop. What is 7 plus 6 and you get the answer 13. Number talk taught us how to think deeper than that. (First focus group interview)

> Fifth Grade Teacher Two: Mine was the Greater Metropolitan Math Partnership. Those patterns and numerical reasoning classes were awesome. I learned so many different

> strategies and different ways of thinking myself. And it help me change my way of thinkin and that allowed me to take that to the classroom. (Second focus group interview)

One of the third grade teachers from the second focus group interview reported using Singapore mathematics in her classroom. Singapore mathematics is a curriculum adapted by the United State from the Singapore's Ministry of Education because of their performance on the Trends in International Mathematics and Science Study (TIMSS).

> Third Grade Teacher: I went one year to a local hotel to the Singapore Math strategy. And I was learning. But I was like wow. When they told me what all they do, and they said that you know when they did research however long ago that was and that they realize that their greatest natural resource was their people. And that's what they chose to put all of their money in to was their people and their children. And if you go to their schools and if you go upstairs and they've got their multiplication facts painted on the stairs going up. It is called a complete emersion…I was overwhelmed in the way you know we had our little workbook they gave us. They were showing you know there were all word problems. All real life situations all word problems. (Second focus group interview)

Teachers reported that pedagogical practices are based upon using a cycle of the strategic lesson plan- (a) before, (b) during, and (c) after. Teachers reported spending more time in the during cycle of the lesson plan cycle. In the during part of the cycle, teachers in both focus group interviews reported using center activities, mathematics manipulatives, modeling, and graphic organizers. The teachers also reported using cooperative learning strategies such as Think-Pair-Share, and reading strategies such as finding context clues in mathematics classroom. Think-Pair-Share is a cooperative learning strategy where teachers pose a question for students to answer. Before students respond to the answer, they think of the answer. After thinking, students pair with a partner to discuss their answer. Then, a teacher chooses a student to share the answer with the class.

> Fifth Grade Teacher: We are using partner activities. We are discussing. We are doing a graphic organizer. (First focus group interview)

> Math Teacher: Aside from the regular math time, especially with the strategic lesson plan model so we ensure that most of the time spent is in the during time to work with each group. And in particular your intensive group the struggling students.. We are using centers that whatever your data reflects its what is in the center that gives you reinforcement and practice. (Second focus group interview)

During the before stage, teachers reported using pedagogical practices to set the stage and bridge background knowledge to new concepts pedagogical practices that include discussion, brainstorming and giving a pre-test. Third grade teacher from the first focus group interview reported using conversation or a story. She starts with that conversation or quote a passage related to what they want to talk about. Fifth grade teacher from the first focus group interview discusses using brainstorming:

> I kind of like brainstorming. I write the problem up there and kind of brainstorm different solutions or different ways to solve it, or like if we are doing problem or word problem. We might do the carousel grain storming. Different chart paper like what are clue words you already know for addition and they just write their idea and they just rotate. I like brainstorming (First Focus group interview-before stage).

Lesson Plans Analysis

Lesson plans were analyzed using content analysis to identify pedagogical practices that teachers use in their lessons that encourage their African American elementary students' success in mathematics. Teachers were asked for three sample mathematics lesson plans. Star Marker Elementary creates mathematics lesson plans for the entire grade level; therefore, teachers for each grade level have the same lesson plans. Furthermore, Star Maker Elementary has adapted the Strategic Lesson Plan Template. The Strategic Lesson Plan Template includes several components: (1) daily outcome, (2) before, during, after strategies, (3) open ended questioning. The before, during, and after strategies were analyzed in the three requested lesson plans to address research question two on pedagogical practices. Table 15 is a list of pedagogical practices listed by grade level for before, during, and after strategies.

Table 15

Strategic Lesson Plan: Before, During and After Strategies

Grade Level	Before	During	After
Third	Table talk, number line, think aloud, preview chart	Think aloud, Think-Pair Share, Guided practice, Small group, whole group, Journal response	Exit slip, Add it up
Fourth	KWL, Board Time, Think Pair Share, Ink Time	Table Talk, TWIRL, Jot Notes,	KWL, Quick Write, Pair Share, Graphic Organizer, So What's up With
Fifth	Bubble Map, Brace Map, Flow Charts, Number Talk, KWL	"I Do, We Do, Ya'll Do, You Do", Center Activity, Turn and Talk. Real Life Connections, ARMT+ plus Item Spec.	Exit Slip, KWL, Journal Writing.

All teachers from grades three through five included pedagogical practices in their lesson plans that allow for mathematics discourse. Mathematical discourse involves communicating mathematically to deepen mathematical understanding (NCTM, 2000). Students use discourse as a tool to for understanding and to generate strategies through discussion. Such pedagogical practices that promote discourse included think aloud, table talk, and partner discussion. Think aloud is a literacy strategy where the teacher helps direct student thinking through talking aloud the thinking process for solving problems (Literacy & Learning, 2013). Table talk is a literacy strategy that allows time for focus discussion on a concept that students have been working on with other students (Nation, 2013).

Teachers further included pedagogical practice that allow for lesson differentiation. Third and fifth grade teachers included activities that guided instruction. Third grade teachers included

guided practice and whole group instruction. Firth grade teachers included I Do, We Do, You All Do, You Do. Fifth grade teachers reported included center activities and real life connection activities. All teachers included pedagogical practice that allow for mathematical thinking. These include writing in math with Quick Write, thinking about learning, Number's Talk. All three teachers included Exit Slip in their lesson plans.

Research Question Three

Research question three investigated, "What rationale do teachers use for selecting specific pedagogical practices to support African American elementary students in mathematics?" The following description discusses the results in regards to research question three using data from focus group interviews and teachers' lesson plans. The researcher employed open coding to analyze focus group interviews and teacher lesson plans.

Focus Group Interviews

The interview protocol included ten items. Through open coding, themes emerged and were placed in one of three categories. Categories one and two are discussed above. The third category was related to the third research question on a teacher's rationale for selecting pedagogical practices that may be related to the success of African American elementary students in mathematics. Themes reoccurring throughout the categories included (a) building background, (b) learners' preferences, and (c) reinforcement and advancement of skills.

Teachers stated that their rationale for selecting pedagogical practices was to build background knowledge. Teachers reported using graphic organizers and communication to build background knowledge and to bridge prior knowledge to new knowledge. They also reported that using real life situations help to develop their lessons.

> Third Grade Teacher: I use real life situations and develop lessons based according to various skills we are on and try to relate it to vicarious situations. (First focus group interview)
>
> Fifth Grade Teacher Two: Building on background knowledge [by] making more meaningful for them with real life experiences…Real life experiences to make it more meaningful for them to actually wrap their minds around it. (Second focus group interview)

In addition to building background knowledge, teachers stated that their rationales for choosing pedagogical practices are based upon their learners' preferences. These preferences may be based on their learning style or choice in solving a math problem. Teachers reported offering students various methods to solve mathematics problems through modeling. They also are encouraged to use the method they feel more comfortable to solve problems.

> Fourth Grade Teacher: I try to pull in many hands-on types of activities and teach different strategies as oppose to making a child feel like that there is only one way that you can come to an answer or having one way when we having math class. (First focus group interview).
>
> Third Grade Teacher: I will have to say the" during" [part of the lesson plan cycle I spend more time one] where I am trying to show different types of ways to do the same skill. So I'm doing a lot of modeling… different ways of attacking that skill. (First focus group interview)
>
> Fifth Grade Teacher One: I consider their learning styles first. Uhm and that is something I do in the very beginning of the year. Uhm even if it's just the questionnaire or sometime of instrument that I can use to kind of gauge their learning styles. Then once I uh accomplish that, then I do have to look at students… (Second Focus group interview)

Teachers stated that their rationale for choosing pedagogical practices is based upon the learners needs. Their learners' needs may range from reinforcement of skill for struggling students or to extend the learning for the advance students. Fourth grade teacher from the first focus group interview reported using project such as having students to create a geometry notebook to display what they have learned for his advanced students. Math teacher from the second focus group interview reported her rationale for using centers is to reinforce practice for

her struggling learners. Fifth grade teacher one from the second focus group interview reported her rationale for providing the next grade level problems was to challenge her advanced students to extend their learning.

Lesson Plans Analysis

In addition to the focus group interviews, lesson plans were analyzed to address the third research question. Teachers are required to give a statement of purpose for each pedagogical practice for the before, during, and after components. The statement of purpose will serve as the teacher's rationale for selecting the pedagogical practice.

All three grade level teachers reported their rationale for choosing a pedagogical practice was based on the component of the strategic lesson plan cycle. During the before component, teachers stated their rationale for choosing pedagogical practice included to build background knowledge and to activate prior knowledge. For the during component of the strategic lesson plans, teachers' reported that their rationale included to direct thinking, to integrate new knowledge with existing knowledge, to collaborate with peer, and to check for and clarify understanding. For the after component of the strategic lesson plans, teachers' reported their rationale for all three grade levels is to check for understanding.

CHAPTER V:

FINDINGS, CONCLUSIONS, IMPLICATIONS, AND RECOMMENDATIONS

Findings and Conclusions

The purpose of the study was to examine teachers' beliefs and expectations about African American students' ability in mathematics at an elementary school, to examine the pedagogical practices these teachers use to successfully teach mathematics to African American students, and to examine teachers' rationales for using specific pedagogical practices to support African American students in mathematics. Due to the small sample size (less than 30), the researcher is not able to generalize findings beyond this study. The following research questions were investigated

1. What are teachers' beliefs and expectations about African American elementary students' ability at mathematics;
2. What pedagogical practice do teachers incorporate in their lessons that encourage their African Americans students' success in mathematics; and
3. What rationale do teachers use for selecting specific pedagogical practices to support African American elementary students in mathematics?

Research Question One: Teachers' Beliefs and Expectations

Research question one investigated teachers' beliefs and expectations of African American elementary students' ability at mathematics. The researcher employed the descriptive and inferential *Mathematics Teachers of African American Students Beliefs Instrument* (MT-ASBI). Teachers responded to 40 Likert-type questions. Question one of MT-ASBI sought to determine teachers' definition of mathematics. The teachers indicated their beliefs about African

American students by their response to the Belief About African American Students Index (BAASIX). The BAASIX scaled was based on 16 survey items (items 23 through 39). The findings indicated that most of the teachers held the second highest definition of mathematics, platonist view. One teacher held the highest definition of mathematics. The findings also indicated that there was no significance difference between the definition of mathematics and the mean score for the beliefs about African American students. Therefore, the teachers' beliefs about African American elementary students were not related to their mathematics definition. Lastly, the findings indicated that 12 of the 13 participants had a low level belief about their African American students. The teacher that held the highest mathematics definition had the highest level of belief about her African American students, although her BAASIX mean score was considered to be middle range.

In addition to using MT-ASBI, two focus group interviews addressed research question one, beliefs and expectations. Three themes emerged from the interviews- (1) using real life situations in mathematics, (2) building caring relationships, and (3) expressed beliefs and expectations.

Real Life Situations in Mathematics

Teachers in both focus group interviews believed that all students can learn if real life situation problems where used in mathematics classes. Teachers believe that they have positive expectations because they include real life situations during mathematics instruction. They believed students can make connections and can see the relevancy in abstract concepts if real life situations were included.

Teachers' lesson plans were used to address research question one, beliefs and expectations. Although teachers professed to use real life situations as part of their mathematics

pedagogical practice, only one grade level included it in their lesson plans. The fifth grade teachers reported using real life situations as a pedagogical practice in the during part of the lesson. Teachers from grades three and four did not include any evidence of the use of real life situations in neither component of the strategic lesson plans.

Ensign's (2003) findings support using real life situations in the mathematics classroom. There are several advantages to using real life situations in mathematics according to Ensign. First, students were able to solve sophisticated, multistep problems. Second, students became aware of how much mathematics they used outside of the classroom. Third, students stayed on task during mathematics class and were interested in solving their own personal mathematics problems. Fourth, teachers were able to gain understanding of their students' lives.

Findings by Lipka, Hogan, Webster, Yanez, Adams, Clark, and Lacy (2005) support using real life situations in the mathematics classroom. The researchers investigated the effects of culturally based teaching on student performance in elementary mathematics. The findings suggest several factors that enhance students' learning. Important factors include a non-threatening classroom environment, a positive relationship between teacher and students, harmony in the classroom, and students taking ownership of their learning.

Building Caring Relationships

Teachers in both focus group interviews believe that they have high expectations and beliefs about their student because they build caring relationship with their students. Overall, teachers in both focus group interviews believe establishing caring relationships with their students communicate high expectations to students. Teachers help their students during times outside of their normal mathematics class period. They believe that students are more willing to ask for help if they perceive that their teacher cares for them.

Lesson plans were analyzed to address teachers' beliefs and expectations including the theme build caring relationships. Although teachers made reference to aiding students outside of the mathematics classroom, there was no evidence in the strategic lesson plan. The third grade teachers included the use of small group instructions in one of the strategic lesson plans. However, there was no reference to the type of learners they were providing small group instruction.

Moody's (2004) findings suggest that students' success, especially for African American students, was related to caring teachers. In an interview with two African American students, Moody found that both students attributed their mathematics success to a caring teacher who believed that they could succeed in challenging mathematics. These students received tutoring and encouragement from a caring mathematics teacher. Moody concluded that African American students who are successful in mathematics have caring, nurturing, and encouraging mathematics teachers.

Expressed Beliefs and Expectations

In both focused group interviews, teachers reported that they have high beliefs and expectations about their students because they express them verbally and non-verbally. They reported having honest conversations with their students. Teachers asserted that they believe in being "real" with their students concerning their assessment results, and aiding their students in setting goals for their mathematics learning. Teachers reported communicating the expected mathematics concepts that students must learn orally and written.

In addition to surveys and focus group interviews, lesson plans were analyzed to address teachers' beliefs and expectations. The expectations were expressed in teachers' lesson plans at grades three through five. The expectations were stated in the daily outcome element of the

strategic lesson plans in the form of "I can" statements. The "I can" statements are what students are expected to be able to do a result of the lesson. Although the "I can" statement is present, teachers did not include time for one on one conferencing with students.

Ponder, Webb, and Trawich (2003) investigated the success of Hunter Elementary using a case study. In this case study, four themes emerged using observation logs, transcripts from interviews, lesson plans, curriculum documents, and notes from grade level meetings. The themes found in this study included (1) Time to Shine, (2) Together We Can, (3) First Things First, and (4) Whatever It Takes. "Time to Shine" includes educating the whole child and meeting state academic goals. "Together We Can" is the school's motto and the unifying vision of the school. "First Things First " is the continual language that believes that certain priorities are shared throughout the school. "Whatever It Takes" is the support system necessary to continue student growth and improvement. The findings suggest that having high expectation can have a positive effect on students' academic success.

The researcher concluded that according to the MT-ASBI, teachers did not have high expectations and beliefs about their African American elementary students' abilities in mathematics. Only one teacher had a mid level beliefs and expectations of her African America elementary students. However according to the focus interviews, teachers professed having high expectations and believe that all of their students can learn mathematics. They believe that including real life situations in mathematics, building caring relationships with their students, and expressing their beliefs and expectations will help their students to learn elementary mathematics. Although these teachers professed their beliefs and expectations, their lesson plans had little evidence to support it.

Research Question Two: Pedagogical Practices

Research question two sought to investigate pedagogical practices teachers use in their lessons that encourages their African American elementary students' success in mathematics. Descriptive and inferential statistics were employed to analyze the MT-ASBI. The teachers indicated usage of best practices in the teaching of mathematics was measured by the Best Practice Index (BPIX). The BPIX scale was based on seven survey items (11 through 17) on the MT-ASBI. The scale was indexed between 2 and 10 where 2 indicated a "never" response and 10 indicated a "always" response (Howse, 2006). The mean BPIX for all teachers was found to be 7.34. These scores indicated that these teachers professed to using the best practices in the teaching of mathematics.

In addition to the MT-ASBI, two focus group interviews were used to investigate research question two. Three themes were identified in the pedagogical practices category: (1) differentiated instruction, (2) professional development and (3) the lesson plan cycle.

Differentiated Instruction

Teachers in both focus group interview specified they use pedagogical practices providing for differentiated instruction. These teachers also included various pedagogical practices in their lesson plans as evidence of the use of pedagogical practices. Teachers reported using various instructional strategies to address mathematical concepts. Teachers stated they provided more than one way to solve problems, and used manipulatives, computer enhanced instruction, project learning, and center activities. What was not presented in the literature was their use of literacy strategies in their mathematics classroom. Teachers' adapted literacy strategies from their reading curriculum as part of their mathematics pedagogical practice.

Professional Development

Teachers in both focus group interviews indicated participating in professional development that has shaped their mathematics teaching. The Greater Birmingham Mathematics Partnership was discussed overwhelming by both sets of teachers. They have credited GBMP for changing their mindset on allowing students to use multiple ways to solve problems. The GBMP provided professional development topics such as Patterns and Numeric Reasoning and Number Talks.

Lesson plans were analyzed to address pedagogical practices. The fifth grade teachers included Numbers Talk as a before strategy. Numbers Talk is a topic presented by the GBMP and was discussed in the previous chapter. There was no mention of Patterns and Numeric Reasoning in the lesson plans.

Shulman (1987) and Piccolo (2008) discussed the importance of pedagogical content knowledge and mathematics content knowledge to teach the subject with understanding.

Lesson Plan Cycle

Teachers in both focus group interviews reported using different pedagogical strategies based upon the cycle of the lesson plan: (1) before, (2) during, and (3) after. This is also evident in their lesson plans. Teachers reported spending more time in the "during" component using such pedagogical practices like modeling (I Do, We Do, Y'all Do, You Do), graphic organizers, cooperative learning, and various literacy strategies. Teachers reported using communication, brainstorming, and pre-testing as before strategies to build background knowledge. This is evident in their lesson plans with including pedagogical practices that emphasize mathematical communication and thinking skills such as table talk, and Think-Pair-Share.

Ball and Bass (2000) discussed the importance of teachers possessing both mathematics content knowledge and pedagogical content knowledge to teach mathematics with understanding. Pedagogical content knowledge consists of models of analogies, illustrations, examples, and demonstrations so that the content is clear. Good and Brophy (2008) also discussed the importance using various teaching strategies for teaching African American elementary school students. Teachers who are successful at teaching African American students choose pedagogical practices that involve cultural sensitivity, excellence, and equity. Such practices are centered learning, involve cooperative learning and communication, and use of prior knowledge to bridge math to real life situations

Three research-based elementary mathematics reforms were investigated by Slavin and Lake (2008). The mathematics reform studies included: (1) curriculum change, (2) computer assisted instruction, and (3) instructional process based on cooperative learning. The researcher found that programs with a strong cooperative learning approach were categorized as having strong evidence of effectiveness compare to the other reforms. Vaughn investigated the effects of cooperative learning on achievement and attitude among students' of color. The researcher conducted a 12-week, single group pre-test/ post-test research study in Bermuda using cooperative learning as the treatment of study. Vaughn found a significant difference in pre-test and post test scores. These findings suggest that cooperative learning is effective pedagogical practice. Star Marker Elementary has included cooperative learning as one of their instructional practices.

The researcher concluded that according to the MT-ASBI, teachers professed using best practices in mathematics. The findings from both focus group interviews and lesson plans analysis agrees with the MT-ASBI results with more specifics during the focus group interviews.

Teachers use best practices in mathematics education that provides for lesson differentiations, are learner focused, and determined by lesson plan cycle. Although the teachers credited professional development for shaping their mathematical practices, only one group of teachers gave evidence of the use in their strategic lesson plans.

Research Question Three: Rationale for Pedagogical Practices

Research question three investigated teachers' rationale for choosing specific pedagogical practices. Focus group interviews were used to investigate this question. Three themes emerged from the rationale category: (1) building background knowledge, (2) learners' preferences, and (3) reinforcement and advancement of skills.

Building Background Knowledge

Teachers in both focus group interviews reported their rationale for choosing pedagogical practices was to build background knowledge. The pedagogical practices they reported using to build background knowledge included conversations about mathematical concepts, providing real life situations, and providing graphic organizers to stimulate prior knowledge. This theme is also evident in their lesson plans. On the purpose component part of strategic lesson plans, teachers' have reported building background knowledge or building prior knowledge as the rationale, especially for the "before" component.

Mathematical communication was studies by Huffered-Acke, Fuson, and Sherin (2004). The researchers investigated the effects of mathematics discourse through math-talk learning community with Latino students in an urban elementary school. The results showed that incorporating mathematical communication develops students' thinking and reasoning skills. Moses-Snipes (2005) investigated the effects of bridging African culture into the geometry lesson with African American students. The results show that allowing culture as an instructional

strategy can increase mathematics proficiency. Star Marker discusses using mathematical discourse to bridge prior knowledge to new knowledge; however, they did not mention using other cultural design to activate prior knowledge.

Learners' Preferences

Teachers in both focus group interviews reported that their rationale for choosing specific pedagogical practices based on learners' preferences. Teachers reported using various methods for teaching concepts. Therefore, they reported offering many strategies to solve mathematics problems. Students¸ in turn, could choose the methods they feel more comfortable using to solve problems. Although teachers professed allowing students to solve problem by their preferences, only the fifth grade teachers indicated student preference by including Number Talks to clarify their thinking.

The use of problem solving was investigated by Sakshaug and Wholhuter (2010). The researchers investigated how a group of teachers developed lesson involving mathematics problem solving in a graduate level methods class. Teachers were required to complete an action research assignment in their classroom involving problem solving. Primary data source included teachers' reflection notes about their assignments based on responding to several questions- (1) why I chose this problem; (2) children worked alone or with others; (3) what I did to present the problem: (4) what the children did when they were solving the problem; (5) what the children learned; (6) what surprised me; (7) what I would do differently if I taught this problem again; and (8) how the problem were like/unlike what the authors reported in the class test. Teachers' responses to these questions allowed them to purposefully select certain problems.

Reinforcement and Extension of Skills

Teachers in both focus group interviews reported that their rationale for choosing specific pedagogical practices is based on the assessment of the learner. Teacher reported that they may choose specific pedagogical practices to reinforce skills for struggling students and specific pedagogical practices to extend skill for the advance student. This is also evident in their lesson plans. Teachers reported that the purpose for using specific pedagogical practices was to integrate new knowledge with existing knowledge, for students to explain steps, and to check for and clarify understanding.

The researcher concluded that teachers had specific rationales for choosing mathematics pedagogical practices. According to both focus group interviews, teachers choose pedagogical practices based on building background knowledge, based on learner preferences, and reinforcement and advancement of skills. The analysis of lesson plans offers the same instances for the most part. However, learner preference was not evident in their lesson plans.

Implications

The following are implications that are related to this research study:

1. To ensure all African American elementary students to be successful, teachers should have high beliefs and expectations prior to teaching African Americans elementary students;
2. To ensure all African American elementary students to be successful in mathematics, teachers must include written plans for struggling African American students; and

3. To provide more connections to prior knowledge, teachers must include real life situations relative to their African American students in teaching mathematical concepts in their written lesson plans.

Recommendations for Further Research

This research study investigated teachers' beliefs and expectation of elementary African American students in mathematics; teachers' pedagogical practices; and their rationale for choosing those pedagogical practices. The following recommendations are offered for further research:

1. Further research should involve classroom observations to validate pedagogical practices discussed in the interviews and lesson plans;
2. Further research should involve more than one research site to identify similarities for pedagogical practices;
3. Further research should involve grade levels from kindergarten through fifth grades to determine if there is a change in teachers' beliefs and expectations of African American students' mathematics beliefs and pedagogical practices; and
4. Further research should also involve classroom observations during the RTI time reported by teachers in the focus group interviews.

Teachers' beliefs and expectations play an essential role in teaching African American elementary students in mathematics. There is research studies that discuss the impact of teachers' beliefs and expectations on the level of pedagogical practices used to educate African American students (Good & Brophy, 2008; Ladson-Billing, 2009; Delpit, 1994; Flores, 2007; Haberman, 1991). Based on the results of this research study, there is more research is need on how to increase our teachers' beliefs and expectations of our African American elementary students in

mathematics and to have evidence of our high beliefs and expectation throughout our teaching practices. Furthermore, more research is needed to include the impact of literacy practices as part of the mathematics pedagogical practices.

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APPENDICES

Appendix A
IRB Approval and Informed Consent Statement

Office for Research

Institutional Review Board for the
Protection of Human Subjects

THE UNIVERSITY OF
ALABAMA
RESEARCH

May 2, 2013

Johanna Massey
Department of Curriculum & Instruction
College of Education
Box 870232

Re: IRB#: 12-OR-181-R1 "Teacher Conceptions of Successful Elementary Mathematics Pedagogical Practices with African American Students"

Dear Ms. Massey:

The University of Alabama Institutional Review Board has granted approval for your renewal application.

Your protocol has been given expedited approval according to 45 CFR part 46. Approval has been given under expedited review category 7 as outlined below:

(7) Research on individual or group characteristics or behavior (including, but not limited to, research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices, and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, human factors evaluation, or quality assurance methodologies.

Your application will expire on May 1, 2014. If your research will continue beyond this date, complete the relevant portions of the IRB Renewal Application. If you wish to modify the application, complete the Modification of an Approved Protocol Form. Changes in this study cannot be initiated without IRB approval, except when necessary to eliminate apparent immediate hazards to participants. When the study closes, complete the appropriate portions of the IRB Request for Study Closure Form.

Should you need to submit any further correspondence regarding this proposal, please include the above application number.

Good luck with your research.

Sincerely,

[redacted]

Carpantato T. Myles, MSM, CIM
Director & Research Compliance Officer
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The University of Alabama

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IRB#: 12-OR-181-R1

UNIVERSITY OF ALABAMA
INSTITUTIONAL REVIEW BOARD FOR THE PROTECTION OF HUMAN SUBJECTS
REQUEST FOR APPROVAL OF RESEARCH INVOLVING HUMAN SUBJECTS

I. Identifying information

	Principal Investigator	Second Investigator	Third Investigator
Names:	Johanna Massey	Cynthia Sunal	Calli Holaway
Department:	Curriculum & Instructions	Curriculum & Instructions	Curriculum & Instructions
College:	Education	Education	Education
University:	University of Alabama	University of Alabama	University of Alabama
Address:			
Telephone:	205-427-0708		
FAX:			
E-mail:	newlifer1972@gmail.com	cvsunal@bamaed.ua.edu	cholaway@bamaed.ua.edu

Title of Research Project: Teacher Conceptions of Successful Elementary Mathematics Pedagogical Practices with African American Students.

Date Submitted: 04/02/2013
Funding Source: Principle Investigator

Type of Proposal	☐ New	☐ Revision	☒ Renewal Please attach a renewal application	☐ Completed	☒ Exempt
			Please attach a continuing review of studies form		
		Please enter the original IRB # at the top of the page			

UA faculty or staff member signature: _____

II. NOTIFICATION OF IRB ACTION (to be completed by IRB):
Type of Review: _____ Full board __X__ Expedited

IRB Action:
___ Rejected Date: _____
___ Tabled Pending Revisions Date: _____
___ Approved Pending Revisions Date: _____
X Approved-this proposal complies with University and federal regulations for the protection of human subjects.
Approval is effective until the following date: 5/1/2014
Items approved: __X__ Research protocol (dated _____)
___ Informed consent (dated _____)
___ Recruitment materials (dated _____)
___ Other (dated _____)

Approval signature _____ Date 5/2/2013

Informed Consent

This is a research study for doctoral dissertation at the University of Alabama. It deals with the relationship between teachers' expectations of African American students and their lesson planning. You have been asked to participate in this study because of your school's previous success on statewide testing in the area of mathematics. Approximately 18 teachers will participate in this study.

The required participations for this study will include completing a 20 minute survey. You will be required to answer questions related to teacher beliefs of African American students in mathematics. If you indicate on this your willingness to participate, you will be required to participate in a 45 minute focus group interview. The interview protocol addresses your practices during mathematics class. Upon completion of the focus group interviews, your lesson plans will be needed for further evidence of your mathematics lessons. Post lesson plans analysis interviews will only be need to clarify elements in your lesson plans.

The risk of participation in this study is minimal. The only risk may be the possibility that you might feel uncomfortable answering some of the questions and supplying lesson plans to the researcher. There are no direct benefits to you. However, the study could add to the body of knowledge in research on how to teach African American students mathematics in the elementary schools.

All the information you provide will be kept confidential, and raw data will be destroyed upon completion of the research project.

You may feel choose not to answer any questions that make you feel uncomfortable. Your participation is strictly voluntary. Refusal to participate will involve no penalty or loss of benefits to which you are otherwise entitled.

You have the opportunity to ask questions. You may contact Johanna Massey at (205)427-0708 or by email at newlifer1972@gmail.com or Dr. C. Sunal at (205)348-8264 or by email at cvsunal@bamaed.ua.edu to further inquire about the procedure or any other aspects related to the study now or later. If you have questions or complaints about your rights as a research participant, call Ms. Tanta Myles, the Research Compliance Officer of the University at 205-348-8461 or toll free at 877-820-3066. to inquire about research subjects' rights.

I give my consent to participate and will be given a copy of this consent form. I understand that I am completely free to withdraw my consent and to discontinue my participation at any time for any reason without penalty or loss of benefits to which I am entitled.

Participants' Signature: _____

Grade Level_____

I am willing to participate in focus group interviews ____Yes ____No

Date:_____

Appendix B
Math Teachers of African American Students Beliefs Inventory
(MT-ASBI)

MT-ASBI

Mathematics Teachers of African American Students Beliefs Instrument

Mark Howse
Researcher

Elizabeth Jakubowski, Ph. D.
Advisor

Instructions

1. Please read the **informational letter** and **consent form**.
2. Sign and date the **consent form**.
3. Complete the **survey instrument (10 minutes)**.
4. Submit both the consent form and the completed survey to the **main office**, where each document will be placed into separate envelopes to maintain anonymity.

or

Mail to: **Mark Howse**
xxxxxxxxxxxxxxx
xxxxxxxxxxxxxxx
xxxxxxxxxxxxxxx

Department of Middle and Secondary Education

Race/Ethnicity _____ Sex: Female____ Male ____

Age: (Less than 21)_____ (21 – 30) _____ (31 – 40) _____ (41 – 50)_____ (51 -60) _____ 61 or older _____

Grade level(s) taught (check all that apply): PreK – 2nd____ 3rd – 5th ____ 6th – 8th____ 9th – 12th ____

Years of Teaching Experience: 1 – 3____ 4 – 6____ 7 – 9____ 10 – 12____ 13 – 15____ 16+ ____

Highest Degree Earned: HS Diploma ____ BS or BA ____ Master's____ Ed. Specialist____ PhD. ____

Household income: $30K or less____ $31K - $60K____ $61K - $90K____ $91K - $120K____ $121K or more____
(Annual household income)

1 Select the statement that best fits your definition of mathematics.

- ☐ Mathematics is a static set of absolute, formal, and perfect ideas that exist in the universe and is discovered and not created.
- ☐ Mathematics is collection of rules, symbols, patterns, and algorithms that we use to solve practical problems.
- ☐ Mathematics is an ever-changing field of humanly-created ideas and patterns and, as such, is an unfinished product that is shaped by our quest to understand the world around us.

2 Select the statement that best describes your view on mathematical learning.

- ☐ Mathematics is a collection of universal ideas and patterns that students must discover to be successful.
- ☐ Mathematics is a social phenomenon that can only be learned from human interaction with the environment and with one another.
- ☐ Mathematical knowledge is individually constructed, thus, what is mathematically valid for one person may not be mathematically valid for another.

Please circle the response that best indicates your level of agreement with the given statement.

SD-Strongly disagree D-Disagree N-Neutral A-Agree SA-Strongly Disagree

3	Mathematics can be thought of as a language in which students are to communicate.	3	SD	D	N	A	SA
4	Students should justify their solutions, thinking, and conjectures in a single way.	4	SD	D	N	A	SA
5	In grades K-5, skill and computation should precede word problems.	5	SD	D	N	A	SA
6	Learning mathematics is a process in which students absorb information, storing it in easily retrievable packets as a result of repeated practice and reinforcement.	6	SD	D	N	A	SA
7	Mathematics should be taught as a collection of concepts, skills, and algorithms.	7	SD	D	N	A	SA
8	Children enter kindergarten with considerable mathematical experience, a partial understanding of many mathematical concepts, and some important mathematical skills.	8	SD	D	N	A	SA
9	Good mathematics teachers show students the exact way to respond to math questions that they will be tested on.	9	SD	D	N	A	SA
10	To solve math problems you have to be taught the right procedure.	10	SD	D	N	A	SA

Please indicate how often you use of the following strategies or techniques.

N-Never	R-Rarely	S-Sometimes	O-Often	A-Always

11	I integrate the use of manipulatives (algebra tiles, foldables, etc.) into classroom activities.	11	N	R	S	O	A
12	I use pre-assessment instruments to gauge students' mathematical understanding, interests, and experiences.	12	N	R	S	O	A
13	I require students to maintain journals, give written reports, and to give written interpretations of mathematical concepts.	13	N	R	S	O	A
14	I encourage students to talk to each other about their problem-solving techniques.	14	N	R	S	O	A
15	I use activities that require students to make use of graphing calculators and computer technology.	15	N	R	S	O	A
16	I prompt students to clarify and justify their mathematical responses.	16	N	R	S	O	A
17	I inform students of the Sunshine State Standards, benchmarks, and grade level expectations related to the skills and concepts addressed in class.	17	N	R	S	O	A

Please circle the response that best indicates your level of agreement with the given statement.

SD-Strongly disagree	D-Disagree	N-Neutral	A-Agree	SA-Strongly Disagree

18	Students must have a positive attitude towards mathematics in order to be successful math students.	18	SD	D	N	A	SA
19	Socioeconomic status is an accurate predictor of students' mathematical performance.	19	SD	D	N	A	SA
20	Successful students are those students who can adapt to school and classroom environments.	20	SD	D	N	A	SA
21	It is unrealistic to expect teachers to customize instruction for subgroups of marginal students within a single class.	21	SD	D	N	A	SA
22	A student can not understand mathematics unless they know the appropriate terminology, symbols, and sequence of procedures.	22	SD	D	N	A	SA
23	Generally, African American students are as mathematically literate as other students.	23	SD	D	N	A	SA
24	The level of parental support for African American students is less than that for other students.	24	SD	D	N	A	SA
25	The prior mathematical knowledge that African American students bring to my class is significantly less than that of other students.	25	SD	D	N	A	SA
26	Considering the students that I have taught, there is a performance gap between African American and white students.	26	SD	D	N	A	SA
27	Generally, African American students have the same level of motivation and focus as the other students in my classes.	27	SD	D	N	A	SA
28	African American students are as comfortable with mathematical discussion in my classroom as other students.	28	SD	D	N	A	SA

29	Poor mathematical performance of African American students can be attributed to socioeconomic factors.	29	SD	D	N	A	SA
30	Difficulties in mathematical learning for African American students are largely a result of cultural inconsistencies between home and school.	30	SD	D	N	A	SA
31	High performing African American students are more likely than marginal African American students to have parents that hold a high school diploma or college degree.	31	SD	D	N	A	SA
32	When African American students have difficulties with mathematics, it is often the result of poor study habits.	32	SD	D	N	A	SA
33	Considering the African American students that I have taught, most of them have a positive attitude towards mathematical learning.	33	SD	D	N	A	SA
34	Any deficiencies in the mathematical performance of African American students are due more to failures in the educational system than to any characteristics of the students themselves.	34	SD	D	N	A	SA
35	Peer acceptance, social activities, or extracurricular activities (sports, student government, clubs, and organizations) often outweigh academic performance in terms of their importance to African American students.	35	SD	D	N	A	SA
36	Many African American students seem to do better when they are allowed to work in groups that are based on performance levels.	36	SD	D	N	A	SA
37	Generally, African American students respond well to open-ended questions that allow them to express personal mathematical thought processes in their own words.	37	SD	D	N	A	SA
38	African American students are most successful at activities that are based on the memorization of formulas and algorithms.	38	SD	D	N	A	SA
39	I find that African American students perform better when they are aware of the Sunshine State Standards benchmarks and grade level expectations for each competency or skill that is addressed in class.	39	SD	D	N	A	SA
40	The factors that contribute to the marginal performance of most African American students are beyond the teacher's control	40	SD	D	N	A	SA

Please make sure that you have responded to each item.

Appendix C
Interview Protocol

Welcome:

My name is Johanna Massey, and I am a doctoral student from the University of Alabama. I will be your moderator for this focus group interview.

Our topic is Teacher Conceptions of Successful Elementary Mathematics Pedagogical Practices with African American Students. The results will be used for completion of my dissertation study and to gain more insight on this topic. You were selected because of your schools consistent achievement on state testing especially in the area of elementary mathematics.

Guidelines:

- There are no right or wrong answers, only differing points of view.
- We are tape recording; therefore, one person speak at a time.
- We are on a first name basis.
- You don't need to agree with others, but you must listen respectfully as others share their points of view.
- We ask that all cell phones be placed on vibrate or silent to eliminate for any distractions. If you have to take a call, please do so quickly and quietly.
- My role as the moderator is to guide us through the discussions

Questions:

1. When thinking about your African American students, describe your belief of teaching mathematics.

2. When thinking about your African American students, explain how a typical mathematic lesson plan is developed.
3. When thinking about your African American students and viewing of this lesson plan cycle, are there elements the cycle you spend more time on than others? Explain.
4. When thinking about your African American students, give examples of strategies you use to determine students' prior knowledge of concepts?
5. When thinking about your African American students, explain how you ensure that they are successful at mathematics.
6. When thinking about your African American students, explain the extra support how you offer extra support to the one who struggle.
7. When thinking about your African American students, explain extensions activities your offer to your advance students.
8. When thinking about your African American students, how do you communicate your expectations?
9. When thinking about your Africa American students, how do you hold them accountable for their learning?
10. When thinking about your African American students, describe any specific professional development that shaped your teaching of mathematics.

Appendix D
Focus Group Interview Directions, Code, and Data

Directions for Coding Focus Group Interview.
Read both sets of interview responses.
Code each response using the following:
B= beliefs and expectations
P-Pedagogical Practice
R=Rationale for choosing the pedagogical practice
Place the coded information and response in the attached chart.
Second coder--Teacher Interview #1
Second coder—Teacher Interview #2

Question	Beliefs and Expectation	Pedagogical Practice	Rationale
When thinking about your African American students, describe your beliefs on teaching mathematics.	1st Coder 1.All can learn if use real life situations 1.No difference in learning by race 2. Family life affects learning	1.Real life situations Concrete 1.Relate to real world experiences 2. manipulatives 3. Traditional 4.Self discipline	1Reinforcement 2.Reach all different needs 1.Home can influence learning 2.Reinforcement at home
	2nd coder 1. All can learn IF use real life situations 1. No difference in learning based on race of child 2. Family life affects learning of math 3. Emphasis on value of education at home	1. Get things mean something to students in order to get it 1. Relate to real world experiences 2. Use manipulatives 3. Self discipline 4. Critical thinking skills	1. So they get it 1. Reinforcement at home and school 2. Factors at home influence school work so help students succeed

Question	Beliefs and Expectation	Pedagogical Practice	Rationale
When thinking about your African American students, explain how a typical math lesson plan is developed.	1st Coder 1.	1.Hands on 2.Different strategies 1.Learning styles inventory* Assessment	1.Make it authentic 2.More than one way to solve problem 1.Helps with making learning based on student's needs
	2nd coder	1. Lesson plans to foster various skills 2. Lesson plans with different strategies to trigger light bulb in students 1. Questionnaire 2. Examine strengths/weaknesses in assessment data 3. Course of Study 4. RTI 5. Student learning styles	1. Relate to own experiences 2. Authentic 3. More than one way to solve a problem 1. Helps with making individualized plans for student learning

Question	Beliefs and Expectation	Pedagogical Practice	Rationale
When thinking about your African American students and viewing of this lesson plan cycle, are there elements the cycle you spend more time on than others? Explain	1st Coder 1.Background knowledge 2. Reteach as needed 3. Teach same skill in different ways 1.During lesson is more bang for your buck. Spend more time.	1During-modeling+ 2Show many ways 3Partner activities 4Graphic organizer 1.Individualized+ 2.instruction 3.Reading Strategies*	1.Lot of practice To make sure that get each learning style 1.Cooperative learning* 2. Student Centered lessons
	2nd coder 1. Background knowledge 2. Work to reteach as needed 3. Teach same skills different ways 1. During lesson is where spend more time/focus	1. Focus on beginning of lesson 2. Light bulb goes on, go into lesson 3. Partner activities 4. Discussion 5. Graphic organizer 6. Modeling 1. Modeling 2. Individualized	1. Catch where kids are 2. Practice 3. Teach to each learning style 1. Student-centered lesson 2. Work with individual students/small groups

		instruction 3. Groups	

Question	Beliefs and Expectation	Pedagogical Practice	Rationale
When thinking about your African American students, give examples of strategies you use to determine students' prior knowledge of concepts?	1st Coder 1. Expound on what student know 2. Pre test to see what to teach	1. Conversations 2. Pretest 3. Brainstorming	1. Make meaning 2. Determine what students know 3. Find different methods 4. Pretest help set up c/r 5. Brainstorm to get ideas
	2nd coder 1. Expound on what students think they know 2. Go from the pretest to see what to teach 3. Different solutions	1. Lots of conversations 2. Pretest—new skill 3. Brainstorming 4. Chart paper	1. Develop deeper meaning 2. Pretest helps set up classroom, group students, teach content 3. Brainstorm to expound on ideas

Question	Beliefs and Expectation	Pedagogical Practice	Rationale
When thinking about your African American students, explain how you ensure that they are successful at mathematics.	1st Coder 1.Student teach it 2.Put weight on student 1. Place responsibility on students to participate.	1.Not use paper pencil test 2. Student conversations 3.Math game	1Teach it know it
	2nd coder 1. Teaching others helps own learning 2. Want every student to get it 3. Responsibility on students as willing	1. Not pencil/paper test always 2. Student conversations 3. Math games	1. Students fearful of tests 2. Students active learners

	participants		

Question	Beliefs and Expectation	Pedagogical Practice	Rationale
When thinking about your African American students, explain the extra support how you offer extra support to the one who struggle	1st Coder 1.Hesitant to tell when they don't understand 2.One-on-one help 1.Lessons to fit learner	1.One on one conference+ 2.Strategic lesson plan model* 1.During time 2.RTI* 3.Context clues* 4Reading strategies	1Avoid embarrassment 1Reinforce skills* Understand word problems*
	2nd coder 1. Hesitant to tell don't understand in front of others 2. One-on-one helps students trust teachers 1. Adapt lesson plan for all learners 2. Reinforce skills	1. Isolate students 2. One-on-one 1. During time 2. Intensive/struggling students work with most 3. Centers 4. RTI 5. Context clues 6. Think/Pair/Share	1. Students embarrassed to say don't understand 1. Data guides instruction

Question	Beliefs and Expectation	Pedagogical Practice	Rationale
When thinking about your African American students, explain extensions activities your offer to your advance students?	1st Coder 1.finish work on time can do these things. 1.Get it, can move independently	1.Computer – 2.Research+ 3.Projects 4. Riddles 5.Centers 1Centers+ 2.Peer tutoring* 3Middle School math* 4Magazines 5.Computer activities 6. Go to library	1.Extend learning 2Challenge students- 1.Help others 2.Challenge students 3.Motivate students

	2nd coder 1. Finish work on time can do these things 1. Once get it, can move independently	1. Research projects 2. Computer Time 3. Math notebooks 4. Online activities 5. Extension activities 1. Magazines 2. Centers 3. Peer tutor 4. computer 5. Interactive activities 6. Go to library	1.Thinking power 2. Extend learning 3. Challenging activities 1. Students can move at own pace then 2. Work on middle grades math 3.Challenge students

Question	Beliefs and Expectation	Pedagogical Practice	Rationale
When thinking about your African American students, how do you communicate your expectations?	1st Coder 1.Student know teacher love it. 2.Be real-Tell it+ 3.Goal setting+ 1.List objectives on board+ 2.Data board*	1.Change atmosphere 2.Post objectives on board 1.Objectives on board 2.Tell student outcome 3.Data boards	1.Boost confidence 2.Give student attainable goals 1.To see progress
	2nd coder 1. Teacher's love of math transcends to students 2. Don't hide from students what want them to know 1. When students know expectation, will be more successful	1. Change atmosphere 2. Course objectives on the board 1. Objectives on board 2. In and out of classrooms all day 3. Tell students outcomes 4. Data boards 5. Teacher conferences with students	1. Boost confidence in students accounts for growth in students' work 2. Give students achievable goals and they will attain them 1. Teachers expect best from students, students will give it

Question	Beliefs and Expectation	Pedagogical Practice	Rationale

When thinking about your Africa American students, how do you hold them accountable for their learning?	1st Coder 1Be real-tell them 2Have them keep notebook/notebook check 1Take no excuses 2Social responsibility*	1.Math notebooks 2.Stay on top of assignments 3.Notebook check 1.Concrete modeling 2.Talk outside the box 3Career activity	1.Make students more responsible 2.Student/parents accountable 1.Show what they learned
	2nd coder 1. Give students expectations 2. Be real with students 1. Accept no excuses from students 2. Social responsibility to learn 3. Relate what want to be to what it takes to get there	1. Math notebooks 2. Keep up with things 3. Correct homework 4. Stay on top of assignments 5. Organize notebook 6. Bring notebook every day 7. Journal checks 8. Homework agenda 9. Check own grades 1. Talk outside the box 2. Career activities 3. Concrete illustrations	1. Students become/stay more responsible 2. Student/parent accountability 1. Students associate what they hear to what they learn

Question	Beliefs and Expectation	Pedagogical Practice	Rationale
When thinking about your African American students, describe any specific professional development that shaped your teaching of mathematics?	1st Coder 1.Gridded note books for accountability Analysis of data	1GMMP 2Math Partnership 3Numbers Talk 4Notebook 5Journaling 1Patterns Course 2Singapore Math	1.Learned about notebooks 2.Different strategies for learners 3.Teach kids to explain their thinking. 4.Teach how to think mentally. 5Give manipulatives 6Numerical empowering Numerical empowering Top nation in math
	2nd coder 1. Gridded notebooks important 2. Analyzing data	1. GMMP 2. Student records of all math done 3. Note taking 4. Journaling 5. Number Talks	1. Students held responsible 2. Reframe student thinking 3. Hands on=minds on 4. Helps students think deeper about math 1.Top scores in nation in

	3. Writing 4. Okay to make mistakes 1. Complete emersion helps students learn 2. Consider resources given 3. Greatest resource is children	Number Talks 1. Singapore Math 2. Real life problems 3. Word problems 4. GBMI 5. Patterns 6. Numerical reasoning 7. Number talks 8. Manipulatives	math 2. Thinking in different ways 3. Numerical empowering

Appendix E
Lesson Plans Analysis Directions, Coding, and Date

Directions for Coding Lesson Plans Content Analysis
1. Read the teachers lesson plans. Each set of teachers has 3 lesson plans; a total of 12.
2. Code the lesson plans using the following: E-Teacher Expectations; P-Pedagogical Practice: R- Rationale for Practice -
3. Place the coded information in the chart provided.
4. Find an overarching theme that is common between the coded information included in the chart.

Coder 1: Grade 3

Lesson plan #	Expectations and Beliefs	Pedagogical Practices	Rationale for selecting specific pedagogical practice
1 9/10/12	I can round whole numbers, add, and subtract to the thousands place value.	Before-Table talk, use number line During-Think aloud-explain step to solve problems After-exit slip-solve addition on and subtraction problem	Build background Direct thinking Reflect on content
2 10/1/12	I can identify ordinal numbers I can identify and write numerals in standard, expanded, and word form I can compare and order numerals.	Before-Think aloud-position kids in ordinal position-partner work discussion, During-Journal Response-Small group identify positions of letters, label numbers on sentence strips.-Create three problems After-Sum it up-Retell	Build background Engage with text Formative assessment
3 10/08/12	I can add whole numbers. I can estimate the sum. I can add 2-and-3-digit numbers. I can do column addition to the hundreds place.	Before- Preview Chart, During-Think Pair share, guided practice After: GIST	Generate questions Make connections to text/ Check for understanding Reflect on the content of lesson

Coder 2: Grade 3

Lesson plan #	Expectations and Beliefs	Pedagogical Practices	Rationale for selecting specific pedagogical practice
1 9/10/12	1. Round whole numbers 2. Add/subtract to thousands place value	1. Table talk 2. Number line 3. Board work 4. Think aloud 5. Exit slip 6. Formative assessment 7. Open-ended questions 8. Textbooks 9. Charts	1. Direct student thinking 2. Students explain steps 3. Reflect on lesson content 4. Build background knowledge
2 10/1/12	1. Identify ordinal numbers 2. Identify/write numerals in standard/expanded/word form 3. Compare and order numbers	1. Think aloud 2. Assign ordinal positions with bodies 3. Partner work 4. Journal response 5.Sum it up 6. Peer partners do board work 7. Think aloud 8. Sentence strips 9. Whole group review 10. Open-ended questions 11. Formative assessment 12. Textbooks 13. Charts	1. Build background knowledge 2. Engage with text 3. Ability to discuss/retell/summarize
3 10/8/12	1. Add whole numbers 2. Estimate the sum 3. Add 2-digit and 3-digit numbers 4. Column addition to hundreds place	1. Preview chart 2. Think/Pair/Share 3. GIST 4. Peer partners 5. Formative assessment 6. Whole group guided practice 7. Independent practice 8. Open-ended questions 9. Word problem on board 10. Textbooks 11. Charts	1. Content reflection 2. Make connections to text 3. Generate questions

Coder 1: Grade 4

Lesson plan #	Expectations and Beliefs	Pedagogical Practices	Rationale for selecting specific pedagogical practice
1 9/04/12	Outcome I can model 10 to 1 relationship among place value position in the base ten number system	Before-KWL, Think Pair Share, Ink Think, Toss Around During-Table Talk, TWIRL, After-KWL, Quick Write, Pair/Share, graphic organizer	Activate prior knowledge Recall prior info, Assess info, Review Integrate new skill, check for understanding Recall Info. Check for understanding
2 10/11/2012	Outcome Add and subtract whole numbers and determine whether solution to add or subtract problems are reasonable I can draw a diagram to solve comparison problems	Before-KWL, Board Time, Ink Think, Think/Pair/Share During-Jot notes, Table Talk, After-KWL,3-2-1, Quick write, So what up with	Activate prior knowledge, check for understanding, Recall prior info Integrate new knowledge, Collaborate with peers on new knowledge Reflect on learning, Check for understanding, recall info Check for understanding
3 10/22/2012	Outcome Use place value understanding and properties of operations to perform multi-digit arithmetic	Before-KWL, Board Time, Ink Time, Think/Pair/Share During-Jot notes, Table Talk, After-KWL, 3-2-1, Quick Write, So What's Up With	Activate prior knowledge. Check for understanding, Recall info. Integrate new knowledge, Collaborate with peers Reflect on learning, Check for student understanding, Recall info

Coder 2: Grade 4,

Lesson plan #	Expectations and Beliefs	Pedagogical Practices	Rationale for selecting specific pedagogical practice
1 9/4/12	1. Model 10 to 1 relationship among place value positions in Base 10 number system	1. KWL 2. Interactive math journal 3. Creating foldables 4. Think/Pair/Share 5. Cooperative groups 6. Quick write 7. Ink Think 8. Students comment on question written on chart paper 9. Table talk 10. Peer collaboration 11. Toss around 12. TWIRL 13. Graphic Organizers 14. Formative assessment 15. Open-ended questions 16. Interactive flip chart 17. Promethean Planet	1. Activate prior knowledge 2. Integrate new knowledge with prior knowledge 3. Reflect on learning 4. Compare prior responses to KWL 5. Recall prior information 6. Assess learned information 7. Learn new information 8. Check for understanding
2 10/11/12	1. Determine whether solutions to positive/negative problems are reasonable with whole numbers	1. KWL 2. Jot Notes 3. Interactive math journals 4. Create foldables 5. Formative assessments 6. Board time 7. Table talk 8. 3-2-1 9. Peer collaboration 10. Dry erase boards 11. Cooperative groups 12. Ink Think 13. Quick write 14. Think/Pair/Share 15. So What's Up With 16. Toss around 17. TWIRL 18. I Know/Who Knows 19. Draw diagram 20. Math tubs 21. Manipulatives	1. Activate prior knowledge 2. Integrate new information with prior knowledge 3. Reflect on learning experience 4. Check for understanding 5. Recall prior information 6. Review 7.Talk/write/investigate/read/listen to show understanding

		22. Promethean Planet	
3 10/22/12	1. Use place value understanding and properties of operations to perform multi-digit arithmetic	1. KWL 2. Jot Notes 3. Board time 4. Table talk 5. 3-2-1 6. Ink Think 7. Quick Write 8. Think/Pair/Share 9. So What's Up With 10. Toss Around 11. TWIRL 12. I Know/Who Knows 13. Math Journals 14. Create foldables 15. Formative assessments 16. Peer collaboration 17. Cooperative groups 18. Partner pairs 19. Math tubs 20. Manipulatives 21. Promethean Planet	1. Activate prior knowledge 2. Integrate new information with prior knowledge 3. Reflect on learning experience 4. Compare prior responses with KWL 5. Check for understanding 6. Recall information 7. Ask/answer/share information with class 8. Raise questions about what unsure of 9. Review 10.Talk/write/investigate/read/listen to show understanding

Coder 1 Grade 5

Lesson plan #	Expectations and Beliefs	Pedagogical Practices	Rationale for selecting specific pedagogical practice
1 9-4-12	Be able to write decimals in standard, word, and expended form Be able to order decimals from least to greatest and greatest to least TSW learn to multiply fractions and simplify as needed	Before: Bubble Map; Brace Map, flow chart, Number Talk; Review KWL During: I Do; We do, You All do, you do; Center Activity, Turn and Talk After: Exit Slip	To formulate strategies for reading, writing and expanded form of decimals; Student clarify own thinking and investigate and apply math relationship. Activate prior knowledge To verify and formulate strategies. To verify understanding of skills To reflect on the content of skills. To verify understanding of skills.
2 10-15-12	TSW learn to multiply fractions	Before: Number Talk, Review/KWL During: I Do; We do, You All do, you do; Center Activity, Turn and Talk, Review After: Exit slip, ,KWL, Exit slip/Journal Writing	To allow student to clarify their thinking; To review skills covered To verify understanding of skills covered in class, To review skills covered in class To reflect on activities, To verify understanding covered in class
3 10-29-12	TSW learn how to solve problems involving discounts and sales tax.	Before: Review/Item Spec. During: I Do, We do, You All do, You do; Activity, Complete Activity(work around the class to solve problem); Real Life Connections After:	To prepare student for testing To verify understanding of skills; To demonstrate understanding of skills.

Coder 2 Grade 5

Lesson plan #	Expectations and Beliefs	Pedagogical Practices	Rationale for selecting specific pedagogical practice
1 9/14/12	1. Write decimals in standard, word, expanded form 2. Order decimals from least to greatest 3. Order decimals from greatest to least 4. Multiply decimals 5. Convert decimals to percents 6. Convert percents to decimals 7. Divide by whole	1. Promethean Flip chart 2. Go Math! 3. Envision Math 4. Harcourt Math 5. Graphic Organizers 6. File Folder Games 7. Place Value Chart 8. Promethean Planet 9. Bubble Map 10. Brace Map 11. Flow Chart 12. “I do/We do; You All do/We do”	1. Formulate strategies for reading, writing, expanded form of decimals 2. Verify and write strategies for writing and utilizing three forms of decimals 3. Reflect on content of the skills covered 4. Formulate strategies for ordering and comparing

	numbers 8. Divide decimals by decimals 9.Add/subtract/multiply /divide decimals using standard algorithm	13. Exit slip 14. Cardstock 15. Video 16. Formative assessment 17. Number talks 18. Pair work 19. Snowball summary 20. Team work 21. Open-ended questions 22. Flip-chart game 23. Shopping Spree	decimals, multiply, and divide decimals 5. Activate prior knowledge 6. Encourage students to compute mentally 7. Review 8. Solve whole number computations mentally and discuss "thinking" 9. Verify understanding of adding/subtracting/multiplying/dividing decimals using standard algorithm
2 10/15/12	1. Learn to multiply fractions 2. Multiply fractions and simplify as needed 3. Multiply mixed numbers 4. Multiply fractions and mixed numbers including simplifying 5. Multiply fractions and mixed numbers	1. Go Math! 2. Harcourt Math 3. Envision Math Center Activities 4. Numbers Talk 5. Video 6. Flipchart 7. Mental math strategies 8. Promethean board to work problems 9. Turn and Talk 10. Exit slip 11. KWL 12. "I do/We do; You do/You All do 13. Journal writing 14. Pair work 15. Formative assessment 16. Quiz 17. Open-ended questions	1. Clarify own thinking 2. Investigate and apply math relationships 3. Make decisions about choosing efficient strategies for specific problems 4. Use mental math opposed to basic algorithm 5. Verify understanding of skills covered in class 6. Reflect on lesson and video 7. Activate prior knowledge of skill 8. Review 9. Verify what learned in class
3 10/29/12	1. Learn how to solve problems involving discounts and sales tax	1. Fraction Tiles Math 2. Go Math! 3. Harcourt Math 4. Websites 5. Review 6. "I do/We do; You All do/You do	1. Prepare students for testomg 2. Verify understanding of skill 3. Demonstrate understanding of skill 4. Ensure

		7. Independent work 8. Test items practice 9. Word problems 10. Formative assessments 11. Complete activity 12. “Real Life” connection activity 13. POD 14. Open-ended questions	understanding of skill 5. Students receive ample practice with fractions