

ACADEMIC EXCELLENCE IN ACTION: A CASE STUDY OF EFFECTIVE  
INSTRUCTIONAL METHODOLOGIES OF MIDDLE GRADES MATH TEACHERS

by  
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Liberty University

A Dissertation Presented in Partial Fulfillment  
Of the Requirements for the Degree  
Doctor of Education

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## **ABSTRACT**

The purpose of this case study was to analyze highly effective math teachers in a middle school in Tennessee and describe the methodologies utilized in their middle grades classrooms. This case study was an instrumental single case study within a bounded system. Effective math teachers employ certain methodologies consistently in their classrooms that can be utilized by other teachers to help students achieve academic success. Tennessee's First to the Top Act (2010) requires using teacher effect data to comprise 35% of teachers' retention/dismissal evaluation scores and requires a concentrated focus on seventh grade mathematics instruction. Questionnaires, interviews with math teachers and student focus groups, and observations of math teachers were utilized to ascertain common methodologies. The study revealed that effective middle school math teachers used several instructional methodologies during the course of teaching a math lesson. The instructional methodologies used by all middle school math teachers in the study and remembered by the majority of students in the student focus groups involved hands-on activities. Other methods that promoted retention and academic growth in the students included writing the objective of the lesson on the board, using formative assessments throughout the lesson, and modeling of the lessons' concepts by the teacher. This study can be used to help administrators at all levels to recognize and retain their most effective teachers and to help the mediocre teachers become more effective.

Descriptors: effective teachers, middle school concept, teacher effect score, instructional strategies, best practices

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## CHAPTER ONE: INTRODUCTION

### Background

Over the last 20 years, policy makers have worried over the quality of public education in the United States. Ultimately, the success of public education rests upon the skills of over three million teachers in classrooms all across this country. Every other education issue—curriculum standards, standardized testing, and accountability—are all secondary, intended to support the fundamental interaction between teachers and students. Without the right people standing in front of the classroom, all other interventions, incentives, and reform efforts are futile. Complicating this issue is the No Child Left Behind Act of 2001, which mandates that all teachers should be highly qualified (HQ) in their subject areas and places significant importance on the accountability of every classroom teacher. It is increasingly clear that having the necessary qualifications and certifications to teach does not necessarily promote student learning. Corcoran and Silander (2009) highlighted the need to worry not only about *what* teachers teach, but also about *how* they teach. To improve the educational achievement of U.S. students, effectiveness of teachers and instruction must be increased. This is especially true in the area of middle school mathematics. “Effective mathematics teaching requires understanding what students know and need to learn and then challenging and supporting them to learn it well” (McKinney & Frazier, 2008, p. 202). As Goldhaber (2009) stated, good teachers certainly make a difference, but it is unclear what makes for a good teacher.

## **Problem Statement**

Middle school students, defined as grades 6-8, comprise two thirds of America's standardized test takers (NASSP, 2006). However, this age group is almost totally ignored in educational research. Research exists regarding middle school organization or structure (Anfara, 2006; Clark & Clark, 2006; Flowers, 2000), but little research exists on effective teachers or instructional methodologies for this age group. Battelle for Kids' (BTK, 2010) research contended recognizing that teachers have significant influence on students' academic success, it is imperative to understand what highly effective teachers do in the classroom. Balfanz and Byrnes (2006) ascertained that "for many students, the middle grades are a period in which achievement gaps in mathematics become achievement chasms" (p. 143), thus the effective instructional best practices of middle school math teachers was the focus of this study. Because mathematics is a content area that causes many middle schools to fail to make Adequate Yearly Progress (AYP), and because "there is growing evidence citing if schools and districts want to improve achievement for all students in the middle grades, they need teachers who know what to teach and how to teach it" (Cooney, 2000, p. 4), the effective instructional best practices of middle school math teachers is an area of concern for policy makers, districts, and individual middle schools. Middle school students are at a unique and crucial developmental stage. This stage demands teachers who understand them and who know how to teach them in ways to increase their learning. Middle schools staffed with teachers who have both content knowledge and specialized professional preparation and pedagogy provide the best academic opportunities for their students (Lounsbury & Vars, 2003). Research (Rivers & Sanders, 2002; Weisburg et al., 2009) indicated that students

assigned to a very good teacher for a single school year may gain up to a full year's worth of additional academic growth compared to a student assigned to a poor teacher. Having a series of strong or weak teachers in consecutive years compounds the impact (Weisberg et al., 2009). If high-need students are given three highly effective teachers in a row, they may outperform students taught by three ineffective teachers in a row by as much as 50 percentile points (Weisberg et al., 2009). McKinney and Frazier (2008) concurred that "students showed significant gains in mathematical achievement when placed with an effective math teacher for three consecutive years as compared with students placed with an ineffective teacher for the same time span" (p. 202). McGranger, VanDerHeyden, and Holdheid (2011) espoused that an essential component of raising student achievement in math is to improve the quality of math teaching. Though Tennessee's efforts to identify teacher effectiveness are better than most states, its efforts still have room for improvement (Jacobs, 2009). This realization was the rationale for this study.

### **Purpose Statement**

The purpose of this case study was to determine the methodologies effective middle school math teachers in West Tennessee Middle School employ in their classrooms. For this study, an effective middle school math teacher is determined by his or her teacher effect data from the 2010 Tennessee Comprehensive Assessment Program (TCAP), the standardized testing program used in Tennessee. Each of the middle school math teacher participants in this study have a teacher effect rating of 3 or higher, which equates to more than one year's academic growth in students. These teachers are therefore considered highly effective by the State of Tennessee's definition of effective teachers. Student achievement is at the forefront of all educational issues. "The ultimate

goal of curriculum and instruction implementation is to improve the teaching and learning process” (Flowers, 2000, p. 7). Improvement in teaching and learning, in turn, improves student success. National Middle School Association (NMSA) research conducted by Erb and Stevenson (1999) indicated that the coordinated efforts of middle school theory and the implementation of practices in the classroom are linked, suggesting one influences the other. The perspective for studying effective teaching methods at the middle grades level and implementation of the middle school concept must, therefore, take place in a middle school setting. Also, in correlation with the above statements, this case study was a single case study using the representative case. Because “large-scale studies reviewed are not particularly helpful in identifying ways to quantify teaching expertise” (Haycock, 1998, p. 13), the purpose of the study was to determine the instructional methodologies used by effective middle school math teachers.

### **Significance of the Study**

Of all the work taking place at every level of educational systems, the interaction between teacher and student is the primary determinant of student achievement (Gordon, Kane, & Staiger, 2006). An effective teacher can make the difference between a student who is successful at high academic levels and a student who slips through the cracks. Daggett (2011) asserted “effective instruction really matters; no single variable has more impact than teaching” (p. 1). This is especially foretelling at the middle school level of education. Studies in middle school education focus much attention on organizational structure of middle schools and little on instructional methods. This study focused on middle level math teachers’ best instructional practices and methodologies and the middle school concept in the wake of the No Child Left Behind Act (2001), the



reauthorization of the Elementary and Secondary Education Act (ESEA, 2010), and Tennessee's First to the Top Act (2010). Tennessee school districts have received the directive to focus on seventh grade math achievement as one of three target areas in the First to the Top Act (2010). Because improving teacher quality is one of the most powerful ways—if not *the* most powerful way—to create better schools (Weisberg, Sexton, & Mulhern, 2009), this research has pedagogical importance to all educators.

### **Research Questions**

For this study, middle school theory, proper implementation of the middle school theory as the best organizational strategy for the middle grade learners, and brain-based learning theory was researched. The core idea of the middle school theory can be traced to Tennessean William M. Alexander. The middle school concept had been in Alexander's thoughts for three decades before being implemented. In 1963, Alexander was asked to speak on the topic of junior high school at a conference held at Cornell University. Alexander, instead, focused his speech on a school between the elementary and high school, the middle school. The middle school concept is a philosophy of education with a special spirit and deep philosophical roots—a set of beliefs about kids, education, and the human experience (George, 2009). Due to Tennessee's First to the Top Act's (2010) requirement of a concentrated focus on seventh grade mathematics instruction, because “much of the failure in school mathematics is due to a tradition of teaching that is inappropriate to the way students learn” (McKinney & Frazier, 2008, p. 203), and because limited literature researching instructional strategies (Ball & Forzani, 2010) in the middle school setting exists, middle school math was the focus of inquiry. Thus, the following questions guided this study:

1. What instructional best practices do effective math teachers at West Tennessee Middle School, as identified by teacher effect data from the 2010 Tennessee Comprehensive Assessment Program (TCAP), utilize when teaching state standards to students in Grades 6 through 8?
2. What is the common theme in the instructional best practices among effective math teachers of students in Grades 6 through 8 at West Tennessee Middle School?
3. In what ways has math instruction at West Tennessee Middle School been affected as a result of the No Child Left Behind Act (2001), the reauthorization of the Elementary and Secondary Education Act (2010), First to the Top Act (2010), high stakes testing, student achievement, and individual accountability?
4. In what ways has West Tennessee Middle School been affected as a result of the No Child Left Behind Act (2001), the reauthorization of the Elementary and Secondary Education Act (2010), First to the Top Act (2010), high stakes testing, student achievement, and individual accountability?

### **Delimitations**

I opted to limit the participants to middle level math teachers. Telese (2004) maintained that the way mathematics is taught has recently gained the attention of policy makers, parents, and other stakeholders as the result of recent reports of low performance in an international comparison of United States students to students in other nations. A second rationale for limiting the research to this group was to further investigate the implementation of middle school theory in light of the mandates of the No Child Left

Behind Act (2001), ESEA (2010), and Tennessee First to the Top (2010). As the literature indicated, many studies stated that the teacher is the influential factor of student success in the classroom (Marzano, 2000; Rice, 2003; Rivers & Sanders, 2002). However, studies were limited as to what methodologies the effective math teacher employs. For the purposes of this study, an effective middle school math teacher is determined by his or her teacher effect data from the 2010 Tennessee Comprehensive Assessment Program (TCAP). Each of the middle school math teacher participants in this study have a teacher effect rating of three or higher, and are therefore considered highly effective. Because Tennessee school districts received the directive to focus on seventh grade math achievement as a target in First to the Top Act (2010), I elected to focus this study on middle school mathematics instruction. In using this approach, I clinically disaggregated the data for collection and analysis.

### **Research Plan**

I conducted a qualitative research study, specifically in the form of case study research. A case study design is utilized to gain a thorough understanding of the situation and its significance for persons involved (Merriam, 1998). The purpose is “in process rather than outcomes, in content rather than a specific variable, in discovery rather than confirmation” (Merriam, 1998, p. 19). To conduct the research, I examined seven middle school math teachers’ effective instructional best practices through the lens of middle school theory and brain-based learning theory. The selection criteria for choosing West Tennessee Middle School was threefold. First, the school incorporated the sixth through eighth grade middle school configuration; second, at least two components of the middle school theory: common planning times for content subjects and advisor/advisee

mentoring (Anfara, 2006; Clark & Clark, 2006; Flowers, 2000) were present; and third, the school was a Title 1 school with a diverse student population. I collected data using a teacher questionnaire, interviews with the seven math teachers at the school and a focus group of 24 (total) eighth grade students, and an observation instrument. The instrument used was the Tennessee Instructional Performance Assessment observation framework. The instrument is one of the appraisal documents by which all Tennessee teachers are evaluated. As a Tennessee school district administrator-supervisor, I was trained by State Department of Education officials on implementation and use of this instrument. Once the research collection stage of the study completed, data were analyzed, reported the findings from the data, discussed conclusions drawn from the study, and gave recommendations for future research.

### **Definition of Terms**

All definitions unless otherwise noted were developed by the researcher.

**Adequate yearly progress.** “For a public school and Local Education Authority (LEA) to make AYP, each student subgroup must meet or exceed the state annual measurable objectives, each student subgroup must have at least a 95% participation rate in the statewide assessments, and the school must meet the state’s requirement for other academic indicators. However, if in any particular year the student subgroup does not meet those annual measurable objectives, the public school or LEA may be considered to have made AYP if the percentage of students in that group who did not meet or exceed the proficient level of academic achievement on the state assessments for that year decreased by 10% from the preceding public school year; that group made progress on one or more of the state’s academic indicators; and that group had at least 95%

participation rate on the statewide assessment” (U.S. Department of Education., 2010b, p. 27).

**Best practices.** Best practices are “the integration of professional wisdom with the best available empirical evidence in making decisions about how to deliver instruction” (Whitehurt, n.d.).

**Effective teachers.** “Effective teachers are teachers who have the ability to accelerate a student’s rate of academic progress to reach grade level expectations and beyond.” (Tennessee Department of Education, 2007b, p. 1)

**Instructional strategies.** Instructional strategies include any activity in a classroom that is utilized by a teacher to relay the curriculum standards to the student for the purpose of student learning.

**Middle schools.** For this study, a middle school is any public school consisting of Grades 6, 7, and 8.

**No Child Left Behind (2001).** “The reauthorization and amendment of the Elementary and Secondary Education Act signed into law by President George Bush in January 2002. The focus of No Child Left Behind (2001) is historic school reform based on accountability, flexibility, research-based education, and parent options” (U.S. Department of Education, 2001).

**Tennessee First to the Top Act (2010).** First to the Top Act (2010) is the legislation signed into effect by Tennessee Governor Phil Bredesen in January of 2010. This act secured 500 million dollars for education revamping and reform for Tennessee schools in the first round of the Federal government’s Race to the Top competition.

**Title 1 school.** A Title 1 school is a school which has a large population of low-income students, as determined by enrollment in the school's free and reduced lunch program, and receives supplemental funds from the Federal government to help the school reach its educational goals.

**Value-added.** Value-added is the comparison of the gains that each student makes from year to year with gains made by a normative sample for that same student between the grades.

## CHAPTER TWO: LITERATURE REVIEW

### Introduction

The middle school years are difficult ones for the student and can be perplexing for the adults working with them (San Antonio, 2006). Still, these are very rewarding years for educators who are prepared to work with this age group. There is something unique about watching the maturation process of students during the middle grade school years. Students in middle school are in the process of moving from childhood to adulthood emotionally, in addition to the changes their bodies are undergoing physically. According to San Antonio (2006),

Early adolescents are fiercely independent, yet yearning for meaningful relationships with adults; revealing emotional vulnerability, yet deeply self-protective; capable of complex analytical thinking, yet disorganized to the point of chronic forgetfulness; compassionate and altruistic in the desire to make the world a better place, yet capable of striking out cruelly at an unpopular classmate; able to understand and accommodate the needs of others, yet displaying a self-centeredness seemingly regressive compared with the kind 8-year-old who was known a few years earlier. The early adolescent can both worry and astonish at the same time. (p. 8)

Schooling at this age requires adjustments so students have the highest rate of academic success possible (Anfara, 2006). In much the same way middle school students are unique, so should be the middle school educator.

Research in the field of middle school focuses largely on the organization and structure of middle schools and little on instruction and instructional methods. Indeed,

the most important factor affecting student learning is the teacher, and it seems teachers vary widely in effectiveness (Grossman et al., 2010; Haycock & Hanushek, 2010; Rice, 2003). Toch and Rothman (2008) contended that of all the things schools can give students to help them succeed, effective teachers are the best bet. Daggett (2011) avered that most of the research was consistent on one key school improvement issue: effective instruction matters. There is not one single variable that is more important than teaching. Therefore, it is extremely important to identify what highly effective teachers do regarding instructional best practices and then teach these methodologies to other teachers (Marzano, 2000). Battelle for Kids (2010) explained,

teachers are the lynch-pin to improving student performance and transforming American education. Learning what our most effective teachers are doing in the classroom and the behaviors and attitudes they embody are the first steps toward helping all teachers become more successful. (p. 30)

No Child Left Behind (2001) introduced educators to the term *highly qualified teachers* and mandated that a highly qualified teacher be in every classroom across the nation. The percentage of teachers who meet these requirements has steadily increased over the past decade. This is an important step in promoting teacher effectiveness, but research (Goldhaber & Brewer, 2000; Hanushek, 1997; Toch & Rothman, 2008) on teacher effectiveness has shown that meeting the requirement does not predict or ensure a teacher will be successful at increasing student learning. Effective teaching is one of the pillars of the reauthorization of ESEA (2010) and effective teachers and leaders is a component of Tennessee First to the Top (2010). Thus, it is time for all teachers to become effective teachers. An important concept for educators to remember is that the school's



organizational structure does not impact student achievement; however, bell-to-bell effective instruction does.

Because of this increased and more direct focus on effective teachers, the State of Tennessee is, and has been, making strides to properly identify the state's most effective teachers. Sanders and Rivers (1996) elucidated that the Tennessee Value Added Assessment System (TVAAS) was devised and has been shown to be an effective and efficient system for ascertaining each teachers' impact on the rate of academic progress for each student population. In 1984, Dr. William L. Sanders and fellow statistician, Dr. Robert A. McLean, published a working paper entitled *Objective Component of Teacher Evaluation: A Feasibility Study*, which espoused the use of student achievement data as the foundation of assessing teachers' effectiveness on student achievement. Students from Knox County, Tennessee, Blount County, Tennessee, and Chattanooga (Tennessee) City Schools were used for the pilot study of linking student achievement to the teachers of record for the students. "Even though the findings indicated the efficacy and utility of this assessment approach, the Sanders model, as the process was labeled in Tennessee, was for several years known only to a small circle of educators and statisticians" (Sanders & Horn, 1994, p. 300).

Kupermintz, Shepard, and Linn (2001) explained that TVAAS and the Sanders model became the focal point of a large-scale educational reform effort by the Tennessee Education Improvement Act of 1992. Inequities in school funding among the school districts in the state, followed by a lawsuit brought against the state by a group of rural school districts, led to an all-inclusive revamping of the Tennessee education structure. Since 1991, the state has been harnessing its longitudinal student assessment database,

which includes links between students and their teachers, to measure teacher effectiveness. TVAAS requires three components: (a) a testing process and procedures which result in scales having a strong relationship to the curriculum standards and have the capacity to cross grade levels, (b) the development and ongoing extension of longitudinal data, and (c) a numerical process that enables a statistical distribution of unbiased and efficient estimates of the wanted effects (Sanders et al., 1996). Rationale for Tennessee using the Sanders model is actually simplistic:

By grouping teachers into quintiles according to the size of their former students' achievement gains, the researchers could estimate how assignment to teachers of different levels of effectiveness would influence student outcomes. Additionally results were additive and cumulative, so the contributions of both highly effective and ineffective teachers to students' learning gains could be measured for at least 4 years after students left their classrooms. (Rivers & Sanders, 2002, pp. 16-18)

The district administrators, building level administrators, and educators are able to discern the academic effect the particular teacher has on his/her class. Tennessee has had a successful 20-year implementation of the Sanders model. More Tennessee specific middle level education and effective teacher information is addressed in a subsequent section.

## **Theoretical Framework**

### **Brain-based Learning Theory**

The theoretical framework behind the middle school concept, effective teachers, and effective instructional methodologies is brain-based learning theory and the middle school theory. Jensen (2008) contended the brain's most important work is thinking and

problem-solving. Brain-based education considers how the brain learns best, and the past 20 years have provided exceptional progress in understanding the nature of learning (Caine & Caine, 1990). Since the inception of brain-based learning theory, neuroscience and classroom instruction have become inextricably linked. “In the 1980s, brain-based education finally emerged as a whole new field based on what was learned about the brain and how it would interface with education” (Jensen, 2008, p. 3). Blanton (1998) stated that brain-based learning theory has enabled educators to determine the most effective ways to teach so students learn and retain information taught. The principles of cognitive learning have a strong correlation to application in the field of education. An information-processing approach shifts attention away from the products or outcomes of learning towards the processes involved in learning and teaching (Blanton, 1998). The brain is inextricably linked to every aspect of education, educators, and student interaction. Jensen (2009) purported that brain-based education is about the professionalism of knowing why one strategy is used instead of another. For educators, this approach is a new concept. The science is based on what is known about how the brain works and on the professionalism to be research-based in instructional practices and strategies.

No one method or technique can by itself adequately encompass the variations of the human brain; teachers need a frame of reference that enables them to select from a vast array of methods and approaches that are available (Caine & Caine, 1990). However, research supports the theory that the more ways classroom material is introduced and reviewed, the more pathways of access will be created in the brain. Willis (2007) contended it is optimal to teach through multiple learning pathways, such as

through several senses (hearing, seeing, touching) as well as through several subjects (cross-curricular topics). Jensen (2008) introduced the term self-convincer state to educators and contended the brain must have three forms of verification to truly believe it has learned. These three are as follows

1. Modality: The learning must be reinforced in the learner's dependent modality (i.e. visual, auditory, or kinesthetic). The learner must see it, hear it, or feel it.
2. Frequency: The new learning must get reinforced with repetition. The number of repetitions necessary varies from one to 20 depending on the individual.
3. Duration: The learning must be validated for a length of time—anywhere from two seconds to several days, depending again on the individual. (p. 92)

This is important in the light of effective teachers and teaching practices. The creation and delivery of lessons that rely less on ineffective rote memory and more on differentiation is the goal of brain-based education. Effective teaching uses strategies to help students recognize patterns and then make the required connections to process the new working memories so they can travel into the brain's long-term storage areas.

### **Middle School Theory**

The core idea of the middle school theory can be traced to Tennessean William M. Alexander. The middle school concept had been in Alexander's mind for 30 years before being implemented. As a novice teacher in the McKenzie, Tennessee public school system, Alexander taught in the elementary school in the morning and at the high school in the afternoon. The walk "between the schools gave the novice teacher time to reflect on the lack of communication between the elementary and senior high school" (Hodges, n.d. p. 7). In 1963, Alexander was asked to speak on the topic of junior high

school at a conference held at Cornell University. Alexander instead focused his speech on a school between the elementary and high school, the middle school. The middle school concept is a philosophy of education with a special spirit and deep philosophical roots: a set of beliefs about kids, education, and the human experience (George, 2009). The ideals and recommendations of the middle school concept are reflections of its two primary premises: the accepted principles of learning and the nature and needs of young adolescents (Lounsbury & Vars, 2003). The middle school was designed to feature several educational components that foster all areas of young adolescent development: physical, intellectual, emotional, social, and moral (Franz et al., 2010). “A properly done middle school is an explosion of intellect, the kind which lays the foundation for an educated citizenry and the innovations needed to remain a leader in the world economy” (Wormel, 2006, p. 13). Advocates of the middle school concept turn to two sources for what they believe is a truer definition of the middle school theory. These two sources are the Carnegie Council on Adolescent Development’s *Turning Points: Preparing American Youth for the 21st Century* published in 1989 and the NMSA’s *This We Believe: Successful Schools for Young Adolescents* (Beane & Lipka, 2006). Both of these publications hold firmly to five components of middle schools: interdisciplinary teams, common planning time for teachers, flexible block scheduling, advisor/advisee time during the school day, and exploratory classes.

The middle school theory supports relationships between the adults and the students; thus, the most well-known component of the middle school theory is interdisciplinary teaming. A core of two to five teachers and the students they commonly teach is the universally known definition of interdisciplinary teaming (Thompson &

Homestead, 2004). The design of interdisciplinary teaming provides opportunities for getting to know the students, establishing a community of learners, collaborative planning, and fostering collegiality among teachers. McEwin, Dickinson, and Jenkins (2003) reported that in 1993, 52% of the middle schools in America had organized themselves into interdisciplinary teams of teachers and students, and NMSA (2005) stated that number of middle schools had risen to 79% by the year 2000. A companion piece to interdisciplinary teaming is common planning time for the teachers on a team. NMSA (2005) maintained that common planning time is critical to the success of an interdisciplinary team because it provides teachers with an opportunity to plan collaboratively. Flowers (2000) further averred that interdisciplinary teams with regular common planning time, staffed by teachers prepared to teach young adolescents, tend to engage in classroom practices, which result in better student behavior and higher achievement.

A third component of the middle school theory is a specific way of scheduling classes. Rather than the traditional six-period day of many high schools, or the same courses at the same time each day classes of elementary schools, middle schools prefer block scheduling. This block scheduling, which can be either same day or alternate day, refers to large academic blocks of time in which students have extended class period time to delve deeper into academic content and/or work on projects. Williams-Boyd (2005) maintained that flexible block scheduling allowed students to fully participate in cooperative learning, role-play, differentiated instruction, and inquiry- and project-based instruction. The next component, advisor/advisee groups, is a unique and integral part of the middle school theory. Advisory programs consist of small groups of students, usually

15 or less, assigned to one adult for the purpose of developing trusting relationships and discussing the issues and concerns of adolescents. The optimal advisor/advisee grouping is called looping. This type of program structure places a group of students with the same teacher for the students' three years of middle school (George, 2009). Researchers (Styron & Nyman, 2008) have found that advisory periods have a significant impact on both student adjustment to and achievement in middle school.

A final component of the middle school theory is specialized classes. These are classes such as music, art, technology, photography, or foreign languages that students may rotate through in the course of their middle school years. Thompson and Homestead (2004) affirmed the middle school theory embraces the notion of exploration, which is the idea that young adolescents should spend a part of the school day in elective courses in which they can discover and explore various topics. Anfara (2006) averred empirical evidence has confirmed that the characteristics of the middle school theory, such as teams, advisory programs, and common planning, when present over time, have led to higher levels of student achievement. However, these same characteristics have limited value when implemented singularly.

### **Effective Teachers**

The organization of middle schools is important. It is just as crucial to staff this educational setting with highly effective experts in adolescent pedagogy (Anfara, 2006). Weisberg et al. (2009) stated that a teacher's effectiveness—the most important factor for schools in improving student achievement—is not measured, recorded, or used to inform decision making in any meaningful way. In fact, there is not even a working definition of what an effective teacher or teacher effectiveness encompasses. Goe (2009) noted that

the term teacher effectiveness had not been officially defined by the federal government in the way same way highly qualified teacher was defined by No Child Left Behind (2001). Devoid of this national guidance, teacher effectiveness must be defined at the state and local levels if these entities are to set goals for advancing teacher effectiveness and developing strategies to meet these goals. Also, without a working definition of teacher effectiveness, there would be no way to measure outcomes and no way to determine if efforts are successful. If the federal government had its way, teachers' effectiveness would not only impact student achievement, their school, and the district, but would also impact their livelihoods. A teacher's academic impact on the students is not always predicted by teacher preparation education or prior classroom experience. Weisberg et al. (2009) coined the term *The Widget Effect* to describe this phenomena. The Widget Effect illustrates the inclination of educational systems to presuppose that effectiveness in the classroom is consistent among all teachers. It is not only disrespectful to teachers to deny the individual strengths of effective teachers, but it also gambles with the achievement of students by being indifferent to the instructional ineffectiveness of weaker teachers. Effective teachers know students bring different bodies of knowledge to the classroom. Rather than treating all students as blank slates, effective teachers instruct each student by drawing upon the knowledge and experience each particular student already has. "Effective teachers address individual developmental differences, establish appropriate challenges, teach critical thinking skills, and vary instruction, curriculum, and assessment to meet the diverse developmental and educational needs of the students" (Styron & Nyman, 2008, p. 9).



Teacher effectiveness, especially in the middle grades, is extremely important. The National Association of Secondary School Principals (NASSP, 2006a) maintained that the success of No Child Left Behind (2001) rests largely on the shoulders of middle level leaders, teachers, and students. As of 2006, students in Grades 6 through 8 represented 57% (14 million) of the nation's annual test takers (NASSP). Therefore, an effective middle grades teacher is not only a necessity, but should also be a requirement. George (2009) averred there is little doubt middle grades teachers are better trained and more professional currently than in any prior period. The curriculum is more rigorous, expectations have never been higher, and schools are equipped with a variety of advanced technologies to support learning.

### **Review of Empirical Research**

Imig and Imig (2006) found that research on effective teaching has typically addressed two categories: personal teacher characteristics (caring, enthusiastic, fun, humorous, friendly, supportive, respectful, etc.) and professional skills (pedagogy, subject matter knowledge, policy, cultural knowledge, multiple approaches, and teaching style). Both of these categories will be investigated further, beginning with "effective teachers promote certain habits of the mind lifelong learners possess, including intellectual curiosity, respectful skepticism, adopting alternate perspectives, and thoughtful reflection" (Virtue, 2007, p. 244). Virtue (2007) contended that effective teachers are apt instructors who plan and implement lessons, evaluate student learning, set high expectations for their students, are skilled at establishing constructive human relationships, and strive to construct and cultivate relationships between the professional and academic communities to which they belong and from which their students come.

Polk (2006) identified 10 basic characteristics of effective teachers: good prior academic performance, communication skills, creativity, professionalism, pedagogical knowledge, thorough and appropriate student evaluation and assessment, self-development or lifelong learning, personality, talent or content area knowledge, and the ability to model concepts in their content area. Other researchers (Lacina & Watson, 2008) gave the following as a characteristic of effective middle level teachers: “Effective teachers address students’ learning needs through the use of a variety of teaching and assessment strategies. These teachers realize no one instructional method will meet the needs of all students” (p. 160).

Sherman and Ding (2008) cited effective teachers’ characteristics as years of teaching, major of undergraduate study, coursework or degree(s) obtained, and graduation from a teacher education program. While these are important qualities or standards to which to rise, they are not part of instructional practice. Grossman et al. (2010) contended that “the emphasis on teacher characteristics and preparation obscures the importance of instruction within the classroom” (p. 1). Classroom instructional practices are the vehicle by which teachers affect achievement. Goe, Bell, and Little (2008) gave the following five-point definition of teacher effectiveness:

1. Effective teachers have high expectations for all students and help students learn, as measured by value-added or other test-based growth measures, or by alternative measures.
2. Effective teachers contribute to positive academic, attitudinal, and social outcomes for students such as regular attendance, on-time promotion to the next grade, on-time graduation, self-efficacy, and cooperative behavior.

3. Effective teachers use diverse resources to plan and structure engaging learning opportunities, monitor student progress formatively, adapt instruction as needed, and evaluate learning using multiple sources of evidence.
4. Effective teachers contribute to the development of classrooms and schools which value diversity and civic-mindedness.
5. Effective teachers collaborate with other teachers, administrators, parents, and educational professionals to ensure student success, particularly the success of students with special needs and those at high risk for failure. (p. 3)

The pre-eminent feature of the definition is that it includes criteria for measuring teachers' performance in the classroom or school by their own behaviors and practices, as well as by the performance of their students. Barnett (2007) averred effective teachers are instructional strategy specialists well versed in brain research and learning theory.

Although research exists on the importance of effective teachers, few investigations address how these characteristics come to life in the classroom through instructional strategies. In light of high stakes testing and student achievement, it is the instructional strategies of effective teachers that are more important than the characteristics they embody. Laine (2009) maintained that building teacher effectiveness is essential for ensuring all students reach their full academic potential. At the time of the current study, the empirical research base does not support inferences about possible relationships between teacher effectiveness (determined by value-added scores) and observable teacher qualifications, teacher characteristics, or teacher practices (Goe & Stickler, 2009). The sophisticated statistical models yield value-added scores *can* estimate teachers' supposed contributions to their students' learning; however, they do

not illuminate *what in particular* (methodologies) makes a teacher effective. Research conducted by Gordon et al. (2006) affirmed that certification of teachers bears little relationship to teacher effectiveness, and Goldhaber and Anthony (2004) found that “while teacher quality is an important determining factor in influencing student outcomes, there is little consensus about the relationship between specific teacher credentials (e.g., experience and degree level) and characteristics (e.g., age, race, and ethnicity) and teacher effectiveness” (p. 5). Researchers (Gordon et al., 2006) also stated that there are effective certified teachers and ineffective certified teachers; the difference between the stronger teachers and the weaker teachers only becomes evident once the teachers have been in the classroom for a couple of years.

Effective mathematics instruction at the middle school level necessitates understanding what students know and need to learn, and then challenging and supporting the students as they learn (McKinney & Frazier, 2008). This research does not state what type of instructional strategies would facilitate the use of these tools. Therefore, “it may be necessary to assess what teachers are actually doing in the classroom in order to evaluate teacher quality,” (Goldhaber & Anthony, 2004, p. 5). Dunn, Honigsfeld, and Doolan (2009) contended that to teach effectively, instructors must know how to teach individuals on the basis of their identified brain processing, environmental requirements, sociological inclinations, perceptual strengths, and interests or talents. Turner (2009) maintained that middle school teachers must continue to do what they already do well: teach creatively and plan engaging lessons with differentiation and student diversity in mind. Teachers must continue to offer young adolescents in middle school a rich, exploratory, standards-based curriculum with many opportunities to

use their knowledge in authentic contexts. These statements are by far the best advice to make middle school teachers more effective, but what do these instructional strategies look like in practice? The characteristics a teacher embodies are not as important as the bell-to-bell instruction taking place in the classroom.

### **Tennessee Specifics on Effective Teachers and Middle Schools**

In today's standards-based policy environment, improving instruction is critical to achieving the dual goals of increasing academic rigor while also raising the achievement standards for all students (Rouse & Kemple, 2009). Without accountability, schools, like other organizations, are drawn toward that which is most comfortable to the organization, not necessarily that which is best practice. In regard to Tennessee and effective teaching practices, Stone, Bruce, and Hursh (2007) state the good news is that Tennessee's value-added database provides an unprecedented opportunity to examine the question of which teaching practices are being used by effective schools, and whether these practices are among the old and discarded or the new and unique.

In Tennessee, teacher effectiveness is measured by the TVAAS "the most sophisticated educational accountability system in the country" (Stone et al., 2007, p. 5). Dr. William Sanders's name is well known to any Tennessee educator who has been in the business for the last two decades. Dr. Sanders and his colleagues conducted some well-known research studies on teacher effectiveness. Three such studies on TVAAS and Sanders's research include *The Tennessee Value-Added Assessment System (TVAAS): Mixed-Model Methodology in Educational Assessment* (1994); *Cumulative and Residual Effects of Teachers on Future Student Academic Achievement* (1996); and *Teacher Quality and Equity in Educational Opportunity: Findings and Policy Implications*

(2002). Each of these studies related the background, inception, and analysis of TVAAS and showed the progression of the methodology through the course of more study and use. In the 1994 study, *The Tennessee Value-Added Assessment System (TVAAS): Mixed-Model Methodology in Educational Assessment*, TVAAS was monitored through the lens of school assessment, test reliability and relevance, and the mixed-model methodology. This study concluded with the following areas of recommendation: “for TVAAS to accomplish its task, it has been necessary to develop a software system to contend with the simultaneous computation of ten of thousands of equations” (p. 310) and “future areas of exploration may include the effects of teaching mode, class size, textbook adoption, technology, and curricular innovations” (p. 310).

The next study (1996), written by Sanders and his wife, June Rivers, was *Cumulative and Residual Effects of Teachers on Future Student Academic Achievement*. This study explored the results of teacher effects in mathematics in Grades 3 through 5 in two of Tennessee’s metropolitan areas. The study, again, took the reader through several pages of methodology, analysis, and results. Two very telling findings came from this study: “students benefiting from regular yearly assignment to more effective teachers (even if by chance) have an extreme advantage in terms of attaining higher levels of achievement” (p. 7), and “these studies suggest that with appropriate measurements of teacher effectiveness, administrators have undeniable opportunities to minimize the near-permanent retardation of academic achievement of many students” (p.7). The third study, written in 2002 with co-author June Rivers, was *Teacher Quality and Equity in Educational Opportunity: Findings and Policy Implications*. This study asserted that academic growth that is within the control of educators is dependent upon the district and

the school, but most importantly upon the teachers (Rivers & Sanders, 2002). The study stated that six million student records have been analyzed as part of TVAAS data collection over 10 years, and there is wide variance among teachers effectiveness and student academic growth. This variability increases with grade level and is most pronounced in mathematics (p. 16), and teacher effects (either positive or negative) can be measured up to 4 years after students received the instruction of the teacher.

Sanders' article, *Value Added Assessment*, was published in *School Administrator* in December, 1998. This article was not a research article by Sanders, but rather an explanation of how and why TVAAS came into existence. The article, only three pages in length, explained in great detail the many findings of TVAAS data. The most relevant theme in TVAAS statistics was teacher effectiveness:

Of all the contextual variables that have been studied to date (indicators of school socioeconomic status, class size, student variability within classrooms, etc.), the single largest factor affecting academic growth of populations of students is differences in effectiveness of individual classroom teachers. When considered simultaneously, the magnitude of these differences dwarf the other factors. (p. 29)

Though Tennessee's efforts to identify teacher effectiveness are better than most states, its efforts still have room for improvement (Jacobs, 2009). Not only does the state have all the elements of a student- and teacher-level longitudinal data system, it commendably uses this value-added data to consider teacher effectiveness. The state has assigned unique student data across key databases for years and has assigned unique teacher identifiers that enable it to match individual teacher records with individual student records. The state also has the capacity to match student test records from year to

year in order to measure student academic growth. Tennessee uses the value-added data to measure teachers' effectiveness by isolating the impact each teacher has on an individual student's academic growth. This impact is translated into a *teacher effect* score, which can be used as part of the teacher's work-performance evaluation. The state also admirably requires both subjective and objective measures of student performance in its teacher evaluations and makes student performance the preponderant criterion.

Jacobs (2009) advocated that teachers should be judged primarily by their impact on students. Many factors should be taken into account when evaluating a teacher; however, the most important factor is academic effectiveness. Tennessee teachers are evaluated by the Tennessee Framework for Evaluation and Professional Growth. This framework evaluates teachers' mastery of the domains, two of which are directly related to classroom effectiveness. Tennessee is to be commended for requiring teacher evaluations to include evidence of student learning gathered through both subjective and objective measures, as well as for making this measure a necessary criterion for passing an evaluation (Jacobs, 2009).

In regard to middle level educators, Tennessee requires middle grades certification (Grades 4-8) for all middle school teachers. All new middle school teachers in Tennessee are required to pass a Praxis II subject matter test to attain licensure. Candidates are only required to pass the general middle school content test, in which sub scores are not provided. Because no content scores are given, there is no assurance these middle school teachers will have sufficient knowledge in each subject they teach. While the state may be praised for not allowing middle level educators to teach on a K-8



generalist license, it should consider requiring subject-matter testing for all middle school teacher candidates in every core academic area they intend to teach.

Research studies (Tennessee Department of Education, 2009) have indicated that teachers influence student learning more than any other factor in school and the effect of teachers on student achievement is cumulative. Rivers and Sanders (2002) reported having just a few ineffective teachers can have detrimental long-term consequences for the students affected. Likewise, having effective teachers positively impacts student achievement significantly and, as Haycock (1998) contended, “there is considerable evidence that, at least in Tennessee, the effects of teachers are long-lived, whether they advance student achievement or squash it” (p. 6). Continual research, bolstered by the Tennessee First to the Top Act (2010) mandates, reinforces Tennessee’s unwavering commitment to identify and provide highly effective teachers for the 135 school systems in the state. Education Consumers Foundation (2007) ascertained:

Few states provide parents and the public such sophisticated information about their child’s educational progress and the quality of local schools. The Education Consumers Foundation salutes Tennessee for making such data available and encourages parents to make the most of it. Tennessee’s TVAAS indicator of school quality and its student projection reports give parents the information they need to help their child succeed before educational opportunity slips away—an outcome which occurs all too frequently. (p. 6)

### **Middle Schools**

McEwin, Dickinson, and Jenkins (2003) said there is widespread agreement that young adolescents enrolled in middle grades need and are worthy of schools dedicated

wholly to their education and well-being. Early adolescence, the ages from 10 to 14 years of age, is a time when students are struggling with a multitude of issues such as emotional changes, physical changes, their newly found social lives, and a quest for identity (McEwin et al., 2003). Five years prior to entering middle school, students are writing letters to Santa Claus. A mere three years after leaving middle school, students are writing college entrance essays. However, between those two extremes lies the middle. “Young adolescents encounter more of everything in middle school: more space to navigate, more people with whom to interact, and more choices in terms of classes, friendships, and activities” (Parker & Neuhearth-Pritchett, 2009, p. 20). Middle school is a transition school which allows adolescents to adjust to the changes taking place in their lives and mature some before they undertake the higher stakes academia of high school. Middle school educators are in a unique position to play an integral role in the students’ transitional experiences.

The middle school grades are crucial years of schooling. It is the middle school years in which far too many students become statistics for the system because they either consistently fail courses or eventually drop out. This is the reason requirements for the preparation and teacher licensure of middle school educators should be re-evaluated. A failure to distinguish between the knowledge and skills needed by a middle school teacher and the knowledge and skills needed by an elementary teacher or high school teacher exists in many states’ education preparation courses and in the states’ teacher licensing departments. Jacobs (2009) asserted that whether teaching a single subject in a departmentalized setting or teaching multiple subjects in a self-contained setting, middle school teachers must be able to teach significantly more advanced content than

elementary teachers do. The idea that someone could be identically prepared to teach first grade or eighth grade mathematics seems ridiculous. However, states who license teachers on a K-8 generalist license indirectly endorse this idea (Jacobs, 2009). Lacina and Watson (2008) affirmed that teachers of adolescents must recognize and understand the developmental characteristics exclusive to this age group. “For classroom instruction to be developmentally appropriate and effective for this age level, educators must recognize and understand the physical, psychological, and cognitive developmental characteristics of adolescents” (Lacina & Watson, 2008, p. 159). Middle schools, more often than not, are high performing institutions. The fundamental challenge with middle schools is not grade configuration, but educational ideology (Mizell, 2003). Regardless of how a school is configured, in this era of academic standards and accountability it must concentrate on students’ attainment of basic academic skills and knowledge (Yecke, 2005).

### **No Child Left Behind Act (2001)**

A new age of educational accountability began on January 8, 2002, as President George W. Bush signed the federal No Child Left Behind Act of 2001 into law. The objective of the law is to ensure all students, regardless of ethnicity, disability, or socio-economic status, receive a quality education. The reform legislation called for an unprecedented focus on school accountability and the academic achievement of all students. States and local education agencies were given the directive that by the 2013-14 school year, all students would score at the proficient or advanced levels on state mandated standardized tests. Schools and districts who failed to make AYP toward this objective would either receive technical assistance from their state to help reach the goal

or be subject to corrective action from the state. “The nation’s education policies have changed dramatically in the recent decade, as have the economy and societal expectations, and it is clear that instruction, both teaching and learning, has to change as well” (Corcoran & Silander, 2009, p. 173).

The goals and objectives for education reform of No Child Left Behind (2001) were particularly bold, probably unachievable, and its passing was partnered with a minute amount of federal funding designed to help districts with high concentrations of poverty reach the targets of No Child Left Behind (Mizell, 2003). Nevertheless, the guiding principles were simple: close the achievement gap and increase accountability by rewarding success and sanctioning failure; promote more choice for parents and make more information about schools, teachers, and students available for parents; and improve teacher quality. No Child Left Behind is not perfect education reform, and it is possible to analyze and parse it into impotency, and this practice is happening in many instances (Mizell, 2003).

The real tragedy, however, is not the complexity or ambiguity of the law’s provisions, but the fact it has taken so long and the power of the federal government to insist upon what school systems should have embraced long ago: no tolerance for persistently low-performing schools, highly qualified teachers for every student, and compelling evidence in successive grades all students are performing at increasingly higher levels. (Mizell, 2003, p. 1-2)

NASSP (2006) stated there is full agreement that the fundamental objective of No Child Left Behind is that every student in the nation deserves a first-rate education which allows him or her to thrive not only in a school setting, but also in the workplace.

However, the legislation does not full address the educational needs of students in Grades 5 through 8. No matter the opinion of the law, school districts are now faced with the quandary of not only reaching No Child Left Behind's long term goal of proficient student performance by 2014, but also the short term expectation of making AYP toward proficiency (Mizell, 2003).

### **The Reauthorization of Elementary and Secondary Education Act (2010)**

Federal policymakers have revisited No Child Left Behind legislation, and educators are now working under the mandates of the Reauthorization of the Elementary and Secondary Education Act (ESEA) of 2010. *A Blueprint for Reform: The Reauthorization of the Elementary and Secondary Education Act* was released by the United States Department of Education in March, 2010. One of the defining pillars of ESEA (2010) is the following:

To elevate the teaching profession to focus on recognizing, encouraging, and rewarding excellence, to call on states and districts to develop and implement systems of teacher and principal evaluations and support, and to identify effective and highly effective teachers on the basis of student growth.

(p.4)

For student educational outcomes to be more equal or reasonable, for the majority of students to be proficient in the mastery of knowledge and skills needed to succeed in life, educators will have to modify and adjust the instruction to take into account differences in students' motivation level, dispositions, aptitudes, experiences, and instructional needs (U.S. Department of Education, 2010). However, researchers, policy makers, nor educators have a viable idea on how to surmount the task (Corcoran &

Silander, 2009). An unmistakable parallel exists between the performance of adults in the school building and the performance of the students. If schools do not recognize, understand, and address this correlation, they are acting on only one half of the education problem (Mizell, 2003).

### **Tennessee First to the Top Act (2010)**

The Tennessee First to the Top Act was signed into law in January 2010 by Tennessee Governor Phil Bredesen. This act was then submitted to the Federal government in an attempt to receive funds for educational improvements in the Race to the Top competition. On March 29, 2010, Tennessee was one of two states chosen to receive 501 million dollars for educational reform. Half of the funds were sent to the 136 school districts in Tennessee; the other half remained at the State level. The funds allowed Tennessee and its school districts to implement a comprehensive set of education reform plans over the next four years. The state of Tennessee has partnered with Battelle for Kids, a national not for profit organization specializing in education reform to help assist schools, school districts, teachers, and principals with the First to the Top initiatives.

Each of the school districts in Tennessee had to submit a Scope of Work (SOW) to the State Department of Education. The SOW detailed how the districts funds from First to the Top will be allocated over the four years of the initiative. The SOW had to be correlated to the three areas of need listed in the First to the Top Act (2010): third grade reading, seventh grade mathematics, and high school graduation rate. Tennessee's goal for First to the Top is to "adopt a series of changes to transform public education for

every student, from urban centers to rural hamlets, from growing suburbs to the smallest towns” (Tennessee Higher Education Commission, 2010).

Changes for educators abounded at the Tennessee State Department of Education in answer to First to the Top funding. One of the more rigorous programs of Tennessee First to the Top, the Teacher Evaluation Advisory Committee (TEAC), was created in January 2010. The committee, comprised of educators, principals, business leaders, and legislators, was charged with development of the new annual teacher evaluations which will include 50% student achievement data. Thirty-five percent of the 50% total will come from TVAAS data collected by linkage of students to their teachers. According to the mandates of the Act, a teacher must be at a Level 4 or 5 in years four and five of teaching to gain tenure. If a teacher receives a Level 3 or less, he/she will be employed on a year to year contract. A teacher receiving Levels 1 or 2 two years in a row is subject to dismissal.

### **Middle School Educators and Classroom Practices**

The job of a middle school teacher is extremely exigent. Middle school teachers must know academic content and understand how to teach middle school students effectively. Lounsbury (2009) averred,

middle school is not just a physical place in which teachers teach about things needed in the future, it is an environment in which youth come of age, acting out new roles as maturing social beings. It is not a teaching factory but a laboratory of living—not just a learning place, but also a growing place. (p. 33)

This is an important realization given that middle school teachers usually fall into one of two categories. Middle school teachers are prepared to teach content (those with

secondary certificates) or to teach children (those with elementary certificates) as asserted by the Southern Region Education Board (2006). Teachers should possess an in-depth knowledge of their content areas and teaching strategies which engage and challenge students. Cooney (2006) affirmed inadequate teacher preparation and licensing and assignment for convenience results in too many middle school teachers who have insufficient knowledge of the subjects they teach and the best way to teach those subjects.

Despite a climate which gives inadequate recognition and support to middle schools or middle school teachers, many genuinely effective teachers are successfully teaching skills and content in middle schools across the nation (Lounsbury, 2009). Similarly, some of the best models of what the art and craft of teaching can be when implemented fully are frequently found at the middle school level (Lounsbury & Vars, 2003). Educators specifically trained for middle school have an in-depth understanding of adolescent characteristics and are able to gear teaching toward those specific characteristics. Marzano (2003) maintained students in classes led by teachers who were classified as most effective had achievement gains of over 50 percentage points over one academic year. However, students in classes taught by less effective teachers had student achievement gains of only 14 percentage points. Flowers (2000) affirmed that while schools operate on multiple levels, it is the implementation of curricula and methodologies at the classroom level is the most crucial to improving student success and achievement. Curricular and instructional methodologies intersect in the classroom, goals of both teacher and student are implemented in the classroom, and it is the classroom where the impact of those goals is almost immediately observable in the teaching-learning process (Flowers, 2000). Conversely, a result of increased pressure for



student academic performance on standardized tests is teacher reliance on strategies which increases contact with the test-aligned curriculum, rather than emphasizing curriculum applications and research-based instructional strategies (Faulkner & Cook, 2006).

### **Implications for Future Research**

In order for a middle school to be successful, its students must be successful academically. In order for middle school students to reach academic success, the middle school organization, curriculum, pedagogy, and programs must be founded upon the developmental readiness, requirements, and interests of its adolescent stakeholders (Anfara, 2006). No Child Left Behind (2001), the Reauthorization of ESEA (2010), Tennessee First to the Top Act (2010), highly qualified teachers, and a concentrated emphasis on accountability has accentuated the importance of student achievement. Mathers, Oliva, and Laine (2008) ascertained that pinpointing the skills which lead some teachers to have a larger impact on student academic performance than other teachers is an area under great discussion in a country which grapples with educating all its children equally.

Some teachers augment their students' academic growth better than other teachers (Goe, 2008). However, the specific teacher qualifications, characteristics, and classroom practices which are most likely to improve student learning cannot be adequately identified (Goe, Bell, & Little, 2008).

Once better theories of instruction, better measures of practice, and more rigorous studies of the effects of particular instructional approaches or routines are available, it will be possible to begin to build a body of knowledge about

instruction that can compel the profession to attend to its implications for teaching. (Corcoran & Silander, 2009, p. 177)

Unfortunately, this is the information policy makers need the most, and as a result, districts, schools, and teachers are continually searching for ways to improve student learning and achievement (Goe & Stickler, 2009). Findings of value-added investigations offer a significant window of opportunity into teacher effectiveness and the education curriculum, as explained by Jacobs (2009). For Tennessee, rather than analyzing teacher effectiveness issues through the long-established practice of theory and pedagogy, the question of best approaches to teaching and training can be answered by observation of data drawn from real Tennessee students in real Tennessee schools (Tennessee Department of Education, 2009). With the implementation of First to the Top Act (2010), Tennessee can provide an enormous advantage to the cause of educational improvement by employing its TVAAS database and findings from its execution to the issue of what makes one teacher more effective than another (Stone, Bruce, & Hursh, 2007). Fisher and Frey (2007) ascertained that there are many unchanging variables, especially in the learning needs and achievement of our students. However, several changing variables are under a teacher's control. For example, the way teachers use instructional time and the constancy with which they put instructional strategies into practice are two variables over which teachers have direct authority (Fisher & Frey, 2007).

Goe and Stickler (2009) maintained Federal lawmakers created the No Child Left Behind Act (2001) to respond, in part, to strong research evidence that teachers' subject matter knowledge contributed to greater student learning. The same research (Goe &

Stickler, 2009) stated this evidence is reverse thinking on the part of the Federal government. For years, the Department of Education advocated student teaching and pedagogy courses. With No Child Left Behind (2001), anyone with a 4-year degree in a content area could teach the subject matter on a license waiver. The only stipulation was a requirement to secure 12 hours of education classes before the 3-year waiver expired. A need still exists for pedagogical knowledge, not just content knowledge, especially at the middle school level, as averred by The Southern Region Education Board (SREB; Bottoms & Timberlake, 2007). Goe (2009) declared “research studies reveal substantial differences in individual teachers’ abilities to improve student achievement, but the identification of a highly effective or ineffective teacher is backward-looking” (p. 16). Because standardized testing is done and value-added is calculated at the end of an academic year, a teacher’s effect on a student is not known until it is too late to intervene. The effect of the teacher, positive or negative, toward the academic achievement of the student, has been established. The student’s subsequent teachers must then deal with the positive or adverse effect of someone else.

Other areas for future research can be found in NASSP’s Policy Recommendation for Middle Level Reform (2008). The areas include developing a component of study intended to improve the performance of both middle schools and middle school students, and devising a national database at the middle school level which enables researchers to recognize and isolate school and classroom dynamics which facilitate or hinder students’ academic achievement. “Research recognizes the greatest determinant of student achievement is the teacher, yet questions remain as to what characteristics of teachers are the most influential,” (Ackerman, Heafner, & Bartz, 2006 p. i). Raphael, Pressley, and

Mohan (2008) asserted that for over a quarter of a decade, educators have espoused highly engaging teachers use a variety of instructional best practices to enhance and encourage student engagement. However, Raphael et al. (2008) contended the focus of middle school teaching observations has typically been on one or very few teaching behaviors which might influence student achievement. Marzano (2007) and Sherman and Ding (2008) found that the one factor which surfaced as the single most influential element of an effective school is the individual teacher within the school, and teachers do make a difference in student achievement. If teacher effectiveness is to improve, classroom practices must improve. On a day to day basis, a variety of strategies—from problem sets to small group instruction and activities—are used by teachers. Presumably some of these strategies are more effective than others. However, because large-scale studies correlating classroom practices to student test scores or academic outcomes have almost never been conducted, little is known about which strategies are most effective (Wenglinsky, 2000).

Future research also exists for the area of mathematics. Bottoms and Phillips (2010) suggested that math teachers focus on the most essential mathematical concepts in a given year. Many times, middle school math teachers try to cover too many concepts in a year's time. Such practice results in too much information being given to students without time to ensure they gained an understanding of the skills behind the sub-sets of information. Thus, students suffer from incomplete mastery of the mathematical concepts. "Focusing on essential mathematical concepts is especially important for students making the transition from the arithmetic-based curriculum of elementary school to the algebra-centered curriculum of high school," (Bottoms & Phillips, 2010, p. 188).

Cuban (2007) reiterated for those committed to improvements in schools, research on how teachers teach is a powerful tool in student learning and academic success.

### **Summary**

Middle school students (Grades 6-8) comprise two thirds of America's standardized test takers (NASSP, 2006). However, this age group is almost totally ignored in educational research. Research exists regarding middle school organization or structure (Anfara, 2006; Clark & Clark, 2006; Flowers, 2000), but little research exists on effective teachers or instructional methodologies for this age group. It is vitally important that middle level students have the most advantageous educational experience possible during their middle school years. The time has come for middle level schools to be middle in more than the name above the door. The schools should adhere to the middle school concept that has been shown to work, if implemented properly and with fidelity (Schafer, 2010). Teachers must not only be highly qualified; they must be highly effective. TVAAS, Tennessee's data system for tracking teacher effectiveness, has been used for 20 years to show teacher effect on student academic achievement.

It is possible and highly desirable to know what effective teachers do and to make improvements in middle level classroom practices across the nation. However, for this to happen, policy makers, district administrators, school leaders, and educators must delve into the nature of teaching and learning by influencing what takes place from bell to bell in each and every classroom in each and every school, and if need be, go back to the middle school theory. Effective middle school teachers must be recognized and the instructional methodologies they use must be taught to other teachers.

## **CHAPTER THREE: METHODOLOGY**

### **Introduction**

This chapter describes the qualitative case study methodology that was utilized in this study. As explained previously, teacher effectiveness, especially at the middle school level, is challenging and the methodologies that effective middle level math educators implement should be researched and emulated. The purpose of restricting this study to middle school math was to correlate with the First to the Top Act (2010), which specifically targets seventh grade math achievement. As the literature has repeatedly shown, the teacher is the most influential factor of student success in the classroom (Goldhaber & Anthony, 2004; Marzano, 2007; Rice, 2003; Rivers & Sanders, 2002; Weisberg et al., 2009). However, limited studies examined what methodologies the effective teacher employs, even though teacher effectiveness is diametrically connected to the mathematical achievement of students (Ball & Forzani, 2010; McKinney & Frazier, 2008). The intent of a case study such as this is to emphasize “a phenomenological view in which reality inheres in the perceptions of individuals” (Glatthorn & Joyner, 2005, p. 40) and to attain meaning from events as they occur in nature. The goal of employing a qualitative design provided greater depth of understanding regarding instructional practices in the middle school mathematics classrooms.

### **Research Design**

Qualitative research uses an array of methods to study its subject matter by employing a naturalistic approach. Qualitative researchers study effects in their natural settings, attempting to make sense of, or interpret, events in terms of the meanings people

bring to them (Denzin & Lincoln, 1998). Qualitative research provides an advantageous method for the researcher to observe, interpret, and describe data gathered from human participants concerning their opinions and actions (Hoepfl, 1997; Merriam, 1998). The nature of this qualitative study called for the use of thick, rich descriptions, including direct quotes, paraphrases, and vivid descriptions of the context (Denzin & Lincoln, 1998). The pointed descriptions enhance both the dependability and credibility of the study.

This study utilized an instrumental, single case study methodology as it “is anchored in real life, provides rich detailed accounts of phenomena, and permits an in-depth examination of factors” (Ary, Jacobs, Razavieh, & Sorenson, 2006, p. 457) that result in effective teaching methods. The perspective for studying effective teaching methods at the middle grades level and implementation of the middle school concept, therefore, took place in a middle school setting. Thus, in correlation with the above statement, this case study was an instrumental single case study within the bounded system of one middle school setting. Merriam (1998) espoused that a case study design is employed to gain an in-depth understanding of the situation and meaning for those involved. The primary aim of the study was “to gain knowledge” and “to discover or build a theory” (Ary et al., 2006, pp. 458, 462) about the methodologies effective math teachers utilize in their classrooms and to, perhaps, “directly influence policy, practice, and future research” (Merriam, 1998, p. 19). My challenges were to accurately code and interpret common categories from a questionnaire, from interviews, and from an observation instrument. I collected data through questionnaires, interviews, and observations. I then analyzed data by looking for common themes among the

participants' responses and/or actions during the observation experience. Because case studies are distinguished by their form, an instrumental case study gave me the essential basics for a qualitative educational research study. I wanted to have an in-depth examination of factors to explain math teachers' methodologies; thus, an instrumental case study allowed for such examination. Researchers (Brown, 2008; Chang, 2005; Herzog, 1995) have used case studies for their educational qualitative studies.

Data were gathered from math teachers' questionnaires, interviews, and teacher observations, as well as from information gathered from a student focus group to address the following research questions:

1. What instructional best practices do effective math teachers at West Tennessee Middle School, as identified by teacher effect data from the 2010 Tennessee Comprehensive Assessment Program (TCAP), utilize when teaching state standards to students in grades six, seven, and eight?
2. What is the common theme in the instructional best practices among effective math teachers of students in grades six, seven, and eight at West Tennessee Middle School?
3. In what ways has math instruction at West Tennessee Middle School been affected as a result of the No Child Left Behind Act (2001), the reauthorization of the Elementary and Secondary Education Act (ESEA, 2010), First to the Top Act (2010), high stakes testing, student achievement, and individual accountability?



4. In what ways has West Tennessee Middle School been affected as a result of the No Child Left Behind Act (2001), the reauthorization of the Elementary and Secondary Education Act (ESEA, 2010), First to the Top Act (2010), high stakes testing, student achievement, and individual accountability?

## **Participants**

### **Teachers**

The participants for this study were seven math teachers at West Tennessee Middle School. The math teachers from the school comprised the research participants based on their TVAAS 3-year average for 2010. The criterion for selecting these teachers was having a 3-year growth average of 2.0 or greater in the area of mathematics. Tennessee has the following as its 3-year average: 0.3 for sixth grade mathematics, 0.1 for seventh grade mathematics, and -0.4 for eighth grade mathematics. An average of 0.0 is considered one year's growth according to the scale designed by Dr. William Sanders. A math teacher with a 2.0 growth or greater as his/her 3-year average outperforms the state average and produces more than one year's growth in the students. According to the Tennessee Teaching Effectiveness Summary, this is a Level 5 teacher: a teacher whose students are making substantially more progress than the State growth standard. A math teacher with a growth of equal to or greater than a 1.0, but less than a 2.0 is a Level 4 Teacher: a teacher whose students are making more progress than the State growth standard. A math teacher with a growth of equal to or greater than -1.0, but less than 1.0 is a Level 3 teacher: a teacher whose students are making the same amount of progress as the State growth standard. Math teachers at Levels 3, 4, and 5, therefore, are considered highly effective. All math teachers at the selected site have a higher 3-year TVAAS

average than 1.0 and are Level 3, 4, and 5 teachers. Therefore, I was interested in observing the instructional methodologies used in the teachers' classrooms.

I was also interested in observing math teachers in West Tennessee Middle School because the teachers do not teach from a math textbook. All math teachers have downloaded Tennessee Curriculum Standards for their individual grade levels and teach the standards through differentiated instruction and the integration of technology. Each math classroom, which is outfitted with an interactive Smartboard, bought with Tennessee First to the Top funding, allows for more interaction between teacher and student. There are two math teachers for each grade level at West Tennessee Middle School and one math teacher who loops through Grades 6, 7, and 8. This looping allows for students who master the standards at one grade level to work on the next grade level or to receive remediation for math deficiencies at a particular grade level.

The teacher participants in this study were purposefully chosen based on the content area they teach: middle school mathematics. First, I contacted the Director of Schools to gain permission to conduct research with the selected middle school. Second, I contacted the principal of the selected middle school to explain the study and request permission to contact his math teachers for the study. Upon getting permission from both administrators, participants were contacted. The seven middle school math teachers all agreed to be participants in the study by signing the consent form I provided to explain the study. The first data gathered from the participants was a six-item questionnaire. This questionnaire garnered background information on each teacher and was e-mailed to each participant. I received three questionnaires through e-mail, and I picked up the other at the research site. The second data collection was the interview with each teacher

participant. These interviews were carried out at the participating school site. Prior to the interview date, I e-mailed the interview guide to each participant. The final teacher data collection was the 52-minute observation of the teachers teaching a mathematics lesson

### **Focus Group**

Additional participants for this study were 24 (total) eighth grade students chosen as a theoretical sample. The total enrollment for Grade 6 in West Tennessee Middle School in 2009-2010 was 142 students. This group of 142 students was in Grade 8 in the 2011-2012 school year. Choosing 24 (total) students would equate to roughly 20% of the Grade 8 student body that actually began enrollment at West Tennessee Middle School and had continual enrollment through all three grades. The rationale for only choosing students in Grade 8 was that these students have had educational exposure to more of the school's math teachers, whereas the students in Grades 6 and 7 would not have this exposure. Auerbach and Silverstein (2003) described theoretical sampling as the choosing of sample participants who have knowledge of information the researcher wants to gather. Simply, I wanted to know from these students how their teachers teach. The guidance counselor chose the students according to an established criterion. I asked the guidance counselor to choose the students because I felt the guidance counselor would be a neutral party for the students. By this, I deduced that the students would not feel intimidated by the guidance counselor and me asking about their teachers. The students might feel some intimidation if the questioning came from the principal and me.

The primary requirement in choosing the 24 eighth grade students was all participants must have had continuous enrollment in West Tennessee Middle School for their three years of middle school. Other pre-requisites for selecting the participants were

diversity both ethnically and socio-economically, but an equal number of participants in gender. The group consisted of not only high and low achievers, but also students with discipline infractions. The justification for the focus group including high and low achievers and students with discipline problems was to ensure diversified feedback. I looked for many evidences of an effective teacher, and I wanted as much variety in my student sample as was possible. The sample was a convenience sample because this group allowed me “easy and immediate access” (Auerbach & Silverstein, 2003, p. 96).

The data collection for the focus groups of students took place after collecting all data from the teacher participants. I met with the guidance counselor, explained the study and the selection criteria for student selection. The guidance counselor was able to generate a computerized list of students meeting the selection criteria I requested. From the guidance counselor’s computer generated list, the first 12 males and the first 12 females were selected to be participants. The guidance counselor gave me the students’ home addresses, and I mailed the consent form home to the parents/guardians of the students in the focus groups. Twenty-four parent/guardians responded positively to the request to interview their child for this study. The focus group interviews were coordinated with the guidance counselor of the middle school and took place over four days during the students Cav Group time (7:40-8:00 AM) in the selected school’s conference room.

### **Site**

For this case study, I looked at a set of events within a real-life context, thus I incorporated an exploratory research method in this research. Exploratory research allowed me to delve deeply into the research and bring meaningful information to light

(Van Manen, 1990). Case study research generally answers one or more questions that begin with "how" or "why;" however, solving the enigma does not always mean answering exactly those questions that are asked at the outset of the project (Van Manen, 1990). At times, the most interesting questions come at the end of the research when the researcher has more experience and expertise in the subject being studied. Yin (2003) indicated that the objective of an instrumental single case study within a bounded system is to capture the circumstances and conditions of an everyday or commonplace situation. Hence, for the purpose of this particular study, a public middle school in rural West Tennessee was selected. The rationale for choosing this particular middle school was that it is the only middle school in my area to move away from teaching math by using math textbooks and utilizing the technology available to teach mathematics. Additionally, West Tennessee Middle School has shown positive gains on the Tennessee Comprehensive Assessment Program in the area of mathematics and has had one of its Level 5 teachers to present her methodologies at a forum in Nashville, Tennessee in June, 2011. The duration of the study was approximately 7 months. The selected school has a sixth through eighth grade configuration. To preserve confidentiality, the middle school was called West Tennessee Middle School.

At the time of this study, West Tennessee Middle School served 572 students in Grades 6 through 8. Seventy percent of the student population was white; 15.4% of the population was African American; 0.4% was Asian/Pacific Islander; 13.2% of the students were Hispanic; and 0.5% of the students were Native American/Alaskan. These demographics give the particular school system a very diverse ethnic population, which is unique for this area of West Tennessee. Because of the diversity of the students in this

school and the effectiveness of the mathematics teachers, this study could be replicated in other demographic areas to determine if the same results will be found. Sixty-eight percent of the population was economically disadvantaged and was eligible for free or reduced lunch prices. Approximately 50% of the student population is female; 49 % is male. The school's leadership team was relatively new to the site: the principal was newly named for the 2011 school year, and the assistant principal was in his third year of administrative duties. The teaching staff was comprised of 29 general education teachers, four special education teachers, five related arts teachers, one librarian, one literacy coach, one interventionist, one middle school consultant, one guidance counselor, one in-school suspension teacher, five paraprofessionals, and two secretaries.

### **Personal Biography**

Qualitative research is distinguished by the methods used to collect and analyze data (Ary et al., 2006). One of those distinguishing features of naturalistic investigation is the use of the researcher as the primary instrument for collection and analyses of data. The validity of the study, therefore, was contingent upon the skill of the researcher to gather and analyze data and to form accurate and meaningful conclusions (Patton, 1990). The human instrument provides flexibility and adaptability to study complex human thoughts and actions (Ary et al., 2006 p. 453).

I have 24 years of experience in education as a teacher, administrator, and supervisor. For the first 2 years of my career (1988-90), I served as an English and Spanish teacher at a public high school in rural Middle Tennessee. The school district housed a total of three schools: two elementary (K-8) and one high school (9-12). At the end of the 1989-90 school year, I added elementary certification to my license and began

teaching in my hometown in West Tennessee. For the next 5 years, I taught reading and language arts at a small rural elementary school that housed 600 students in Grades K-6. The school was a Title I school and the only school in the city district. In 1990, the school had a free or reduced lunch rate of over 65%. Because the school housed its own central office, the director, finance manager, and all supervisors were on campus. Beginning in the 1995-96 school year, I began teaching fourth grade students at the same school. I obtained my Master's Degree in Curriculum and Instruction in 1994.

I was hired by a neighboring county in the 2000-01 school year. I taught language arts and science to fifth grade students in a low socio-economic county. The six schools in this county house only two grades each until high school, which houses Grades 9-12. The school demographics for the fifth and sixth grade school were 95% free or reduced lunch, with a student population of 88% African American, 9% Caucasian, and 3% Other. During my 3 years at this school, I served as liaison between the school and the disciplinary committee for the district and acted as chairperson on the School Improvement Plan. In December 2000, I completed coursework and tests necessary to receive administrative and supervisory licensure.

In the 2003-04 school year, I returned to my hometown to teach at the county middle school. The assignment was reading/English at the eighth grade level. At this time, the school was operating under the team concept for middle grades and was showing gains in student achievement. Seventy-six percent of the population was Caucasian; 15% of the population was African American, and 9% of the student population was Hispanic. Sixty-one percent of the population was eligible for free or reduced lunch.

I was named assistant principal at this school in 2005. In this position, I was responsible for the instructional leadership of the school, teacher evaluations, teacher candidate interviews, and student discipline. At the end of the 2006-07 school year, the school began to feel the effects of two very well-defined problems: (a) the school did not make AYP for African Americans in reading/language arts for the second year in a row, and (b) the mandates of a highly qualified teacher in every subject area was making the teaming concept at the school virtually impossible. Prior to the 2006-07 school year, the school was divided into two teams on each hallway for Grades 6, 7, and 8. Each teacher taught his/her subject for five periods per day and taught reading to their homeroom students sixth period. However, due to No Child Left Behind and the mandate for a teacher to be highly qualified in the subject taught, the teaming concept had to be revamped. If the teacher did not have an endorsement in reading/language arts, then no longer could the history, science, or math teacher on a team teach reading. To help resolve these issues the school initiated two key changes: first, the middle school expanded its reading/language arts program by hiring two more teachers and making a reading/language arts block during the school day; and second, the school moved from the team concept and required teachers to become highly qualified in every subject areas taught. This change affected all teachers, except those teaching English, by creating two class preparations for them, for example, math and science. The school has since moved off the target list for reading/language arts, but, because of the aforementioned concerns of the middle school and the solutions imposed, I became acutely interested in the middle school concept and effective teaching practices.



In December 2008, I received my Education Specialist degree in Educational Leadership, and in July 2009, I took over duties as Supervisor of Federal Programs and Special Education for the district. In this position, I had my hand in every aspect of education from Pre-K to state mandated testing at all grade levels to Individual Education Plans (IEP) to English Language Learners (ELL). I was also responsible for providing instructional leadership, hiring personnel, and creating budgets. The beginning of the 2011-12 school year brought another career change for me. My duties of Special Education Supervisor were taken away, and Supervisor of Instruction was added. This additional responsibility allows me to work with teacher licensing, professional development, textbook adoption, curriculum, and to be Testing Coordinator for the district.

Because of my past educational experiences, my future aspirations, and the fact I will always have the heart of an educator and want the best for students, this research study holds intrinsic value for me. I have never taught math to middle school students; however, I am a firm believer that all students are capable of learning. Therefore, I go into the math classrooms believing the teacher is the determining factor in the teaching and learning process.

### **Data Collection**

Before any research took place, approval from the Institutional Review Board at Liberty University was attained (see Appendix A). To confirm access to the TVAAS data of teachers and to the schools, teachers, and the focus group participating in the study, I wrote a letter (see Appendix B) to the administration of the school and briefly described the study and requested the school's participation in the study. In the letter, I

asked administrators to grant me permission to interview and observe the math teachers and the focus group. Because TVAAS information is confidential, I did not ask the administration to supply the data; I asked the teachers who chose to participate to supply the information to me. Each participant told me his/her TVAAS score at the interview session. I sent a Consent Form (see Appendix C) and a letter (see Appendix D) to the prospective participants requesting their participation in the study. After receiving positive feedback from prospective participants: teachers, focus group participants and their parents, I contacted the teachers by e-mail to establish a time and date for an interview. The teachers' e-mail addresses were published on the school's web-site and were accessible to viewers of the site. I used this initial contact as a springboard for establishing a time for the observation of the teacher. After the questionnaire and interview of the teacher participants, I met with the guidance counselor to discuss the study and her role in choosing the 10-student focus group. After receiving the 24 names of students and their parents, a letter (see Appendix E) was sent to their homes asking permission to interview the students for the study.

During the observation of the teachers, I incorporated the application of field notes. Because the instrument I used calls for the use of narration, this was an integral step in the Tennessee Framework for Evaluation and Professional Growth observation process. Additionally, because this narration piece was familiar and expected at the end of an observation, I gave each teacher a copy of the write-up at the end of the observation.

## **Questionnaire**

A teacher questionnaire (see Appendix F) was sent to all participating math teachers. The purpose of the questionnaire was to attain demographic information about the teachers. The questionnaire contained questions pertaining to education, experience, certification, instructional methodologies, and middle school organizational theory. The questions were as follows:

1. What is the highest level of education you have received?
2. What certification and/or licensure do you hold?
3. How many years of teaching experience do you have?
4. What effective instructional methodologies do you incorporate into your daily teaching repertoire?
5. How do you measure the effectiveness of these methodologies?

The purpose of these questions was to determine the education and experience of effective teachers, and the instructional methodologies of effective teachers. These five questions related directly to the focus of the study and to findings in literature regarding characteristics of effective teachers, licensure concerns of middle school teachers, and effective instructional methods. The first three questions correlated to the research which holds that education, licensure, and experience are the determinants of effective teachers, while questions four and five correlated to the methodologies the teacher uses and how the teacher teaches determines the effectiveness of those methods.

## **Interviews**

The goal of this research instrument was to collect firsthand, descriptive data from teachers and the focus group regarding effective teaching practices. To gather data from

the participants, I utilized open-ended interview questions (see Appendix G) that encouraged detailed responses and revealed important information concerning effective teaching methods. Open-ended interviewing allowed me to access the participants' viewpoint rather than leading the participant to an answer. According to Patton (1990), "qualitative interviewing begins with the assumption the perspective of others is meaningful, knowable, and able to be made explicit" (p. 278). I employed a standardized open-ended interview approach with identified questions to be discussed before the actual interview. The list of interview questions ensured that I covered the same relevant topics with each participant, while allowing the necessary flexibility in the wording and sequencing of questions (Patton, 1990). It also allowed data to be collected systematically as similar questions were asked of each participant. The interview questions were as follows:

1. What makes a math teacher effective?
2. Do you consider yourself an effective teacher? Explain fully, please.
3. Will you share your TVAAS effectiveness level data with me and allow me to publish this information in my research?
4. Have your instructional methods changed over the past 5 years? Explain fully, please.
5. Are the changes, or lack thereof, due to the No Child Left Behind Act (2001), ESEA (2010), or Tennessee First to the Top (2010), or some other factor? Explain fully, please.
6. Has West Tennessee Middle School changed in organization or structure over the past 5 years? Explain fully, please.

7. Are the changes, or lack thereof, due to the No Child Left Behind Act (2001), ESEA (2010), or Tennessee First to the Top (2010), or some other factor? Explain fully, please.
8. What components of the middle school theory, if any, should be reincorporated into West Tennessee Middle School? Explain fully, please.

The purpose of questions pertaining to the specific teacher was to gather information about each individual participant and his/her concept of teacher effectiveness. The next questions were from literature review findings and areas of future research. Interviews were structured enough to allow participants' thoughts and ideas to provide comprehensive data, but naturally conversational. I digitally recorded and summarized each interview. The recordings are kept in a fireproof safe at my home and will be destroyed at the end of a 3-year period.

### **Teachers**

Sending the questionnaire to each teacher and receiving it back was initially for me to explain the study and to establish a rapport with the teacher. However, because the interview questions were more thorough and thought-provoking, I was looking for common themes in the answers to the questions. From the teachers' answers on questions 1, 2, 6, 7, and 8, I began the initial coding process of deciphering the information given. This information served as a catalyst as to what I was looking for in the observations of the teachers and their instructional methodologies.

### **Focus Group**

With permission attained from a signed consent letter from the parents of the students, I assembled a student focus group with the cluster of 24 eighth grade students,

not individual students. I asked the school's guidance counselor to sit in on the focus group session held in West Tennessee Middle School's office conference room with the students as well. The 24 students were divided into four groups of six students each. The rationale for dividing the focus group into four was to not only give each student more voice, but also for ease and convenience of scheduling. I had only one question for the students in the groups. This question was, "What is the best lesson your math teacher has taught, what did you learn, how do you know you learned, and what made it the best lesson?" It was my objective for this question to lead to the methodologies the teachers used that were most beneficial and memorable to the students. I used this information to correlate with actions observed and documented in the questionnaires, interviews, and observations.

### **Observation**

The observations were conducted using the Tennessee Teacher Instructional Performance Assessment (see Appendix H). This observation instrument was used by administrators and supervisors in all public schools in Tennessee prior to the new observation instrument which came with First to the Top (2010) implementation. This instrument was used for the following four reasons: (a) it is an instrument with which the teachers are familiar; (b) it was part of the Tennessee framework for assessment, and, therefore, is valid and reliable; (c) I am an administrator in Tennessee and have been trained in using this observation instrument; and (d) this old instrument has no connection to the teacher's formal assessment under the new First to the Top (2010) legislation and cannot be used as a determinant of either tenure or dismissal.

A requirement of being an administrator/supervisor in a Tennessee school is to be formally trained on the use of the Tennessee Framework for Evaluation and Professional Growth. This training involved an in-depth study of the entire evaluation framework, of which the observation instrument was just a part. The training's focal point was to identify and support instruction. Upon passing a test on skills learned through the retraining course, certification as an evaluator was attained. I have this certification.

The purpose of the observations was to see firsthand what instructional methodologies the teachers incorporated during their teaching of the state standards to their students. It was my assumption that these effective teachers teach and instruct students differently than non-effective teachers; therefore, I wanted to describe the instructional methods used.

The Tennessee Teacher Instructional Performance Assessment (see Appendix H) was approved by the Tennessee State Department of Education. The following paragraph explains the trustworthiness of the instrument:

The Framework for Evaluation and Professional Growth meets requirements for evaluation and encourages teachers to move beyond their current level of performance by focusing on student growth, self-reflection on areas for their own growth and school improvement. The TN Department of Education website states on June 23, 2004, the State Board of Education approved further revision to the original model. These revisions improved both the rigor and structure of the model by substantially increasing its specificity and aligning it with the highly qualified provision of No Child Left Behind. (Tennessee Department of Education, 2007a p. 3)

Upon completion of the observation, I gave the teacher a copy of the completed instrument. The original completed observation forms are kept in a fireproof safe at my home. The observation instruments will be destroyed at the end of a 3-year period.

### **Data Analysis**

“Data analysis is one of the few facets, perhaps the only facet of doing qualitative research in which there is a right way and a wrong way” (Merriam, 1998, p. 162). In qualitative inquiry, data analysis occurs concurrently with the data collection. Answers to the teachers’ questionnaires were written by the individual teachers. The questionnaires were sent to each teacher through his/her school e-mail account, and three teachers returned the questionnaire via e-mail. I picked up the other four questionnaires from the teachers. Data from the questionnaires were analyzed and disseminated (see Appendix I) to capture the education, experience, highly qualified status, and participants’ perceived effective methodologies. Every teacher’s interview and the four focus group interviews were captured by a digital recorder which allowed me to have a verbatim recording. The observation instrument contained actual, real-time instructional actions the teachers performed while I was in the classroom. I summarized each interview (see Appendix J) to identify and review common themes and methodologies, as well as individual mannerisms. According to Ary et al. (2006), “All qualitative analysis involves attempts to comprehend the phenomenon under study, synthesize information and explain relationships, theorize about how and why the relationships appear as they do, and reconnect the new knowledge with what is already known” ( p. 490).

Through my summarization of the interviews and the reading and rereading of the observation instrument (see Appendix K and L), I familiarized myself with the data. I



recapitulated what was found in each of the three instruments and assembled this information into a narrative organized by teacher and methodology used. From this organizational standpoint, I began the process of establishing themes for this research project.

Through summarization and rewriting of information gathered from the questionnaires, interviews with both teacher participants and student focus groups, and observations, I compared and categorized themes, thoughts, and feelings from multiple sources of data to fully analyze the instructional methodologies used by the middle school math teachers. As the large themes began to emerge from the theming process, they were refined based on patterns and the number of times an instructional method was incorporated during a lesson or mentioned during the interview process. Coding categories were formed and expounded upon in an effort to fully analyze the descriptive data. Two-tier coding involved making a master list of instructional methodologies, thoughts, or patterns which emerged from the sets of data. This list then became the categories and/or themes into which other data was sorted and coded. Coded data was examined and analyzed several times to confirm patterns. Assistance from my peer review team was utilized during this process.

### **Interview Summaries**

The interviews conducted with the teachers and the focus group were summarized. The purpose behind the summarizing of the interviews was to find the commonalities among teachers and the focus group regarding effective teaching methods. The summarization of these interviews consisted of making a master list of information offered by the teacher participants. This list included items such as feelings about middle

school theory, effective instructional methods, No Child Left Behind, First to the Top, thoughts on education, in general. As a theme presented itself, I wrote it down and then put a check and teacher initials for each time it resurfaced.

### **Field Notes**

Field notes were incorporated when analyzing the observation instrument. “Field notes may contain valuable comments and insights that address the recommended categories for analytic memo reflection” (Saldana, 2009, p. 33). Because the observation instrument was live documentation of the teacher in action, notes were written as the teachers implemented their lessons. Merriam (1998) suggested that field notes written during observations need to be formatted in such a way as to easily find information pertinent to the study. I used the field notes written during the observations to not only describe, but also to analyze what I saw the math teachers doing during the observation periods. Saldana (2009) suggested focusing on the study’s articulated research questions, purposes, and goals as analysis progresses as a way to incorporate field notes into the final analysis of the study.

### **Trustworthiness**

I bore a responsibility to represent the research participants as authentically and accurately as possible and to provide assurances this obligation was met. I took all necessary steps to limit personal bias from influencing the results of the study, even though I conducted the research in a middle school and with middle school teachers and students who were in my hometown and in my school district. In this study, the three primary methods of data collection—questionnaires, interviews with teacher participants and the student focus groups, and observations produced a vast amount of material that,

after coding and analysis was completed, was triangulated for general tendencies, recurrent themes, and subtle anomalies. Triangulation was also utilized in the investigative observation tool that was discussed previously, and with the tools subsequently discussed. Again, the ultimate goal of this triangulation is to discover and strengthen the general tendencies of the material.

### **Peer Examination**

Merriam (1998) defined peer examination as asking colleagues to comment on the findings as they emerge. I incorporated the use of peer examination into this research study by asking the Supervisor of Instruction in a neighboring system and the Director of Schools (a former middle school principal) where I am employed to be my peer examination team. I chose these two colleagues because I knew they were as concerned with effective instructional practices as I am. I conducted the research, wrote the field notes and narration of the observations, and compiled the coding. As I went through each of these steps, I asked these people if my hunches, themes, and/or ideas were correct and valid. Utilizing the educational and instructional expertise of these individuals enhanced the internal validity of my study.

### **Audit Trail**

The dependability and credibility of the research was established through the use of an audit trail. Hoepfl (1997) defined an audit trail as the scheme for identifying data chunks according to their speaker and context. The questionnaires were sent to the participants via e-mail. Participants answered three via e-mail, thus they have the date on them, and I picked up the other four. I put the date on these and coded all seven with a number system correlated to the name and pseudonym of each participant. The

summarizations of the interviews provided a record of the participants' responses to the interview questions. The observation instrument was dated, and therefore provided a record of the time, setting, and action described on the instrument. The participants' voices were evident in all three data instruments.

### **Member Check**

To reduce the effects of researcher bias and ensure the dependability and credibility of this study, I employed member checks. "Member checks involve taking data and tentative interpretations back to the people from whom they were derived and asking them if the results are plausible" (Merriam, 1998, p. 204). Each adult participant was given the opportunity to review the data he or she provided to determine the accuracy and meaning. Data provided included the questionnaire, interview transcripts, and observation instrument narration. Questionnaires were e-mailed to the participants and returned via e-mail or picked up by the researcher. The participants, therefore, had a copy of their written word. Approximately two weeks after conducting the interviews with the adult participants, I sent a written copy of the interview to each participant. This copy was placed in the teachers' mailboxes at West Tennessee Middle School. A copy of the narration taken at the time of the math teachers' observations was given to each teacher on the day of observation. Participants had the opportunity, at any time prior to publication of the final document, to bring discrepancies or concerns to my attention.

### **Ethical Considerations**

"All research is concerned with producing valid and reliable knowledge in an ethical manner" (Merriam, 1998, p. 198). As I conducted the research, I was conscious of ethical issues that could arise from the study. I worked diligently to avoid such issues,

but if they did surface, I corrected them as soon as possible. First, the use of pseudonyms were used for the school where I carried out the research and for the research participants so as to preserve confidentiality of site and/or participants. All data collected for this research study was kept confidential through secure and safe means for all questionnaires, field notes, and instrumentation related to the study. This safe and secure means first necessitated privacy. No one but the participants and I viewed the information attained through research gathering. Secondly, all written documentation and the audio tapes are kept in a 1,200 pound, fire-proof safe in my home. IRB approval was acquired before any research was performed. Per IRB guidelines, data will be kept in this manner for three years and then disposed. The disposal method for written documents will be shredding, and the audio tapes will be erased. As a researcher, it is my duty and responsibility to be honest, truthful, and straightforward in communicating the findings of my study. Thus, I reported conclusions of the study in an accurate and unbiased manner.

## **CHAPTER FOUR: FINDINGS**

### **Introduction**

The purpose of this study was to discover and describe the effective instructional methodologies of middle school math teachers. The research method selected was an instrumental, single case study within the bounded system of one middle school setting. Case study design can yield in-depth understandings of situations, give meaning to those involved in the situations, and possibly, influence policy, practice, and future research in the field studied (Merriam, 1998). Because teachers and effective instructional methodologies are the decisive factors in the educational process, this chapter involves extensive examination of the research questions using the words and actions of the participants. Teachers, through the use of a questionnaire and an interview, were asked to state their most effective instructional strategies. To fully evaluate the effectiveness of the strategy, teachers were asked how the effectiveness of the strategy was not only measured, but also monitored and maintained. In addition, because of the Reauthorization of ESEA (2010) and Tennessee First to the Top Act (2010) focus on seventh grade mathematics instruction and teacher evaluations being a determinant of continued employment, teachers were asked to reflect on the educational changes and concerns this legislation brought. After getting the teachers' opinions and personal feelings on the aforementioned topics, the researcher observed the teachers actively teaching a class. In this research project, great care was taken to accurately report the interview experiences and classroom observations, as well as represent the data and findings with accuracy and truthfulness.

## **Research Questions**

The purpose of this study was to determine the instructional methodologies effective middle school math teachers in West Tennessee Middle School employ in their classrooms. Because of my interest in the Reauthorization of ESEA (2010) and the Tennessee First to the Top Act (2010) emphasis on seventh grade mathematics instruction, focus of the study and research questions for the study are specific to middle level instruction. The questions were:

1. How do effective teachers, as identified by teacher effect math scores on the 2010 Tennessee Comprehensive Assessment Program, utilize best practices to teach state standards to their students in post-No Child Left Behind middle schools?
2. What is the common theme in the instructional best practices among effective math teachers of students in Grades 6-8?
3. In what ways have middle schools and middle school math instruction changed as a result of the No Child Left Behind Act (2001), the reauthorization of the Elementary and Secondary Education Act (2010), First to the Top Act (2010), high stakes testing, student achievement, and individual accountability?
4. In what ways has West Tennessee Middle School been affected as a result of the No Child Left Behind Act (2001), the reauthorization of the Elementary and Secondary Education Act (2010), First to the Top Act (2010), high stakes testing, student achievement and individual accountability.

The exact purpose of the research project was to determine what effective middle school math teachers do, in regard to instructional methods, and to assess how federal and state legislative changes have affected instructional and teacher accountability.

### **Questionnaire**

The teacher participants included in the study were all middle school math teachers (See Table 1). The average class size for the participants was 25 students. For this particular study, the middle school is comprised of Grades 6, 7, and 8. All seven of the participants taught at the time of the study, and five of the seven have only taught at the selected middle school. There were six female participants and one male participant. Five of the seven teachers held a Bachelor's Degree; two had Master's Degrees. All seven had Elementary licensure (K-8); three had taken the Praxis exam to be highly qualified in all middle school subjects; one had taken the Math Content Praxis to be eligible to teach middle school math; and one was highly qualified in math in grades seven and eight through TVAAS scores. Collectively the participants had 37 years of teaching experience with the average years of experience being 15. In actuality, their years of experience ranged from 14 years (highest) to seven years (middle) to two years (lowest).



Table 1

*Description of Middle School Teacher Participants*

Teacher	Grade	Experience	Education	How HQ'd
Ms. C	8	5 years	M.Ed	Middle Grades Praxis
Ms. E	7	2 years	BS K-6	Middle Grades Praxis
Ms. W	Multi-grade	14 years	M.Ed	Professional Matrix
Ms. M	8	2 years	BS K-6	Middle Grades Praxis
Ms. A	7	7 years	BS K-6	Math Content Praxis
Mr. W	6	5 years	BS K-6	NTE
Ms. G	6	2 years	BS K-6	NTE

The teacher participants were asked to list the effective instructional strategies incorporated in their teaching repertoire. All seven listed technology (Smart boards, clicker answer systems, or mobis), grouping and/or pairing of students was listed on four questionnaires, modeling by the teacher was also listed four times, and using real-life examples, audio/visual presentations, lecturing, and hands-on/manipulatives were each listed once. The final question on the questionnaire asked the teacher participants to indicate how they know their instructional methodologies are effective. Because this question represented the basis of the research, a few of their responses are given verbatim.

**Mr. W.** “Technology has enhanced the overall effectiveness of lessons and enables students to be more involved.”

**Ms. C.** “The students are engaged and their test scores have gone up.”

**Ms. W.** “I retest the students on standards as we progress through the year; I don’t just assume they get it once and retain it forever.”

Because of the wide variety of answers given and the lack of a consistent methodology used by all teachers to gauge effectiveness, it was anticipated that the interviews of the participants would reveal additional insights into their teaching and more exacting methods of instruction.

### **Interviews**

The interviews were audio recorded with all seven interviews lasting approximately 90 minutes. The recordings were saved in participants’ individual files on the audio recording device and labeled with their pseudonyms. The interviews took place over 5 days. After each interview, I summarized the interview and made notes as to the instructional methods used by the participants. I did not edit the interviews or responses given; however, nouns were added for the pronouns omitted when the participants’ answers would have otherwise been unclear. While care was taken to stay on topic and adhere to the interview guide, many times a participant digressed from the subject at hand. These digressions were noted in the summaries and coded as to the nuances, emotions, and feelings of the participants. Themes observed in the summaries and noted by the researcher were put on a master list of all methodologies given during the interview sessions to further determine both common and individual instructional methodologies of the participants.

## **Interview Question Data Analysis**

The interview questions were created by the researcher and then given to the two members of the peer examination team for feedback. Care was given to create questions that were rooted in research findings and would elicit in-depth responses from the participants. Research questions one and two were replicas of the final two questions of the questionnaire that participants answered prior to the interview session. Question three was asked simply to have the teacher participants to divulge their confidential TVAAS information for publication. Questions 4 and 5 were asked to determine whether the participants had changed their teaching methodologies over the past few years. If the teacher indicated in question four that he/she had changed some of their instructional methods in the past five years, question five asked if the change had to do with legislation such as ESEA (2010), First to the Top (2010), or some other factor. The next three questions all pertained to the middle school theory, or lack thereof, at West Tennessee Middle School. The final question, question 8, asked what components of the middle school theory, if any, should be re-introduced at the school.

The level of duplication found in the teachers' replies to the interview questions brings validity to the information provided. The purpose of the study was to determine the instructional methodologies used by effective middle school math teachers; therefore the responses recorded reveal the consistency of responses given by the teacher participants in the study.

## **Interview Data Analysis Summary Results**

Answers to interview questions brought together a variety of responses, as well as feelings and emotions from the individual teacher participants. At times during the

interview process, a question was posed and not enough information was given in response; other questions garnered more information than was needed to adequately and appropriately answer the question. In several instances, the teacher participants strayed from the initial question but were eventually able to reach a consensus on an answer. Teacher participants' feelings and emotions regarding certain educational, legislative and/or organizational issues were evident in their responses. In order to bring more clarity to the interview data analysis summary section, teacher quotes from the interviews will be dispersed among the narrative.

When the teacher participants were asked what makes a math teacher effective, four of the respondents, (57%), stated effectiveness coincides with the relationship the teacher has with the students in his/her classroom. The teachers felt that the better they knew their students, (i.e. their likes, dislikes, or interests), the more effective the teacher was in the classroom.

**Ms. C.** "Number one is relationships. You have to know your students and where they're starting from."

**Ms. E.** "I start the year with students doing an interest inventory. Then throughout the year I use the student information from the interest inventory to make math questions go along with that."

Closely following rapport with the students was knowledge of subject matter, which was given by 42% of the respondents:

**Ms. W.** "For me, effectiveness is equal parts of know what you're teaching and who you're teaching it to."

**Ms. M.** “You have to know your subject (content knowledge) and differentiate your lessons a lot!”

**Ms. A.** “I think being effective is knowing your stuff (content knowledge).”

Other answers cited as a measure of effectiveness included being flexible, differentiating presentation of materials and lessons, and using technology.

The findings from the inquiry into whether the teachers considered themselves effective were overwhelmingly positive. A total of 71% of the respondents consider themselves to be effective and 43% relate this back to student test score data evidence.

**Mr. W.** “Based on test scores from last year...my students really did well, so I’m going to go with that. But, I’ll adjust each year and try to improve what I do.”

The average TVAAS score for these seven participants was four. The State of Tennessee defines a Level 4 teacher as having above average effectiveness: teachers whose students are making more progress than the state average (the teacher’s index is equal to or greater than one but less than two; Teacher Value-Added Report, 2010). In simpler terms, these teachers are able to attain over one school year’s growth (achievement) in his/her students during the course of a school year.

Four of the seven teacher participants reported changing their instructional methods over the past five years; however, six of the seven responded that using and integrating technology generated the biggest change. The use and integration of technology response produced positive correlation to the successive question of Federal or State legislation initiating the changes in instructional methodologies. While No Child Left Behind was mentioned as a cause for change by 43% of the participants, First to the Top was referred to by all seven participants. As stated previously, all Smart Boards in

use at West Tennessee Middle School were purchased through First to the Top funding. Thus, First to the Top legislation set in motion the practice of math teachers having access to technology and using technology on a daily basis.

**Mr. W.** Mr. W stated the following:

I don't know if I should tell this, but the other day the bulb went out in my ceiling mount projector. I really didn't know if I'd be able to teach the lesson I had prepared for the day. I mean, I know I taught for a few years without a Smart Board, but I'm so used to it now that I just didn't know if I could do it.

Five of the seven participants have been at West Tennessee Middle School five years or more. All five (71%) stated the school had changed in organization and/or structure over the past five years.

**Ms. C.** Ms. C explained,

They've (administration) shortened class time to 52 minutes from 59 last year. You wouldn't think seven minutes would make that much difference, but it does. We definitely don't have enough time to cover all I feel like I need to cover.

Three of the four teacher participants with at least five years of experience at the school alluded to leadership changes (principal and assistant principal) as having an effect on school culture and climate.

**Mr. W.** Mr. W also noted the following:

In the past 5 years, we have had three different principals and two different assistant principals. I guess that is the biggest change. Every one of them had their own way of doing things and of wanting certain things done. We have

changed something every year. It is hard to get a consistent flow when something changes every year.

The four (57%) participants with 5 years of experience or more cited No Child Left Behind as the biggest factor in the organizational and/or structural changes at the school. Conversely, the three (43%) teacher participants who had 2 years of experience stated First to the Top as the reason for change.

**Ms. W.** Ms. W stated,

I have been doing this (teaching) awhile, and I've seen things (legislation) come and go. No Child Left Behind made teachers more...not necessarily accountable, maybe, but more focused on the subgroups in our classes. It also brought 'highly qualified' into teaching. I believe you can be highly qualified and not know a thing about teaching. At least with First to the Top there seems to be a shift to what makes teachers effective.

When the teacher participants were asked what components of the middle school theory they would like to see come back to West Tennessee Middle School, there was no hesitation before stating teams or common planning for teachers in the same grade level. Both answers were given by 43% of the respondents.

**Ms. A.** "I loved, loved being on a team. The classes were longer, and I felt like I knew the students, and their needs, better."

**Ms. G.** "I miss that the whole side of the hall had planning time together. If something, good or bad, came up about a child, we could discuss it as a group."

The overwhelming consensus among the teacher participants with prior knowledge of the middle school theory was that both achievement for the students and teacher morale was enhanced when the middle school theory was in place.

**Ms. W.** “I’d like to see this school go back to the middle school concept. I think we had better scores, better communication between teachers, between teachers and students, and between teachers and administrators. We were a ‘team.’”

Twenty-nine percent of the teacher participants would like to have longer classes; 14% (one teacher) had to have the middle school theory explained to her and, afterward, acceded that the teaming concept had the potential to be beneficial to both teachers and students on the team.

Additionally, since all teachers pointed out the need and desire to return to the “true” middle school format, more discussion of the team and common planning ideal is given. The teachers (5) who had experience in the middle school concept or a “true” middle school setting cited teaming and common planning time as helping both students and teachers. All teachers expressed that they would like to see the common planning time come back to West Tennessee Middle School. The teachers reported being able to talk about their subjects and their common students at lunch, yet all feel this is inadequate to meet the needs of students (academic) or teachers (instructional).

**Mr. W.** Mr. W explained,

I remember the real deal of middle school and would like to go back to that.

Teachers talked more...not just casual talk, there was that, too, but talk about the students and what we were teaching and who might be having trouble in class. It was better.



**Ms. G.** “Really, I would like to have the other sixth grade math teacher to talk to during mutual planning times. Right now, we can only talk at lunch, and who wants to spend lunch talking about math?”

**Ms. C.** Ms. C noted,

I’d like to have planning time again with the other math teacher on this hall. We talk between classes and at lunch, but that’s not enough. I’d also like to just teach math. If I had one class to concentrate on, I know I would be a better teacher in that one subject.

**Ms. W.** Ms. W stated,

It was especially good to have all the sixth grade students on a hall, seventh grade students on a hall, and eighth grade students on a hall. Parents liked it that the students didn’t mix. It is a small thing, but in a community like ours it made a difference. This junior high thing of a bell ringing and students going like a herd of cattle is nerve-wracking sometimes, not to mention it takes longer to really know my students. When we (teachers) were in charge of 100 students, 115 at the most, we could be more personable and personalize our instruction more.

### **Observations**

The observation notes and details were manually transcribed during the observation period. The transcriptions were saved in individual file folders labeled with the participants’ pseudonyms. The observations took place over a three-month period. After each observation, I summarized the actions depicted during the observation as to the instructional methods used by the participants. Because instructional methodologies and what effective math teachers do during instructional class time is the focal point of

this research study, care was given to write down what the participants did during the lessons, as opposed to what the participants said. Themes observed in the transcriptions were added to the master list of themes and marked as to participant name and how many times the methodology was mentioned in an effort to further determine both common and individual methodologies for each participant.

The classroom observations provided an excellent opportunity to observe, analyze, and document the various instructional strategies utilized by the seven middle school math teachers. Additionally, data gathered during the observations afforded the opportunity to assemble the most commonly used instructional strategies of the math teachers. The instructional strategies occurring with the most frequency are shown in Table 2.

## **Results**

### **Overview of Themes**

After the interview portion of this study and the observations of the teachers teaching a math lesson, 10 specific instructional strategies used by the teachers in the study emerged. These 10 strategies all incorporated doing, not only on the part of the teachers, but also by the students in the classes. The instructional methodologies are a direct correlation to the brain-based learning theory, which states that when the brain is engaged in learning by active participation, learning will not only take place, but also be retained for longer periods. The middle school theory component of common planning time fit with these methodologies as well. If teachers in a middle school setting receive time during the instructional day to meet and discuss academia, it is logical that the teachers would discuss and exercise these strategies.

Table 2

*Most Frequently Used Instructional Strategies of Highly Effective Middle School Math Teachers*

Name of Identified Instructional Strategies	Number of Participants Using the Strategy (Percentage)
Objective written on Board (Visible to Students)	7 (100%)
Hands-on Activity within Lesson	7 (100%)
Formative Assessments throughout Lesson	7 (100%)
Use of Technological Devices	7 (100%)
Pairing and/or Grouping Students	7 (100%)
Modeling by Teacher of Lesson Concepts	7 (100%)
Closure Activity	7 (100%)
Bell Ringer Activity	5 (71%)
Relation of Lesson to Real-Life (Examples)	4 (57%)
Use of "I Can" Statements	4 (57%)

The highly effective middle school math teachers incorporated the following instructional strategies into their lessons. Because these strategies were such an integral part of the research, a definition for each strategy is given. Additionally, notations about the strategy garnered from the observations accompany the definitions. When applicable, quotations overheard by students in the teachers' classes reinforce the validity of the methodology for student learning.

### **Objective Written on Board (Visible to Students)**

In every classroom observed, the objective of the day's learning was either written on the board or placed elsewhere in the room and visible to the students. The teacher had written the objective in the form of content standard of learning, student performance indicators (SPIs), or Grade Level Expectations (GLEs). This strategy is beneficial to both teachers and students. This strategy enables the teacher to know which standards have been covered during the course of the year, how many times the standard has been covered, and if there is a need to reteach the standard. It is also beneficial to the students because it sets the learning expectation for the day and gives direction to the learning.

One example of this strategy occurred daily in Ms. C's classroom. On the wall beside the Smart Board was a mural of sorts. This mural spanned the length and height of the wall space from the Smart Board to the corner, a distance of approximately 3.5 m (10 ft) by 3.5 m (10 ft). This mural contained all the math standards that Ms. C must teach her eighth grade students during the school year; Post-It flags were stuck beside each standard. Each time Ms. C covered the standard, she marked the standard with a Post-It flag. Some of the standards had only one flag beside it, while others had three, four, or more. Ms. C stated the standards wall served several purposes: (a) to provide a visual for the students regarding their learning, how often they are covering a particular standard, and the extent of the coverage; (b) to help Ms. C ensure that she covered each standard more than once; and (c) to be a constant reminder of the power of repetition for both teacher and students. Thus, this standards wall is another direct correlation to brain-based learning theory.

All seven teacher participants in the study had written the objective of the day on the board or made sure that it was visible to the students. However, five of the seven teacher participants (71%) spent two to three minutes at the beginning of class to review the objective and explain it in more detail, while two of the teachers simply restated what was written.

### **Hands-on Activity within Lesson**

Every observed lesson had a hands-on activity embedded within the lesson. These hands-on activities involved manipulatives, drawing, writing, demonstration of working a problem on a calculator by simulation, and dance. These activities not only provided a “hook” to get and keep the students’ interest, they also provided a means to reinforce the learning. Again, there is a correlation to brain-based learning theory: by teachers tapping into students learning styles, visual, auditory, or kinesthetic, constantly and consistently, student learning will occur and student achievement will increase.

Hands-on activities within the lessons were as varied as the teachers themselves. In Mr. W’s classroom, a student demonstrated how to work a math problem for the rest of the class by going to the large calculator on display on the classroom wall. This calculator was approximately .6 m (2 ft) wide by 1.2 m (4 ft) high. The student explained each step of the problem as she touched the buttons on the display calculator.

In Ms. M.’s classroom, students took note cards with rational numbers, irrational numbers, fractions, decimals, and math symbols on them and arranged themselves in a human number line according to their note card. The students arranged themselves around the perimeter of the classroom. After several discussions among the students as to what number should be next, the class indicated to the teacher that the number line was

correct. The teacher checked for accuracy. Four of the 23 students were not in the correct order. Ms. M asked these students to look at their numbers, the number to the right and left of them, and to re-evaluate their positions. With help from Ms. M, other students, and a calculator, the students were able to find the correct position.

### **Formative Assessments throughout Lesson**

A formative assessment is any assessment designed to evaluate students' learning; the results indicate whether to monitor and adjust teaching and learning activities. Whereas some teachers used the very simple Thumbs/Up and Thumbs/Down method to evaluate learning, others used the clicker response system or red, yellow, green cards. What was most important in these assessments was that the results were not put in the grade book or used punitively; rather, the teachers used the formative assessment results to gauge their instruction and remediate if necessary. Formative assessments are a way of avoiding the "educational autopsies" that were once so prevalent. Formative assessments not only allow a teacher quickly and accurately to determine whether learning is taking place, but also do so while the teacher can still influence the students' learning. If students are struggling with a concept, the teacher is able to intervene before a test indicates learning did not occur. This methodology, again, coincides with brain-based learning theory. By teachers using formative assessments to guide and direct their teaching and student learning, students have a greater sense of when they have learned a skill or concept. This may take a student to the self-convincer state of learning more quickly. This methodology can also relate to the middle school theory in that using formative assessments gives the teachers a better idea of student learning, which in turn,

means teachers know their students better. If a teacher is responsible for only a team of 100 to 115 students, this methodology should lead to increased student achievement.

Ms. G used formative assessment by demonstrating a math problem and asking the students to indicate with a thumbs-up if it is correct and a thumbs-down if it is incorrect. Twenty of the 24 students responded with a thumbs-up. The problem was correct; Ms. G gave the four students who responded incorrectly a similar problem to complete while the other students went on to the next problem. Again, Ms. G differentiated for the students who missed the problem. This scenario continued for three more problems. By the end of the review, 15 students had been able to work through all five problems, 6 were one problem behind, and 3 were two or more problems behind. For those three students, Ms. G assigned them to Academic Lab to get reinforcement with the math concepts.

Ms. A used the clicker response system to direct her teaching and the students learning. Ms. A gave the students review work that would lead into the day's lesson. Next, Ms. A reviewed math vocabulary for the lesson. The students then watched a Teacher Tube video of the Box and Whisker Plot Dance on the Smart Board. Ms. A then conducted a formative assessment of the learning. The formative assessment, done with the clicker system, showed that 35% of the students still did not understand the concept of the lesson, 20% were "sort of" on track with the concepts, and 45% understood the concepts of the day's lesson.

### **Use of Technological Devices**

Whether it was calculators, computers, ceiling mounted projectors and Smart Boards, or a combination of all four items of technology, every participant used

technology in some fashion. As mentioned earlier, one teacher used the clicker response system, and another utilized a Teacher Tube video to reinforce the skills being taught in her lesson. Today's learners have been raised using cell phones, ipods, and home computers; thus, effective teachers know they must incorporate the technology aspect into their everyday teaching repertoire. This methodology directly links with brain-based learning theory due to the fact that this methodology correlates to the way students learn best. There is also linkage to the middle school theory of exploration within classes. Whereas this concept was not being actively used at West Tennessee Middle School, the idea of exploration in classes for the middle school-aged student is one of the components of middle school theory.

All seven of the teacher participants used the Smart Board as a part of their instruction. Several put problems on the Smart Board for the students to work; however, Ms. G used her Smart Board as an interactive teaching tool.

Ms. G put examples of two-dimensional shapes on the Smart Board. Individual students approached the Smart Board and used the magnifying glass tool on the Smart Board to see the names of the planes of the shapes. The students answered questions and then were able to drag the arrow to uncover the correct answer to the question. Students dragged shapes (rectangles, squares, triangles, etc.) to form a two-dimensional object representation of a three-dimensional object. The students were able to check for correctness of their representations by dragging an arrow on the Board.

### **Pairing and/or Grouping Students**

In every classroom, the teachers utilized pairs of students or groups of students to reinforce the learning objective of the day. The uses of pairs of students or groups of



students were many and varied. Many times the teacher would have the students turn to their shoulder partner; in other instances, the teacher placed the students in groups of either three or four. At times, students in pairs or groups became off-task and talked about things other than the math lesson, but this was short lived. The students were responsible and accountable for their own learning. One classroom observation revealed that as groups completed the assignment, individual members of the group helped other groups with the concept.

This methodology corresponds to the brain-based learning theory in that students may feel they have actually learned something after discussing the skill or concept with others or after teaching the skill or concept to someone else. A case may be made for linkage to middle school theory as well, due to the fact that middle school-aged students are social by nature, and this methodology gives the students the freedom to engage socially and interact with their peers, all under the guise of learning.

In Ms. E's classroom, student pairing incorporated assigning students into A and B partners. Ms. E displayed six math problems for the students on the Smart Board. For the first three problems, Students A were the "teachers" and Students B were the "students." For the last three problems, the students' roles reversed.

Mr. W divided students into six groups of four students each to complete an activity of measuring cylinders and using a formula to figure out the volume of the cylinders. Mr. W monitored the progress of the groups and redirected and/or adjusted the teaching as needed per each group. Three groups struggled with the work. As Mr. W watched the groups' interactions, he realized the groups were using the diameter of the

cylinders instead of the radius of the cylinders. With Mr. W's help, the students corrected their mistakes and began calculating correct answers.

Ms. A's class was where members of one group helped other groups. Ms. A gave a fairly difficult math reading problem for the students to complete. Ms. A explained how the students should dissect the information in the problem and work in backward order to get the original numbers the problem asked to be found. Students worked in groups of three. All groups of students were engaged and worked diligently to reach the correct answer. The groups worked the problem on their white boards, and Ms. A constantly monitored their progress. The members of the first group to finish the problem correctly went to other groups to offer assistance and guidance.

### **Modeling of Lesson Concepts by Teacher**

Teacher modeling gives the students a clear, and often multi-sensory, model of a skill or concept. The teacher participants in this study provided this model. The participants called their approach the "I Do, We Do, You Do" method. This method is just as it sounds: the teacher describes the steps to solving and models how to solve several problems, has the students help with solving a few of the problems, and then the students work independently. This approach is reminiscent of the Tennessee Instructional Model (TIMS) method of 25 years ago. Nonetheless, the approach works and gives the students a firmer foundation when applying a new skill or concept. This methodology corresponds favorably with the brain-based learning theory by allowing students to "see" how a concept or skill should look at the on-set of learning. There is no guesswork for the students because the teacher gives clear and precise models of his or

her expectations for learning. As is the case with several of the instructional methodologies found in this study, modeling by the teacher can take a variety of forms.

Mr. W instructed his students to make a foldable for the learning about to take place. Mr. W demonstrated each step of this activity: how many folds and in what order, where the students were to write the objective for the day (upper left corner), and how to draw the replicas of the cylinders they were about to measure (two circles, one above the other, connected with straight lines).

Ms. W demonstrated modeling in another way. Ms. W's students were challenged to answer several TCAP-type questions during the observed lesson. The questions included four answer choices. Ms. W did not give only the correct answer choice to the students; instead, Ms. W discussed every answer choice and determined the logic of each one. She also gave the students hints and strategies for selecting the correct answer choice along with key words to look for in the question and the answer choices to make getting the correct answer more viable.

### **Closure Activity**

Some type of closure activity was present in every classroom. Closure activities, again, were part of the TIMS model of the 1980s. Closure activities create powerful learning effects at the end of the instructional period. These activities are a way to bring the class back together after a lesson, restate the learning objective of the day, complete another activity to reinforce the skill taught, and effectively bring a close to that day's instruction for the class. Closure activities included something as simple as the entire class restating the objective of the day, a Purpose Important information and Connections (PIC) chart which requires more complex and higher order thinking from the students, a

Box and Whisker Plot dance, or having students to complete an exit slip recapping the days learning before they exit the classroom. Closure activities show a positive correlation to brain-based learning theory by recapping the learning for the students and linking it to real-life or previous learning. This recapping and linkage creates more avenues of learning in the brain, and the more avenues of learning that are created, the more learning occurs in the adolescent brain, and thus, student achievement is higher. This correlates to middle school theory in that teams of teachers and students could create more individualized closure activities that are personalized to teams of students.

Ms. G used the PIC chart as a closure activity. Ms. G told the students the information that was to be put on the chart: P represented the purpose of the learning (objective or goal of the day's lesson); I for important information learned from the lesson (this is individualized to each learner and in each learner's own words); and C indicated connections of this lesson to real-life or to previous learning.

For Ms. A, a closure activity took the shape of dance. Ms. A had all her students stand and perform the Box and Whisker Plot Dance they had watched on the Smart Board at the beginning of class.

Four of the seven teachers used students' exit slips as closure activities. An exit slip is a piece of paper with the answer to a question about the day's learning written on it. Students give this slip to the teacher as they leave class for the day. For Ms. C, an exit slip took the following form. The day's lesson was on probability. On the exit slip, the students wrote an explanation, in their own words, what they had learned in class that day and how this concept or skill related to their lives personally. Ms. C stated she would

begin the next day's class with a discussion of some of the answers given on the exit slips.

### **Bell Ringer Activity**

A bell ringer activity sets the tone for the start of the class in much the same way a closure activity brings the class to an end. A bell ringer was present in all but two of the observed classes. In the five classes where a bell ringer activity started the class, the bell ringers were a review of previous learning. In one instance the bell ringer led to a mini-lesson of sorts because the teacher realized the students did not fully understand what was being asked of them. Bell ringer activities correlate in the same way as closure activities to both brain-based learning theory and middle school theory. The bell ringers set the tone for learning and begin the process of creating avenues of learning in the brain. These activities also give the students a feeling of success before the new learning ever takes place. Thus, the self-convincer state of learning occurred and was achieved more quickly.

As students walked into Ms. E's class, the bell ringer was on the Smart Board. The bell ringer consisted of five math problems from the previous day's lesson. Each math question had a student's name in it. As the students worked to complete the bell ringer, Ms. E walked around the classroom and monitored the students' work. At the end of seven minutes, the teacher called on four volunteers and one non-volunteer for the answers.

In Ms. C's classroom, the bell ringer was on the board; Ms. C asked students to get out their warm-up sheet and answer the two bell ringers. Ms. C asked students to put their answers in the form of both a fraction and a percent (conversion from ratio). A

student asked what 2 out of 5 really means. Ms. C took the time to teach a mini-lesson on ratios to the class. This demonstrated differentiation on the part of Ms. C because she was able to meet the students where they were in their understanding instead of waiting for a test to tell her that a group of students did not understand a concept.

### **Relation of Lesson to Real-life (Examples)**

Effective teachers are able to provide real-life examples for concepts and are able to show students how and/or where they will use the skills they are being taught. In four of the seven classes observed, the teachers related what was being taught to real-life. Relating the lessons to real-life is positively correlated to brain-based learning theory because again, this methodology creates learning pathways in the brain and the more paths that are created, the more the student retains and student achievement is increased. Additionally, relation of abstract concepts—and many math concepts are becoming more abstract as students progress through middle school—to real-life examples gives the students a concrete example of what or how they should be learning and/or retaining the learning. This methodology can also be positively linked to returning to the middle school theory due to the fact that if the teachers were on a team and had a group of 100-115 students, these real-life examples could be more personalized to the individual students and/or teams of students.

The ways of relating the math concepts to real-life were as varied as the teachers themselves. In Ms. C's classroom, she related the concept of probability in math to another discipline, Science, by referencing and discussing the Punnet Square. Mr. W provided the following scenario to create a real-life lesson. Mr. W held up an empty coffee can and asked students why they believed it would be important to know how

much coffee the can could hold. The students gave answers such as: to know if the company who makes the coffee puts too much or too little in the can before the can gets to the store, to see what the best price (per ounce) is for the coffee, to compare name brand coffee to generic coffee, and to see how many cups of coffee can be made from the can of coffee.

The students in Ms. G's classroom embarked on a scavenger hunt to find real-life examples of the shapes they had studied previously. The students were given five minutes to find as many objects as they could. The students found objects such as: a tissue box (rectangular prism), an unsharpened pencil (cylinder), and the globe (sphere).

The students in Ms. W's classroom had to use the Pythagorean Theorem (their learning for the day) to answer the following real-life scenario:

You are locked out of your house and the only open window is on the second floor—20 ft above the ground. You need to borrow a neighbor's ladder and place it 6 ft from the base of the house....you can't get into your mother's flowers.

What length ladder will you need to borrow to reach the open window?

### **Use of "I Can" Statements**

"I Can" statements are a relatively new concept in education circles. The teacher takes his/her standard or State Objective for learning, but instead of tagging it as "the student will...", the students take the same objective and turn it into what they *can* do. There is positive correlation between "I Can" statements and brain-based learning theory. "I Can" statements are examples of students believing in themselves and being able to achieve the self-convincer state for learning and achievement. In essence, an "I Can"

statement can become a self-fulfilling prophecy for the students. If students believe they can learn and succeed, they will.

The “I Can” statement’s methodology, like other instructional methodologies in this study, is as varied as the teachers using them in their classrooms. There were four instances of the teacher participants using “I Can” statements and one example of student testimony in regard to “I Can” statements.

In Ms. W’s class, the students wrote “I Can” statements after the teacher explained the objective of the day. In Ms. M’s class, the students created “I Can” statements from the Student Performance Indicator (SPI) derived from the standards. After Ms. E introduced the day’s lesson and stated the objective for the day, she asked the students to write “I Can” statements based on their own knowledge and ability level for what they were going to accomplish for the day.

Perhaps the most successful example of students writing an “I Can” statement occurred in Ms. G’s classroom. The objective for the day was to analyze characteristics and properties of two- and three-dimensional shapes. Ms. G instructed, “Now, let’s put this into an “I Can” statement. Turn to your shoulder partner and tell him or her what you can do by the time this class is over.” Ms, G then called on four students to say their “I Can” statement aloud. Ms. G asked every student to write their “I Can” statement on the top line of their notebook paper so the students could see it as they go through the lesson. At the end of Ms. G’s class, she formatively assessed the students and all students scored perfectly on the assessment. A female student responded, “Wow, Ms. G, we really can tell the difference in flat shapes and 3-D shapes!”



## **Student Focus Group Interviews**

The four student focus groups were each comprised of six students who met with the guidance counselor and me. The interviews were audio recorded and saved in individual files on the audio recording device. The only identifying labels for these interviews are Group 1, Group 2, Group 3, and Group 4. The interviews took place over the course of 4 days, with each taking place during the students Cav Group time (7:40 AM-8:00 AM). After the interview sessions, I summarized the interviews and made notes as to what the students said. I did not edit the interviews, nor did I edit any response given by the students. However, nouns were added for any pronouns omitted when the participants' answers would otherwise be unclear. While care was taken to stay on topic, there were times when a participant digressed. Additionally, there were participants who were more vocal than others. Again, care was taken to hear each student's voice, to give each student a chance to respond, and to capture what students' believe makes a teacher effective.

## **Student Focus Group Data**

The student focus groups interview question was created by the researcher. Clarification, in wording and for meaning, was given by a committee member. The question was then given to the two members of the peer examination team for feedback. Thought was given to create a question for the students that was both easy to comprehend and easy to answer. While this was the intention of the question, it should be noted that the question seemed confusing to some of the student participants. I do not know if this confusion was from the question itself, or from unique student personalities, as some students were, by nature, more talkative than others.

The level of duplication found in the students' replies to the focus group questions brings validity to the information the question elicits. The purpose of this portion of the study was to have students, in their own voice, tell what makes a teacher effective.

### **Student Focus Group Data Analysis Summary Results**

The question posed to the focus groups of students was, in my estimation, very simple, yet thought provoking enough to elicit viable responses from eighth grade students. The question was the following: *What is the best lesson your math teacher has taught, what did you learn, how do you know you learned, and what made it the best lesson?*

It was my intent to correlate students' responses as to what makes a lesson memorable to the instructional strategies used most frequently by the teachers. However, I was not able to correlate all the instructional strategies the teachers used to memorable lessons for the students. Examples from students' responses will be used to enhance the instructional strategies, as appropriately correlated. All seven teachers and cited by 12 (50%) of the students cited activities in class as making a lesson memorable and conducive to learning for the student.

**Genesis.** Genesis stated the following:

We were learning about volume, and we played a game called Better Buy. The classroom was set up like a store; we had play money, and we went shopping around the room. The teacher had real food we could buy and eat in the classroom. That made the class good...getting to eat. I know I learned, though, because I really wanted the fun size Snickers, but the Little Debby nutty bar was a better buy.

**Kelsey.** Kelsey explained a different memorable lesson:

We got to go outside. We did jumping jacks...you know, how many we could do in a minute. And how many times we could say the alphabet in a minute and hop on one foot in a minute. I went home and told my momma about it. My little sister drove me nuts about saying the alphabet in a minute. She could do it 20 times, and I could only do 16.

**Jayden.** Jayden's memorable activity included the following:

I remember the lessons on probability. We had a talk about athletes here going on to the pros and stuff like that. We learned about 'odds.' That's what my daddy says; he don't call it probability. Anyway, we played a dice game at the end of class to see who lost all their dice first. I learned that 2s and 12s are hard to roll.

Following activities was the 'other' category. Forty-two percent of the student respondents (10) stated they "just remembered how to do the lesson" and demonstrated the skill, equated good grades on tests and homework to mastery/learning, recalled real-life examples or examples put on the board during class as akin to mastery/learning, and lastly cited catchy sayings or songs helped them to retain the skill.

**Ian.** "I know how to do slope. Let me show you... See, I can do this. Go me!"

The student took a sheet of paper and drew the following (see Figure 1):

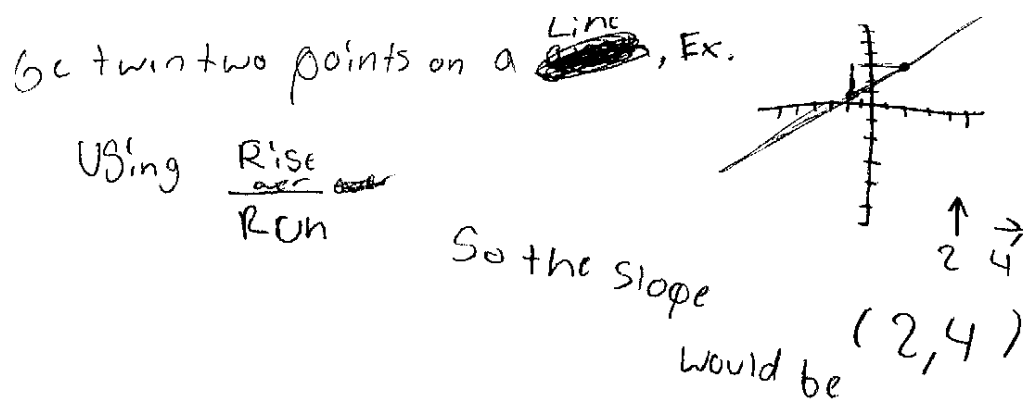


Figure 1. Student slope drawing.

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**Morgan.** Morgan stated the following:

I remember the stuff we did with Pythagorean Theorem. We learned stuff like how to get the distance from a wall to a ladder. I know I learned because I thought it was fun to learn that kind of stuff. I liked that my teacher gave us problems that can happen in real-life, and she put our names in the problems.

**Jennifer.** Jennifer remembered geometry activities:

I learned all about geometry. She always put up lots of examples of shapes, lines, and that kind of stuff. She had cool names for them, not just rectangle or square, but rhombus and trapezoid. We (the students) had to classify, compare, and contrast the shapes, and then the teacher added to what we had to say. I know I learned because I can still remember the names of the shapes and do the equations from the lesson.

**Leah.** Leah recalled a lesson on integers:

I remember learning about integers. We had to sing a song about integers. That song made it easy for us to know what to do and to remember the steps to the problems. When I took my test, I sang the song in my head and knew what to do. Then last year on TCAP there were a couple of integer questions...so I sang my song.

**Robert.** Robert explained the following:

My best math lesson was when I learned PEMDAS. We learned that each letter means something and when you see them in a math problem that is the order you work them in. P-parentheses, E-exponents, M-multiply, D-divide, A-add, and S-subtract. Our class learned it as People Eat Mustard Dogs at Sonic.

One of the respondents (4%) mentioned the use of the Smart Board or any type of technology as making a lesson effective or memorable; however, it is reasonable to presume that all teachers did use technology in the lessons.

**James.** James recalled the following lesson:

Just a few weeks ago I learned how to simplify equations. We played a basketball game on the Smart Board, and you had to get the question right before you could shoot the ball in the goal. I missed about three before I got the hang of it, but once I got it, I got it!

Another 4% (1) of the respondents were off topic in answering the interview question.

## Research Questions and Conclusions

### Research Question 1

*What instructional best practices do effective math teachers at West Tennessee Middle School, as identified by teacher effect data from the 2010 Tennessee Comprehensive Assessment Program (TCAP), utilize when teaching state standards to students in Grades 6 through 8?* The seven middle school math teachers at West Tennessee Middle school incorporated seven specific instructional methodologies as they taught their content standards to their students. Three other methodologies that were used by some, though not all, of the math teachers could also be considered best practices and should lead to student achievement as measured on standardized testing. When I posed the interview question asking about the methods the teachers used and they considered effective, I received seven different answers and not much explanation as to why the teachers believed those methods were best practice. I even received one answer of “relationships” with the students lead to best practices. The teacher expanded this by saying, “When the students like you, they will do anything you ask them to.” This is true, but that philosophy does not show a positive correlation through empirical research to student growth and achievement.

Although the teachers could not pinpoint any one strategy or best practice used, six of them did say they were effective teachers, and Ms. C cited her TVAAS data as verification of their effectiveness. These TVAAS scores is one of the reasons I chose to conduct this research study at this particular site. All seven of the math teachers were Level 3, 4, or 5 teachers according to the State of Tennessee’s definition of teacher effectiveness.

Mr. W stated, “I was a 5, but it wasn’t all me.” Ms. E said the following:

I was a 3, and I was surprised. I was just learning as I went along. I came here and there was no book, no technology in my room yet, nothing. I made everything from scratch. I really worried if I was on the right level for them (students). Was it too hard? Too easy? I was really happy to be a 3.

I was a bit surprised at the modesty the teachers exhibited when talking about their TVAAS scores and their effectiveness. I surmise the modesty comes from the fact that this score is fluid and will change at the end of each school year based on how the students perform on the standardized test from year to year. After the questionnaire and interview data gathering segments of the research study, I was looked forward to see the seven teachers in action.

Through the observations I came to realize that these teachers used certain strategies, and these strategies were a permanent fixture in the teachers’ classrooms. The students had come to expect the various activities that would take place during the class period and would ask the teachers what they were going to do today. In at least three classrooms, a student asked, “Are we going to play a game today?” The teacher usually provided no explanation as to what the students would be doing, and at times, the teacher did not respond yes or no. It was just a natural, seamless part of the class to move about the room, get into groups, or use technology in some form.

This theme of game was reaffirmed by 50% of the students in the student focus groups. The students equated the games, as they called them, to learning and remembering a skill.

## **Research Question 2**

*What is the common theme in the instructional best practices among effective math teachers of students in Grades 6 through 8 at West Tennessee Middle School?*

Whereas literature (Anfara, 2006; Clark & Clark, 2006; Flowers, 2000; Goldhaber, 2009) has indicated a lack of sufficient evidence denoting what effective teachers do on a daily basis, the findings from the interviews and observations from the teacher participants in this study suggest effective teachers have many instructional strategies as part of their teaching repertoire. The key element and common theme to these strategies points toward doing. Of the 10 themes that emerged from the data, seven have the students actively involved in the learning through visual, auditory, and kinesthetic means. These methodologies include hands-on activities, formative assessments, a closure activity, use of a technological device, and pairing or grouping students. All seven of the teachers' classes began with the objective of the day visible to the students.

As noted earlier, the teachers did not choose these activities for the benefit of the observation. The strategies were alluded to in the interviews with the teacher participants and were evidenced in the classroom observations. The students themselves were comfortable with all the movement and activity in the classrooms and half of the focus group participants mentioned activities as the method they needed for learning and remembering the skill or objective of a lesson.

## **Research Question 3**

*In what ways has math instruction at West Tennessee Middle School been affected as a result of the No Child Left Behind Act (2001), the reauthorization of the Elementary and Secondary Education Act (2010), First to the Top Act (2010), high stakes testing,*



*student achievement, and individual accountability?* After interviewing the teacher participants, it was apparent that math instruction has changed at West Tennessee Middle School over the past several years. However, after interviewing the teachers, there was no clear reasoning for the change. Teachers with five or more years of experience speak of the changes No Child Left Behind brought.

As a result of No Child Left Behind's highly qualified licensure mandate, one of the teachers at West Tennessee Middle School was moved from an eighth grade science position to sixth grade math. Mr. W could teach all subjects in first through sixth grade, and was highly qualified for seventh and eighth grade science by academic major. Mr. W explained:

At first I viewed this as sort of a demotion. You know, like I wasn't doing a good enough job where I was, so I was moved to a lower level. Now I see it as the best move I could have made. The sixth graders are really impressionable, and I know I am a role model for them. They haven't run into many male teachers at the elementary level.

The other teachers who referenced No Child Left Behind as the basis of instructional change were indirectly affected by the Act. Ms. C stated:

I was hired because I took and passed the Middle School Praxis. That meant I could teach any subject in middle school. That was important 5 years ago because the school needed a highly qualified teacher in every content area.

Ms. W said the following:

No Child Left Behind was tough on us. It made us focus on certain groups of students, almost to the neglect of others. I can't say I really agree with that. The good thing is we (teachers) were forced to look at what we taught and how we taught, so we could possibly reach and move every student.

The teachers also referenced Tennessee First to the Top as bringing many changes to Tennessee and West Tennessee Middle School. First, the state was given over two million dollars to disperse to all school systems in the state. With this money, West Tennessee Middle School was outfitted with a Smart Board in every classroom and a few other items of technology. Due to the First to the Top directive to focus (raise) math achievement and close gaps among subgroups of students in seventh grade math, all math classrooms were outfitted first. Every teacher mentioned First to the Top as a basis of instructional change. Along with the Smart Board in every math classroom, the teachers moved away from teaching from a textbook. The district purchased a classroom set of textbooks for each math classroom in Grades 6 through 8, but these are used by substitute teachers if the regular classroom teacher is not there. All math teachers have downloaded the State standards for their grade and solely teach the standards by use of the Smart Board and other activities. As is evidenced by the teacher observations, none of the observed lessons incorporated textbooks.

An additional change in instruction at West Tennessee Middle School is the "looping" math teacher. This teacher teaches students in Grades 6, 7, and 8. This looping allows for students who master the standards at one grade level to work on the next grade level or to receive remediation for math deficiencies at a particular grade level. The students in the "looping" teacher's class are also able to participate in a math

lab called Study Island. One day per week, these students go into the lab and receive more direct instruction, through the use of a computer program, for academic advancement or academic remediation.

#### **Research Question 4**

*In what ways has West Tennessee Middle School been affected as a result of the No Child Left Behind Act (2001), the reauthorization of the Elementary and Secondary Education Act (2010), First to the Top Act (2010), high stakes testing, student achievement, and individual accountability?* When this question was posed to the teacher participants during the interview session, I specifically asked about changes occurring in organization and structure at West Tennessee Middle School over the past five years. The participants with five or more years experience and the teacher participant who had returned to West Tennessee Middle School after a several-year hiatus were adamant about changes in organization and structure. As a result of the No Child Left Behind Act (2001), the teaming structure that was in place at West Tennessee Middle School had to be revamped. The highly qualified requirements of the No Child Left Behind Act (2001) applied to all public school teachers who taught core academic subjects. Thus, the four teacher teams of a cohort of students could no longer work. This one seemingly small component of No Child Left Behind was referenced throughout the interviews by teachers as being detrimental to West Tennessee Middle School. Ms. G remembered:

Fifteen years ago this was a true middle school. There were two sides to sixth grade, each side had a name, and I was one of the two social studies teachers. All the teachers on my side had planning at the same time. We were able to meet and

talk about students. If they (students) were doing good or if they were struggling. We also had exploratory classes per side. I taught Spanish during my exploratory time. I don't know how I got that, but it was fun!

Six of the seven teacher participants mentioned Tennessee First to the Top as creating change in the middle school's organization and structure. Throughout the course of the interviews, the teachers referred to new evaluation system for teachers and the increased accountability brought forth by the Act. Ms. C stated that she feels Tennessee First to the Top Act (2010) "will bring attention to what we need to work on as teachers, but with the new evaluation stuff, there may not be any teachers left teaching." Ms. E said, "I worry because I don't have a whole lot of experience and the whole state is looking at seventh grade math this year."

Three of the teacher participants talked about changes in administration and class instructional time as the biggest changes in organization and structure at West Tennessee Middle School. Ms. A put it succinctly:

Things have changed a lot here. Three principals, all looking for something different in the teachers. The classes have gone from four 75-minute classes that rotated every week to 65-minutes to 59-minutes to reading/language arts classes being a double period to cafe' redo to Cav Groups.

### **Summary**

The participants of this study, both teachers and students in the focus groups, offered varied insights into what methodologies effective middle school math teachers employ. By listening and recording what the participants had to say and by observing effective middle school math teachers in action during the instructional day, it is clear

that effective teachers do, and it is this doing that students remember. Through the interview process with the teacher participants, it was obvious the participants could not specifically name one strategy or any particular thing they did during the course of instruction that the participants felt made them effective. Yet, six of the seven participants believed they were effective and gave varying reasons as proof of their effectiveness. One participant answered the question both positively and negatively. She stated that she did not have enough experience to consider herself effective. It was only after watching the teacher participants in action that the themes of why they were so effective began to emerge. The teacher participants knew their content, this was evident, and there was a genuine respect present between the teachers and the students they taught, however, it was the constant and consistent, but never oppressive, way these teachers had their students actively engaged in the learning from bell to bell. This theme of active participation was echoed by the students in the focus groups, as well. While many of the student participants could recall facts, catchy wordings, or songs that helped them to remember a concept, by and large all the students remembered something he or she did in math class that made the skill or concept easier to remember and do. Thus, the students in the focus groups were able to connect the effectiveness of the teachers with the activities of the classrooms. This parallel of doing and remembering on the part of the students leads to student achievement.

The purpose of this chapter was to report the instructional methodologies effective middle school teachers in West Tennessee Middle School employ in their classrooms. The voices and actions of the teacher participants and voices of students in focus groups revealed certain themes of what these teachers do during the instructional

day that leads to student achievement. Chapter Five: Discussion will provide a brief summary and more discussion on these findings.

## **CHAPTER FIVE: DISCUSSION**

### **Introduction**

This instrumental single case study within the bounded system of one middle school setting focused on middle level math teachers' instructional best practices and methodologies and the middle school concept in the wake of the No Child Left Behind Act (2001), the reauthorization of the Elementary and Secondary Education Act (ESEA, 2010), and Tennessee First to the Top Act (2010). First, a summary of the study is provided to reacquaint the reader with the research study. Then, the focus of this final dissertation chapter turns to providing answers to the research questions that were developed at the beginning of the study, and conclusions from the initial research questions will be discussed. The final sections of the chapter include recommendations for future research and a discussion of the limitations and delimitations of the study.

The purpose of this case study was to determine effective middle school math teachers' instructional best practices and methodologies and the middle school concept in the wake of the No Child Left Behind Act (2001), the reauthorization of the Elementary and Secondary Education Act (2010), and Tennessee First to the Top Act (2010). Chapter 1 outlined the purpose of the study, identified the problem statement, and related the significance of the research. Assumptions about the study were made in order to develop the research questions presented in Chapters 1 and 3. The goals and outcomes of the study were supported by the following research questions:

1. What instructional best practices do effective math teachers at West Tennessee Middle School, as identified by teacher effect data from the 2010 Tennessee Comprehensive Assessment Program (TCAP), utilize when teaching state standards to students in Grades 6 through 8?
2. What is the common theme in the instructional best practices among effective math teachers of students in Grades 6 through 8 at West Tennessee Middle School?
3. In what ways has math instruction at West Tennessee Middle School been affected as a result of the No Child Left Behind Act (2001), the reauthorization of the Elementary and Secondary Education Act (2010), First to the Top Act (2010), high stakes testing, student achievement, and individual accountability?
4. In what ways has West Tennessee Middle School been affected as a result of the No Child Left Behind Act (2001), the reauthorization of the Elementary and Secondary Education Act (2010), First to the Top Act (2010), high stakes testing, student achievement, and individual accountability?

Chapter 2, the literature review for this study, yielded many findings in regard to middle schools, effective teachers and effective teaching methodologies, or lack thereof, and middle school teachers and federal and state legislation. Middle school students (Grades 6-8) comprise two thirds of America's standardized test takers (NASSP, 2006). However, this age group is almost totally ignored in educational research. Research exists regarding middle school organization or structure (Anfara, 2006; Clark & Clark, 2006; Flowers, 2000), but little research exists on effective teachers or instructional



methodologies for this age group. Battelle for Kids (BTK, 2010) research contended recognizing that teachers have significant influence on students' academic success, it is imperative to understand what highly effective teachers do in the classroom. Balfanz and Byrnes (2006) ascertained that “for many students, the middle grades are a period in which achievement gaps in mathematics become achievement chasms” (p. 143). Due to this gap in the literature, coupled with Tennessee First to the Top Act (2010) which mandates a focus in math achievement for seventh grade students, a need for more research in this area presented itself.

Chapter 3 explained the methodology used in this research study. An instrumental, single case study method was utilized for this research study. This case study took place at a small, rural Title 1 middle school in Tennessee. Participants in the study consisted of the seven highly effective math teachers at the school and 24 eighth grade students divided into four focus groups. Questionnaires for the teacher participants, interviews with the teacher participants, and observations of the teacher participants teaching a math class, along with interviews with the students in the four focus groups were the data-gathering instruments used in the study.

Chapter 4 conveyed the findings of this study through the voices and actions of the participants. Several themes emerged from the data collection, and these themes shaped the outcomes of this study.

### **Discussion of Findings**

The following discussion of the findings includes the themes found in the research, research findings regarding effective teaching methodologies, relationship of

the findings to previous research, changes in math instruction at the middle school level, and teachers' feelings regarding Tennessee First to the Top Act (2010).

The research questions that guided this study were addressed through the data gathered from the participants, and the findings from these questions were addressed in the previous chapter. While the teacher participants were not able to put their effective instructional strategies into words, they were able to show through actions displayed during the observations what an effective teacher does throughout the instructional day. The teacher participants incorporated several activities during their class periods and each of these activities are designed to enhance both student achievement and retention of skills and concepts. These actions of the teachers were supported by the student focus group participants as they were able to tell me they could remember what their teacher had them do and this doing leads to remembering. While no one common theme was evidenced among the effective teachers, all seven teacher participants did the following: had the objective of the learning visible for the students, had hands-on activities within the lessons, used formative assessments through the lesson and let these assessments guide the teaching, used technology in some way, put the students in pairs or groups for learning, modeled the lessons' concepts, and had a closure activity to end the day's lesson.

Literature review findings indicated that research in the area of teacher effectiveness had been limited to two categories: personal teacher characteristics (caring, enthusiastic, fun, humorous, friendly, supportive, respectful, etc.) and professional skills (pedagogy, subject matter knowledge, policy, cultural knowledge, multiple approaches, and teaching style). These two categories were touched upon during the interview

process and the personal characteristics aspect was seen during the observations. The personal teaching characteristics were harder to define with this study. It can be noted that the teachers and students did exhibit mutual respect for each other and the classroom atmosphere was conducive to the teaching and learning process. The professional skills characteristic was easier to categorize for this study. The seven teachers were all trained in elementary pedagogy, and four of the seven had taken tests to make them eligible to teach at the middle school level. This relates back to the empirical research that elementary trained teachers tend to teach students while high school trained teachers tend to teach content. Whether or not this statement is true seems to be a moot point in light of the evidence uncovered by this study. The effective teachers in this study all had various activities to enhance the teaching, learning, student retention, and student achievement cycle. The empirical evidence was rife with assertions of the importance of students being taught by effective teachers, yet the literature provided little data as to what comprised effective teaching methodologies. From my research findings on effective teaching methodologies, it can be noted that effective teaching methodologies do exist and can be researched in their entirety.

Data from the questionnaires and interviews with the teacher participants revealed that middle school math instruction has changed tremendously due to state legislation. Teacher participants cite the biggest change for not only middle school math, but also for teachers themselves, is the First to the Top Act of 2010. This finding may be due to an incongruity in the information given by the teacher participants. Only one teacher participant had enough experience to know about the No Child Left Behind Act (2001) from its onset, yet all were very aware of Tennessee First to the Top Act (2010). One of

the teacher participants talked about the No Child Left Behind Act (2001) and related the fact that she was hired because of the Act. However, since only one of the seven had been teaching in 2001 when the Act took full effect, I feel this Act was far overshadowed by Tennessee First to the Top Act (2010) and the many changes to Tennessee education and educators. Instruction for all teachers had to change due to the new evaluation system brought about by Tennessee First to the Top. Therefore, it can be presumed that the teachers are reacting to the most recent legislation and may not have knowledge of or necessarily be concerned with prior legislation and the mandates that legislation brought.

Nevertheless, it can be surmised from this research study that the teacher participants were already incorporating effective teaching methodologies into their teaching repertoire prior to Tennessee First to the Top Act (2010) legislation coming into effect. The data used to determine the teachers' effectiveness rating was from the 2010-11 school year, and the First to the Top Act mandates did not begin until the 2011-12 school year. For the teachers to have a two-year or longer effectiveness score of three or higher, their teaching methods had to include some of the strategies seen during the observations. It seems implausible that the teachers would have completely changed their teaching methods, teaching styles, and/or mode of delivery in the four months between Tennessee First to the Top implementation in August 2011 and the dates of their observations.

Data revealed that West Tennessee Middle School had been affected by both federal and state legislation. The teacher participants alluded to the No Child Left Behind Act (2001) as the beginning of the changes in the school. This Act brought the highly qualified teacher aspect into being and caused the first round of movement from

the middle school concept. The teacher participants all cited Tennessee First to the Top Act (2010) as having a tremendous impact on both the school and the teachers. This Act mandates that seventh grade math achievement become a focal point for all school districts and the State of Tennessee and that student achievement/teacher effectiveness become a factor in teacher retention or dismissal. There are other mandates of the Act, however, these two were the ones weighing heavily on the middle school math teachers.

The teacher participants with five or more years of experience also cited changes in administration and basic organizational structure as having an effect on West Tennessee Middle School. For several of the teacher participants, the administrative changes were a problematic area. The teachers spoke of feelings of uncertainty as to what was expected of them (teachers). The teachers also related that with each new principal (three since 2005) or assistant principal (two since 2005) the areas of need or importance changed. It has left the teachers in a state of flux in regard to what the new person wants and/or feels is most beneficial for the school. Another area teachers felt was challenging was in the basic organizational structure of the school day. In West Tennessee Middle School, the instructional day has been changed every year since 2005. This causes concern for the teachers. The main area of concern is the shortening of the instructional periods. One teacher participant stated that it is hard to know if something is working if it is changed every year. West Tennessee Middle School operated on a six-period instructional day during the 2011-12 school year. In the upcoming school year, West Tennessee Middle School will operate on a seven-period instructional day. This is movement further away from the middle school theory of teams and common planning

time that the teacher participants all voiced needed to be reincorporated into the school organizational structure.

### **Theoretical Framework Conclusions**

The theoretical framework used as a basis for this research study on effective math instructional methodologies at the middle school level was brain-based learning theory and the middle school theory. Brain-based learning theory enabled educators to determine the most effective ways to teach so students learn and retain the information taught to them. No one instructional method is able to meet the learning needs or styles of all students, thus this theory supports the idea that the more ways material is taught to the student, the more pathways of access will be created in the student's brain. A supporter (Willis, 2007) of brain-based learning theory states that teaching a concept in multiple ways is most advantageous to student retention and achievement. The findings of this study fully support this statement. Jensen (2008) stated that brain-based education is best understood in three words: engagement, strategies, and principles (p. 4). As these teacher participants teach their classes, they are the embodiment of those three words. Brain-based learning theory advocates that learning is best when it is focused, diffused, and focused again. By the teacher participants breaking the instruction into chunks bounded by periods of activity, peer interaction, or short assessments, the students have time to process the information they are being given and thus, the information is moved into long term memory.

The effective teachers in the study used several methods to teach the math concepts to the students. These methods included hands-on activities within the lessons, use of technological devices (calculators, pencil and paper, and Smart Boards), pairings

and/or grouping of students, and some type of closure activity to reinforce the concept of the day. Whether or not the teacher participants in this study knew they were engaged in brain-based learning techniques is not certain. However, it would be productive for all teachers to have professional development in brain-based learning strategies.

Eric Jensen (2008) used the term “self-convincer state” which surmises that the brain has three criteria that must be fulfilled before the brain knows that it has learned something. The three criteria are: engagement, strategies, and principles. Each of the effective middle school math teachers in this research study fully incorporated these three criteria. Each teacher had several modes of instruction during the instructional block; there was much repetition for the skills that were being covered; and the math concepts were introduced and revisited over several days, weeks, and months of the school year. Effective math instruction at the middle school level requires teachers to understand what students need to learn and then to challenge and to support the students as they learn the mathematical skills or concepts. Brain-based learning theory, the middle school theory, the teacher participants in this study, and the activities used by the teacher participants in this study are correlated for student achievement.

The middle school theory, conceived by William Alexander, was developed to foster a set of beliefs about the proper education of students who were no longer elementary aged, but not quite ready for high school academia. The middle school theory supports relationships between the adults in the school and the students they teach. The two most distinct and recognizable components of the middle school theory are interdisciplinary teaming and common planning time. These two key components provide opportunities for teachers to know the students, establish a community of

learners, plan collaboratively, and foster collegiality among teachers. Research (Anfara, 2006) contended the characteristics of the middle school theory such as teams, advisory programs, and common planning, when present over time, lead to higher student achievement. However, this is not the case if the characteristics are implemented singly. Unfortunately, this is the case at West Tennessee Middle School. While two components of the middle school theory are in place: common planning for content level teachers and advisor/advisee groups, these are not the two components the teacher participants feel are most needed in the school. All middle school math teachers expressed the need to re-establish common planning time and teaming. Interdisciplinary teams with regular common planning and staffed by teachers prepared to teach middle school aged students tend to engage in classroom instructional practices which result in better student behavior and higher student achievement.

There is no doubt that smaller classes, teams of teachers with common planning times, and flexible scheduling are the epitome of middle school. Small communities of teachers and learners are the ideal to which the teachers at West Tennessee Middle School would like to aspire, and they are hopeful that one day the school will return to the true middle school theory. However, at this time, with legislative mandates as they are, teacher qualifications to teach in grades six through eight middle school as they are, and space as limited as it is in West Tennessee Middle School, the school will operate next school year on a seven-period day closely akin to the junior high organizational structure. For the teachers in the school, this will be the sixth scheduling, organizational, or administrative change in as many years. This change seems counter-productive in two main areas: what is best for teachers and what is best for students. Teachers repeatedly



referred to smaller classes, better knowledge of students, ability to personalize lessons and instruction, and communications with colleagues as the most important aspects of the middle school theory. If the administration truly wanted to do what is best for the teachers and students of West Tennessee Middle School, it should try to return to the middle school theory. Middle schools, by basic concept and design, are configured to promote the physical, intellectual, emotional, social, and moral needs of adolescent learners; therefore, it stands to reason that fully implementing the middle school theory would also promote the physical, intellectual, emotional, social, and moral needs of the middle school teachers.

### **Recommendations for Future Research**

This instrumental single case study within the bounded system of one middle school setting examined middle level math teachers' instructional best practices and methodologies and the middle school concept in the wake of the No Child Left Behind (2001), the reauthorization of the Elementary and Secondary Education Act (ESEA, 2010), and Tennessee First to the Top Act (2010). No Child Left Behind (2001), the Reauthorization of ESEA (2010), Tennessee First to the Top Act (2010), highly qualified teachers, and a concentrated emphasis on accountability has accentuated the importance of student achievement. Based on information gathered from the participants' answers to questionnaires, teachers' and focus group interviews, observations of teachers, and document examination, I have developed recommendations for identifying effective instructional methodologies of middle school math teachers.

An area of recommendation is to observe Tennessee and track how the state's teachers and students progress under Tennessee First to the Top Act (2010) and the

waiver to release Tennessee from No Child Left Behind (2001) mandates. Tennessee's education structure has undergone many changes in the past two years as part of the First to the Top Act (2010). Tennessee First to the Top (2010) brought forth the new annual teacher evaluations which will include 50% student achievement data information with 35% of the 50% total coming from TVAAS data collected by linkage of students to their teachers, 50% of the score is from the new teacher observation model, and the final 15%, although chosen by the teacher, must come from achievement data results. According to the mandates of the Act, a teacher must be at a Level 4 or 5 in years four and five of teaching to gain tenure. If a teacher receives a Level 3 or less, he/she will be employed on a year to year contract. A teacher receiving Levels 1 or 2 two years in a row is subject to dismissal. Only time will tell if the new requirements of the Act (2010) and instructional performance of the teacher yields the results the State Department of Education is requiring.

Another area of recommendation is to bring some aspects of the middle school theory back to middle schools that have moved away from that organizational structure. The one component of the middle school theory mentioned most was common planning time for teachers in a subject area or on a hallway. All teacher participants in this study voiced concern over the lack of time teachers have to talk about common students and their instruction. While it is understandable that many educational trends had to change with the implementation of No Child Left Behind Act (2001), it is imperative to meet the needs of students (academically) and teachers (instructionally).

Future research also exists for the area of mathematics. Bottoms and Phillips (2010) suggested that math teachers focus on the most essential mathematical concepts in

a given year. Many times, middle school math teachers try to cover too many concepts in a year's time. Such practice results in too much information being given to students without time to ensure they gained an understanding of the skills behind the sub-sets of information. Thus, students suffer from incomplete mastery of the mathematical concepts. "Focusing on essential mathematical concepts is especially important for students making the transition from the arithmetic-based curriculum of elementary school to the algebra-centered curriculum of high school," (Bottoms & Phillips, 2010, p. 188). It is hopeful that this practice will change as Tennessee transitions to Common Core State Standards (CCSS). Kindergarten through second grade had full implementation of CCSS in the 2011-12 school year. Grades 3 through 8 will begin partial implementation of math CCSS in the 2012-13 school year, with full implementation of all math and English/Language Arts CCSS in 2013-14.

The final area of recommendation for future research lies within this study itself. The research study's intent was to identify the effective methodologies of middle school math teachers, and for all intents and purposes, this occurred in the study. However, because large-scale studies correlating classroom practices to student test scores or academic outcomes have almost never been conducted, little is known about which strategies are most effective (Wenglinsky, 2000). It can be surmised that a research study focusing on another content area, or conducted in a school with a different demographic make-up, and in an inner-city school could possibly yield different results. All possibilities to generate the most effective instructional methodologies of teachers are recommended.

## **Limitations and Delimitations**

### **Limitations**

The limitations of this study were its focus on one area of middle school academia: mathematics. The study took place in one middle school with human subjects and limiting geographical factors. Certain limitations were naturally inherent to qualitative studies. As indicated by Bogdan and Biklin (2006), these involve the use of participants' subjective reports and the fallibility of a human data collector and interpreter. At the time of this study, West Tennessee Middle School was a Title 1 School. A Title 1 school is characterized by a large concentration of low-income students, as determined by the number of students enrolled in the free and reduced lunch program, and receives supplemental funds from the Federal government to help the school reach its educational goals. Although care was taken to choose a Title 1 school that was highly diverse in socioeconomic status and ethnicity, the geographic setting of this inquiry could limit the opportunity to generalize its conclusions. An additional limitation to setting the case study in a Title 1 school was that instructional practices and methodologies which work well in a Title 1 school setting may not work as well in a suburban school. A final limitation to this research study was my close association with the chosen site. Although I have not been the building level administrator for several years, I am a supervisor in the school district.

### **Delimitations**

I opted to limit the participants to middle level math teachers. Telese (2004) maintained that the way mathematics is taught has recently gained the attention of policy makers, parents, and other stakeholders as the result of recent reports of low performance

in an international comparison of United States students to students in other nations. A second rationale for limiting the research to this group was to further investigate the implementation of middle school theory in light of the mandates of No Child Left Behind Act (2001), ESEA (2010), and Tennessee First to the Top (2010). Literature suggests that many studies state the teacher is the influential factor of student success in the classroom (Marzano, 2000; Rice, 2003; Rivers & Sanders, 2002). However, studies were limited as to what methodologies the effective math teacher employs. Because Tennessee school districts have been given the directive to focus on seventh grade math achievement as a target in First to the Top Act (2010), I elected to focus this study on middle school mathematics instruction.

### **Conclusion**

For too many years in the field of education, a teacher's qualifications (i.e., advanced degrees and certification) were the hallmarks of a good teacher. This concept radically changed in 2001 with the passage of No Child Left Behind and the intensive focus on district, school, and teacher accountability. This changed even more for educators in Tennessee in 2010 with the passing of Tennessee First to the Top Act, the end result of receiving federal Race to the Top funding. For two very definite reasons, middle school math teachers were the focus of this study. First, middle school students (Grades 6-8) comprise two thirds of America's standardized test takers (NASSP, 2006). However, this age group is almost totally ignored in educational research. Research exists regarding middle school organization or structure (Anfara, 2006; Clark & Clark, 2006; Flowers, 2000), but little research exists on effective teachers or instructional methodologies for this age group. Second, McKinney and Frazier (2008) stated that

“students showed significant gains in mathematical achievement when placed with an effective math teacher for three consecutive years as compared with students placed with an ineffective teacher for the same time span” (p. 202). McGranger, VanDerHeyden, and Holdheid (2011) espoused that an essential component of raising student achievement in math is to improve the quality of math teaching.

In order to make our students able to compete in a global society, we must better prepare them for the world outside the classroom door. In order to make our students more competitive, we must make our teachers more effective. Thus, researching, observing, and emulating the effective instructional methodologies of middle school math teachers will raise student achievement and influence teacher accountability.

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## APPENDICES

### Appendix A: IRB Approval Letter



The Graduate School at Liberty University

November 3, 2011

Nancy Hutchison

IRB Approval 1178.110311: Academic Excellence in Action: A Case Study of Effective Instructional Methodologies of Middle School Math Teachers

Dear Nancy,

We are pleased to inform you that your above study has been approved by the Liberty IRB. This approval is extended to you for one year. If data collection proceeds past one year, or if you make changes in the methodology as it pertains to human subjects, you must submit an appropriate update form to the IRB. The forms for these cases were attached to your approval email.

Thank you for your cooperation with the IRB and we wish you well with your research project.

Sincerely,

A handwritten signature in black ink, appearing to read "Fernando Garzon".

**Fernando Garzon, Psy.D.**  
*IRB Chair, Associate Professor*  
**Center for Counseling & Family Studies**

**(434) 592-5054**



*40 Years of Training Champions for Christ: 1971-2011*

## Appendix B: Principal Participation Letter

Date:

Dear Principal:

My name is Nancy Hutchison, and I am an educational supervisor at Crockett County Schools in Alamo, TN, and a doctoral student at Liberty University in Lynchburg, VA.

As you know, teacher effectiveness, especially in the middle grades, is extremely important. The National Association of Secondary School Principals (2006) states that the success of No Child Left Behind rests largely on the shoulders of middle level leaders, teachers, and students. Students in grades 5 through 8 represent 57% (14 million) of the nation's annual test takers. Therefore, an effective middle grades teacher is not only a necessity, but should also be a requirement. The purpose of my case study is to observe effective math teachers' instructional methodologies in the hope these methodologies can be emulated by others.

Thus, I am asking for your help and the participation of your math teachers for this research. The following are the questions I would like to answer with my research:

- (1) What instructional best practices do effective math teachers, as identified by teacher effect data from the 2010 Tennessee Comprehensive Assessment Program (TCAP), utilize when teaching state standards to students in grades 5-8?
- (2) What is the common theme in the instructional best practices among effective math teachers of students in grades 5-8?
- (3) In what ways have middle schools and middle school math instruction changed as a result of the reauthorization of the Elementary and Secondary Education Act (ESEA, 2010), high stakes testing, student achievement, and individual accountability?
- (4) In what ways has West Tennessee Middle School been affected as a result of the No Child Left Behind Act (2001), the reauthorization of the Elementary and Secondary Education Act (ESEA, 2010), First to the Top Act (2010), high stakes testing, student achievement, and individual accountability?

I would ask that you allow me to come into your school to interview your math teachers and to observe them using the TN Performance Assessment. Pseudonyms will be used for the participants, the school, and grade level to protect the confidentiality of all involved with this study. I would like to have a focus group of 24 eighth grade students. I have one question that I would like to ask them about their teachers' instructional methods.

Since teacher effectiveness will now play a part in the retention/dismissal evaluation process and teacher tenure, I know this information will be valuable to all Tennessee educators. Because effective teachers are one of the pillars of ESEA (2010), it is my hope this research study can be beneficial to other areas of the nation, as well.

Please complete and return the enclosed form indicating your decision to participate in the study.

Thank you for your time and consideration.

Sincerely,

Nancy Hutchison



## **Appendix C: Consent Form**

Academic Excellence in Action: A Case Study of Effective Instructional Methodologies  
of Middle School Math Teachers

Nancy Hutchison

Liberty University

Department of Education

Dear \_\_\_\_\_:

You are invited to be in a research study of the instructional methodologies of effective math teachers. We ask that you read this form and ask any questions you may have before agreeing to be in the study.

This study is being conducted by Nancy Hutchison, a doctoral student in the Education Department at Liberty University.

### **Background Information**

Teacher effectiveness has been discussed a great deal lately in regard to using teacher effectiveness and TVAAS as a means of retention or dismissal in the evaluation process of teachers. However, no one can seem to define teacher effectiveness. A plethora of research exists for characteristics of effective teachers, but minimal research exists to show the methodologies effective teachers use day in and day out in their classrooms. The purpose of this study is to categorize those successful instructional strategies being used by effective math teachers and to share the information with others in education. Because I am also interested in finding if the middle school theory is still widely used during the reauthorization of ESEA, the study is set at the middle grades level. The study will attempt to answer the following questions:

- (1) How do effective teachers, as identified by teacher effect math scores on the 2010 Tennessee Comprehensive Assessment Program, utilize best practices to teach state standards to their students in post-No Child Left Behind middle schools?
- (2) What is the common theme in the instructional best practices among effective math teachers of students in grades 5-8?
- (3) In what way have middle schools and middle school math instruction changed as a result of the reauthorization of the Elementary and Secondary Education Act (ESEA, 2010), high stakes testing, student achievement, and individual accountability?
- (4) In what ways has West Tennessee Middle School been affected as a result of the No Child Left Behind Act (2001), the reauthorization of the Elementary and Secondary Education Act (ESEA, 2010), First to the Top Act (2010), high stakes testing, student achievement, and individual accountability?

### **Procedures**

The goal of this research design is to collect first-hand, descriptive data regarding the effective instructional methodologies of middle school math teachers. To gather data

from the participants of the study, I will utilize a questionnaire, an interview, and observation of effective math teachers. I will use the Teacher Instructional Performance Assessment as the observation instrument. The, interview and the observation will take place in your school. The questionnaire will take approximately 20-25 minutes to complete. The interview will take 30-45 minutes to complete. The observation will be the length of one class period, 52 minutes. I will provide a copy of the observation instrument beforehand. Through observation of teachers' instructional strategies, I will compile the results and establish what instructional methodologies are used most often.

### **Risks and Benefits of being in the Study**

The minimal risks involved are those associated with interviewing and being observed by an administrator. Observations will be recorded on the official document provided by the Tennessee State Department of Education and will be destroyed at the end of a three year period. Pseudonyms will be used for participants and schools to protect confidentiality. Teachers may have a copy of the completed observation document, if he/she so chooses.

This study will provide administrators and teachers with effective instructional practices that can be emulated and shared with other teachers. However, the ultimate benefit of this study is that its findings may help others in the field of education to become more effective, which will be of benefit with the Reauthorization of ESEA (2010), First to the Top (2010), and enhancing teacher effectiveness.

### **Confidentiality:**

The records of this study will be kept private. In any sort of report we might publish, we will not include any information that will make it possible to identify a subject. Research records will be stored securely and only I will have access to the records.

Pseudonyms will be used to protect the confidentiality of the participating teachers and school. If teachers wish to have a copy of the completed observation document, one will be provided. The interviews between researcher and teacher will be recorded and summarized. The recordings and transcriptions will be stored in a fireproof gun safe at the researcher's home and destroyed at the end of a three year period. The research data will be limited to this research study.

### **Voluntary Nature of the Study:**

Participation in this study is voluntary. Your decision whether or not to participate will not affect your current or future relations with Liberty University. Your decision to participate will not impact your job, your relationships within the school system, or your livelihood in anyway whatsoever. If you decide to participate, you are free to not answer any question or withdraw at any time without affecting those relationships.

**Contacts and Questions:**

The research conducting this study is Nancy Hutchison. You may ask any questions you have now. If you have questions later, **you are encouraged** to contact Mrs. Hutchison at (731)696-2604 or [nhutchison@liberty.edu](mailto:nhutchison@liberty.edu).

If you have any questions or concerns regarding this study and would like to talk to someone other than me, **you are encouraged** to contact the Institutional Review Board.

*You will be given a copy of this information for your records.*

**Statement of Consent:**

I have read and understood the above information. I have asked questions and have received answers. I consent to participate in the study.

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Signature of Researcher: \_\_\_\_\_ Date: \_\_\_\_\_

## Appendix D: Teacher Participation Letter

(Date)

Dear (Name of Teacher):

My name is Nancy Hutchison. I am an educational supervisor for Crockett County Schools and a doctoral student at Liberty University in Lynchburg, VA. The most significant factor that influences student learning in school classrooms is the quality and effectiveness of the teacher who heads the classroom. As you know, all teachers are not created equally, yet the state of Tennessee wants to measure all by the same yardstick—TVAAS scores. I am conducting research study on the effective instructional methodologies of middle level math educators. It is my hope that by spotlighting the instructional methods of effective math teachers other teachers will emulate the methodologies so **all** teachers are effective teachers.

I am writing to you because I would like to interview you and observe your teaching. I will use the Teacher Instructional Performance Assessment as the observation instrument. Pseudonyms will be used for participants and school to protect the confidentiality of all involved.

Please complete the consent form included with this letter stating your intent to participate. I will pick up the form, sign it, and give you a copy on my next visit to the school.

Thank you for your time and consideration.

Sincerely,

Nancy Hutchison

*You will be given a copy of this information for your records.*

**Statement of Consent:**

I have read and understood the above information. I have asked questions and have received answers. I consent to participate in the study.

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Signature of Researcher: \_\_\_\_\_ Date: \_\_\_\_\_

## **Appendix E: Letter to Parents**

Date:

Dear Parents/Guardians:

Your child has been selected to be in a research study of the instructional methods of effective middle school math teachers. I ask that you read this form, talk with your child about participating in the study, and ask any questions you may have before agreeing to be a participant in the study.

This study is being conducted by Nancy Hutchison, a doctoral student in the Education Department at Liberty University in Lynchburg, VA and an educational supervisor with Crockett County Schools.

### **Background Information**

Teacher effectiveness has been discussed a great deal lately in regard to using teacher effectiveness and TVAAS as a part of the teacher's evaluation results. However, no one can seem to define teacher effectiveness. Much research exists for characteristics of effective teachers, but little research exists to show the instructional practices teachers use day in and day out in their classrooms. The purpose of my study is to categorize those successful instructional strategies being used by effective math teachers and to share the information with others.

### **Procedures**

To accomplish the goals of this study, I will be asking students such as your child just one question. The question is, "What is the best lesson your math teacher has taught, what did you learn, how do you know you learned, and what made it the best lesson?" This activity will take approximately 45 minutes to complete and will be administered in 'free' time; classes will not be disrupted by this study.

### **Risks and Benefits of Being in the Study**

The minimal risks involved are those associated with being questioned by someone who is in the school system, but is unfamiliar to your child. To ease this, I am asking that the guidance counselor be with me during the interview process. Additionally, your child will not be interviewed alone, but in a 'focus group' of 6 other students. No names or likenesses of these participants will be used. I will only use the information gathered by answering the question.

### **Confidentiality**

Throughout this study, the confidentiality of your child's responses is guaranteed. Pseudonyms will be used in place of your child's name

Upon completion of the study, I will report the general results to parents and to the school. These results will be based on the combined data from all students who

participate. Because the study guarantees anonymity, no individual student's results will be available.

I hope you agree with me that this study is important and you will allow your child to take part. If you are willing to have your child participate, please talk with your child about participation. Your decision to allow your child to participate or not to participate will not favorably or adversely affect the student in any way.

If you agree to have your child participate, please sign the attached consent form and return the form in the self-addressed stamped envelope.

Thank you for your consideration of this request. If you have any questions or comments about the study, please call me anytime. My number is (731) 345-6106.

Sincerely,

Nancy Hutchison



## Appendix F: Questionnaire

1. Are you:    Male                      Female
  
2. Circle each of the following regarding your education and certification.
  - A. General education—circle the highest that applies.  

Bachelor's Degree	Master's Degree
Master's Plus 30 Degree	Education Specialist Degree
Doctoral Degree	
  
  - B. Certification—circle all that apply.  

Elementary teaching license	Secondary teaching license: content area:
Special education license	Bilingual credentials
Supervision certification	Alternate licensure: content area:
  
3. Teaching Experience:
  - A. How many years have you taught, not counting this year? \_\_\_\_\_
  - B. How many years have you taught at your present school, not counting this year? \_\_\_\_\_
  - C. How many years have you taught middle school mathematics?
  
4. What is your class size?
  
5. What effective instructional methodologies do you incorporate into your daily teaching repertoire?
  
6. How do you know these methodologies are effective?

## **Appendix G: Interview Guide for Educators**

1. What makes a math teacher effective?
2. Do you consider yourself an effective teacher? Explain fully, please.
3. Will you share your TVAAS effectiveness level data with me and allow me to publish this information in my research?
4. Have your instructional methods changed over the past five years? Explain fully, please.
5. Are the changes, or lack thereof, due to No Child Left Behind (2002), ESEA (2010), or Tennessee First to the Top (2010), or some other factor? Explain fully, please.
6. Has West Tennessee Middle School changed in organization or structure over the past five years? Explain fully, please.
7. Are the changes, or lack thereof, due to No Child Left Behind (2002), ESEA (2010), or Tennessee First to the Top (2010), or some other factor? Explain fully, please.
8. What components of the middle school theory, if any, should be reincorporated into West Tennessee Middle School? Explain fully, please.

**Appendix H: Tennessee Teacher Instructional Performance  
Assessment**



Tennessee Department of Education

Commissioner Lana C. Seivers

September, 2007

## TEACHER INSTRUCTIONAL PERFORMANCE ASSESSMENT

### GUIDE

#### PURPOSE

Pursuant to Public Chapter No. 376, House Bill 472, of Public Acts, 2007, Section 10, Tennessee Code Annotated, Section 49-5-5205, principals are to conduct a performance assessment two times within a five year period for each teacher in the principal's school. This instructional performance assessment guide is designed to provide support for schools and school systems to that end. This guide provides principals with a tool which incorporates the domains of the approved Framework for Evaluation and Professional Growth and is designed to collect data over time on individual teachers. This assessment information may serve to inform the Performance Assessment as prescribed by law, two times every five years.

#### DESIGN

This document is designed to align with the Approved Framework for Evaluation and Professional Growth and allows principals and reviewers to focus on one domain per classroom visit. The feedback conference format is designed to enhance collaboration between the principal and teacher, as they jointly develop opportunities for improvement in each area of need.

#### RECOMMENDED PURPOSES AND PROCESSES

Data from this instrument may be used at the teacher level to improve individual teaching strategies, build individual professional development plans, and or/growth plans. At the school level this information may be used in an aggregate form to guide instructional practices school-wide in the TSIP Action Plan supported by data and/or to develop school-wide professional development plans as appropriate. Other uses include assuring inter-rater reliability, \*development of a systemwide professional development plan, as a focus for celebrations, the accountability for fund use, alignment of professional development plans (individual, school or district) with other resource management, and to build capacity in the classroom, school and system.

#### RECOMMENDED FEEDBACK PROCESS

Feedback should be written and communicated within 48 hours.

\*Compile and share reports with appropriate LEA Personnel monthly or quarterly.

#### DIRECTIONS

This performance review may be conducted by the administrator or identified other, as the principal requests. It is recommended that the reviewer (or designee who is a non-

administrator, in an administrator's presence,) review the information with the teacher to provide timely feedback and an opportunity for dialogue. Upon completion of the discussion, the teacher and reviewer should both sign and date the form. Signature indicates that the conference has been held; it does not indicate agreement with findings. Teachers should receive a copy of the signed document. If a teacher elects not to sign the form, the principal should secure a witness signature which reflects that the teacher was a participant in the conference, had an opportunity to respond in writing, and received a copy of the document. A copy of the signed document should be placed in the teacher's file.

Performance Standards <b>Domain ONE:</b> <b>Planning</b>	Implementation Evidence	Check	Data Source
<b>INDICATOR A:</b> Establishes appropriate instructional goals and objectives	a. Selects goals and objectives aligned with the Tennessee academic content standards and state assessments.		
	b. Gives instructional priority to content goals and objectives that have been identified as high-stakes assessment items.		
	c. Identifies goals and objectives that include the key concepts of the content area and are developmentally appropriate for all students.		
	d. Includes goals and objectives that emphasize higher-order thinking skills appropriate to the content area and the students.		
<b>INDICATOR B:</b> Plans instruction and student evaluation based on an in depth understanding of the content, student needs, curriculum standards, and the community	a. Uses state performance indicators and multiple classroom assessments within the content to obtain information about students and their achievement, and uses this information to design and deliver appropriate instruction.		
	b. Plans and designs instruction and evaluation aligned with state academic content standards and state performance indicators that are developmentally appropriate for all students.		
	c. Selects research-based strategies, methods, activities, and materials validated as sound practice within the content area.		
	d. Plans student evaluation and assessments that will allow all students ample opportunity to demonstrate what they have learned on the identified content goals and objectives.		
	e. Designs instruction to cause students to integrate content knowledge, skills, and inquiry across content areas.		
	f. Designs instruction that utilizes materials, human and community resources, and technology in ways appropriate to the content area.		
	g. Includes instructional experiences relevant to students, real life, and student career pathways.		
<b>INDICATOR C:</b> Adapts instructional opportunities for diverse learners	a. Uses aggregated and disaggregated data from state assessments, and classroom formal and informal assessments to identify the diverse needs of students as a whole class, as groups, and as individuals.		
	b. Plans and designs content instruction that is developmentally appropriate and includes strategies, activities, and assessments appropriate to the content and learner.		
	c. Plans and designs evaluations and assessments for diverse students.		

Performance Standards <b>Domain TWO: Teaching Strategies</b>	Implementation Evidence	Check	Data Source
<p><b>INDICATOR A:</b> <i>Demonstrates a deep understanding of the central concepts, assumptions, structures, and pedagogy of the content area</i></p>	a. Presents the content correctly in a logical, coherent fashion, building on content previously mastered and connecting to content to be learned in the future.		
	b. Paces the presentation of concepts appropriately to build students' capacity for critical thinking, problem solving, and clarifies when students misunderstand.		
	c. Uses questioning techniques appropriate to the content and structures activities that require students to use higher-order thinking.		
	d. Facilitates students in constructing their own understanding of the content in large group, small group, and independent settings, and provides specific, corrective feedback relevant to the task.		
	e. Assures that students have ample opportunity to explore, respond, and extend their thinking through technology, as appropriate to the content area.		
<p><b>INDICATOR B:</b> <i>Uses research-based classroom strategies that are grounded in higher order thinking, problem-solving, and real world connections for all students</i></p>	a. Emphasizes student ownership of learning through connecting the content and content standards to employability and/or postsecondary education.		
	b. Promotes positive intellectual interactions among students and teacher through instructional experiences that result in student investigation of theories, facts, and opinions related to the content area.		
	c. Provides opportunities for students to learn and challenge each other through planned, cooperative peer interaction.		
	d. Communicates the content to students through research based methods, activities, and materials specific to the content that are differentiated for diverse learners.		

Performance Standards <b>Domain THREE: Assessment and Evaluation</b>	Implementation Evidence	Check	Data Source
<b>INDICATOR A:</b> Uses appropriate evaluation and assessments to determine student mastery of content and make instructional decisions	a. Aligns classroom assessments with state performance indicators and grade level accomplishments.		
	b. Uses multiple evaluations and assessments to evaluate student mastery of content and to inform instruction for the class as a whole, as individuals, and within diverse groups.		
<b>INDICATOR B:</b> Communicates student achievement and progress to students, their parents, and appropriate others	a. Uses state assessment data for communicating student achievement in the content area to students, parents and other stakeholders.		
	b. Maintains correct and useful records of student work within the content area and communicates student performance correctly and responsibly to students, parents, and other stakeholders, with prompt and useful feedback given to students.		
<b>INDICATOR C:</b> Reflects on teaching practice through careful examination of classroom evaluation and assessments	a. Uses state and national academic content standards, curriculum guides, and state assessment outcomes as a framework for reflection.		
	b. Analyzes state academic content standards and state performance indicators to assure that standards have been taught to the level of understanding assessed by the standard.		
	c. Reflects on strategies, methods, materials, and activities used in instruction and seeks feedback from colleagues.		
	d. Demonstrates efficacy with struggling students and diverse groups.		



Performance Standards <b>Domain FOUR:</b> <b>Learning Environment</b>	Implementation Evidence	Check	Data Source
<b>INDICATOR A:</b> Creates a classroom culture that develops student intellectual capacity in the content area	a. Exhibits enthusiasm and positive disposition toward the content area and conveys high expectations for success to students.		
	b. Establishes clear classroom standards and expectations for behavior that emphasize self-control, self-discipline, collaboration, and mutual respect among students and teacher.		
	c. Establishes clear classroom standards and expectations for achievement that focus upon content knowledge, engagement in purposeful learning, high academic performance, and ownership of learning.		
<b>INDICATOR B:</b> Manages classroom resources effectively	a. Creates a classroom environment that organizes and manages time, space, facilities, and other resources for maximum engagement of students in the content.		
	b. Demonstrates flexibility in restructuring time, space, facilities, and other resources as the situation demands.		

Date of Observation \_\_\_\_\_ Page \_\_\_\_ of \_\_\_\_ pages

Teacher Name: \_\_\_\_\_

<b>Time</b>	<b>Observation Notes</b>

## Appendix I: Notes, etc. from Questionnaires

Teachers/Education	Grade Teaching	Experience
1. W-male (B)	6	5 years
2. G-female (B)	6	2 years-low
3. E-female (B)	7	2 years-low
4. A-female (B)	7	7 years-mid
5. C-female (M)	8	5 years
6. M-female (B)	8	2 years-low
7. W-female (M)	multi	14 years-high
		36 years total
		36 divided by 7= 5.1 Avg. exp

HQ Status (what they said checked against Assurance Page in Central Office)

Teacher 1—Elementary Praxis (Grades 1-6)

Teacher 2—Elementary Praxis (Grades 1-6)

Teacher 3—Middle Grades Praxis (Grades 4-8)

Teacher 4—Math Content Praxis (Grades K-8)

Teacher 5—Middle Grades Praxis (Grades 4-8)

Teacher 6—Middle Grades Praxis (Grades 4-8)

Teacher 7—Elementary Praxis (Grades 1-6) and Professional Matrix for Math (Grades 7-8)

Effective Instructional Methodologies—(They say)	Tally
Grouping	3
Technology (includes clickers and Smart Boards)	1
Real-life examples	1
A/V presentations	1
White boards (hand-held)	1
Individual help	1
Modeling	3
Guided practice	1
Notes	1
Demonstrations	1
Lecture	2
Feedback from teacher	1
Hands-on activities	2

How do you know methods are effective? Examples...

- Technology has enhanced the overall effectiveness of lessons and enables students to be more involved
- I have students show and talk me through their math problems

- I compare multiple assessment scores to determine if improvements have occurred
- Students seem to enjoy them (methods) and they (students) have good grades
- I let students present problems at the board so I know they are learning from me and from the other students
- Students are engaged and their test scores have gone up

**Appendix J: Sample Interview Summary**  
**Personal Interview with Teacher 5—conducted 12/06/11 at 9:00 AM**

Question 1: Teacher Effectiveness—

- #1 is relationships
- Being able to build relationships and make it (math) more hands-on
- Be energetic
- Be excited about what you're teaching
- If you're not excited about what you're teaching, they (students) can tell
- Have to know content and be able to differentiate

Question 2: Personal Effectiveness—

- TVAAS proves I am
- I explain everything thoroughly
- I am systematic: step-by-step everyday
- I encourage them
- I include as many activities in a lesson as possible
- I try to make it fun and not all sit down, take notes and lecture everyday
- If I do have to lecture one day, I plan activities to support the lesson to do with the class the next day
- I make TCAP style tests with 4 answer choices
- Smart Boards helped to open up more resources for the teachers and students than ever before

Question 3: TVAAS

- Five

Question 4: Change in instructional methods—

- More visuals (because of Smart Boards)
- I know now, because I have more experience, how to teach certain topics
- I differentiate more, adapt and change easier, and stop lessons if I see students are struggling
- Presentation of material is better than in previous years because I am more confident in my abilities
- I try to create a variety of strategies to teach a concept
- I use lots of formative assessments

Question 5: Changes due to Federal and/or State legislation—

- New eval system upped the game
- It forces you to push the kids more, and ask them higher order questions
- I feel we are still in the catch-up process from when standards changed three years ago

Questions 6, 7, and 8: Changes in organization of school, what caused the changes, and what part of middle school concept should return—

- Not enough class time (instructional time)
- I liked it when I could talk to other math teachers on my hallway during planning time
- I have cross grade planning, but would like a math hallway
- I really liked being part of a team
- Changes due to No Child Left Behind
- I feel like we haven't had First to the Top long enough to see how it will effect teachers and students

## Appendix K: Example of Teacher Observation

Date of Observation 02/24/12 Page 1 of 4 pages

Teacher Name: \_\_\_\_\_ Ms. M \_\_\_\_\_

Time	Observation Notes
9:04 *tech- nology *bell ringer	Ss enter classroom—Bell work on board Ss get calculators and begin to work Bell ringer is a review of yesterday’s lesson
	Standards on wall Student work on back wall Crazy # is an irrational number—it keeps going
*form. assess	23 students T tells Ss to take a half sheet of paper—3 questions about what we did yesterday <ol style="list-style-type: none"> <li>1. Name 1 of 3 ways we know a # is rational</li> <li>2. Give an example of a rational #</li> <li>3. Give an example of an irrational #</li> </ol>
	T ‘spot checks’ a few of the papers for correctness...”This gives me a way to gauge instruction for the day.”
9:10 *tech. *obj. of day	T puts objective on Smart Board: <ul style="list-style-type: none"> <li>• Expand on rational and irrational numbers</li> <li>• Order rational and irrational numbers on a number line</li> <li>• Compare rational and irrational numbers</li> </ul>
	Ss copy these objectives on their own paper Ss are instructed to convert all numbers given in next exercise to the same form: “What does this mean?” Ss respond. “Convert all decimals...it will be easier to put them on a number line.”
*model	Teacher puts this example on board: $\frac{1}{4}$ , 75%, .04, 10%, $\frac{9}{7}$ Ss respond with correct answers in decimal form

	T asks Ss to put numbers in order from least to greatest
	T gives another set of numbers for Ss to do on their own: $.25$ , $3/8$ , $7/12$ , $5/16$ , $.5$ Ss work and T monitors All Ss on task “Numbers rational or irrational?” Ss respond
9:14  *tech	T puts corrects answers (numbers) on board and asks for a volunteer to put them in order for her S goes to Smart Board At times, T gives hints to S to help him get the numbers in the correct order
*group	“Now you’re going to do some on your own.” T passes out worksheet for Ss “Work with the group you are sitting in to do this worksheet.” (Although Ss could work in groups, most chose to work independently) Thought: Have worksheet on Smart Board...Ss copy onto their own paper Ss work and T monitors
9:18  *part-ners *model	“Stop where you are and turn to your A partner and check answers.” Ss do this—one S explains to another—Ss correct mistakes T explains she observed Ss having difficulty with negative numbers T takes time to demonstrate on Smart Board how to properly place negative numbers
9:26  *act *group	“Let’s do an activity with what we’ve worked with so far this morning.” T puts students in groups of 4 (1 group of 3) and passes out note cards to the groups Put the numbers on the cards in order from least to greatest Students work



	<p>Ss work and then T asks each group to stand in order of their note cards</p> <p>As Ss assemble themselves, T monitors and corrects the Ss in groups</p> <p>Also asks other groups what they observe...</p> <p>“Looks like you understand ordering; let’s do a number line.”</p> <p>T does a quick review of number lines</p> <p>Puts examples on Smart Board</p> <p>“Remember to change all numbers to the same form—What form is that?”</p> <p>Ss—“decimals.”</p>
<p>9:34</p> <p>*model</p>	<p>“Do this with me.”</p> <p>T puts example on board:</p> <p>←-----→</p> <p>0 1 2      <math>\frac{3}{4}</math>, <math>2\frac{1}{4}</math>, <math>\frac{6}{12}</math>, <math>\frac{10}{10}</math></p> <p>As Ss give answers, T puts them on number line</p>
<p>9:37</p> <p>*act</p>	<p>“Now with your note cards, I want you to make a human number line around the classroom.”</p> <p>Ss take the cards and begin to line up...Ss have to remember to convert to decimals and one student has the <math>\pi</math> symbol on the note card</p> <p>T monitors and helps Ss as they assemble themselves</p> <p>T reminds Ss to convert to decimals</p> <p>Several Ss get paper to work conversions</p>
<p>9:47</p>	<p>After discussion and conversion of numbers among Ss, they are finally lined up in ‘order’</p> <p>T evaluates number line</p> <p>“Look at the number to your left and to your right to make sure you are in the right spot.”</p> <p>4 Ss out of order</p>
<p>9:51</p>	<p>T asks SS to go back to their seats</p> <p>T brings class back together by asking the SS to restate the objective of the day</p> <p>Ss respond</p>

9:52  *closure	“There’s just a few minutes left in class, so let’s review what we did today.” T puts 3 questions on Smart Board and gives Ss a minute to answer 1 question T then chooses a question (Q3)...all Ss who answered question three stood up T had each S read his/her answer Ss with the correct answers lined up at classroom door to leave Incorrect answers had to answer another question This procedure goes on until bell sounds for dismissal of class (9:56)
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## Appendix L: Example of Teacher Observation

Date of Observation 01/09/12 Page 1 of 2 pages

Teacher Name: Ms. E \_\_\_\_\_

Time	Observation Notes
8:00 *bell ringer	Students enter room Bell ringer on board Objective on board
8:04	Teacher begins class Checks roll Tells Ss they have about a minute to finish bell ringer T walks around class and monitors Ss work T introduces objective for the day
8:07 *I Can *Tech	“Okay, let’s write an I Can statement. Based on your own knowledge of inequalities, write what you will be able to do at the end of class today.” Ss write I Can statements... T shows a Discovery Education video on inequalities
*real life	T then asks how inequalities are used in real life Ss respond: Six Flags rides, cell phone minutes, time on a computer, price for items vs. amount of money in pocket
8:15 *Tech *Model *Form Assess	T reviews days lesson by putting 5 problems on Smart Board T works first problem; T and Ss work next 2 problems; Ss work last 2 problems T does a Thumbs Up/Thumbs Down to assess learning on last 2 problems
8:30 *Pairs *Act	T puts Ss into pairs to work 6 problems First 3, Student A is teacher and Student B is student—then roles reverse for last 3 problems T monitors Ss as they work Redirects Ss as needed All Ss on task

<p>8:40 *Tech  *Form Assess</p>	<p>T goes over problems with Ss T puts all work on Smart Board and goes over them step by step Each problem is assessed with a Thumbs Up, Thumbs Side, or Thumbs Down</p>
<p>8:47  *Form Assess</p>	<p>To end class, T instructs Ss to get clickers out of the desks and log in T puts 5 review questions on Smart Board and asks Ss to answer them</p>
	<p>T shows Ss how the class as a whole did on the review assessment 87% of the class mastered the objective of working with inequalities in math T has students to repeat the objective of the day and to revise I Can statement if needed</p>