Implementing Differentiated Strategies During Math Instruction

Jessica Cavaleri

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Abstract

In any elementary school classroom there are students with different abilities, learning styles, and personalities. Teachers need to find a successful way to individualize their teaching in order to benefit every child in the class. I designed this action research study to study the implementation of differentiated strategies in my third grade classroom at Riker Hill Elementary in Livingston, New Jersey. My class consists of 22 students during Math instruction. I studied the use of differentiated instructional techniques through the implementation of specific strategies, including group work, attending to multiple learning styles, and the use of centers. I implemented the strategies at different times throughout the research study. While these strategies were being used in my classroom, student learning was studied. The instruments I used to collect data in this study were: a student questionnaire, a teacher observation journal, interviews, and short student feedback forms to be used after each lesson where a new strategy was used. I used all instruments to analyze student learning based on the differentiated strategies used when teaching Math.

My analysis of multiple data sources demonstrated that working in groups was beneficial for student learning. Also, it was evident that students learn better when working with manipulatives and when the teacher models.
IMPLEMENTING DIFFERENTIATED STRATEGIES
DURING MATH INSTRUCTION

by

Jessica Cavaleri

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Introduction

In the past couple of years, I have had a difficult time adjusting my teaching to meet the diversified needs in my classroom. It is challenging to address the needs of all students in my classroom with whole-class instruction, activities, and assignments. I believe there is a need for differentiated instruction in my school and, particularly, in my classroom. I teach third grade at Riker Hill Elementary School in Livingston, New Jersey. Livingston is a suburban town with six elementary schools; Riker Hill being one of the six. In the past two years of teaching third grade at this particular school I have taught classes with a wide range of ability levels.

Originally, I wanted to frame my research question around differentiated instruction and how it affects student engagement across all subject areas in my classroom. My question was, “How can I increase student engagement during lessons?” I planned to use differentiated strategies in order to accomplish my research goal. Then, I did not think that my question was directing me towards what I wanted to study, so I changed it to, “How can I increase student engagement during lessons and follow-up activities?”

After I began collecting my journal entries, I started to look at the specific subject areas that I taught and how I could narrow down my research. I paid particular attention to my math instructional time. This year, particularly in my math instruction, I was finding that I was not able to reach all my students effectively when I taught. I was continually seeing that many of my students were not reacting to my teaching in a way that I had hoped for. Students seemed bored, did not participate often, and some struggled quite a bit with most of the concepts being taught. I did not feel that my
students were fully grasping the concepts that I was teaching, while there were a handful of students who seemed to already know several of the topics I taught. Also, the math curriculum is pretty heavy and there are a lot of units to get through.

Math is taught right after lunch which might contribute to the problem, but I wanted to find a way to effectively teach my students, being sure to challenge the children who need to be challenged and give more assistance to the children who need it. I wanted to know what teaching strategies would be successful when teaching the math curriculum. I was curious as to which differentiated teaching strategies my students would react well to. Then I formulated another research question, which is what I based my research on. My question was, “What happens when I implement differentiated strategies into my math instruction?”

I wanted to use the data that I collected to help me become a better teacher and question the teaching strategies that I was using. I was open to my research taking me in different directions and wanted to see what it would tell me about my students and my teaching. In order to better understand this, I looked at literature that other people wrote on differentiated instruction. I also read other people’s research on differentiated instruction to help guide me in my own action research study.

In this paper I will provide a description of my research study and my findings. First, I will be discussing important points from the literature on differentiated instruction. Then, I will be discussing the methods that I used to collect my data. I will explain how I analyzed the data and present my research findings. I will conclude by discussing what I have learned about my teaching and my classroom and where I plan to go from here.
Literature Review

Differentiated instruction is a set of strategies that teachers use in order to meet the individual needs of all students in a classroom. It is an educational approach that involves structuring and adjusting instruction, grading, and assessments to accommodate individual students’ needs rather than beginning at a predetermined set point. It gives each student the opportunity to work to his or her capacity. Differentiated instruction is teaching with student variance in mind. It is responsive teaching to students’ varying readiness levels, varying interests, and varying learning profiles rather than a “one-size-fits-all” teaching approach (Adams & Pierce, 2003; Anderson, 2007; Cox, 2008; Good, 2006; Lawrence-Brown, 2004; Levy, 2008).

Many research studies about differentiated instruction have been carried on in a variety of schools and grade levels. A study completed by Tobin & McInnes (2008) reports on compelling evidence from Grade 2/3 classrooms in which teachers differentiated instruction in a variety of ways to benefit all students. In particular, teachers provided additional scaffolding for struggling literacy learners by offering a menu of tiered work products, expert tutoring and additional supports. The study emphasizes the critical importance of responding to the needs of diverse and at-risk learners in the regular classroom. Differentiated instruction is suggested as a powerful organizing framework in the language arts classroom.

An action research project done by Danzi, J., Reul, K., & Smith, R. (2008) studied the methods used to reduce boredom and frustration and increase students’ academic motivation in three mixed-ability classrooms. Danzi et al. (2008) used three documentation tools to gather data regarding the problems they were observing, including
a parent survey, student survey, and an observation checklist. The tools were then used again at the end of the study to compare the post-assessment data to the pre-assessment data that was collected.

After conducting their pre-assessment of the situation at hand, intervention strategies were developed to try and improve the situation (Danzi et al., 2008). Three specific differentiated instruction strategies were chosen for implementation: free-time activities, tiered assignments, and authentic assessments. Free-time activities included different content areas, appealing to the students' multiple intelligences. They allowed early finishers to self-select their free-time activities. Tiered assignments allowed the same objective to be obtained at various levels and modalities. The teachers developed assignments that ranged from simple to complex and appealed to the students' multiple intelligences. Authentic assessments that were developed included culminating activities and tests that targeted various learning styles, multiple intelligences, and ability levels.

At the conclusion of the project the researchers (Danzi et al., 2008) compared and analyzed their pre- and post- data to identify changes that occurred in the classrooms. This included fewer children distracted during work-time and a decreased number of off-task behaviors. The data was collected through the use of a pre- and post-observation checklist. The researchers (Danzi et al., 2008) felt that students were picking tiered assignments that were too easy for them and it was difficult for them to monitor the students' choices. In addition, early finishers moved too quickly through the free-time choices and, therefore, boredom was not alleviated.

Although the data did not confirm the researchers' hypothesis, after reviewing the results, the teacher researchers (Danzi et al., 2008) recommended the continuance of
differentiated instruction. "We feel that to best meet the individual needs of learners, some aspects of differentiated instruction should be included as part of the curricula" (Danzi et al., 2008, p. 60). However, if they were to conduct the study again, they would only introduce one strategy, free-time activities, tiered assignments, or authentic assessments, which would allow the teacher researchers better management.

Benefits of Differentiated Instruction

Even though there are several barriers to differentiated instruction, the benefits far outweigh the anticipated barriers. As classrooms become more culturally diverse, it becomes imperative that differentiated instruction occur in elementary classrooms. Teachers can nurture the different abilities of their students early on by maximizing the potential of each student in their classrooms, including students who come to the class with defined disabilities. Practicing differentiation in the elementary years is important because students' early experiences have a profound impact on their views of school, their understanding of the learning process, and their views of themselves as learners (Carolan & Guinn, 2007; Cox, 2008). "Modifying instruction to draw on student interests is likely to result in greater student engagement, higher levels of intrinsic motivation, higher student productivity, greater student autonomy, increased achievement, and an improved sense of self-competence" (Cox, 2008, p. 3).

On the basis of analysis of student achievement data and attitudes toward reading, Baumgartner, T., Lipowski, T., & Rush, C. (2003) concluded that the implementation of differentiated instructional strategies had been an effective approach toward successfully increasing reading achievement. They used differentiated approaches that included flexible grouping, student choice of various tasks, increased self-selected reading time,
and access to various reading materials. They found improvements in students’ instructional reading levels and number of comprehension strategies used, mastery of phonemic and decoding skills, and attitudes toward reading.

According to McBride (2004), differentiated instruction is vital to effecting positive change in student performance, because the one-strategy-fits-all approach does not work in a real classroom and it is necessary to construct lesson plans to address individual needs so that no student is unprepared for assessments. Anderson (2007) discusses that more and more research is beginning to emerge within the field of education supporting the potential for differentiated instruction as a vital means of assisting diverse learners in their acquisition of knowledge and skills while also breaking down the barriers that inhibit their unique abilities to successfully demonstrate their maximum potential as learners.

**Barriers to Differentiated Instruction**

Although differentiated instruction may be an essential set of strategies to meeting the needs of all students, many real barriers exist and many teachers are hesitant to weave differentiated practices into their classroom methods because they believe that they lack time, professional development resources, and administrative support (Carolan & Guinn, 2007). Because these barriers exist, it is sometimes important to turn to expert teachers who have been differentiating their lessons long before the term was popularized. We can observe how successful differentiators overcome common obstacles and seamlessly weave differentiation strategies into their practice while staying true to their personal style (Carolan & Guinn, 2007).
Differentiated instruction does not develop without an effort to keep the current educational expectations in play. Because of new movements evolving, it becomes more apparent that there is a need for differentiated instruction in the classroom. As part of the ever changing educational system, the standards movement recently evolved in an effort to ensure that all children receive an equivalent education. There are sets of standards that each student must achieve regardless of the teacher, socioeconomic status, disabilities, or other differences in either the educational institution or the student. The standards make up the goals established for all of our students, but how we reach the goals may require different paths. Because of this movement, the risk is that our focus will shift to the standards and away from the child. With the tools of differentiated instruction, we can keep the focus where it belongs and take each student as far as he or she can go (Levy, 2008).

Anderson, K., Stetson, E., & Stetson, R (2007) speak about several challenges to differentiated instruction. These challenges include finding planning time because differentiated instruction requires much more elaborate and individualized planning, which is time consuming, and working with many different learning styles within a classroom. Differentiated lessons take more time to plan because you might need to teach the skill or strategy several different ways in order to reach every student. For example, some students might be auditory learners, learning best by listening, while others work better with hands-on materials. Then, you might have a third group of students who need your close attention. These factors require more time of the teacher because the same lesson needs to be planned several different ways to be taught to a group of students.
Carolan & Guinn (2007) believe that many educators mistakenly think that differentiation means teaching everything in at least three different ways—that a differentiated classroom functions like a dinner buffet. In addition, Tomlinson (2005) believes that barriers stem from a combination of misconceptions about quality differentiation, misconceptions about quality grading, and habitual practice of one-size-fits-all instruction coupled with intractable beliefs about grading.

**Successful Strategies**

Some studies show that differentiated instruction proves to be successful in the classroom and there are many strategies that are successful. Flexible grouping, sometimes referred to as cluster-grouping, is a strategy to incorporate into a classroom that incorporates differentiated instruction. Renzulli (2008) concluded that cluster-grouping based on ability level will enable teachers to more easily provide different assignments and content. Similarly, Cox (2008) believes that there are many ways to use flexible grouping in a classroom. Teachers can use whole class instruction, small group instruction, individual instruction, and students can be grouped based on readiness, interests, or learning profile.

Cox (2008) also found tiered activities successful, where the teacher keeps the concepts and skills the same for each student but provides “routes of access” that vary in terms of complexity, abstractness, and open-endedness. Tiered assignments can include “cube” activities where different assignments are written on the faces of a cube. All cube activities reflect the same content, but each activity is different. According to Renzulli (2008), tiered assignments give all students a chance to share knowledge and ideas yet, at the same time, work at a level that is both academically challenging and comfortable. It
also gives the teacher a chance to teach more flexibly and to engage students’ interests as well as meet their needs.

Assessment

Before a teacher implements differentiated instruction strategies into his or her classroom, it is important to have an idea of when and how the children are going to be assessed. Students come to us with greatly varying abilities and experiences and the place to begin teaching is pre-assessment (Levy, 2008). "The idea is to give you a snapshot of where your student is with respect to what you plan to teach" (Levy, 2008, p. 162). Levy (2008) states that to be effective teachers, we must begin at each student’s individual level. Formative assessments are also important and can be done in many ways. The results will give a teacher direction for further instruction with each individual student. On the other hand, summative assessment is used to determine whether the student has successfully learned what was taught. Varying the assessments, especially with differentiated instruction, allows teachers to understand the individual student needs in their classrooms (Levy, 2008).

Differentiated assessment can include giving students choices as to how they want to show their knowledge and possibly letting them develop their own forms of assessment. It also means that each student in a classroom might share their knowledge in different ways. For example, when assessing a unit in Social Studies, students might write a song, create a poster, or put on a play.
Learning Styles

Gardner (1995), states that a learning style designates a general approach that an individual can apply equally to every conceivable concept. In contrast, Gardner (1995) believes that an intelligence is a capacity, with its component processes, that is geared to a specific content in the world (such as musical sounds or spatial patterns). In other words, learning styles can change within a person based on the information being learned and the context with which it is being learned. Intelligences are much broader and define persons’ abilities in a more general way.

An action research study done by Lopez & Schroeder (2008) studied a way to maximize learning for all students by addressing different learning styles and implementing various strategies. The students in the targeted school exhibited difficulty in experiencing academic success while exposed to conventional teaching strategies. The two target schools consisted of an intermediate school, which serves students in third through fifth grades and a middle school, which serves students in sixth through eighth grades. Lopez & Schroeder (2008) found that students were being taught as a whole class and not as individuals. As a result the researchers implemented the following strategies to teach students individually: chunking, tiered assignments, differentiated instruction, and cooperative learning. Prior to implementation they developed lessons that focused on various multiple intelligences, provided differentiated instruction through several different instructional strategies, and provided opportunities for cooperative learning groups.
Over the course of twelve weeks, the researchers (Lopez & Shroeder, 2008) developed lessons that incorporated chunking, differentiated instruction, cooperative learning, and addressed the multiple intelligences (Gardner, H., 1995).

Tiered assignments included leveling groups based on the assessment of prior knowledge. The groups were then given a variety of activities on the topic being taught. Week twelve’s assessment consisted of allowing the students to select their assignment from a list of ten choices. Each of the multiple intelligences was addressed in the choices. The multiple intelligences that were addressed throughout the study are: Verbal/Linguistic, Logical/Mathematical, Visual/Spatial, Interpersonal, Intrapersonal, Bodily/Kinesthetic, Musical/Rhythmic, and Naturalist.

The instruments used by the researchers (Lopez & Schroeder, 2008) were student surveys, teacher observation checklists, and informal assessments/anecdotal records. The survey was designed to determine the students’ preferred learning styles based on Howard Gardner’s multiple intelligences. Each intelligence has certain characteristics that describe a learner’s preferred learning modes. The student surveys were conducted prior to the intervention period and immediately following.

As the second method of assessment, the researchers (Lopez & Schroeder, 2008) used observation checklists to record learning success on a daily basis. The researchers noted who had comprehension of the lesson by checking for understanding. Prior to the intervention, the observation checklists indicated that five or six students did not indicate a clear understanding of the task at hand. Using formative assessments during the intervention, the number of students who did not comprehend the lesson being taught
fluctuated from two to six. After the intervention, fewer than five students were not on task and did not understand the material.

The researchers (Lopez & Schroeder, 2008) also used both formal and informal assessments, which were conducted throughout the intervention. Rubrics and checklists were distributed to the students, which allowed them to view the requirements necessary to complete each task. The teacher researchers noted that students understood the expectations and greeted assignments with enthusiasm as a result of the tiered assignment, cooperative learning, and the knowledge of their preferred learning style. Approximately 95% of the students turned in their work on time and achieved better than average grades.

According to Lopez & Schroeder (2008), the achievement of students in two fourth grade classrooms showed dramatic improvement when the instruction was differentiated. When standard instruction was delivered, the grades were average and significantly below average. After the interventions were executed, assessments revealed higher than average grades when teaching methods were varied. Clearly, differentiated instruction was successful in this study.

The teacher researchers (Lopez & Schroeder, 2008) encourage surveying students to identify their preferred learning style. Using differentiated instruction can also ensure student success. Tasks should be delivered based on ability because a lesson that is too difficult may cause frustration, hinder learning, and encourage behavior problems. The data indicated a significant increase in understanding and positive assessment results.

Lopez & Schroeder (2008) encouraged teachers to promote a positive learning environment in the classroom and they advocate the use of cooperative learning groups.
Traditional teaching methods do not always address the various types of learners and their different abilities. This creates a predicament for teachers trying to reach all students.

I believe differentiated instruction to be the ability of a teacher to educate every student in his or her classroom in a way that the student learns best. This may mean that in a class of 24 students, five different things can be going on in order to teach one math strategy. Some students may be working with manipulatives, some may be on the computer, and some may be sitting quietly working at their seats individually. Ideally, I want my classroom to look like this, but have only begun to get my feet wet with differentiated instruction. For this study I have started to explore several differentiated strategies hoping that I will eventually work my way into how I want my ideal classroom to look.

After reviewing the professional literature, I decided that to best serve my students, I will implement a combination of differentiated instructional strategies in my third grade classroom during math instruction. This literature review helped me to shape what I did in my study. I was able to use studies that were already conducted to see the positive and negative effects of differentiated instruction.

Methodology

Research Question

I arrived at my research question because I wanted to discover ways of teaching my students math in a more effective way. I wanted to use strategies that would individualize instruction by differentiating what I was teaching in order to reach all
students. The question that guided my research was, "What happens when differentiated strategies are implemented during Math instruction?"

**Context of the Study**

Riker Hill Elementary School is located in Livingston, New Jersey, a suburban middle class town. Livingston, New Jersey is primarily white non-Hispanic (80.9%). It is composed of mostly middle to high class families. In Riker Hill Elementary, 98.6% of students speak English as their first language and 1.4% of students are limited English proficient. In addition, 9.7% of students have Individualized Education Programs (IEPs). It contains Kindergarten through fifth grade.

My third grade classroom is decorated in bright colors and I try to create a very warm atmosphere where my students are comfortable with me and each other. I have been at Riker Hill for three years, which has been my entire teaching career so far. I am always looking for new strategies and teaching styles that might work for my students each year. I like having students work in groups, in partners, and with manipulatives. I think it is important for young children to have a hands-on experience when learning math. I am open to new suggestions and am very critical on myself as a teacher.

The math curriculum in my district is comprehensive and many units need to be completed by the end of the year. Also, it is required that each third grade classroom throughout all the elementary schools in Livingston be teaching the same units at around the same time. Students are learning many concepts for the first time such as: rounding, adding and subtracting three and four digit numbers, multiplication, and division.
**Participants**

My third grade class consists of 24 students with academic levels ranging from those who receive special education services in math to those who go to gifted and talented classes on a biweekly basis. Since this study was done during math time, the special education students were not involved because they were out of the room for their small group math instruction in the resource room. In addition, there are a number of students that are toward the lower academic spectrum who need a lot of individual attention. Many other social and emotional factors, such as divorced parents and fighting on the playground, also contribute to the diversity of my third grade class. All students are native English speakers, but several of them speak two languages when at home.

I received permission from my students to conduct this research study by having students sign a consent form in class and sending a parental consent form home for parents to sign. All students and parents gave consent.

**Data Collection**

Throughout my research study, I used various data tools to guide my actions. I used a student questionnaire, individual student interviews, student feedback based on various lessons, and I kept a research journal. The initial student questionnaire was made up of nine general questions about how students viewed their own learning styles. It was read aloud to students and they had to circle the response that best fit their opinions. The interviews were more open-ended and consisted of six questions. I interviewed each student individually over the course of the study. The questions focused on their attitudes toward math and how they felt about the way I taught it. Student feedback was specific to the various lessons I was teaching. The student feedback forms were open-ended and
there were three questions on each. I used my research journal to record what I was teaching on a daily basis as well as to record the way I grouped the children and their reactions to my teaching.

First, I gave all my students a questionnaire (See Appendices A-B), which showed me my students’ learning styles and how they liked to learn math. I needed to know this in order to implement differentiated strategies. I gave it to students orally prior to incorporating any differentiated strategies. This tool has taught me how my students learned best and what strategies they liked best when I taught math.

Also, I conducted individual interviews with my students. The interviews were collected throughout the entire research study. Through the interviews I learned how my students learned best, what they struggled with, and ways that they liked to be taught. I used this information to guide me when implementing certain strategies during math instruction. (See Appendix C-D)

In addition, I collected student feedback after lessons where specific strategies were used. During the research process, I realized that my feedback format was not giving me the information that I needed and was not connecting specifically to the lessons that I taught. That being said, after using the original feedback form twice (See Appendix E), I decided to develop questions for students to answer based on the lesson that I taught on that particular day.

Each time I collected the students’ feedback (a total of seven times), I created the questions based on what the lesson was for that particular day (See Appendices F-S). This way, I was able to collect data specific to how each lesson went. By using the questionnaires, I hoped to be able to compare the differentiated strategies that I used in
order to determine which ones were more successful and which ones I should not use again. I hoped to implement several strategies to be able to truly understand how my students learned best.

Finally, throughout my study I kept a research journal where I reflected on what happened during math instruction on a daily basis. This journal helped me to keep track of my daily teaching and my students’ responses. I wanted to know what strategies I used a lot and which ones I should have used more in order to enhance students’ learning.

Data Analysis

I used a color-coding system in order to highlight the big ideas as I read through the findings again. For example, purple indicated data related to group work, red indicated data related to multiple learning styles, and yellow indicated data related to the impact of differentiated instruction. This system helped organize my thoughts and findings in a way that made sense for me. I used this information to triangulate the data, because the same ideas were repeating across all of my data tools and this helped me to keep track of how often I was seeing the same information repeat across all data tools. It also allowed me to further identify questions and areas where I might continue the research process. Writing all of the initial findings after reading my data through the first time helped me to put the ideas into a more systematic order. Then, repeatedly reading through the data after identifying the initial findings allowed me to make more sense of the information that was collected, which contributed to the big ideas that were already starting to come into focus.

The tools that were used for assessing the outcome of my study included a student questionnaire, student interviews, short questionnaires based on the different strategies
implemented, and teacher observations kept in a research journal. A lot of information was collected and I had to come up with a systematic way of looking at my data.

First, I analyzed the student questionnaires that were given at the beginning of the study. I used a tally system as I went through the completed questionnaires in order to compile all the students’ answers. Then, I wrote out the initial findings that I noticed. This allowed me to see how the majority of my students felt about each question and guided me as to which strategies I should implement. I read through the questionnaires early in the study, which allowed me to implement strategies that aligned with the students’ responses on the questionnaires.

Next, I read through all the data that was collected through the interviews, student feedback, and research journal and listed all the initial findings that I was able to gather. I read through each data tool separately. I listed anything that popped out at me, that I thought would lead me to another discovery, or something that connected with something else I had discovered. This, of course, started to become a pretty long list, which I knew would have to be revisited. I quickly started to see many areas that were similar across all data tools and, because this is a process, many areas in which I might want to explore next. I reviewed my data and initial findings several times before moving on to my next step of analysis. I consistently came across the same initial findings across several of my data tools.

Then, I read through my initial findings for all the data tools and looked for the big ideas that popped out at me. Group work, attending to multiple learning styles, and impact of differentiation on students were the three big ideas that continued to repeat themselves throughout all data tools. Under each of those big ideas, I started to realize
that there were particular areas that gave me more specific information. For instance, under the big idea of group work I found that some of my data reflected the students’ perspectives, some were more geared towards my teaching and planning strategies, and some were more geared toward my efforts to impact my students’ learning. I was amazed at how easily the big ideas came into focus. At the beginning it just seemed like a lot of miscellaneous information. Many questions were continuously being raised and answered, followed by more questions. I was consistently learning more and more about my teaching strategies. Then some of the big ideas came into focus. I was starting to collect the same reactions from students as well as similar ideas about my teaching and planning.

Findings

Description of Findings

Overall, I found that students have a positive attitude towards math instruction. On the student questionnaire, given prior to any implementation of differentiated strategies, the majority of students said that they liked working on math problems. Also, after analyzing my student interviews, I was able to see that most students thought of math as fun and really seemed to enjoy it. Group work and partner work proved to be a strategy that students responded well to and it allowed students to talk more about their learning. In addition, students enjoyed learning math when they were moving around the classroom and participating in hands-on learning and/or visual learning. I also found that differentiation has an impact on time, planning and the ability levels of students.

Group Work and Partner Work

Prior to beginning this study, I already used group work and partner work when
teaching math but did not use it as frequently as I would have liked because the curriculum did not allow for it. Often when I incorporated partner work I allowed students to choose who they worked with, which, in turn, did not give me a lot of control as to who each student was paired with. Also, when incorporating group work, I usually only had the students work at their tables with the people they sat with and did not vary the members in the groups much because it seemed easier than having all of the children moving around. I was merely doing this to save time and it might not have been the best choice.

During my study I tried to incorporate more lessons that involved more differentiated group work activities with the students working with different people instead of always working at their tables. I started to mix up the groups based on ability level. I used quick, short assessments to see where the students were at in learning a new strategy. Then, I would group them according to level of mastery. This also allowed me to pull groups of students, who were having trouble, to work with me more closely. Also, I was able to vary the type of activities and assignments I was giving my students.

*Student perspective.* Students enjoy working in groups on various math assignments. This was evident through the initial student questionnaire, the student interviews, and the student feedback forms. On the initial questionnaire, 41% of students chose working in small groups, 5% chose working in a whole group, and 55% chose working with the teacher (See Appendix B).

Many of the students explained during their interviews that they thought working in groups was fun. They also said that when they were given independent work without any help it was harder for them and they did not like it. For example one student’s
response to the question, “What’s the best way for you to learn math?” was “sometimes in groups because if you don’t know something you can ask someone”. Another student responded with, “in a little group with a teacher because it’s hard for me to concentrate in math when there’s a lot of people talking and a lot of people around me.”

Similarly, on the student feedback forms, there was a positive response when students worked in groups or with partners. Most kids chose to work in pairs and/or groups when given the option. Some of the reasons given by students as to why they enjoyed working in groups were that “it is fun being with other people”, “you get to hear other people’s answers”, “you can help each other”, “it makes it easier”, and “it is less work”. When asked the question, “Did you choose to work with a partner?” some responses were: “I chose to work with a partner because it is fun. I would rather work with partners” and “I chose to work with a partner because I have fun with almost all my partners.”

On the other hand, a lot of children had different opinions on group work depending on who they were working with. More students liked groups better if they were able to choose partners or group members as opposed to being assigned partners or group members. Other negative issues with group work are being the only boy or girl in the group, always working with the same people, cooperation, arguing, and sharing materials. Some students also felt that they could work faster and more efficiently when working on their own instead of with partners or groups. For example some responses were: “I did not like working in pairs because me and my partner did not work good together”, “Not really because my partner got a little lazy at times”, and “No because I
was the only boy” in response to the question, “Did you like working in pairs? Why or why not?”

Planning and teaching. Planning for group and/or partner work was not difficult and it allowed me to adjust the partners and groups if necessary. It was not difficult because I felt that I knew my students as learners pretty well. I knew which children needed more assistance and which children needed more of a challenge. Also, I used some pre-assessments when I started new units in order to help group the students according to level of understanding. Incorporating lessons and activities with group work or partner work also gave me the opportunity to pair heterogeneously or homogenously depending on the lesson or activity. For example, when reviewing for our number sense unit, I paired students based on ability level in order to be able to work more closely with students who were having trouble and challenge students who had already mastered the topics that were taught. In addition, because the students are situated in groups of four around the classroom, they often worked and discussed with the people in their group.

Group and partner work also assisted me with a means of quickly assessing my students in order to see if they were able to grasp the concepts being taught. For instance, I gave them a problem to complete on their communicators (similar to white boards) at their seats. Then, after they were finished with the problem, they traded with a partner and checked each others’ answers. Through my research journal I noted that this allowed communication among the students, which enhanced their understanding of the information being taught. In addition, I walked around the classroom and the students verbalized their thinking to me, and I was able to see who needed more assistance and who understood what was taught. The short conversations and other means of formative
assessment allowed me to structure my teaching according to the specific needs of each of my students. In addition, I would use different forms of formative assessment such as: answering problems on communicators and completing problems on exit tickets at the end of a math period, throughout the course of a unit, in order to group students based on ability level.

Centers. Centers were incorporated as a means of group work in order to allow me to focus in on the children that needed help, while giving the students that were easily grasping the concept more freedom to complete their work at their own pace. The centers consisted of playing math games on the computers, working with the teacher on practice addition and subtraction problems, completing review sheets with addition and subtraction problems, using communicators to write addition and subtraction problems for each other to answer, and working with base ten blocks to model answering addition and subtraction problems. The students were out of their seats and moving around the classroom and loved the use of centers.

It was particularly helpful when I incorporated centers into my classroom, requiring the students to complete the centers in their groups. I had never used centers before and wanted to incorporate them in order to be able to work with individuals that needed more attention. I developed the centers on my own, trying to include various types of learning styles. I was able to differentiate through the centers because students were grouped homogenously based on ability level. As each group circulated through the centers, I was able to vary the levels of the activities and assignments that they were completing. I found the centers to be incredibly successful because the students responded well to them. Twenty-one out of 24 students said that they liked how centers
were incorporated into math and 19 out of 24 students felt that they were incorporated in a way that helped them learn. This was all evident through the student feedback forms and my daily journal notes.

*Impact on student learning.* After reviewing my collection of data, it was evident that group work and/or partner work had a positive affect on student learning. Whenever there was a student feedback form given after a lesson which incorporated group or partner work, the students responded positively. For example, when responding to the question, “Did you enjoy working in groups?”, some of the responses were, “Yes, because it makes you smarter.”, “Yes, because you can help each other.”, and “Yes, because you can go over your answers.” In addition, when responding to the question, “Were you able to cooperate nicely with your group?” some of the responses were, “Yes, because we worked nicely and we did it fast and we go with the flow”, “Yes, because we shared and were nice”, and “Yes, because we’re all friends”.

Also, after looking over my daily journal, it was obvious that group work had a positive impact on student learning. Discussions among groups reflected higher level thinking and questioning on the part of the students. Prior to having student work in groups, they did not have good questioning techniques. As I taught them more and more and they were able to work in groups, they were able to come up with some better questions. They were also able to challenge each other based on their differing ability levels, especially when they were grouped with people on similar levels. Prior to incorporating group work, students were not appropriately challenging each other because they were often grouped with students of varying abilities. Grouping students
with others at the same ability levels really helped the students to challenge each other and push their thinking.

Group work enhanced the sense of community that was set up in the classroom. Students were already comfortable with each other and were proud to share their answers and opinions. However, group work allowed the students to become more comfortable with each other by allowing students to help each other and talk about the strategies they were using to solve the problems, which created a better classroom community, a community where no one was afraid to show their answers. For example, during the interviews, one child said, “I like working in groups or partners because if you don’t get something you can ask them.”

*Attending to multiple learning styles*

*Bodily-Kinesthetic.* The subject of math provides many options to incorporate hands-on lessons and activities. Prior to the study I used manipulatives to help teach many math lessons. I used mostly base ten blocks, Unifix cubes, plastic money, and clocks. Students would use manipulatives at least once or twice a week. Sometimes a week would go by where they did not use them at all. I always thought that hands-on learning was successful when teaching math, but wanted to see how my students felt about it when I increased the frequency of it and paid closer attention to their reactions. After analyzing my data, it was evident that students responded positively to the hands-on lessons that were taught. Throughout the research study, I used many different materials such as: base ten blocks, Unifix cubes, communicators, calculators, and pattern block shapes.
After reading over the student interviews, I noticed that the majority of students said that hands-on lessons are helpful and fun. In response to the questions, “What would you like me to do more during Math to help you learn better?” one student said, “Explain it more by using Unifix cubes and other materials.” Another child said, “Go on the computers.” In addition, during the interviews, several kids said that using the communicators and playing games would help them learn better. When asked what tools in the classroom make math easier to learn, the students responded with answers such as: calculators, Unifix cubes, pattern blocks, base ten blocks, coins, clocks, a number line, rulers, and communicators. One child stated that, “Unifix cubes and pattern blocks help because you can move them around and figure things out easier.”

My third data collection tool, the student feedback forms, showed similar results when the children were asked about hands-on learning. I received mostly positive feedback to hands-on learning. On a lesson about three-dimensional shapes, the children were asked if they liked how the math lesson went that day. Some responses were, “Yes, because I like looking and holding 3-D shapes”, “Yes, because I like to actually hold things”, and “Yes, because first we got the shapes and got to look at them.”

Another lesson was taught in the unit of multiplication where the children had to use plastic chips and egg crates to represent different multiplication facts. Overall, the children felt that it was easy to work with the chips because they helped them see the pictures, helped them work, they were able to use their hands, and it was easier to think. The word “fun” was also used a lot when children were asked about how it was working with the chips. On a different lesson on multiplication where the kids had to use the
Unifex cubes to model the array for each fact, the students again responded positively. Most students said that the lesson was fun and easy.

Finally, during a third lesson where pattern blocks were used, the children felt that the lesson was fun and easy. They said that the pattern blocks made the lesson easier to understand and they were fun. Some children also said that the blocks were helpful and it was easy looking at the pictures.

In my research journal I noted several instances where students were more independent and able to structure their own learning when using the hands-on approach. During one lesson when the students were using Unifix cubes to model different multiplication arrays, I was able to walk around and monitor each child more closely because they were able to work at their own pace using the manipulatives. Also, during a lesson on probability, students were using plastic spinners to help them when answering questions. I noted that most students were more involved and participated more. Also, they were able to create their own probability questions because they had the spinners to use. This provided a way to incorporate some higher level thinking skills. Students also shared that they enjoyed playing math games on and off the computer. Overall, it was evident that hands-on learning is beneficial to the students in my classroom.

Visual/written. In my third grade classroom, writing notes and problems on the overhead or whiteboard and modeling how to solve problems is necessary when teaching the math curriculum. Also, children need to write notes for themselves to truly internalize each new skill being introduced. I am consistently writing on the board or overhead, for all subjects, in order to help my children follow along during lessons. I also like to have students come up and write their answers on the board. Sometimes I
also use this as a means of assessing students to check for understanding of certain topics. Specifically in math, writing on the board is necessary. It is necessary when teaching a specific problem-solving strategy or simply to allow students to check their answers. Only in this way are children fully able to grasp and understand the concepts being taught. After reviewing my daily journal, the student interviews, and the student feedback forms it became apparent that children learn well when these strategies are used.

Through my daily journals I was able to note that the children enjoyed coming up to the front board or overhead to solve problems. I made specific notes regarding positive reactions from students when they would be writing on the board. For example, during a subtraction lesson the children were called up to the board to solve various problems. This increased motivation and participation. The students were squirming to participate and get called up to write and those that did not get called were anxious to get chosen. In addition, during a lesson about three dimensional shapes the children were working in groups and had to come up to the board to write information. I noted that this fostered communication and cooperation because they had to work together and choose who was going to write each piece of information. The children were also very eager to participate and share their group’s information.

Using the board not only allows students to see and write out the problems, but it gets them out of their seats when they become antsy. Also, when I modeled step-by-step how to solve a problem or complete an activity, students were able to understand the concept better. Visualizing the steps needed to solve a problem allows them to see the correct way that it needs to be done instead of orally giving the directions. I noticed that
when I give directions orally or we corrected problems orally instead of writing them down, I tended to lose students’ attention, which caused them to become more confused. For example, after teaching an addition lesson I decided to check the answers by going around the room and having each student say the answer out loud. This became very frustrating because students were constantly asking for answers to be repeated, which caused more confusion for those that were able to follow along. Nothing seems to get accomplished successfully when things are strictly shared orally.

After interviewing my students, I was able to further confirm the idea that students learn better when they write math problems down or problems are written for them on the board or overhead. It was evident that explanation, as well as written documentation is needed. My students have a hard time following along if things are read aloud with nothing written in front of them. Just modeling something does not help them. For example, when I asked students what I did during math that helps them learn, some responses were, “The overhead because it’s easier to see what we’re doing in class and so I know how to do it”, “You give examples for us and you take us step by step” and many kids responded with, “You usually write on the board which helps me understand the things better.”

Students filled out feedback forms on various lessons throughout my research study. During a lesson on problem solving strategies and how to organize information in a table, I used the overhead to explain how to answer the word problems. When students were asked if they liked when I used the overhead to teach the strategy, some responses were, “Yes, because I need to see to understand”, “Yes, because it’s better to explain it to me”, and “Yes, because that’s the way I learn.”
On another lesson when I was teaching key addition and subtraction words to help answer word problems, I had students come up to the board to write the key words after discussing them with their groups. Most students shared that they enjoyed going up to the board to write and some responses included, “because it is fun”, “you can share your information”, “it gives everybody or some people a chance to write what they think”, and “it makes me feel like I am the one teaching”. In addition, on a multiplication lesson on arrays, students were taught how to construct arrays for different multiplication problems. I modeled on the overhead while students worked at their seats. Almost all of the students felt that the modeling on the overhead was helpful because it helped to show how to do things, to see the pictures, and to know what to do. Students, overall, found it more beneficial for their learning to have math problems, instructions, and examples written for them to see rather than just having directions or explanations given orally.

Movement around the classroom. Prior to my study, I did not have students move around much during my math instruction. I always felt that it caused a lot of chaos and confusion. If I had the children move around, it was simply to trade papers with each other or to write on the board.

Prior to my study, I realized that most third graders are active and like to move around when they are working in the classroom. Whether it is by coming up to the board to write an answer, switching seats with a partner to check the answers, or moving through centers, my study documented that most of my students enjoyed lessons more when they were able to be out of their seats. After analyzing my data from my daily journal, student interviews, and student feedback forms, I found this to be true.
Notes recorded in my daily journal revealed that the children enjoyed coming up to the board or overhead to share their answers. During a lesson on multiplication where the children had to construct various arrays with Unifex cubes, I asked for volunteers to come up and show the arrays on the overhead. I noted that the majority of my class had their hand up and wanted to come up to the overhead. In addition, I noted that many students were correcting the arrays that they had constructed in front of them after seeing the example on the overhead. Whenever I incorporated this into a lesson, it also fostered more participation and active engagement in the lesson.

Similarly, student interviews demonstrated students’ overwhelmingly positive response to writing on the board or overhead and switching tables. When asked, “What would you like me to do more during math to help you learn better?”, some responses were, “call people up and do little parts for each person” and “let us write on the board”. I had the students fill out a feedback form after they went through math centers for a week.

Also, the students were engaged and actively participating. I noted in my journal that many children were using their time wisely and working with each other in order to practice their addition and subtraction strategies. They loved the idea of being out of their seats while they were learning. For example, 19 out of 24 students said that they felt that the centers were set up and used in a way that helped them learn the math concepts being reviewed. In addition, 21 out of 24 students said that they liked the way the centers were done. In general, students enjoyed being out of their seats and moving around the classroom during math instruction.

*Impact of Differentiation*
Time. The issue of time continuously popped up throughout my research study. Differentiated instruction requires a lot of time on the part of the teacher. Time is needed to carefully plan appropriate lessons for all students, making sure to individualize instruction for the students that need it. Also, time is needed during math instruction to implement the differentiated activities that are planned. Sometimes, there is not enough time during the math period to get done what needs to get done. In order to differentiate lessons, a teacher may need to teach the same concept at least three or four different ways depending on how each student in the classroom learns best. If a teacher is not differentiating, lesson planning is still time consuming, but not as much because concepts may only be taught one way. Differentiation requires that a teacher really takes the time to understand and get to know how each individual child learns best. This will provide for more successful learning, but takes hours and hours to accomplish.

In my daily journal, I repeatedly spoke about the issue of time. I was finding it harder and harder to implement the differentiation that I had planned. I noted that several students in my classroom needed one-on-one or small group assistance when certain topics were taught. I consistently wrote about my frustration in not being able to sit down with the students that needed my attention. Also, I wrote about my frustration in not having the time to challenge the children that needed to be challenged. Again, this required me sitting down with a small group of students and I rarely had the time during the day to do it.

Also, because we had to do specific standardized test preparation, time was even more of a problem. We were required to teach a wide array of concepts that we were not going to be able to get to prior to the students taking the NJASK. This took away from
the multiplication unit that I was teaching at the time. Some students were not fully grasping the various multiplication concepts because the math period was divided each day. At times, I had to reorganize what I had planned to teach on a particular day because we needed to fit in specific test prep information. I found that because of the NJASK test prep, it was hard to differentiate and find the time needed to do so.

I also noticed through the interviews and student questionnaires that the pacing of my lessons might not always be appropriate for all of the students in my class. One student said during an interview, “sometimes when we’re checking something you go too fast.” I found this was the case for several other students as well. I observed, over the course of this study, that when we are checking over a review sheet or problems that they had to complete, it was not always easy for every child to follow along. I think I need to work on structuring my teaching at a pace that is suitable for all students. This is where more differentiation is needed, but I still have not mastered how to adjust the pacing of my lessons to meet individual needs. I have definitely come a long way, but a lot still needs to be changed.

When I implemented math centers for one week, I found that time was definitely an issue. I don’t think the students realized it because they enjoyed the centers so much as per their questionnaires, but it was definitely overwhelming for me. I had to make sure that each child was where they were supposed to be and also make sure that I was working with the group of students that I needed to be working with. Overall, centers were successful, but I have to change them next time so that I do not feel rushed and unorganized.
Curriculum/planning. The math curriculum in my district is very structured and organized in such a way that we should only be teaching each concept a certain number of days. There are also a lot of concepts to be covered and, not necessarily, enough time to cover them. Planning, on the part of the teacher, presents another issue with differentiated instruction. By keeping a daily journal, I was able to reflect on the issue of planning and curriculum restraints. The same was also true after reading the student questionnaires.

One of the first lessons on multiplication was a lesson where students used plastic chips to make groups and then wrote the multiplication sentence to go with each picture. This was the first time that we were doing a lesson like this for multiplication. However, when the children were asked, “Did you find the lesson too hard, too easy, or just right?” a majority of the students said that the lesson was too easy or just right because of prior experience with multiplication. The curriculum restraints, especially with the multiplication unit, make it harder to differentiate a lesson like this. The children all received a multiplication binder with activities for each times table up to twelve and it had to be completed regardless of how many students already knew their multiplication facts. Although I predicted that this lesson would be a bit too easy for many of my students, I was required to teach it because of the very structured third grade math curriculum.

Because the curriculum is loaded with concepts that need to be taught, it makes it harder to plan and make sure that everything gets taught throughout the year. Also, when planning with other grade level teachers, differentiation is more difficult. I met with my team on a weekly basis in order to make sure that I was staying on track with
what was supposed to be taught. Then, I would think about the needs of my students and adjust my lessons accordingly. For example, when teaching a lesson on fractions, I had my students use paper plates to create a variety of fractions amongst their groups. We then used the paper plates to write, compare, add, and subtract fractions. I took a more hands-on approach with this lesson because I felt that my students would learn best this way.

*Ability levels of students.* Having different ability levels in my classroom was the source and reason for this research study. I had a wide range of student math abilities in my classroom, which made it harder and harder to incorporate lessons to reach each individual. After reviewing my data collection, it was apparent that the wide range of students’ math abilities impacted differentiation.

I made several notes in my daily journal referring to the range of ability levels in my class. First, on the days that I taught more challenging lessons, the children with higher ability levels were more actively engaged and participating in the lesson. The children with lower abilities could not keep up. Also, I realize that it is always the same kids having trouble, working at a slower pace, or needing my attention. In addition, when it came to preparation for the standardized test, even though every child had to be prepared the same way, it was much harder for the struggling students to keep up.

Differentiating instruction allows me to group the students based on ability level, which helps me to focus on different areas with each group. I can also give the students who have higher math abilities more freedom when working on activities or assignments while helping those that need more individualized help.
The differing ability levels of students were also apparent from reviewing the student responses on the student interviews. When asked, “What would you like me to do more during math to help you learn better?” some student responses were, “being challenged”, “give me some extra sheets to work on”, and “after school classes”. Again, these responses showed the wide range of needs of my students. Some felt that they needed extra help and some felt like they needed to be challenged. So I offered students extra help outside of the math period and I created a “challenge basket” so that students who finished early had something to do while they are waiting for the rest of the class. I plan to continue to incorporate other strategies into my teaching in order to better solve these issues.

For a lesson where three-dimensional shapes were being taught, I got different responses on the student feedback forms. Most students found the lesson too easy or “just right”. Some responses were, “it was too easy because you might need to give me a harder shape”, “the lesson was just right because we learned it and it was a review”, and “it was just right because it’s easier because we had the shapes”. These responses tell me that I need to challenge my students more and possibly use more pre-assessment techniques in order to better sculpt my teaching accordingly.

For another lesson where I taught a higher level problem solving strategy as part of the test preparation, most students found the lesson too challenging or too hard. Some responses were, “the work was really hard because it had problems I don’t get” and “the work was too hard because I didn’t know how to work the table”. Many students also said that it was hard but working with partners made it easier. Based on these comments I will try and partner or group children more when it comes to teaching test preparation
strategies. Also, I might be able to incorporate a more hands on approach to test preparation since I found that many of my students benefit from it.

Interestingly, for a whole group introductory lesson on writing numbers in the 10,000’s and 100,000’s, many students did not feel like the lesson was too easy because it was a brand new concept to them. However, even though many students felt that it was not easy, the majority of the class said they could have been challenged more.

Impact on My Practice

This study has helped me to become more aware of my teaching styles and how they affect my students as learners. Prior to conducting the study, I knew that, as a teacher, I can not always assume that all students learn the same way. Therefore, I wanted to find ways in which I could successfully teach all of my students. Differentiated instruction allows a teacher to reach every individual student’s learning needs and styles. In order to differentiate, it is important to get to know your students as learners early in the year in order to plan accordingly.

Many factors impact differentiated instruction in my classroom. Planning, time, assessment and student needs are all issues that need to be dealt with when trying to incorporate differentiated instruction.

Planning for differentiated instruction takes much more time and energy than if I were planning a whole group lesson for the class. Also, it makes it harder to plan with my grade level team, considering the fact that we did not all teach math using the differentiated approach. On the other hand, it can also be helpful because we can share ideas and strategies that work in our classrooms.
This research study allowed me to reflect on my teaching strategies, specifically during math instruction. I realized that I usually teach using strategies that are simple to plan lessons, such as having students work at their tables instead of mixing up the groups, or having students complete review sheets independently instead of individualizing the work for different learning styles. Differentiation has helped me see different ways that I am able to teach my students more effectively.

Time is an issue that all teachers struggle with, especially if differentiated instruction is being incorporated. I was continuously finding myself frustrated with the lessons that I had planned because there never seemed to be enough time to complete them successfully. Also, if I wanted to get feedback from my students, which is an important part of teaching, I would have to end my lesson earlier in order to have the time for it.

Another time issue constantly came up when I had to work individually with students who were struggling while the other students were working on something else. I found that I was never able to successfully sit with a group of students for a long enough time. Then, this left the struggling students alone because we were only able to get through a couple of problems at a time, not fully allowing enough time for everyone to grasp the concept. Time continues to be an issue that I need to work through in order to help my students be successful.

Differentiation needs to be done on assessments as well. I realize that it is not fair to assess students the same way if they do not learn the same way. For instance, prior to my study only students who were classified received modified tests with tests or quizzes being the only ways to formally assess my students in math. Also, the children who need
more of a challenge should be assessed differently than those who are struggling. This is something that I have not done so far in my study.

One formative assessment that I used was an exit ticket, which consisted of giving students three or four addition or subtraction problems to solve in order to guide my teaching for the following day. I would then check over the problems and group my students according to understanding. While I incorporated some formative assessments throughout my study in order to properly group my students, I have not yet developed multiple differentiated assessments.

I understand that whole group instruction is not the best way to teach my students. The wide range of ability levels in my classroom often caused me to pay more attention to the students having more difficulty and requiring more attention. And because there were a number of students who needed more help from me, it caused me to not focus enough on the students who needed more of a challenge. This is definitely something that I continue to struggle with and I have not yet found a way to properly challenge those students.

With 24 students in my class, it is hard to give each student the amount of time that is needed to assist or challenge them. For example, when-ever students completed their work, they were told to do something quietly at their seat. Very few students used the challenge basket independently and I would have to remind them about it in order for them to utilize it.

**Conclusion**

Because others have found that differentiated instruction can be a successful way of varying one’s teaching (Adams & Pierce, 2003; Anderson, 2007; Cox, 2008; Good,
2006; Lawrence-Brown, 2004; Levy, 2008), I decided to implement several differentiated strategies, which have been used in other classrooms, in my third grade classroom. I have used various ways to group my students, both heterogeneously and homogeneously in pairs and small groups, as part of my study in order to make sure that each student is learning effectively during math. I also attended to multiple learning styles by planning my lessons using hands-on, visual, and movement around the classroom. Trying to implement differentiated teaching into my math instruction proved to be very time-consuming because it took additional time to differentiate instruction. Much more time was needed to be taken in order to carefully design lessons that addressed the needs of each student. However, I found that if differentiation is part of the regular design of instruction, the children knew what was expected of them and routines ran smoothly.

Differentiation takes time and I think that in order to benefit my students, I need to try implementing different strategies while teaching. My students respond well to lessons that involve moving around the classroom, using tools, and working in pairs or small groups. Therefore, I need to continue to sculpt my teaching around what helps my students learn best. I plan to continue to self-evaluate my teaching in order to further enhance how I teach my students.

I plan to continue implementing differentiated strategies into my teaching of math. I want to try out many different strategies in order to meet the individual needs of my students. Grouping and attending to multiple learning styles was successful with my students, but there is further to go with it. I also want to try to differentiate assessments so that the children who need a challenge will be assessed differently than the students that need more help. I now realize how important it is to assess students on what they are
capable of doing. I plan to modify assessments more and also incorporate assessments other than tests and quizzes. I plan to continue my study and implement tiered assignments and authentic assessments into my math instruction. I also want to incorporate multiple intelligence lessons into my teaching.

After working on differentiating my math instruction, I plan to incorporate differentiated instruction throughout all of the subject areas that I teach. For instance, I want to use the strategies that I found to be successful during math instruction when teaching language arts and science. I realize that each school year brings a new group of students with different needs and I will work on assessing the needs of my students early in the year, so that I can tailor my teaching to meet their needs and learning styles. I will continue to question my teaching styles and ask for students’ input to make sure that they feel comfortable with the way that I am teaching them. I realize that their opinions are important in order to help structure my teaching.

Throughout this process I have learned to think more critically about my teaching. I know that it is okay to reflect on your teaching strategies in order to make you a better teacher. I think this process has allowed me to reflect in ways that I might not have prior to this study. For example, I rarely thought about the strategies that I was using to teach my students and how they were affecting my students as learners before this study and now that I have, I now know how it can help me to individualize my teaching to meet the needs of my students. I know that it is a learning process for me as well as for my students and that by trying out new teaching strategies I will be able to better meet the individual needs of my students.
This study was merely a jump start to researching and implementing differentiated instruction. It has allowed me to become more aware of my teaching and how it affects each individual student. The student feedback forms that I used truly helped me the most because I was able to get the students’ true reactions to my teaching. I also think that it allowed me to talk openly with them about what I was trying to improve. I learned that there are endless ways to incorporate differentiation into my classroom, and in my study I was only able to integrate a few strategies. Grouping students and attending to multiple learning styles were the two main ways I used differentiation and both seemed to be successful. I plan to continue with these strategies, while adding more differentiation through assessment and the other subjects that I teach.

I realize that action research is an ongoing process that constantly presents teachers with questions that need to be addressed. Some of the questions I have are, “How can I make time work in my favor while incorporating differentiated instruction?”, “What strategies that I have not used would be helpful to integrate in the classroom?”, and “How can I make differentiated instruction successful in language arts, science and social studies?” Through this research process, I have come up with more questions than I had originally. It also allowed me to really focus in on an area of my teaching that I want to improve. I plan to continue to research my teaching methods in order to help me become a better teacher. I do not think that there is really ever an end to it and that is what makes teachers become better at what they do.
Bibliography


Appendices
Appendix A: Student Questionnaire

Name: ____________________________________________

**Student Questionnaire**

**Directions:** Circle your choice after the teacher reads each question.

1. Do you like working on math problems (questions involving numbers)?
   - Yes
   - No

2. When working on your math work, do you enjoy moving around the classroom and being out of your seat?
   - Yes
   - No

3. Does it bother you when others are moving around you?
   - Yes
   - No

4. Is Math easy for you?
   - Yes
   - No

5. Circle the situations that make Math easy for you.
   - Whole-group lessons
   - Small Groups
   - Working with the Teacher

6. Could you do harder math work?
   - Yes
   - No

7. Do you like it to be completely quiet when you complete math work?
   - Yes
   - No

8. Would you like to be given a choice of activities during Math?
   - Yes
   - No

9. Do you like working with tools (base 10 blocks, number line, etc.) during Math?
   - Yes
   - No
### Appendix B: Student Questionnaire Responses

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Do you like working on math problems (questions involving numbers)?</td>
<td>15</td>
<td>6</td>
<td>22</td>
</tr>
<tr>
<td>2. When working on your math work, do you enjoy moving around the classroom and being out of your seat?</td>
<td>17</td>
<td>5</td>
<td>22</td>
</tr>
<tr>
<td>3. Does it bother you when others are moving around you?</td>
<td>7</td>
<td>15</td>
<td>22</td>
</tr>
<tr>
<td>4. Is math easy for you?</td>
<td>19</td>
<td>3</td>
<td>22</td>
</tr>
<tr>
<td>5. Could you do harder math work?</td>
<td>16</td>
<td>6</td>
<td>22</td>
</tr>
<tr>
<td>6. Do you like it to be completely quiet when you complete math work?</td>
<td>16</td>
<td>6</td>
<td>22</td>
</tr>
<tr>
<td>7. Would you like to be given a choice of activities during Math?</td>
<td>20</td>
<td>2</td>
<td>22</td>
</tr>
<tr>
<td>8. Do you like working with tools (base 10 blocks, number line, etc.) during Math?</td>
<td>17</td>
<td>5</td>
<td>22</td>
</tr>
</tbody>
</table>

#### #5 The Situations that make Math Easier

- Small Groups: 55%
- Whole Group: 41%
- Teacher: 5%
Appendix C: Student Interview

**Interview Questions**

1. If a new student came into our classroom, how would you describe our Math period each day?

2. How do you feel about Math? Why do you feel this way?

3. What do I do during Math that helps you learn? What do we do during Math that does not help you learn?

4. What would you like me to do more during Math to help you learn better?

5. What tools (base 10 blocks, number line, etc.) in the classroom make math easier to learn?

6. What’s the best way for you to learn Math?
Appendix D: Student Interview Responses

<table>
<thead>
<tr>
<th>Category</th>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive attitude towards math.</td>
<td>14 out of 21</td>
</tr>
<tr>
<td>Writing things on the board or overhead increases math learning.</td>
<td>7 out of 21</td>
</tr>
<tr>
<td>Noise around the classroom during math is distracting</td>
<td>2 out of 21</td>
</tr>
<tr>
<td>Math games are beneficial when learning math.</td>
<td>3 out of 21</td>
</tr>
<tr>
<td>Hands-on materials increase math learning.</td>
<td>5 out of 21</td>
</tr>
<tr>
<td>Unifix cubes and/or base ten blocks are beneficial when learning math.</td>
<td>15 out of 21</td>
</tr>
<tr>
<td>Working in groups/pairs increases math learning.</td>
<td>11 out of 21</td>
</tr>
</tbody>
</table>
Appendix E: Original Student Feedback Form

**Student Feedback**

1. Did you like the way I taught the math lesson today?
   Yes                              No

2. Were the tools (base 10 blocks, number line, etc.) that we used today helpful to you?
   Yes                              No

3. Was the lesson too easy for you?
   Yes                              No

4. Do you think you could have been challenged more?
   Yes                              No

5. Did I teach today’s lesson in a way that helped you learn?
   Yes                              No
Appendix F: Student Feedback Questions #1

1. Was it easy or hard working with the calculators? Why?
2. Did you choose to work with a partner? Why or why not?
3. When we correct morning work, are you able to follow along? Why or why not?
Appendix G: Student Responses #1

<table>
<thead>
<tr>
<th>Category</th>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Working with calculators is easy.</td>
<td>20 out of 20</td>
</tr>
<tr>
<td>I chose to work with a partner.</td>
<td>16 out of 20</td>
</tr>
<tr>
<td>There is good pacing when correcting morning work.</td>
<td>17 out of 20</td>
</tr>
</tbody>
</table>
Appendix H: Student Feedback Questions #2

1. Did you enjoy working in pairs? Why or why not?

2. Was the work too hard, too easy or just-right?

3. Did you like when I used the overhead to teach the strategy? Why or why not?
Appendix I: Student Responses #2

<table>
<thead>
<tr>
<th>Category</th>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Working in pairs is beneficial for math learning.</td>
<td>17 out of 21</td>
</tr>
<tr>
<td>The work was too hard.</td>
<td>8 out of 21</td>
</tr>
<tr>
<td>The work was just-right.</td>
<td>12 out of 21</td>
</tr>
<tr>
<td>Modeling on the overhead to teach the problem-solving strategy was helpful.</td>
<td>18 out of 21</td>
</tr>
</tbody>
</table>
Appendix J: Student Feedback Questions #3

1. Did you like how today’s math class went? Why?
2. Did you enjoy working in groups? Why?
3. Was the lesson too easy, too hard, or just-right? Explain.
<table>
<thead>
<tr>
<th>Category</th>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Holding and working with 3-D shapes increased math learning.</td>
<td>4 out of 21</td>
</tr>
<tr>
<td>Going up to write on the board was beneficial for math learning.</td>
<td>5 out of 21</td>
</tr>
<tr>
<td>Working in groups helped children.</td>
<td>15 out of 21</td>
</tr>
<tr>
<td>The lesson was too easy because it was a review.</td>
<td>6 out of 21</td>
</tr>
<tr>
<td>The lesson was just-right.</td>
<td>16 out of 21</td>
</tr>
</tbody>
</table>
Appendix L: Student Feedback Questions #4

1. Did you enjoy working in groups at your tables? Why or why not?
2. Do you like coming up to write on the board? Why or why not?
3. Do you think making the strategy rings was helpful? Why or why not?
Appendix M: Student Responses #4

<table>
<thead>
<tr>
<th>Category</th>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group work was beneficial.</td>
<td>15 out of 22</td>
</tr>
<tr>
<td>It is beneficial to have children come up and write on the board.</td>
<td>19 out of 22</td>
</tr>
<tr>
<td>Making the strategy rings to review was helpful</td>
<td>19 out of 22</td>
</tr>
</tbody>
</table>
Appendix N: Student Feedback Questions #5

1. Did you find the lesson too hard, too easy, or just-right? Explain.

2. Was it easy or hard to work with the chips? Explain.

3. Was it helpful how I modeled for you? Why or why not?
Appendix O: Student Responses #5

<table>
<thead>
<tr>
<th>Category</th>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>The lesson was just-right.</td>
<td>11 out of 20</td>
</tr>
<tr>
<td>The lesson was too easy.</td>
<td>7 out of 20</td>
</tr>
<tr>
<td>Working with the plastic chips was easy.</td>
<td>17 out of 20</td>
</tr>
<tr>
<td>Teacher modeling was helpful.</td>
<td>16 out of 20</td>
</tr>
</tbody>
</table>
Appendix P: Student Feedback Questions #6

1. Was the lesson easy, hard, or just-right? Explain.

2. Did you like working with the Unifix cubes? Why or why not?

3. Did the modeling on the overhead help you? Explain.
Appendix Q: Student Responses #6

<table>
<thead>
<tr>
<th>Category</th>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>The lesson was just-right.</td>
<td>14 out of 21</td>
</tr>
<tr>
<td>Working with the Unifix cubes was fun.</td>
<td>17 out of 21</td>
</tr>
<tr>
<td>Teacher modeling on the overhead was helpful.</td>
<td>18 out of 21</td>
</tr>
</tbody>
</table>
Appendix R: Student Feedback Questions #7

1. Did you enjoy working with the pattern blocks? Why or why not?
2. Was it easy to follow along with the teacher? Why or why not?
3. Were you able to cooperate nicely with your group? Explain.
4. Did you use your note card with the shapes for help?
Appendix S: Student Responses #7

<table>
<thead>
<tr>
<th>Category</th>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pattern blocks are fun to work with.</td>
<td>20 out of 20</td>
</tr>
<tr>
<td>Following along with the teacher was easy.</td>
<td>18 out of 20</td>
</tr>
<tr>
<td>Groups cooperated nicely.</td>
<td>15 out of 20</td>
</tr>
<tr>
<td>The note card with the shapes was needed for help with the work.</td>
<td>8 out of 20</td>
</tr>
</tbody>
</table>