Investigating Guided Math in Middle School Mathematics Courses

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Math in the Middle Institute Partnership
Action Research Project Report

In partial fulfillment of the MAT Degree
Department of Mathematics
University of Nebraska-Lincoln
July 2010
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Abstract

In this action research study of two middle school classroom teachers of grades 5 and 6 at an elementary school, I investigated how incorporating a guided math framework in middle school mathematics courses can impact instruction, student discipline, attitude and learning. I discovered that incorporating guided math can improve instruction, student discipline, attitude and learning. Quantitative results are publicized of the impact incorporating guided math in one sixth grade class. These include four major effects. First, when planning lessons, teachers give thoughtful consideration to how to instill a numeracy-rich environment that promotes mathematical learning by the students. Second, the role of the student shifts from the traditional middle school classroom to one in which the student is an active participant in their learning. Third, teachers provide a numeracy-rich environment with high expectations for all students, who not only live up to those expectations, but also who cause other students’ awareness of them to reflect those expectations. Fourth, teachers taught students the relationship between effort and learning where students know who is ultimately responsible for their learning. As a result of this research, I plan to share my findings and lead professional development workshops on guided math with all interested teachers at my elementary school. I also have been asked to participate in some professional development opportunities with my district’s Elementary Curriculum Consultants during curriculum day.
Introduction

Instructional Coaching/Facilitating is one of the most rewarding positions in our public school system. Teachers can learn a great deal when coaches/facilitators observe their classrooms. As an instructional facilitator, it was my responsibility to provide and support the implementation of best practices, which result in better performance. This meant monitoring and identifying low performing students, guiding teachers in changing instructional strategies to support student needs, coordinating efforts in curriculum implementation, seeking out and providing instructional resources and curricular assistance for classroom instruction, and modeling best practices. In many observations, one of the most crucial aspects in learning is making sure students are engaged in learning in all subjects, especially math instruction. Therefore, the issue of teaching that I have embarked upon was in the attempt to explore how guided math impacted student engagement and mathematics learning. I wanted to know if guided math can have a positive impact on middle-school mathematics instruction, student discipline, attitude and learning.

In the sixth grade class I worked with, the needs and academic achievement of the students are very diverse. The academic achievements range from three-grades-below grade level to on grade level. I selected this study because from what I observed in typical middle school classrooms, math instruction is usually taught by beaching the whole group and then assigning students an assignment to complete individually. It is my opinion that teaching to the whole group is not engaging the majority of the students in learning. In a whole group setting, students rarely ask questions regarding the lessons being taught. Time and time again, only those students who are succeeding or vying for negative attention participate during whole group instruction.
Furthermore, students rarely complete the assignments that are assigned or struggle to complete the assignments accurately and independently. It was my hope that guided math would require teachers to engage and interact with students in a style that is quite different from the typical middle school classroom mathematics course. The issue of incorporating guided math in middle school mathematics course to improve instruction, student discipline, attitude and learning relates directly to the National Council of Teachers of Mathematics (NCTM) Principles, Process Standards and Content Standards (2000). With my assistance, a sixth grade teacher did incorporate principles that outline the particular characteristics of high-quality mathematics education in her daily routines and procedures. The NCTM principles of equity, curriculum, teaching, learning, assessment and technology were used to guide the teacher’s decision making when it came to lesson planning and activities geared for mathematics instruction. Incorporating guided math in middle school mathematics instruction did enhance how the teacher taught the subject matter.

Problem Statement

Due to district-mandated time allotments, teachers are required to teach mathematics for an hour daily in sixth grade. With no time to waste, the principle of teaching requires teachers to understand what students know and need to know. With that in mind, the principle of teaching requires teachers to take information and challenge and support their students’ learning. With more challenging middle school math classes and increased access to advance courses, a student’s chances of getting into higher-level math courses in high school is increasing. On the other hand, the achievement gap by eighth grade is significantly growing. The biggest predictor for an increase in achievement gap is the students’ prior achievement and placement in math.
classes. Math achievement is measured via tests, such as the California Achievement Test (CAT) or the district’s Criterion Reference Test (CRTs) given during the school year. Frequently, the teacher’s class recommendations are determined by a student’s engagement and effort. Therefore, students’ displays of attentiveness, disruptiveness and homework habits have a lot to do with their academic progress. I have a problem with this. It is my hope that educators themselves must begin to address gaps in achievement and opportunities to learn within their classroom in order to make a positive difference. In my opinion, until we change our ways of instruction, ensuring that each student has the skills he or she needs to be successful in math class still remains nothing but a dream.

As an Instructional Facilitator, I wanted to know how I could help teachers improve quality without reducing class sizes and how I could help teachers to create a climate that fosters both academic learning and student effort. I wanted to know if guided math could have a positive effect on middle school mathematics instruction, student discipline, attitude and learning. It is my hope that guided math will provide a meaningful use of time, focusing on small group instruction sharing the same or similar instructional needs. With this in mind, in my ideal classroom, guided math will help teachers think about individual student learning, plan and organize instruction, and keep students engaged and on task. Sammons (2009) states, “teachers are searching for effective means to reach all of their students and ways to adapt instructional methods to accommodate all levels of learners” (p. 17). I hope by incorporating the principles of learning and curriculum with guided math, teachers will be required to actively build new knowledge from a student’s experience and prior knowledge with content that is focused on mathematical needs. I hope guided math will insist on high expectations and support for all students, as just teaching whole group lessons translates into fewer skills mastered, an increase in
unwanted behaviors and a greater achievement gap. Last but not least, I hope by incorporating the principles of assessment with guided math will support the learning of important mathematics and furnish useful information to both teachers and students. In my ideal classroom, students will be engaged in learning new material because they have a toolkit of skills from guided math instruction, which will impact student discipline, attitude and learning.

**Literature Review**

I have reviewed literature related to guided instruction and found that guided math is a framework for mathematics instruction. In doing so, I have identified three main themes. The first is instruction and assessment in a numeracy-rich environment. Signs of a numeracy-rich environment include evidence of mathematics instruction, such as manipulatives, math books, posted student work, and stations where students participate in real-world, meaningful problem-solving opportunities. The second theme is that feedback is critical during guided math. Such feedback helps to maximize time and offer ample opportunities for informal assessment using flexible groupings based on students’ needs as well as strengths. In these small groups, teachers can provide specific instruction and feedback that best challenges all learners. The last theme I address deals with providing a more collaborative atmosphere for interaction. This collaborative atmosphere for interaction between students and students and teacher and students allows instruction to become more relevant and a more powerful tool.

**Instruction and Assessment in Numeracy-Rich Environments**

Teachers and students can analyze formative and summative data as part of an ongoing cycle of instructional improvement and goal setting (whole group to guided group) to test hypotheses and increase student learning. For more extensive literature on assessments, I turned to Popham. Popham is a leading figure in the assessment movement that promoted criterion-
referred measurements and was active and productive in the area of educational test development. He received several awards for his career contributions to educational measurement. He was also the president of the American Educational Research Association (AERA). Popham (2006) stated, “Assessments for learning involves the frequent, continual use of formal and informal classroom assessments” (p. 82). Getting teachers and students to analyze data will help them set goals that influence instruction and daily activities. In many typical math classes the teacher is the center of instruction.

According to Leahy, Lyon, Thompson, and William (2005), “everything we do-such as conversing in groups, completing seatwork, conversing and answering questions, working on projects, handing in homework assignments, even sitting silently and looking confused- is a potential source of information about how much they understand” (p. 19). In this study, they held a workshop during the summer with teachers exploring a number of ways of introducing the ideas of assessment for learning based on their research. As a way of following up, they met with those teachers monthly to learn what worked and gave suggestions on how to improve or develop the practice of assessment for learning techniques. They also spent time observing the participating classroom teachers’ classes looking at the effects these techniques had on student learning. As a result they found that different techniques worked for different teachers. This confirmed that assessment for learning is very important, but there is no one-size-fits-all package. Nevertheless, they pointed out five broad strategies that would be helpful for teachers. These strategies were:

- Make sure the objectives are clarified and shared for success
- Make sure you have effective discussions, questions and learning tasks
- Make sure you provide informative feedback that moves students in a positive direction
- Make sure students take responsibility for their learning
- Make sure students learn to use one another as resources.

The authors stressed teachers should use assessment for learning as a way to look for evidence of student learning. When teachers used this evidence to guide their instruction, they are able to see where their students are, where they want to go, and how they want them to get there.

Popham (2008) stated that there are four levels of formative assessment. One of the levels Popham describes deals with the teachers’ instructional adjustments. “Teachers collect evidence by which they decide whether to adjust their current or immediately-upcoming instruction in order to improve the effectiveness of that instruction” (p. 49). Popham’s research and opinion of this matter is based on the research of others. In this article, he explains how formative assessment can be divided into the four levels. He describes the first level as teachers adjusting to current or immediate instruction in order to improve student mastery. The second level of assessment Popham talks about in this article is the importance of students adjusting to this form of learning tactics and strategies. The third level explained in this article has to do with the role of the teacher shifting the classroom climate. Last but not least, Popham describes how it is important for this shift to be school-wide.

Another research article that influenced my research was by Tomlinson (2007). She explains in this article the 10 understandings about classroom assessment and how she views assessment as a way of informing teaching and, finally, informing learning. For example, Tomlinson says informative assessment is not always formal and how it is not about after the end of a unit. Most importantly, she explains in this article, informative assessment is not just about
student readiness. She goes on to discuss how applying these 10 understandings about assessment requires robust teaching and both diagnostic assessments and assessments for learning, therefore leading to better teaching.

Tomlinson (2007) stated,

When students clearly understood our learning objectives, knew precisely what success would look like, understood how each assignment contributed to their success, could articulate the role of assessment in securing their success, and understood that their work correlated with their needs, they developed a need for self-efficacy that was powerful in their lives as learners. (p.11)

Tomlinson’s research has influenced my research in a way that I wanted the teachers to look at assessments. Talk to students and find out what they care about and how they will apply what they learned. Using guided math to give students options on how to learn and an approach to express what they have learned through forms of informal assessment provides teachers with insight about student interest, learning modes and their readiness.

Feedback is Critical during Guided Math

Teachers can use guided math group instructional time to explain or help students analyze feedback on assignment and assessments. In the book, The Daily 5, Boushey and Moser (2006) have a combined experience of more than 40 years and are known for their structure of fostering literacy independence in elementary classrooms and assessment-driven instruction. In this book, they discuss their ideas and lesson procedures to teachers who desire to incorporate balanced literacy components throughout their daily curriculum decisions. The discussion of muscle memory and how to build the students’ stamina for longer periods of independent work are clearly laid out for the reader. They provide the readers with a sample schedule that shows
how to include daily lessons in the beginning weeks of school to build this stamina and they are
detailed in the appendix. According to Boushey and Moser (2006), “creating a strong base for
student independence, there are also key materials, routines, and concepts we introduce… are
crucial to the success of the program” (p. 28). That means during whole group, as well as in
guided group or independent work time, there must be guidelines and procedures in place.
Creating a classroom climate that is conducive for communication may help teachers and
students feel comfortable with feedback.

Another work that has influenced my research is the book titled *Children’s
Mathematics: Cognitively guided instruction* (Carpenter, Fennema, Loef-Franke, Levi, &
Empson, 1999). For guided math instruction, this book teaches teachers how to group, scaffold
and individualize instruction. The authors provide examples of the various problem types
coupled with explanations and strategically placed video clips to guide teachers to a clear
understanding of the problems and expected student strategies, classroom environment and
expectations needed to implement this teaching strategy.

Carpenter, Fennema, Loef-Franke, Levi, and Empson (1999) stated,

Initially, reporting how a problem has been solved is not easy, but it becomes easier as
children have many experiences reporting their strategies. Children are continually asked
to report their thinking, and their peers are expected to listen to and value each other’s
thinking. (p. 99)

Good feedback is essential to student achievement. Feedback can be delivered individually, in
whole group or in a guided group. Based on the desired outcome, teachers must decide when and
where they will deliver the feedback on assignments and assessments.
Brookhart (2008) explains that feedback is only effective when it is in a language that students can understand. Her research explains how providing students with the correct information, via feedback, will satisfy the cognitive factor and the motivational factor as to where they are in their learning. Her article describes effective ways to give feedback. She explains in detail, when to give feedback, how to give feedback, and in what mode is best. According to Brookhart (2008), “…individual feedback tells a student you value his or her learning, whereas group feedback provides opportunities for wider re-teaching” (p. 54).

Communication is very important during guided math instruction. Getting students to explain how they arrived at answers, rather than explaining and correcting their work is essential in providing the most accurate feedback to students. Allowing students to understand how feedback relates to their goals for learning is very critical in guided math.

Chiu’s (2004) study involved ninth-grade teachers and students. The study tested a model of teacher interventions conducted during cooperative learning to see how it affected students’ time on-task and problem solving. The study showed that teachers did initiate intervention when students were off-task. The results showed that time on-task increased when teachers provided help with content and the reduction of student off-task behavior therefore reduced teacher intervention.

Chiu (2004) provides a nice summary of the power of feedback by stating, Evaluations help teachers understand students’ work; thus, teachers who make evaluations are more likely to help students use their ideas than to provide them with new information. By working with students’ ideas instead of simply telling students what to do, these teachers respect and validate students’ ideas as worthy of consideration. (p. 393)
When providing feedback, teachers can observe and make formative assessments while they work. Listening and providing feedback to each student in this intimate setting allows teachers to monitor students’ behaviors and strategies of problem solving without delay.

When it comes to instruction and assessment in numeracy-rich environments, the way teachers instruct, assess and provide feedback is crucial to fostering student improvement and goal setting. Implementing strategies from researchers and authors such as Popham (2008), Chiu (2004), Tomlinson (2007) and Brookhart (2008) provided me with a variety of quality information of how important it is for teachers to understand and utilize assessment and appropriate feedback as a guide for improving instruction.

**Collaborative Atmosphere for Interaction**

Teachers will use guided math group instructional time to invigorate achievement, expectations and values about mathematics that fosters a collaborative atmosphere for student-student and student-teacher interaction. Sometimes students act out or cause disruptions, which deteriorate a collaborative atmosphere. Finn, Pannozzo and Achilles (2003) hypothesize and discuss their opinions based on research how when class size is reduced changes in engagement occur. They researched the relationship between class size and student engagement, or the sociological and psychological theory about student behavior when class size changes. Their findings supported their hypothesis. Finn, Pannozzo and Achilles (2003) have extensively researched class size and related student behaviors: “Studies of students’ pro and antisocial behavior in the classroom have also produced consistent correlations with academic performance” (p. 324). Teachers and students must feel comfortable to share their thoughts, something that might not occur in a whole group setting.
Dekker and Elshout-Mohr (2004) studied how students worked together collaboratively on math problems with the goal of raising their level of mathematical understanding. In the study, the researchers investigated two kinds of teacher intervention. The first type focused on interaction between students and the second on the mathematical content of the tasks or assigned group work. They investigated these using pre-test and post-test comparisons of student learning outcomes. Their results showed that students’ interactions with one another were more effective in terms of students’ learning outcomes.

According to Dekker and Elshout-Mohr (2004), “students, who do not express themselves when they feel insufficiently informed, or do not understand how and why the work is done and justified, will show disinterest, unrest and unease” (p. 43). Does this anxiety stem from past failure of mathematics concepts? Can incorporating the guided math framework lower math anxiety among students and foster a collaborative attitude among students and teachers?

Newstead (1998) focused on mathematics anxiety in children and compared the mathematics anxiety of pupils taught in a traditional manner to teachers who adopted an alternative teaching approach relating to the discussion of pupils’ own informal strategies. She found that students who were exposed to an alternative teaching approach had less anxiety than those who were exposed to the traditional approach to teaching. She questioned if whether anxiety related to working on problems in the presence of the whole class evoked mathematics anxiety. Newstead (1998) stated, “Even for children there appears to be a negative relationship between mathematics anxiety and achievement in mathematics” (p. 54). Students might not feel comfortable with sharing their problem-solving strategies with the class or with an individual student or teacher.
When it comes to developing the theoretical framework for teaching and learning effectiveness, Anderson and Carta-Falsa have worked closely together. Their study, documented in *Factors that Make Faculty and Student Relationships Effective* (2002), was about the need for nurturing, open, nonthreatening and respectful attitudes in student-faculty relationships. In their study students reported that interacting with the teacher was not desirable. From their study, three themes emerged (teaching/learning environment, exchange of information, and mentor/peer association) that affected student and faculty relationships. The results of this study basically found that students and instructors can learn to perceive each other as contributing, mentoring and resourceful individuals who empower each other. According to Anderson and Carta-Falsa (2002), “…well-planned activities designed to produce interaction among the students and the instructors…In turn, this creates interest in the course, motivates students, and leads to student satisfaction with the instructional processes” (p. 134). The expectations and values students and teachers will embrace during guided math are very beneficial to invigorating achievement. Guided math provides a more personal and individual structured lessons will have important affective consequences that lend itself to fostering a collaborative atmosphere with or without the teacher.

When it comes to collaborative learning, Palincsar, whose research focuses on the design of learning environments that support self-regulation in learning activity, especially for children who experience difficulty learning in school and Herrenkohl, whose research focuses on applying developmental theory to support the design of learning environments have completed several research projects. Their background on collaborative learning is extensive and they have been cited by other researchers. In guided math, students are expected to work in collaborative groups based on formative assessments and goals. This study summarizes lessons learned across
two programs of research identifying lessons learned from reciprocal teaching (RT) research and
cognitive tools and intellectual roles (CTIR), which was designed to enhance student's ability to

    Expectation that every participant in the group will be responsible for leading the
dialogue and will receive the assistance necessary to do so. As a form of collaborative
learning, we have been intrigued with students' ability to provide assistance for one
another. (p. 27)

Because guided math requires less direct instruction from the teacher, having students engaged in
independent work based on the skill being taught is important. Teachers must have creative and
specific orchestrated tasks for students to complete when they are not in guided group. Working
independently or helping one another is the key when the teacher is in a guided group session.
Students might prefer this type of instruction.

    According to Anderson and Carta-Falsa (2002), “The study showed that students reported
a desire to work together, to share, and to learn and interact with each other…” (p. 137). Like
relationships athletes with their coaches, the teacher’s relationship with students is critical in the
learning process. The teacher plays an important role in fostering the collaborative atmosphere
within the classroom. Teaching students to get along without the teacher fosters the collaborative
atmosphere for student-student interactions.

    Knutson (2001) argues that students need to engage in communicative behavior
(speaking and listening) in order to develop important communication skills to use in their
everyday life as well as in the classroom. The author provides examples of a variety of
instructional strategies and classroom activities which teachers incorporate these into their daily
routines and lessons. According to Knutson (2001),
From a social interaction perspective, students need to relate to one another not just when they work in pairs or in a small group of classmates, although these experiences are eminently valuable, but also when working together as a whole group (p.1139).

The teacher is the role model and she sets the tone for how students react to one another during guided group or whole group discussions. According to Mueller and Flemming (2001), “…Children in groups organized with a democratic leader-someone who allowed the group to set its own agenda and priorities-appeared far more productive, socially satisfied, and demonstrated a greater originality and independence in the work they completed” (p. 259).

In the end, research has shown that fostering a collaborative atmosphere between teachers and students will foster student engagement and improve student behaviors. Incorporating these suggested factors in daily activities will foster and improvement student and teacher relationships as well as student achievement. In summary, these examples of studies show that teachers who apply strategies that foster a collaborative atmosphere and consistently implement these strategies, will over a period of time improve their classroom climate, affecting student and teacher relationships.

**Conclusion**

I have personally experienced and witnessed in classrooms today, the same whole-class instruction that was the basis in classrooms of the past. In the past, teachers were only required to plan one lesson at one instructional level. Today, it is rare that all of the students in a fifth or sixth grade class are at the same level of mathematics competency. Therefore, differentiated instruction is greatly needed. Teaching to the whole group has its advantages when teachers use it to provide a quick method of presenting information to all students.
When using the guided math framework such differentiation can be accomplished by presenting mini-lessons, reading aloud mathematics literature, setting the stage for Math Workshop, providing practice and review and formal testing or assessments. This method of math instruction is analogous to Guided Reading instruction as espoused by Fountas and Pinnell in their books *Guided Reading: Good First Teaching for all Children* (1996) and *Guiding Readers and Writers Grades 3-6* (2001). As in reading, whole-class instruction is only one tool teachers can use for appropriate instructional tasks. According to Sammons (2009), …there is no one simple method for teaching mathematics effectively. It is a complex process. However, teachers who understand and teach the mathematics standards, use ongoing assessments to guide their instruction, lead their students to construct broader mathematical meaning from specific mathematical tasks, and create a community of learners where mathematics communication is the norm nurture and develop the conceptual understanding of their students. (pp. 246-247)

The guided math framework, if implanted properly, will not require teachers to use all their instructional time in one instructional mode. Guided math will provide flexibility and guidance to help teachers determine how to use their time and resources most effectively to meet the learning needs of all students.

**Purpose Statement**

The purpose of my study was to determine what happens to student achievement and attitudes in two math classes when I work with the classroom teachers to implement guided math instruction. I examined the research themes of:

- Instruction and assessment in numeracy-rich environments,
- Nature and frequency of feedback in guided math,
• Quality of collaborative atmosphere for interaction.

I investigated the following research questions:

• What happens to my interactions with two middle school math teachers as I support their implementation of guided math instruction in their classrooms by working with them to understand student learning needs through interpreting data, developing hypotheses and modifying instruction in small groups?

• What happens to the level of student achievement in two middle school math classrooms when I support their teachers’ implementation of guided math instruction?

• What happens to student attitudes toward math in two middle school math classrooms when I support their teachers’ implementation of guided math instruction?

Methods

In late November of 2009, I began encouraging two (one fifth grade and one sixth grade) teachers to participate in my research project of incorporating guided math into their daily math instruction. The time frame that I chose to do my research project was January 4 through April 15. I explained to the two teachers that with my help incorporating guided math, it would allow them to design a structure that would ensure all children to work at their level of challenge while taking responsibility for their learning and behavior. I explained to them the process and the time I would need to gather data and how I would collect data through selected student work, such as journals, class work, homework, quizzes, and or tests. I assured them that I would administer the pre- and post-surveys and provide them with student journal prompts. I let them know that their time would be spent teaching, assessing and conferring with students. I promised to provide the charts, student schedules, journals and assist with creating numeracy rich math centers. To assure
things went according to plan, I blocked off my daily time so that I could be present in each classroom during their scheduled math block. I found this was the most difficult part of my methods portion. I planned to be present in the sixth grade classroom from 9:10 am to 10:20 am. I also planned to be present from 1:00 pm to 2:00 pm in the fifth grade classroom. Unfortunately, one of the two teachers was diagnosed with cancer and was not able to participate in this study. Other job duties all too often pulled me out of the classroom to complete other tasks. As an Instructional Facilitator, Academic Data Representative, and Behavior Support, my job responsibilities include duties out of my scheduling control. I attended several meetings out of the building; I am called upon at a moment’s notice to be a substitute in any classroom or a substitute for administration in their absence. I am also responsible for scheduling and administering tests, not to mention gathering all the materials and returning them in a systematic format to the district offices. I did not account for all these interruptions when planning the way I could collect data and participate in this research project.

In order to make this process go smoothly, I provided the teachers with a copy of Lanny Sammon’s book titled *Guided Math: A Framework for Mathematics Instruction* (2009). I encouraged the teachers to skim through this book over winter recess. During winter recess, I constructed a schedule (Appendix A), that would provide meaningful use of time or the instructional block without extensive preparation time for teachers. I also color-coded skeleton structure for small group instruction (Appendix B and C) for students who are working on similar skills and strategies. I knew these groups would be homogenous and share the same or similar instructional needs. I planned for these groups to be temporary and require change as students progressed with certain strands. I also initially provided teachers with dates I would not be available, at least for the month of January.
On January 4, I sat down with the teachers and asked them to think about each individual student learning, then plan and organize their instruction based on the upcoming standard and create enriching activities for weekly practice. My goal was to use the remainder of the week to model and introduce the guided math framework to the students while the teachers watched and took notes. I planned to model, teach, and implement the guided math framework of the first strand for the current standard being formally assessed. In order to create a school climate that would both foster academic learning and increase student learning and student effort, I began by giving each classroom a whole group interview (Appendix D) about their attitude toward math and school in general. I also collected data from student assignments (Appendix E) taught during and prior to my project. I also created journal prompts for both students and teachers (Appendix F). I used the information from student/teacher journals (Appendix G). This was the second-most rewarding data collecting piece because it gave me and the teacher insight to the students’ attitudes about the math lesson in a private manner. I also collected data with the pre- and post-surveys on students’ attitudes toward math (Appendix H). The pre-survey was done in small groups while the teacher was doing some conferring with students and other students were working on a pre-assessment project on January 22. The post-survey was done as a whole group on April 5. Last but not least, I collected data from the tested Criterion Referenced Test (CRT) form A and form B, quizzes and daily assignments in the result of second and third quarter grades (Appendix I).

I also kept a weekly journal to record observations and reflections related to interactions with the teacher. I also interviewed the teacher about the process in interpreting data, developing hypotheses and modify instruction to fit individual or small group needs on January 29. One of the hardest ways I gathered the data for my research project was through reading the teachers’
journals about their reflections and observations. I had to often remind the teacher to email me that week’s journal entry. It was also important for me to keep a few copies of student work-tests, class work, math journal, homework, quizzes, and math projects. Unfortunately this was difficult because in our school student work is sent home every Thursday and CRT’s are supposed to be stored in a secure location. Later on during my project, student interviews of individuals and/or a few small groups of students became sparse. I had to administer tests from February to the end of April. I did not have time to spend in classrooms since students were tested in the morning and in the early afternoons. Last but not least, I gathered data through interview of students that included questions about their attitudes, which I collected from pre- and post-attitude surveys.

I organized my data according to what I planned in my data collection. Mainly data were either pre- or post-incorporating guided math. I created tables, charts and graphs or survey data, kept student journals (daily notes and prompts). At first, I kept several assignments that students completed in sequential order, but this was not possible after a while, because student work needed to go home on Thursdays.

The main way in which I analyzed my data was by comparing the pre and post surveys and looking at CRT results. I did a lot of comparison with charts and graphs. I also sat down with the teacher and students early on, and analyzed test scores of each individual student and center project completions. I finally was curious about how the two sixth grade classes compared in the results of CRT’s administered prior to the administration of guided math and after guided math was administered.
Findings

Since the day I began thinking about my Action Research Project, I did not expect to find the data so revealing to my expectations. I knew guided math was powerful, because I used it in my teaching practices of math, but I did not have the research backing to what impact it would have and why. I was just a teacher who had to find a way to differentiate instruction in a fifth grade classroom, in order for all of my students to be successful. My findings produce so much more than my limited expectations.

On a typical day, such as January 15, I enter in the classroom around 9:05 am. At this time Ms. Fischer is usually finishing up going over today’s bell work. At about 9:20 am we finally begin math. Ms. Fischer asks the students to take out their math journals and date the next page. The teacher begins with a quick review of the prior day assignment or what was taught. The students complete this in their journals. Today the quick review consisted of eight questions (four definitions and four pictures) relating to lines, angles and rays. After going over the solutions, it is important that any misunderstandings or questions be answered. Then Ms. Fischer explains the objective of the lesson and asked the students to generate suggestions on why they need to learn this information. For example on this occasion we talked about why we need to learn about angles and lines. The students listed various jobs such construction workers, space explorers and fashion designers. We also talked about sports such as golfers, tennis players and track and field athletes. Next Ms. Fischer begins the mini-lesson. The mini lesson is a whole group introduction of the day’s topic. The students take notes and are instructed to look for geometric shapes, angles and lines in the classroom. Next Ms. Fischer then points out some objects used to measure angles. She showed the students how to use a protractor to measure different angles. The students then had the opportunity to practice using a protractor to measure
an angle in their text book on page 319. After checking for understanding, the teacher explains the schedule and quickly reviews expectations for guided math and what to bring if you met with her. After asking students to get prepared for guided math, she counts down from 10 to 1 and the students are at their respectful stations. On a given day the stations consists of working with the teacher, computers, hands-on activity, partner seatwork or individual seatwork. The activities are already predesigned and specific to the topic learned previously or currently being taught. If students have a question during this time, they write it down on a sticky note and place it on the board. During the five minute break, the teacher takes the time to read the sticky notes and answer the questions or make suggestions. This rotation is repeated one more time. After the second rotation the teacher counts down again and the students are ready for the whole group wrap up. Ms. Fischer uses these 10 to 15 minutes to review what she noticed (good or bad), the topic taught and answers any questions the students might still have.

As a teacher and researcher it was very hard for me to just sit back and watch the teacher lead sometimes. I had to remind her at first the importance of establishing a routine that was consistent and highly structured. When I was in the room, along with the resource teacher, this seemed like a dream or ideal classroom. We were able to walk around and assist students who might have been off task or needed some assistance. I really did not want to do this because I wanted the routines to be as if the teacher was working with a small group and could not assist the students if they had questions.

My interactions with Math Teachers as I support their Implementation of Guided Math

When I addressed my first research question, I was concerned with the fact that I did not work with two classroom teachers. Because the fifth grade teacher had numerous substitutes, she was not able to complete the research project. So when I asked the question of “What happens to
my interactions with two middle school math teachers as I support their implementation of
guided math instruction in their classrooms by working with them to understand student learning
needs through interpreting data, developing hypotheses and modifying instruction in small
groups?” I thought I had failed! In reality I had not, I just had to modify my findings to reflect
only one teacher’s participation. My evidence in both the teacher journals and student pre- and
post-surveys show that my support in implanting guided math was successful when it was used.
For example, on the post-survey, all the students selected strongly agree or agrees when asked
questions like:

- Working in small group makes a difference.
- I set goals with my guided math group based on our group’s assessments.
- Spending time with my teacher is helpful to achieving my goals.
- My teacher reviewing my progress weekly helps me stay focused.

I was concerned about having enough supporting evidence for my assertions since my research
project did not always go as expected. Because of the time I did not spend with the teachers, I
thought my data would show it. For instance, the amount of time and data I collected after March
12 was inconclusive and sparse. Both my journal and Ms. Fischer’s journal state how much
students are learning and enjoying the incorporation of guided math. Ms. Fischer stated in her
first journal entry the week of January 4-8:

I am a little nervous about this with the thought of having so many groups going on at
once, but I know it’s just because I’m trying something new and being “watched” while
doing so. I know Mrs. Simpson is only here to help so I have no need to be nervous. I
need to remind myself what I tell my students, making mistakes and failing helps you
learn. I may fail, but at least with another set of eyes and a brain to pick I will hopefully grow, learn and succeed.

The teacher’s perceptions of incorporating the guided math framework improved over time. On January 19, the teacher wrote:

The students worked in centers for the first time. They followed expectations overall. I saw the students who were supposed to be working in partners conversing and solving the problems together. The students with the teacher worked through problems with the teacher then finished the rest on their own. The center activity had students engaged and talking. A few problems I saw were at the computers and individual seat work. At the computers some students were a little noisy; however they were engaged in the game and excited about it.

Later, on when using guided math to interpret data and create small group instruction, my journal entry during the week of January 25-29, I wrote the following in my journal:

This was an interesting week. I spent the Monday and Tuesday outside of class. When I talked to the teacher, she said things went okay. She said the students are working more independent and she feels good about that. She is also getting better at writing out lesson plans. She said she is not used to creating such detailed plans, but noted that it helps her and she feels more prepared. I spent Wednesday-Friday observing and coaching Ms. Fischer and the students. I videotaped her teach a lesson on Wednesday. It was awesome. I told her how proud I was of her and how she did not look like a first year teacher. On Friday, Ms. Fischer had a formal observation. The assistant principal came in after the mini lesson (just when she was explaining the group rotations). I did chime in and lead the students in their first transition with a countdown; because I was not sure Ms. Fischer
would do it. This helps set the pace and it made it seem more like team teaching. The students quickly went to their respected areas and Ms. Fischer pulled her first math group. While she taught, the resource teacher and I walked around, monitored and assisted students. I notified Ms. Fischer with a time signal when it was near time to transition. Ms. Fischer did very well. The assistant principal was impressed at her small group discussions and made the comment that she doesn’t see much of this in the intermediate classes. I explained to her this was my research project and she said she liked it and I should teach all the teachers how to do guide math. Ms. Fischer and I debriefed in my office after math class. She was extremely nervous. I reassured her that it went great. I did tell her that she did not have her plans available for the observer to see and that she should always have those available. I can’t wait to hear how her conference goes with the assistant principal.

My evidence afterward began to improve drastically with student completion of assignments, the flow of guided math instruction and the student’s ability to function independently and as well as in small groups.

On February 3, the teacher wrote in her journal:

Things have been running smoothly. The students are working well in their small groups. Introducing Ratios and Proportions has been hard for them, but with more practice I feel they will understand it better. The CRT will be this Friday, so I’m interested to see the results and where further practice/enrichment is needed. I am feeling more comfortable with the set up, and it has helped me in my other small group times as well such as Guided Reading and when we do teacher conferences for writing. At times the students come back to the table and expect me to just do the problems for them when something is
a little bit more difficult (using cross multiplication to find the unknown side in similar figures). By having them look at their notes and telling ME how to solve it has helped them understand and hopefully retain better.

Later on during my research project, the teacher and I both became extremely overwhelmed. I began focusing more on completing my Title1 plan for my school and preparing for the upcoming Nebraska State Assessment of Reading (NeSA-R) and the Nebraska State Assessment of Math, (NeSA-M). I began to feel disheartened and I wrote about it in my journal during the week of March 1:

I am only able to spend Monday’s with Ms. Fischer’s class. I am not happy because I feel a little detached from my project. When I came in, the class was excited to see me. They didn’t know I had some writing for them to do. Before I got started I reminded them of how proud I was of their accomplishments on CRT 6-04. I asked them to take out their journals. Most of their journals were in disarray, but I told them to quickly put them together and don’t worry about it if they are not perfect.

I can tell by short informal interviews with students, that math was not as fun anymore. For example, when I asked a student during lunch duty on March 1, what was his favorite part of today’s math lesson, the student said, “Math was boring again.” When I asked why he said that, he said, “We don’t do centers anymore, we can’t even talk anymore.” This disappointed me; I did not know how to address this with the teacher. So I just wanted to hear what her journal reflection said. As stated in her journal dated March 19:

I don’t know if I can do this by myself. Mrs. Simpson has not been here all week and the week before spring break she was not here to help me much. I think I can do it by myself, but I found myself teaching class as usual. I wish Mrs. Simpson was here!”
After reading this I did not ask students about math class, fearing I would hear more negative comments.

What happens to my interactions with two middle school math teachers as I support their implementation of guided math instruction in their classrooms by working with them to understand student learning needs through interpreting data, developing hypotheses and modifying instruction in small groups.

One assertion that I made based on the literature I read and teacher observations regarding a teacher’s ability to understand student learning needs through interpreting data, developing hypotheses and modifying instruction in small groups came from the article titled Assessments for Learning: An Endangered Species (2006). Teachers know how important it is to assess for learning. They also know that this is a great way to understand student learning needs and modify small group’s instruction. What my study showed is that even though assessing, interpreting the data and modifying instruction is crucial and helps guide small group instruction, it takes time and time is something Ms. Fischer felt she did not have enough of, especially later in the semester. Based on the article, Popham feels the same way and states assessment for learning will not survive.

Given insensitive standardized tests and unrealistic AYP targets, more and more teachers are apt to abandon sound instructional strategies like classroom assessment for learning. You see, even this powerful classroom assessment strategy won’t be able to increase students’ scores enough so that most schools avoid AYP assassination. Pressured teachers, then, will most likely succumb in desperation to any sort of quick fix score raising techniques that offer the promise of AYP success—even though some techniques,
such as relentless test-prep drilling using practice items practically cloned from the states
standardized exams are educationally unsound. (p. 2)

I agree that teachers do not utilize assessment for learning as much as they should, but because of
district mandates and best practices I feel many teachers will have to incorporate assessments for
learning into their already jammed packed schedules. I spent a lot of time relating the importance
of this form of assessment to Ms. Fischer and used the idea as a method to formulate her guided
math groups. She liked the idea but I noticed as time became an obstacle, assessment for learning
was one of the first things to get eliminated from the guided math process. Ms. Fischer soon only
relied on pretests and homework results to justify her guided math groups. In her journal on the
week of March 1-5, Ms. Fischer wrote:

The class started the measurement unit. We started with a pre-test, which almost
everyone did poorly on,… I was a little disappointed when quite a number of my students
didn’t even do the assignment from Friday because they stated they didn’t understand. I
reminded them that they were to use the post-it notes to ask questions, and no one had.
We’ll see how things turn out Monday. In the future I think I will expect them to retry the
assignment rather than giving out a different one.

I understand how she feels, because in March teachers and students realize they have pre-
determined breaks and several tests and other pressing items soon to be due. I was able to
understand her method, but using homework assignments, as in the case above, will not
consistently provide the information a teacher needs to formulate guided math groups.

Next, on February 23, Ms. Fischer and I looked to the Student Intervention Indicators for
an answer to my assertion. These indicators can be accessed by the Academic Data
Representative and given to teachers for ways to improve instruction or ways to identify students
who need intervention. We analyzed individual students results based on several indicators from fifth grade such as Test of Cognitive Skills (TCS) test results, California Achievement Tests (CAT) results in math, and the students’ math CRT results.

Even with what I know from observations and reading the literature, I would hate to totally agree with the article or the notion of time constraints hindering assessment for learning. I need to do further investigation of this topic in order to draw a more definite conclusion. I still believe that assessment for learning is crucial and understanding a student’s learning needs through interpreting the data, developing hypotheses and modifying instruction in small groups can only benefit everyone. I would need to see what happens if teachers have rubrics or some sort of assessment model already created as a form they could use to quickly assess students during interviews, center activities and or computer activities.

**What happens to the level of student achievement in two middle school math classrooms when I support their teachers’ implementation of guided math instruction?**

In guided math the opportunity for individual, small group and whole group feedback lends itself for student achievement. An assertion that I made based on Ms. Fischer’s journal regarding student achievement is that guided math did increase student achievement. On January 29, Ms. Fischer wrote, “The students are becoming a little more independent and working in groups...they completed their given assignments and helped each other when someone did not understand something. I was impressed because I was able to check for understanding from their assignments.” She also went on to write:

The students worked in centers for the first time. They followed expectations overall. I saw the students who were supposed to be working in partners conversing and solving the
problems together. The students with the teacher worked through problems with the teacher then finished the rest on their own. The center activity had students engaged and talking. A few problems I saw were at the computers and individual seat work. At the computers some students were a little noisy; however they were engaged in the game and excited about it.

Finn, Pannozzo, and Achilles (2003) also supported my assertion that something positive happens to student achievement when teachers implement guided math instruction. Even though I am particularly talking about small class sizes in guided math instruction, instruction to small groups does impact the way a teacher teaches. This is what the authors had to say: “Teachers change their teaching strategies when class sizes are reduced, providing more individualized instruction and higher quality instruction generally… Teachers … spend more time on instruction and less on classroom management or matters of discipline” (p. 322). Also Finn, Pannozzo, and Achilles talk about how students are more apt to interact with the teacher in a small class or group setting. “Children in small classes were more frequently observed initiating interactions with the teacher, as well as responding and attending to the teacher during interaction” (p. 333). Also leading researchers and authors believe that feedback is very important to increase student achievement.

In guided math, small group instruction and individual conferencing with students provides an outlet or structure for teachers to provide feedback to students. Feedback, especially specific feedback, allows students to get the information they need to improve and increase their scores. Brookhart (2008) states,

Some of the best feedback results from conversations with the student…You should also decide whether individual or group feedback is best. Individual feedback tells a student
that you value his or her learning, whereas group feedback provides opportunities for wider re-teaching. Feedback that helps a student see his or her own progress gives you a chance to point out the processes or methods that successful student use. (“I see you checked you work this time. Your computations were all correct, too! See how well that works?”) Self-referenced feedback about the work itself is helpful to struggling students, who need to understand that they can make progress as much as they need to understand how far they are from the ultimate goal. (p. 3)

This proves to me that guided math will improve student achievement. Any time one can sit down with a student or a small group of students and provide feedback that is specific and not generalized to the whole class, student achievement has to increase. I decided to look to the students for their perspective on student achievement when guided math is implemented. For example, one student who I will call “T” completed an assignment prior to my project and missed 12 out of 13. When I asked him about the assignment and his grade, he said, “I didn’t get it!” I probed further and asked if he asked for help? He said, “No.”

Ms. Fischer also agrees that guided math has helped increase student achievement. In her journal dated the week of February 24, she wrote:

The next day students took the CRT and performed well. It was exciting to see six more students (on top of the original seven) get advanced. One of my resource students even got advanced which was thrilling for her and me as a teacher. I was so proud, because she took her time and went over her answers, being the last to hand it in. All other students received a proficient again so I’m glad they were able to maintain/retain information. We were able to celebrate by playing variations of Around the World the last day of our short three day week, and the students enjoyed it.
Last but not least, I collected data comparing the math grades from second quarter to the third quarter grades, which is the quarter when guided math was implemented. Out of 22 students, every student, which means all 22 students, saw his or her math grade improve or stay the same.

So what does this mean? I have data that shows in this case when guided math was implemented and utilized that student achievement did increase. What I would like to have done is compared fourth quarter grades with third quarter grades. I would like to see how students faired academically when the implantation of guided math kind of fizzled off and the teacher began to use more of the traditional approach to teaching math. Therefore I would need to do further research to see if guided math really made a significant difference or if it was just the standards being assessed at the time of my research project.

What happens to student attitudes toward math in two middle school math classrooms when I support their teachers’ implementation of guided math instruction?

An assertion I made about student attitudes toward math when I support their teachers’ implementation of guided math instruction is that students will enjoy learning math more. Student journals also supported my findings. For example, one student wrote:

I feel at ease with measurement. I feel confident as well. Easy “peasy”, lemon “squeasy”!
I understand meters and kilometers much better. When I was in 5th grade, I thought meters were bigger. Silly me!

Also a student wrote:

I like taking the math CRT because it made a lot more sense. I like math a lot because it is so easy.
Another student wrote:

I feel great about measurement. I think it is fun to use. It is more fun than I expected. I understand how to use the ruler better. It is cool to use. Rulers are fun.

All teachers long to hear students say comments like the ones mentioned above. It is comments like these that show student efficacy is increasing or that students’ attitude toward what they are learning is good. My data on the pre-post survey also justifies my assertion. Here are the results of four of the surveys I gave to students. These surveys were administered either in small group setting or as a whole group. The pre-survey was given at the beginning of January and the post-survey in March. The surveys were administered to all 22 students in Ms. Fischer’s sixth grade class. The pre-test was given in a small group setting and the post-test in a whole group setting. Students who were absent when the post-test was administered took the test individually.

<table>
<thead>
<tr>
<th>My Attitude About Math</th>
<th>Percentages</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Section 1</strong></td>
<td>Pre-Survey</td>
</tr>
<tr>
<td>1. I like math.</td>
<td>80%</td>
</tr>
<tr>
<td>2. I use math in my life every day.</td>
<td>76%</td>
</tr>
<tr>
<td>3. A person can get a better job if he/she has good math</td>
<td>85%</td>
</tr>
<tr>
<td>skills.</td>
<td></td>
</tr>
<tr>
<td>4. Our local schools do a good job in teaching math.</td>
<td>88%</td>
</tr>
<tr>
<td>5. Learning math skills is important for the future.</td>
<td>86%</td>
</tr>
<tr>
<td>6. Advanced math skills increase employment possibilities</td>
<td>74%</td>
</tr>
<tr>
<td>in this area.</td>
<td></td>
</tr>
<tr>
<td>7. Math classes should be required at every level of school.</td>
<td>81%</td>
</tr>
<tr>
<td>8. Few jobs in this region of the country require advanced</td>
<td>56%</td>
</tr>
<tr>
<td>math skills.</td>
<td></td>
</tr>
</tbody>
</table>

The results of the survey, My Attitude about Math, surprised me. I had to go back and double check my numbers to see if the data was accurate. Surprisingly the results were what the students noted on their survey. I do not know if the post survey was given at a bad time of the year or if the student’s attitude about math just decreased. The survey data contradicts what students wrote about in their journals and told me during interviews. I can only assume the students were honest with their ratings.
Running Head: Investigating Guided Math

My Attitude About My Math Class

<table>
<thead>
<tr>
<th>Section 2</th>
<th>Pre-Survey</th>
<th>Post-Survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. My class has specific goals that I understand.</td>
<td>51%</td>
<td>84%</td>
</tr>
<tr>
<td>2. The main purpose of my math class is to help students learn math skills and strategies.</td>
<td>64%</td>
<td>77%</td>
</tr>
<tr>
<td>3. I know why it is important for me to learn what is being taught.</td>
<td>73%</td>
<td>92%</td>
</tr>
<tr>
<td>4. My class challenges me to think and solve problems.</td>
<td>67%</td>
<td>86%</td>
</tr>
<tr>
<td>5. My math class is usually interesting.</td>
<td>52%</td>
<td>74%</td>
</tr>
<tr>
<td>6. Students feel free to express their ideas and opinions in whole group.</td>
<td>48%</td>
<td>70%</td>
</tr>
<tr>
<td>7. Students are given many chances to show what we have learned.</td>
<td>55%</td>
<td>76%</td>
</tr>
<tr>
<td>8. My guided math group is usually interesting.</td>
<td>20%</td>
<td>86%</td>
</tr>
<tr>
<td>9. Students feel free to express their ideas and opinions in guided math groups.</td>
<td>19%</td>
<td>84%</td>
</tr>
<tr>
<td>10. Students are given many chances to show what we have learned.</td>
<td>57%</td>
<td>89%</td>
</tr>
<tr>
<td>11. Grades are given in a fair manner.</td>
<td>65%</td>
<td>83%</td>
</tr>
<tr>
<td>12. Tests and quizzes are related to the material and ideas we are supposed to learn.</td>
<td>70%</td>
<td>92%</td>
</tr>
</tbody>
</table>

The results from the students’ survey entitled, My Attitude about My Math Class, were somewhat what I expected. The students’ attitude about math class in general did improve. I noticed the students felt free to discuss their ideas and opinions in whole group as well as in guided groups. The greatest increase in student attitude was related to question 9, which states students feel free to express their ideas and opinions in guided math groups. The increase from pre-test to post-test was a remarkable 65%. Also, there was a 66% increase when students were asked if my guided math group is usually interesting. I really enjoyed seeing that students were given a chance to show what they learned.

My Attitude About My Teacher

<table>
<thead>
<tr>
<th>Section 3</th>
<th>Pre-Survey</th>
<th>Post-Survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. My teacher expects all students to succeed, no matter who they are.</td>
<td>78%</td>
<td>86%</td>
</tr>
<tr>
<td>2. My teacher gives me challenging work.</td>
<td>69%</td>
<td>72%</td>
</tr>
<tr>
<td>3. My teacher makes learning interesting by teaching in</td>
<td>32%</td>
<td>86%</td>
</tr>
</tbody>
</table>
different ways.

4. My teacher helps me when I don’t understand something. 74% 82%
5. My teacher gives students extra help if it is needed 70% 77%
6. My teacher encourages me. 84% 91%
7. My teacher gives me challenging work. 67% 59%
8. My teacher makes learning interesting by teaching in different ways. 30% 89%
9. My teacher helps me when I don’t understand something. 81% 86%
10. My teacher gives students extra help if it is needed. 70% 81%
11. My teacher encourages me. 82% 88%
12. My teacher expects all students to work hard. 89% 94%
13. My teacher expects all students to succeed, no matter who they are. 83% 92%
14. My teacher makes it clear what I am supposed to learn. 64% 90%

The data above shows that the students’ attitudes about their teacher were pretty high before guided math was implemented. The tables show a slight increase for every question except questions 3 and 14. Question 3 reads “My teacher makes learning interesting by teaching in different ways.” The student’s attitude increased from 32% to 86%. This is a difference of 54%. Question 14 asked students if the teacher makes it clear what I am supposed to learn. The response to this question shows the students attitude on the pre-test at 64% and the post-test at 90%. There is a 34% difference in the students’ attitudes.

<table>
<thead>
<tr>
<th>My Attitude About Guided Math</th>
<th>Percentages</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Section 4</strong></td>
<td><strong>Pre-Survey</strong></td>
</tr>
<tr>
<td>1. Working in small group makes a difference.</td>
<td>24%</td>
</tr>
<tr>
<td>2. I have a strong relationship with my teacher.</td>
<td>78%</td>
</tr>
<tr>
<td>3. I enjoy working with a partner to solve problems.</td>
<td>27%</td>
</tr>
<tr>
<td>4. I enjoy working as a small group.</td>
<td>0%</td>
</tr>
<tr>
<td>5. I set goals based on my assessments.</td>
<td>40%</td>
</tr>
<tr>
<td>6. I set goals with my guided math group based on our groups assessments.</td>
<td>5%</td>
</tr>
<tr>
<td>7. I know I can accomplish my goals with my teachers help.</td>
<td>92%</td>
</tr>
<tr>
<td>8. I know I can accomplish my goals with my classmates help.</td>
<td>73%</td>
</tr>
<tr>
<td>9. I know I can accomplish my goals all by myself.</td>
<td>74%</td>
</tr>
<tr>
<td>10. Keeping a math journal helps me learn about math.</td>
<td>3%</td>
</tr>
<tr>
<td>11. Spending time with my teacher is helpful to achieving my goals.</td>
<td>35%</td>
</tr>
<tr>
<td>12. My teacher reviewing my progress weekly helps me stay focused.</td>
<td>8%</td>
</tr>
</tbody>
</table>

On the survey about guided math the students’ attitude increased positively for every question. For example, question 6 asks students if they set goals with my guided math group
based on our group’s assessments. An increase of 80% is noted in the data. What was interesting, and this data is not evident by the table I am showing above, is the students who said working in small group makes a difference. My data shows that the four of the students, who typically master the sixth grade standards, all noted on their survey that they somewhat agreed.

My finding about student attitudes regarding math were also confirmed when I referenced student interview questions on March 17. I asked students, “How do you feel when you hear the word “math?” Here is what several students had to say:

- “I feel happy, excited, ready, and relived”
- “Excited”
- “Joyful”
- “Happy because it is fun.”
- “Each day I will learn something new.”

According to my journal, I feel the students’ attitudes improved. During the week of March 1-5, I wrote the following entry:

I was very impressed at how many of them were just busy writing away. Some drew pictures and some even wrote down example problems. Why did I choose this question? I chose this question because we had just finished one unit and was about to begin another. I wanted them to also think about what they learned and feel very successful about what they have accomplished.

In the end, my findings show that student attitudes toward math in the middle school math classrooms when I supported their teachers’ implementation of guided math instruction improved. The data in the tables above show students attitude about math and their teacher either improved or stayed the same.
Conclusions

In light of my values and beliefs, my ideal classroom has to incorporate a guided math framework in which lessons are thoughtfully developed by considering all components of the curriculum and the students I serve. Valuing the importance of knowing my students and knowing the mathematics content more deeply helped me skillfully guide class discussions and model guided math groups to the teacher I worked with. My ideal classroom has to incorporate activities and strategies that will help students understand necessary concepts and gain new skills to successfully meet district, states and national learning goals.

According to many articles I have read, teachers must provide students with more rigorous math content and improve on instructional methods; using formative assessment to facilitate guided math can do both of these things. Guided math is a great way to individualize instruction to meet the needs of the students and to ensure that their math scores well improve on state assessments. Just like leading researchers in guided reading, such as Boushey and Mouser (2006), the development of a framework such as guided math is one essential component that teachers are searching for in means to reaching all of their students and way to adapt instructional methods to accommodate all levels of learners. It is my expectation that, just like guided reading, guided math can be the framework of instruction to increase student achievement in mathematics and improve student discipline, attitude and learning. According to Boushey and Mouser (2006), “…all the components…provide us with a plan to manage each piece…so that we are free to work with small groups or have individual conferences” (p.15).
Implications

As a result of my study, I discovered that incorporating guided math can improve instruction, student discipline, attitude and learning. I will work with teachers to incorporate guided math into their daily math instruction. I will use my data to show teachers that guided math can do much more than just help manage a classroom, but increase student learning and achievement. I will show teachers the guided math framework is used and demonstrate how teachers to design a structure that would ensure all children were working at their level of challenge while taking responsibility for their learning and behavior. In spite of the fact that guided math focuses on small-group instruction for students, I will do more to promote and encourage teachers to use the framework when:

- thinking about individual student learning,
- planning and organizing instruction, and
- keeping students engaged and on task.

I will share with teachers how in the small groups, teachers get more acquainted with the students and can explicitly teach effective strategies. I feel that by improving how teachers mange and teach middle-school mathematics, especially in grades 5 and 6, I will help teachers to create a school climate that will both foster academic learning and increased student effort. Also during curriculum day, I will share my findings and experience of the implementation of guided math with intermediate teachers and other Instructional Facilitators.

I hope this will at least encourage others to experiment with it. It is my belief that the guided math’s framework, if used correctly, will help students develop the daily habits of problem solving; reasoning and proof; communication; making connections; and representation that will lead to stronger skills in mathematics.
References


<table>
<thead>
<tr>
<th>Math Block (60 Minutes)</th>
<th>Balanced Math Components</th>
<th>What It Looks Like</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Math Warm-Up</strong></td>
<td>Warm-Up Activities that engage students to think mathematically and reinforce all the standards on a weekly basis</td>
<td>Whole group, small group or individual activities</td>
</tr>
<tr>
<td><strong>Number Sense</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Algebra</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Geometry/Measurement</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Data Analysis</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Math Strategy Instruction</strong></td>
<td>Mathematical Strategy Instruction that Engages Students in Active Learning through the use of manipulatives and Critical Thinking using higher order thinking skills and strategies (Modeled/Shared/Guided/Independent)</td>
<td>Whole group for introduction of skills and strategies utilizing manipulatives and actively engaging students</td>
</tr>
<tr>
<td><strong>Number Sense</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Algebra</strong></td>
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</tr>
<tr>
<td><strong>Geometry/Measurement</strong></td>
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<tr>
<td><strong>Data Analysis</strong></td>
<td></td>
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<tr>
<td><strong>Differentiated Math Instruction</strong></td>
<td>Guided Math/Work Stations (Centers) Students Engaged in Appropriate Leveled Materials, Skills and Strategies</td>
<td>Meet the individual needs of students and move them forward using a variety of manipulatives, materials and strategies</td>
</tr>
<tr>
<td><strong>Guided Math/Work Stations (Centers)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Students Engaged in Appropriate Leveled Materials, Skills and Strategies</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Meet the individual needs of students to move forward</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Monitor student learning and makes adjustments according to individual needs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Instruction based on daily informal and formal assessments</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Instruction using a variety of manipulatives, materials and strategies in order to meet all students ability levels, learning styles, and interests</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Reinforce or re-teach specific skills and strategies</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Teacher facilitates students through a variety of grouping structures: small groups, partners, one-to-one, based on daily needs of students</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Flexible/Small Group Instruction</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Daily for students who have not mastered a standard</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Daily for students who do not understand standard currently being taught</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Student conferences</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Self-Selected Math/Independent</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Students engaged in independent math, working in small groups, with a partner or independently</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Math Reflection</strong></td>
<td>Math Reflection that engages student to reflect on their mathematical learning which will reinforce their skills and strategies</td>
<td>Reflect on the mathematical skills and strategies taught during the direct instruction by class discussion or journals</td>
</tr>
</tbody>
</table>
### Appendix B- Sample Template for Small Group Instruction

<table>
<thead>
<tr>
<th>Week: January 15, 2010 – January 21, 2010</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Activity</strong></td>
</tr>
<tr>
<td><strong>Teacher</strong></td>
</tr>
<tr>
<td><strong>Seat Work</strong></td>
</tr>
<tr>
<td><strong>Partner Study</strong></td>
</tr>
</tbody>
</table>
| **Computer** | **Option 1.** [Guess the Random Angle](http://www.crickweb.co.uk/assets/resources/flash.php?&file=angle) Estimate and guess the angles shown.  
**Option 2:** [Geometry Building Blocks](http://www.math.com/school/subject3/lessons/S3U1L1GL.html)  
**Option 3:** [ToonU- 6th Grade Geometry Angles](http://www.toonuniversity.com/6m_angle_d.html) |
| **Center** | **Center Activity: The Importance of Accuracy** As a Junior Space Explorer, you know the importance of angle measurement. In the examples below, practice accurately measuring angles with your protractor. Materials: Worksheet, protractors, pencils |
### Appendix C- Sample Template for Daily 5 Math Instruction-Intermediate

<table>
<thead>
<tr>
<th>Description</th>
<th>Math Fluency</th>
<th>Reading &amp; Writing About Math</th>
<th>Problem Solving</th>
<th>Inquiry Stations</th>
<th>Strategic Practice</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accuracy and speed based on facts</td>
<td>Using text to make connections to math</td>
<td>Daily concepts embedded into workable problems</td>
<td>Questions that lead students to investigate math on a deeper level</td>
<td>Practicing daily concepts through hands-on experiences</td>
<td></td>
</tr>
</tbody>
</table>

**Looks Like...**
- Computer-based games and review
- Partner activities
- Games
- Reading
- Vocabulary practice
- Journaling
- Drawing and writing about math
- Word problems
- Problem solving steps
- Test prep
- Using different ways to solve problems
- Open-ended questions
- Multi-step processes
- “Science-like” Investigations
- Use of manipulatives
- Skill practice
- Based on the four strands of math

**Types of Activities**
- Computers
- Interactive whiteboards
- Card games
- Board games
- Fiction & Nonfiction text (newspapers, brochures, maps, graphs, etc)
- Word wall activities
- Journal activities
- Games
- Brain teasers
- Problem solving cards/activities
- Interactive whiteboard
- Computer
- Investigations with research
- Questions that have more than one answer
- Real world problem solving
- Computer
- Paper pencil
- Number Sense activities
- Algebra activities
- Geometry activities
- Measurement activities
- Data Analysis/Probability activities
Appendix D- Student Interview Questions

Student Interviews Questions (completed as an individual and/or in small group)

1. In school, what's most important to you?

2. Can your parents help you with your math homework?

3. What motivates you the most to do well in math?

4. How do you feel when you hear the word “math?”

5. Do you feel that math is important in your daily activities?

6. In what ways might math be important for your future?

7. Do you consider yourself successful at solving math problems? (Probe with questions about the use of the calculator)

8. If math were not required in school, would you still take math classes?

9. After you have completed all of your schooling, do you think you will ever use your math knowledge? (Probe for future uses)

10. What are your feelings about advanced math?
11. Do you enjoy taking math in school? (Probe why or why not)

12. Do you think that your teachers do a good job explaining math?

13. After you graduate, will you seek a job that involves advanced math?

Student Name: __________________________________________________________
Date: _______________________________
Appendix E- Sample Student Work

Write the letter of the definition that matches the word.

1. similar △
2. reflection B
3. congruent □
4. rotation ●
5. symmetry ◯
6. translation ◀
7. geometry G
8. polygon ▲

The movement of a figure along a straight line.
A closed figure made up of straight line segments.
Flipping a figure over a line changing the position and location of the figure.
Turning a figure around a point.
Figures that have the same size and shape.
The mathematics of the properties, measurement, and relationships of points, lines, angles, surfaces, and solids.
Figures that have the same shape.
A figure can be folded or reflected and the two parts match.

Use the words in the word bank to label the figures below: HINT- not all of the words are used!

line, ray, angle, line segment, plane, circle, triangle, square, rectangle, pentagon, hexagon, octagon, heptagon, sphere, cone, cylinder

1. Octagon 10. Angle
2. □
3. 29°
4. Plane
5. △
6. Triangle
7. Square
8. Ray
9. ○
10. Sphere
11. Line
12. Circle
13. Octagon
14. Cone
15. Line
16. Segment
17. Sphere
18. Line
19. Octagon
20. Cone
21. Cylinder
Geometry Pre-Test

Match the word with the correct definition.

Write the letter of the definition that matches the word.

- similar
- reflection
- congruent
- rotation
- symmetry
- translation
- geometry
- polygon

- a. The movement of a figure along a straight line
- b. A closed figure made up of straight line segments
- c. Flipping a figure over a line changing the position and location of the figure
- d. Turning a figure around a point
- e. Figures that have the same size and shape
- f. The mathematics of the properties, measurement, and relationships of points, lines, angles, surfaces, and solids
- g. Figures that have the same shape
- h. A figure can be folded or reflected and the two parts match

Use the words in the word bank to label the figures below: HINT - not all of the words are used!

line, ray, angle, line segment, plane, circle, triangle, square, rectangle, pentagon, hexagon, octagon, heptagon, sphere, cone, cylinder

- 10
Points, Lines, and Planes

Here is a drawing of the front wall in a typical classroom. It shows a chalkboard, flag, bulletin board, clock, and poster.

Here are some geometric figures. The arrowhead means the figure goes on forever in that direction.

point A  line segment AB  line PQ  ray XY  plane WXY

Name the geometric figure suggested by each item on the classroom wall.

1. the flag pole  line segment
2. where the hands of the clock meet  point
3. the “Attention Students” poster  plane
4. the chalkboard  plane
5. where the flag pole is fastened to the wall  point
6. a piece of chalk  line segment
7. a corner of the bulletin board  point
8. the left edge of the chalkboard  line segment
9. a hand on the clock  ray
10. the chalk ledge  line
Math Assignment

1. line segment
2. vertical
3. supplementary
4. perpendicular lines
5. ray fg
6. line segment CD
7. line AB
8. right angle
9. obtuse angle
10. acute angle
11. acute angle
12. 40°
13. 140°
14. 50°
15. 90°
16. 180°
17. 140°
18. JK
19. JT
20. IH
21. IH

92%
Feb 5, 2010
Mad Cty
2-04 Form A

-5 prf

1. C. A
2. B
3. C
4. B
5. C
6. A
7. B
8. C

18. C
19. D
20. C.
Feb. 5, 2010
Math
CRT
604. Form A
1-20

1. c
2. b
3. c
4. b
5. c
6. a
7. b
8. c
9. a
10. c
Appendix F- Student Journal Prompts

1. What did I do today in math?
2. What did I learn today in math?
3. What did I not understand in math today?
4. What do I have questions about?
5. What strategy did I use today?

Student Optional Journal Prompts
1. Write a story connected to what I am learning in math.
2. Write a poem connected to what I am learning in math.
3. Make a list of how I have used math today.
4. What was my favorite part of today’s lesson?
5. What was my least favorite part of today’s lesson?
6. If I worked with a partner, what did I do to help?
7. Write a letter to the teacher telling him/her something you learned in math.
8. Write a letter to the teacher asking him/her something you didn’t understand.
9. Write a letter to an absent student telling him/her what they missed.
10. Write a letter to mom telling her what you did today in math.
11. Write a letter to a second grader and tell her/him what you love about math class.
12. Write a letter to the principal telling him/her what you learned today in math.
13. Write a letter to the assistant principal telling him/her what you want to learn in math.
14. Write instructions for completing a problem.
15. Describe uses for what we learned today in class.

Teacher(s) Personal Weekly Journal (to document your observations)

1. What changes have I seen in the students this week?
2. What surprised me this week, related to my problem of practice?
3. What went really well this week, related to my problem of practice?
4. What did I learn this week that will inform my teachers teaching and/or journaling next week?
5. Tensions I and the teachers felt this week between my roles as teacher & researcher:
6. What will happen to students’ justifications and completion of homework if they work individually?
7. How can I help students see the importance of communicating their thoughts for solutions in mathematics?
8. What will happen to students’ confidence level in understanding mathematical concepts if students provide feedback on their homework? Will the completion rate change in classes?
Appendix G- Sample Student Journal Entry(s)

January 28, 10
Math
Today's Journal Prompt

What was my favorite part of today's lesson?

The favorite part of today's lesson was when we learned about similar and congruent figures. Δs □□

I noticed that I love to do math. It helps to take notes. I really enjoy similar and congruent figures. ☀ ☀ △
Dear Mrs. Simpson and Ms. Fischer,

I learned a lot about math but what I liked about it was our math groups. Because we got to work together and every time I learned something new. But my favorite part was when we got to learn about reflection, translation, and rotation. I liked the worksheets that had that and cross multiplication. All of it was perfect.

P.S. And now I love Math. (Bye)
Dear Mrs. Simpson and Ms. Fischer,

I learned that, enjoy working on projects, also working with partners, it was fun. I thought the C.P.F was hard but I tried so hard and got an proficient. The was ok. I liked when people was helping me and I think I need help with division and a little help with multiplication tables like 3, 4, 6, 7, 8, 12 and I worked so hard to remember them.
Dear Mrs. Simpson and Ms. Fischer,

What I learned in math was fun. It was a great experience to learn about angles, shapes, ratios, and everything else. Learning math made me more interested in school. I have to have fun with the both of you as much as I can because this is my last year here. And when I was taking the CRT, I felt tense and confident about it was the testing. Geometry was great. It's way better than algebra. If I have to do advanced geometry, I hope I can do it with the both of you.
I like the math C.R.T. because it made a lot more sense. I like math a lot because it's so easy, what I can't understand is sometimes confusing. I felt the same.

1. That we are a community and we are all important.
2. We shall all cooperate with each other even though it's a wrong answer.
3. That some of us learn at our own speed.
4. When Miss Fischer has small groups we shouldn't mess with her.
5. Take notes.
6. Staying on task.
Dear Mrs. Fischer and Mrs. Simpson,

I learned about vertical, horizontal, angles, and congruent and isosceles, and the differences between the two. I also learned about different ratios.

The quick review that we have before the lesson, it really helped refresh my memory. I am not the best in math, but I seemed to learn better with the quick reviews.

My favorite thing I learned was transformation of figures. When we did assignments in the past with transformations, I felt really confident. It really helped in math when we would write questions on the sticky notes and put them on the board, and we would discuss them out loud in class. I learned about finding the missing measurements, that was the most difficult thing for me.
Dear Mrs. Simpson
And
Ms. Fischer

I liked when I first started the 3rd grade and I didn't get it at first and then when you helped me a little more and then I got
advances on my C.B.I.T test.
But the most thing that I liked was the rays, line segment and a cut, obtuse and more. Well the thing that I liked the most was how
an right angle can form in to a line and it will go to 180° and

well I loved math. Into was a rotation.
2-1-2010

Objective: To write ratios and use ratios to identify similar figures.

Why learn this? It can help you make decisions about objects such as a photograph.

Ratio: a comparison of two numbers, fractions, or decimals.

Equivalent ratios: ratios that name the same comparisons.

Corresponding sides: sides that match in similar figures.

Corresponding angles: angles that match and are congruent in similar figures.

Triangles add up to 180°.

Quadrilaterals add up to 360°.
January 25, 2010

1. 180°
2. 90°
3. parallel
4. perpendicular
5. intersecting

29.1 Transformations of Plane Figures

Objective: To use translations, rotations, and reflections to transform geometric shapes.

Why learn this: You can use this skill to design a logo for a club or organization.

Transformation: A movement of a figure without changing the size or shape of the figure.

Translation: The movement of a figure along a straight line.

The location of the figure changes.

Rotation: Turn a figure around a point. The position and location of the figure.

Reflection: Flipping a figure over a line.
Appendix G- Teacher Journal Entry

Week 5: February 3, 2010
Things have been running smoothly. The students are working well in their small groups. Introducing Ratios and Proportions has been hard for them, but with more practice I feel they will understand it better. The CRT will be this Friday, so I’m interested to see the results and where further practice/enrichment is needed.

I am feeling more comfortable with the set up, and it has helped me in my other small group times as well such as Guided Reading and when we do teacher conferences for writing.
At times the students come back to the table and expect me to just do the problems for them when something is a little bit more difficult (using cross multiplication to find the unknown side in similar figures). By having them look at their notes and telling ME how to solve it has helped them understand and hopefully retain better.

February 5, 2010
The CRT went well. All students received at least a proficient, even the ones that normally get a Beginning or Progressing. It is awesome to see that all of my students have made their Math goal for the Quarter!

Week 6: February 9, 2010
We have begun reviewing for Form B in hopes that more students get an Advanced. It is so great seeing students raise their hands to ask questions. One student during questions and comments even raised her hand just to say how fun the Math website was for computer center! I’m excited that students are becoming more engaged in Math.

Week 7: February 17
This week we only had a day, due to field trips and days off, and it was for review. The students were given a packet to work on throughout the week. I pulled students to work on individual needs the only day we had class. They appeared to be picking up on things, and I was able to correct a few errors in thinking with the lines of symmetry.

Week 8: February 24
The students did a review game in preparation for the CRT. This was good to do as a whole group since it had been awhile from our last math lesson time. The next day students took the CRT and performed well. It was exciting to see six more students (on top of the original seven) get advanced. One of my resource students even got advanced which was thrilling for her and me as a teacher. I was so proud, because she took her time and went over her answers, being the last to hand it in. All other students received a proficient again so I’m glad they were able to maintain/retain information. We were able to celebrate by playing variations of Around the World the last day of our short three day week, and the students enjoyed it.
Appendix H- Student Attitude Survey (pre and/or post)

**Directions:** After reading the following statements, select the response that best fits your feelings or attitude. Survey will be administered in sections.

<table>
<thead>
<tr>
<th>Section 1</th>
<th>5-Point Traditional Likert Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Strongly disagree</td>
</tr>
<tr>
<td>9. I like math.</td>
<td></td>
</tr>
<tr>
<td>10. I use math in my life every day.</td>
<td></td>
</tr>
<tr>
<td>11. A person can get a better job if he/she has good math skills.</td>
<td></td>
</tr>
<tr>
<td>12. Our local schools do a good job in teaching math.</td>
<td></td>
</tr>
<tr>
<td>13. Learning math skills is important for the future.</td>
<td></td>
</tr>
<tr>
<td>14. Advanced math skills increase employment possibilities in this area.</td>
<td></td>
</tr>
<tr>
<td>15. Math classes should be required at every level of school.</td>
<td></td>
</tr>
<tr>
<td>16. Few jobs in this region of the country require advanced math skills.</td>
<td></td>
</tr>
<tr>
<td>17. Comments</td>
<td></td>
</tr>
</tbody>
</table>
Directions: After reading the following statements, select the response that best fits your feelings or attitude. Survey will be administered in sections.

<table>
<thead>
<tr>
<th>Section 2</th>
<th>5-Point Traditional Likert Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>13. My class has specific goals that I understand.</td>
<td>Strongly disagree  Disagree  Neither agree nor disagree  Agree  Strongly agree</td>
</tr>
<tr>
<td>14. The main purpose of my math class is to help students learn math skills and strategies.</td>
<td></td>
</tr>
<tr>
<td>15. I know why it is important for me to learn what is being taught.</td>
<td></td>
</tr>
<tr>
<td>16. My class challenges me to think and solve problems.</td>
<td></td>
</tr>
<tr>
<td>17. My math class is usually interesting.</td>
<td></td>
</tr>
<tr>
<td>18. Students feel free to express their ideas and opinions in whole group.</td>
<td></td>
</tr>
<tr>
<td>19. Students are given many chances to show what we have learned.</td>
<td></td>
</tr>
<tr>
<td>20. My guided math group is usually interesting.</td>
<td></td>
</tr>
<tr>
<td>21. Students feel free to express their ideas and opinions in guided math groups.</td>
<td></td>
</tr>
<tr>
<td>22. Students are given many chances to show what we have learned.</td>
<td></td>
</tr>
<tr>
<td>23. Grades are given in a fair manner.</td>
<td></td>
</tr>
<tr>
<td>24. Tests and quizzes are related to the material and ideas we are supposed to learn.</td>
<td></td>
</tr>
<tr>
<td>25. Comments</td>
<td></td>
</tr>
</tbody>
</table>
### Directions: After reading the following statements, select the response that best fits your feelings or attitude. Survey will be administered in sections.

<table>
<thead>
<tr>
<th>My Attitude About My Teacher</th>
<th>5-Point Traditional Likert Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Section 3</strong></td>
<td>Strongly disagree</td>
</tr>
<tr>
<td>15. My teacher expects all students to succeed, no matter who they are.</td>
<td></td>
</tr>
<tr>
<td>16. My teacher gives me challenging work.</td>
<td></td>
</tr>
<tr>
<td>17. My teacher makes learning interesting by teaching in different ways.</td>
<td></td>
</tr>
<tr>
<td>18. My teacher helps me when I don’t understand something.</td>
<td></td>
</tr>
<tr>
<td>19. My teacher gives students extra help if it is needed</td>
<td></td>
</tr>
<tr>
<td>20. My teacher encourages me.</td>
<td></td>
</tr>
<tr>
<td>21. My teacher gives me challenging work.</td>
<td></td>
</tr>
<tr>
<td>22. My teacher makes learning interesting by teaching in different ways.</td>
<td></td>
</tr>
<tr>
<td>23. My teacher helps me when I don’t understand something.</td>
<td></td>
</tr>
<tr>
<td>24. My teacher gives students extra help if it is needed.</td>
<td></td>
</tr>
<tr>
<td>25. My teacher encourages me.</td>
<td></td>
</tr>
<tr>
<td>26. My teacher expects all students to work hard.</td>
<td></td>
</tr>
<tr>
<td>27. My teacher expects all students to succeed, no matter who they are.</td>
<td></td>
</tr>
<tr>
<td>28. My teacher makes it clear what I am supposed to learn.</td>
<td></td>
</tr>
<tr>
<td>29. Comments</td>
<td></td>
</tr>
</tbody>
</table>
**Directions**: After reading the following statements, select the response that best fits your feelings or attitude. Survey will be administered in sections.

<table>
<thead>
<tr>
<th>My Attitude About Guided Math</th>
<th>5-Point Traditional Likert Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Section 4</strong></td>
<td>Strongly disagree</td>
</tr>
<tr>
<td>13. Working in small group makes a difference.</td>
<td></td>
</tr>
<tr>
<td>14. I have a strong relationship with my teacher.</td>
<td></td>
</tr>
<tr>
<td>15. I enjoy working with a partner to solve problems.</td>
<td></td>
</tr>
<tr>
<td>16. I enjoy working as a small group.</td>
<td></td>
</tr>
<tr>
<td>17. I set goals based on my assessments.</td>
<td></td>
</tr>
<tr>
<td>18. I set goals with my guided math group based on our groups assessments.</td>
<td></td>
</tr>
<tr>
<td>19. I know I can accomplish my goals with my teachers help.</td>
<td></td>
</tr>
<tr>
<td>20. I know I can accomplish my goals with my classmates help.</td>
<td></td>
</tr>
<tr>
<td>21. I know I can accomplish my goals all by myself.</td>
<td></td>
</tr>
<tr>
<td>22. Keeping a math journal helps me learn about math.</td>
<td></td>
</tr>
<tr>
<td>23. Spending time with my teacher is helpful to achieving my goals.</td>
<td></td>
</tr>
<tr>
<td>24. My teacher reviewing my progress weekly helps me stay focused.</td>
<td></td>
</tr>
<tr>
<td>25. Comments</td>
<td></td>
</tr>
</tbody>
</table>
### Appendix I: Second and Third Quarter Math Grades

<table>
<thead>
<tr>
<th>Student</th>
<th>2nd Quarter</th>
<th>3rd Quarter</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>B</td>
<td>B</td>
</tr>
<tr>
<td>2</td>
<td>C</td>
<td>C</td>
</tr>
<tr>
<td>3</td>
<td>C</td>
<td>B</td>
</tr>
<tr>
<td>4</td>
<td>B</td>
<td>B</td>
</tr>
<tr>
<td>5</td>
<td>C</td>
<td>B</td>
</tr>
<tr>
<td>6</td>
<td>C</td>
<td>C</td>
</tr>
<tr>
<td>7</td>
<td>C</td>
<td>B</td>
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<tr>
<td>8</td>
<td>D</td>
<td>A</td>
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<tr>
<td>9</td>
<td>C</td>
<td>B</td>
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<tr>
<td>10</td>
<td>B</td>
<td>B</td>
</tr>
<tr>
<td>11</td>
<td>C</td>
<td>B</td>
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<tr>
<td>12</td>
<td>A</td>
<td>A</td>
</tr>
<tr>
<td>13</td>
<td>C</td>
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