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**Differentiated Math Instruction: Instruction that Incorporates the Common Core State Standards and Effectively Addresses the Needs of Sixth Grade Students**

**A Self-Study**

Nicole Cubiotti

Spring 2015

A thesis submitted to the Department of Education and Human Development of The College at Brockport, State University of New York in partial fulfillment of the requirements for the degree of  
Master of Science in Education

## **Abstract**

My capstone was a self-study conducted in a sixth grade 15:1 classroom. The purpose of my research was to determine how to incorporate the Common Core State Standards for math and effectively meet the needs of sixth grade students with different levels of abilities. Different strategies and interventions were used in the classroom during one hour class period and then were reflected into a journal to document the experience.

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## **Chapter One: Introduction**

### **Problem Statement**

This school year I was given the opportunity to be a long-term substitute teacher in a sixth grade self-contained classroom for the entire year. I was both nervous and excited for the year to start. I started to get nervous because the thought crossed my mind, how am I going to get my students to follow the Common Core State Standards (CCSS) for sixth grade if they are significantly below grade level in all aspects? As the school year started I was getting into the swing of things and noticed that math is a big struggle for my students. The concepts that the students are learning about in sixth grade are challenging, and would be hard for any average functioning sixth grader to retain, let alone a student who is in a self-contained classroom.

Word problems, basic fluency, and retaining information are the biggest struggles that I have observed in my classroom. How can a student answer a word problem when they do not know what information to use? How can a student solve a greatest common factor problem if they have not acquired the basic fluency of math multiplication to know the factors that make up a number? How can a student work on their math problems if they cannot retain the material that is taught to them? These are all questions that I have been asking myself and need the answers to.

I decided I needed to be proactive and look for ways to differentiate the learning but still keep it aligned with the Common Core State Standards (CCSS) for sixth grade. There are many different strategies that can be introduced into the math classroom that can help facilitate the math learning process.

According to Gloria Wilson (2013), in response to helping struggling students solve word problems, “to successfully solve word problems, students must use one step as the foundation for

the next step by breaking down a problem into its component parts.” This makes sense; students need to break down the information given to them in order to understand the problem. The problem with this is, how do I teach my students to do this? When they see a paragraph full of words and numbers in math they start to panic, or they just ramble off guesses on how to solve the problem.

To help my students the first thing I needed to do was realize the problem and then formulate a plan. I will realize the problem by looking at the assessments that I give in class that are aligned to the Common Core State Standards and see how the students are mastering the concepts. I will also look at the strategies the students are currently using to help them solve mathematical problems. My plan will be to use the research that I have found and come up with different interventions and strategies that I can use to help facilitate the math instruction and provide the necessary differentiation for my students. While doing this, I will keep a journal to account for what I am observing in the classroom and what is working and not working for my students. According to Sarah Powell and Pamela Stecker (2014), there needs to be data-based individualization to intensify mathematics instruction for struggling students. The implementation of data-based individualization starts with planning; first you need to diagnose the problem, then you establish instructional objectives and make an assessment plan, and finally you prepare to implement the data-based individualization and make instructional adaptations (Sarah Powell and Pamela Stecker 2014). This was the start that I was looking for in my classroom.

## **Significance of the Problem**

Middle school is a tough age and an adjustment for many students. To go from the comforts of an elementary classroom to the academic environment of a middle school where the course curriculum is more rigorous and demanding and the academic expectations of the students are higher can be challenging. According to the released data from New York State from 2014, in Monroe County there were 18% of sixth grade students that were performing at proficient levels. Furthermore, with the introduction of the Common Core State Standards, the expectations of the sixth grade students with regard to academic achievement and performance are increasing. The students are expected to know more, and know it faster. The complexity of the questions and higher level thinking that needs to take place also presents difficulty for students who have limited experiences with this type of learning.

It is important to differentiate math instruction to address the needs of all students, but in particular those for whom the learning and understand of math concepts is a struggle in order to maximize on their learning potential and increase their chances of academic success. Conducting this self-study will allow me to reflect on my thinking and pedagogy of being a teacher who facilitates math instruction, what good math instruction looks like in the classroom, and allow me to deepen my understanding of the best practices and approaches to employ in planning differentiated instruction that takes into consideration the Common Core State Standards and effectively addresses the needs of students in my sixth grade self-contained classroom. If differentiated instruction is not considered and effectively used to address students' needs, they will continue to experience decreased success in the classroom possibly resulting in less positive life outcomes.



## **Purpose of the Study**

The main purpose of this self-study was to help me gain insight and understanding into how I can better differentiate my instruction to meet the needs of my students while at the same time making sure I seamlessly incorporate the Common Core State Standards into my math instruction at the sixth grade level. I examined the research regarding different ways teachers can differentiate their instruction and different strategies that can be used in the classroom to help the students better understand the mathematical concepts taught and retain the information, and then used those which seemed effective in addressing the needs of my students.

## **Rationale**

I chose the topic of differentiating math instruction to determine the best practices and approaches to incorporate in the math instruction I facilitate for sixth grade students with varying levels of abilities which addresses their needs while still aligning with the Common Core State Standards. Differentiating math instruction is important to me because since I started teaching, I have seen an abundance of students struggle during daily tasks in the classroom, especially math. Now that I am in a self-contained classroom, and teaching sixth grade math aligned to the Common Core State Standards, it is even more evident to me that there needs to be differentiation in order for the students to conceptualize the material. The pace of learning material in a sixth grade classroom during math instruction in my self-contained classroom is not the same as that of a classroom with typical students. I need to be able to facilitate math instruction that focuses on the most important concepts that align with the Common Core State Standards to allow for students to master material at their varying levels of ability while still maintaining high expectation with regard to their academic progress and performance.

There has been a significant amount of research on the topic of differentiation and I was able to find a variety of strategies within my literature review to try in my classroom during my self-study. Although there is an abundance of research on differentiation and strategies to use in the classroom, there is not a lot of significant research that deals with those things and the Common Core State Standards. My study will not only benefit me but will also benefit other teachers and educators because I used strategies given in my literature review and determined how well they worked in the classroom while still incorporating the Common Core State Standards. The results of this self-study are another piece of research that other teachers and educators can use to determine what they should use in their classroom for differentiation with the Common Core State Standards for mathematics. If this research is not conducted, special education teachers and I would still be looking for ways in order to differentiate the math instruction while still incorporating the Common Core State Standards for math.

### **Definition of Terms**

***Differentiate***: To make (someone or something) different in some way.

(Definition from <http://www.merriam-webster.com/dictionary/differentiating?show=0&t=1416413678>)

***Intervention***: To become involved in something (such as a conflict) in order to have an influence on what happens.

(Definition from <http://www.merriam-webster.com/dictionary/intervention>)

***Self-contained Classroom:*** Classrooms catering to students who have special educational needs due to severe learning difficulties or physical disabilities. A classroom setting in which children with special needs are placed with other children with similar needs.

(Definition from

<http://ipsdweb.ipsd.org/uploads/special%20education%20classroom%20definitions.pdf>)

## **Summary**

Math can present anxieties for the typical student, and more so for the student for whom learning can be challenging due to learning disorders and abilities. Students can struggle with understanding word problems, answering grade-level questions, and with basic fact fluency. Some students may be frustrated with the fact that they are having difficulties and it will shut them down. Through this self-study I wanted to find ways to support the variety of ways that students struggle with mathematics to increase their chances of academic success.

Through my literature review of the research related to math instruction, I found different strategies and interventions that I could integrate into my teaching to help differentiate instruction for my students during math class. Having a variety of strategies to try in the classroom enables me to help the students become more successful in understanding the content in the sixth grade curriculum. This self-study will help me to grow as an educator, and will also help my students to gain a sense of independence in mathematics. It will also provide current and future teachers and educators insight into what might not work in the classroom, what is realistic and what is not realistic regarding differentiated math instruction in a self-contained sixth grade classroom.

## **Chapter Two: Literature Review**

“Mathematics is not a careful march down a well-cleared highway, but a journey into a strange wilderness, where the explorers often get lost (W.S. Anglin).” This quote speaks volumes regarding my research. Math is a journey, and students need to understand that they are not going to get everything right their first try. It takes practice and determination to succeed in mathematics. As a teacher I need to know the best interventions to use to effectively help the students, and my students need to learn the strategies to help them succeed in their learning. In order to fully address all of the aspects of my research, this section will be broken into three subsections: Interventions to be used by teachers, strategies to solving word problems, and gaining independence in the classroom.

### **Interventions to be used by Teachers**

Although most educators are learning about the Common Core State Standards, special educators who work with students with disabilities have the added challenge of understanding the standards and knowing how to adapt their instruction to meet the needs of their students while also allowing them to receive standards-based instruction (Saunders, Bethune, Spooner, & Browder, 2013). What does this mean for our students with disabilities? The students are at a disadvantage. Not only are the Common Core State Standards new to teachers, but now the special educators have to take these new standards and try to mold them to fit the needs of the students. Teachers have to follow the legal requirement that all students have access to the general curriculum content and be prepared for state tests, with the No Child Left Behind Act of 2001 and 2006 (Saunders, Bethune, Spooner, & Browder, 2013).

Saunders et al. studied a fourth-grade student with moderate intellectual disability in a self-contained classroom (2013). His teacher, Ms. Adams, struggled in finding the best approaches for Michael. Michael struggled in counting with one-to-one correspondence, could not identify numbers, and primarily worked on tasks such as matching and sorting. Michael would often avoid mathematics tasks by kicking, slapping, or throwing his head back. Saunders et al. worked with Ms. Adams to create a mathematics program (intervention) for Michael. Ms. Adams still used word problems from the fourth-grade mathematics textbook to align with the Common Core State Standards. Ms. Adams incorporated real-life problems for Michael to complete and incorporated basic mathematics skills into her lesson to reinforce the intervention of Michael's individualized education program. Using this intervention plan, Michael showed progress after one semester in both his basic skills of identifying numbers to 10, counting with one-to-one correspondence to 10, and on grade-aligned skills with the help of a calculator to solve equations. Ms. Adams also set up opportunities for Michael to apply his newly learned skills in places other than just the math classroom. Michael's aggressive behavior decreased substantially and was able to participate in full 30-minute math sessions without seeking to escape the lesson.

During the study, a task analysis of the mathematics process was created to use for both instruction and collecting data on student progress with Michael and the two other students in his group. Ms. Adams used systematic prompting strategies to help the group perform each step of the task analysis (Saunders, Bethune, Spooner, & Browder, 2013). The steps that Ms. Adams followed were the steps that Saunders et al. created. There are six steps in the process of this intervention:

1. Select a Topic and Create Objectives

2. Identify a Real-Life Activity Using the Skill
3. Incorporate Evidence-Based Practices
4. Include Instructional Supports
5. Monitor Progress
6. Plan for Generalization

Christopher Rivera and Joshua Baker also spoke of Saunders, Bethune, Spooner, & Browder in their article about teaching students to solve for  $x$  (2013). Rivera and Baker noted that teachers often find it difficult to teach more complicated math skills such as algebraic equations to students with disabilities and they discuss how to use graphic organizers and task analyses to solve simple one-step algebraic linear equations (2013). I would still be able to apply their findings to my classroom even when I am not doing these one-step linear equations.

Mrs. Rodriguez has been working in special education for 10 years and teaching math to middle school students with moderate intellectual disabilities (Rivera & Baker, 2013). Rivera and Baker note that Mrs. Rodriguez has worked tirelessly to teach more advanced mathematical skills like triple-digit addition, subtraction, and proper use of decimals to her students. Even with having years of experience, she is still finding it a difficult task to determine the ways to provide access to the general education curriculum and adapt it to the Common Core State Standards that makes sense to her students, but is also meaningful to them (Rivera & Baker, 2013). Mrs. Rodriguez sought help in the best way to teach her students to write expressions that record operations with numbers and letters standing for numbers.

Teachers are still required to access and teach the more advanced grade-level content and processes recommended by the CCSS. Rivera and Baker state that the most difficult task of

aligning the CCSS is to meet the academic content needs of students with disabilities while teaching appropriate strategies and skills to this population (2013). The challenge lies in selecting standards in a simple, effective, and meaningful manner to teach (Rivera & Baker, 2013).

This study provided examples for Mrs. Rodriguez to use in her classroom. The class size was not specified, the only information given is that Mrs. Rodriguez is a sixth grade math teacher to students with intellectual disabilities in a middle school classroom. Rivera and Baker first had Mrs. Rodriguez implement the CCSS for students with moderate intellectual disabilities by using a guide to develop measurable objectives for students' math skills acquisition, fluency, generalization, and maintenance (2013). Mrs. Rodriguez was able to modify the grade-level standards for her students to ensure that they participated in age-appropriate content that was described in the CCSS (Rivera & Baker, 2013). Mrs. Rodriguez needed help in aligning the CCSS of solving algebraic expressions when letters stand for numbers. She used graphic organizers to support acquisition of essential math content vocabulary, allowing students to make connections between words and visuals, and thus enhancing their ability to recall information (Rivera & Baker, 2013).

There are four steps suggested by Rivera and Baker (2013) when using graphic organizers, step one is simplicity, as the graphic organizer should break down complex information into an understandable format that makes sense to the particular student (Rivera & Baker, 2013). Step two is color coding which can be used as a stimulus prompt to guide students through the problem-solving process (Rivera & Baker, 2013). Students learn to move numbers from the equation to the appropriate colors. Step three, manipulatives helps to make concrete representations of abstract information easier for students to understand (Rivera & Baker, 2013).

Step four is using a task analysis, which can help promote the acquisition of a variety of advanced academic skills; and breaks down a complex skill into a small manageable and teachable component (2013).

Mrs. Rodriguez also provided multiple opportunities for generalization (Rivera & Baker, 2013). Students need to be given repeated trials and provided with a variety of equations to promote generalization of skills. For example, Mrs. Rodriguez can vary the same graphic organizer, but incorporate different equations, and have students solve these equations with different educators, across multiple settings (Rivera & Baker, 2013). Rivera and Baker ended the study by saying that by using all of these implications for practice, along with the patience and solid instruction by Mrs. Rodriguez, she could successfully teach students to solve for  $x$ . The results of Mrs. Rodriguez's study were not included in this article.

Jessica Hunt and Mary Little's study followed an elementary school special education teacher and interventionist, Mr. Powers (2014). Mr. Powers used the lessons from the school's intervention curriculum to intensify small group lessons (Hunt & Little, 2014). This gives the students the opportunities to work with concrete, pictorial, and symbolic models as the teacher model and talks aloud procedures (Hunt & Little, 2014). Hunt and Little state that after the intervention was completed and with progress monitoring, Mr. Powers realized that three of his students were not meeting criteria for mastery and he was concerned with their continued difficulty with the content and wants to work with them one-on-one in an effort to improve their performance (Hunt & Little, 2014). Hunt and Little suggest four steps. Step one, problem identification; step two, analyze the problem; step three, implement a solution; and step four, response to instruction/intervention (2014).



Step one, problem identification, is to think about what you know about the problem or concern for the student. It is important for the teacher to see the gaps that the student is having related to the current skills and what the expected grade-level performance is (Hunt & Little, 2014). Step two, analyze the problem, has the teacher think about why is this occurring? Using the gap analysis, Mr. Powers can record his student's accuracy using an array of assessment tools but also still identifying valuable insights about the student's skills, misconceptions, and erroneous prior knowledge and conceptual understandings (Hunt & Little, 2014). Hunt and Little state that Mr. Powers needed to understand the students' understanding of the concepts, observe and hear how students think about their mathematics, and learn what students think throughout the mathematical process (2014). Step three, implementing a solution, is what can be done to improve the performance. Interventions need to be selected on the basis of their alignment to the assessed needs of the individual students (Hunt & Little, 2014). Teachers need to look at each student's present level of performance relative to the essential understandings in the standards (Hunt & Little, 2014). By doing this, Mr. Powers knew that he needed tasks that will support students learning fractions through standard 3.1 and 3.2 because the assessment that he performed show a lack of mastery for all three of those students (Hunt & Little, 2014). For each student, he created goals for them and interventions to be used by him when teaching. Mr. Powers moved into step four, response to intervention/instruction, but seeing if the plan was working and figuring out how he knew. Mr. Powers was able to progress monitor his students by giving them a curriculum-based measurement (CBM) (Hunt & Little, 2014). Hunt and Little express that a CBM is an effective and efficient means of assessing and monitoring students' ongoing progress in the curriculum (2014). "A CBM can be used to assess areas of need on a weekly basis for a period of 1 to 5 minutes depending on the mathematical skills being measured

(Hunt & Little, 2014).” Mr. Powers was able to observe and collect the specific formative assessment data; he noticed the types of errors that are common and unique to his students (Hunt & Little, 2014). With that, Mr. Powers was able to use this information to provide individualized interventions that are precise and intensive to the student that will positively affect their performance (Hunt & Little, 2014). Hunt and Little urge Mr. Powers to continue to progress monitor and collect trend and rate-of-progress data to ensure that each of his students respond positively to the targeted interventions (Hunt & Little, 2014).

Sarah Powell and Pamela Stecker spoke of using data-based individualization to intensify mathematics intervention for students with disabilities. The study was performed at Riverview Middle School serving grades 5 through 8. The study specifically focused on Molly, a sixth grader at the school, who received special education services on the basis of a specific learning disability in mathematics (Powell & Stecker, 2014). Mr. Drummond, Molly’s special education teacher, worked with Molly five days a week, but Molly is demonstrating minimal progress with the current intervention and he wanted to intensify the intervention work that he had done already as well as use the progress monitoring data to better meet her individual needs (Powell & Stecker, 2014). As a first step in the planning process, Mr. Drummond established the goal of Molly, by the end of the school year, writing 44 digits correctly in answers in six minutes using 25 randomly selected computational problems from the fifth grade curriculum. He then established instructional objectives by referring to the CCSS, the progress monitoring probes, and Molly’s performance to determine the critical content for instruction (Powell & Stecker, 2014). Next, an assessment plan was designed. Due to Molly’s IEP requiring regular progress monitoring using probes at the fifth-grade level, Mr. Drummond administered probes for 6 minutes on the last school day of each week (Powell & Stecker, 2014). He graded Molly’s

performance as she watched, and then helped her graph her score. Mr. Drummond decided to implement intensive instruction in three nine week intervals to determine whether the intervention was helping Molly meet her Individualized Education Program (IEP) goal (Powell & Stecker, 2014). Mr. Drummond implemented the data-based intervention by using smaller steps, modeling, and manipulatives (Powell & Stecker, 2014). This first two nine week intervals of intervention (the second week was inclusive of the aforementioned strategies and also repeated practice, correcting errors, and using precise language) demonstrated minimal improvement in Molly's performance which would not allow her to adequately meet her year-end goal. For the final 9 week interval of intervention, Mr. Drummond asked Molly to explain or instruct him on how to solve specific problems (Powell & Stecker, 2014). After the final 9 weeks of implementing the additional principles for intensifying instruction, Molly had acquired a level of skill indicative of her progress allowing her to be on track toward meeting and exceeding her goal by the end of next year (Powell & Stecker, 2014). Mr. Drummond met with the IEP team to discuss the possibility of raising her goal and trying to accelerate her progress even more to help narrow the gap between her performance and that of her peers (Powell & Stecker, 2014). Powell and Stecker concluded that data-based intervention can create instructional programs that benefit individual students.

The final article to speak of intervention was by Joseph, Kastein, Konrad, Chan, Peters and Ressa. In this article there was not a specific teacher studied, but it spoke of the multiple methods of collecting and documenting evidence of students' performance in the classroom as a fundamental component of formative instructional practices, essential for ensuring student success (Joseph et al., 2014). This intervention will allow educators to make informed decisions about the types of content and skills they will teach, assist teachers in determining at what level

to begin instruction, and help teacher determine how much to teach both content and skills (Joseph et al., 2014). Joseph et al. urged teachers to keep in mind the student performance variables that can represent different aspects of student learning (2014). These variables included acquisition levels, productivity levels, learning rate, maintenance, generalization, and social behaviors (Joseph et al., 2014). Teachers needed to select assessments to collect by corresponding learning targets as well as the individualized learned objectives (Joseph et al., 2014). The assessments suggested for implementation that you can choose from are: direct observations of social behaviors, direct observations of oral academic responses, daily exit slips, teacher-made tests, quizzes, and worksheets, rubrics for written assignments, rubrics for oral presentations, rubrics for projects or labs, and curriculum-based measurement (Joseph et al., 2014)..

These assessments may be used by teachers to determine where students are in their progression toward mastering learning targets by using class records, such as charts, graphs, and goal attainment scales (Joseph et al., 2014). Chart trackers track a students' progress toward achieving learning targets by creating a chart of student performance on classroom assessments and curriculum-based assessments (Joseph et al., 2014). These trackers should be aligned with learning targets rather than assignments and teachers can view these charts frequently to determine which students are on track toward meeting learning targets and identify which students may need supplemental instruction (Joseph et al., 2014). Graph Trackers are recommended for tracking students' performance on CBM, after three CBM's are depicted on a graph, a reasonable goal point can be established and recorded on that graph. There is then an aimline drawn from the median baseline data point to the goal point, and throughout instruction, the teacher can continue to collect and record data on the graph (Joseph et al., 2014). Finally,

goal attainment scaled is a method for monitoring if students are approximating academic and behavior performance goals (Joseph et al., 2014). This information will provide the teacher with weekly indicators of whether students are on track for meeting goals, and this information can also be helpful when sharing information with parents or other stakeholders (Joseph et al., 2014). Joseph et al. state that the methods described are those that can be aligned with learning targets and can be administered repeatedly to document students' growth toward mastering learning targets over time and can most importantly, assist teachers with collecting accurate evidence of student learning and making informed instructional decisions in the classroom (Joseph et al., 2014).

### **Strategies to Solving Word Problems**

Students with disabilities tend to struggle in math. In a self-contained classroom, it is evident that math is an issue. Solving word problems is a big stressor in the classroom. The students can just start to understand the concept being taught, and then they are given a word problem that throws them for a loop. Students in a special education setting usually struggle when given more than one step in a problem. Word problems are notorious for having more than one step or needing to filter out the information that you need in order to understand what operation is needed to solve the problem. Word problems are key to understanding if your students are mastering the concepts. Gloria Wilson addresses this issue by reaching mathematical common core heights for students who struggle with real-life mathematical applications (2013).

Wilson speaks of a teacher, Ms. Tahja that was having difficulties with her sixth-grade students solving word problems (2013). Ms. Tahja notices that even though she taught her students to circle the key operation terms, underline the important information, cross out any

irrelevant information, and then solve the problem, her students are still struggling (Wilson, 2013). Some of her students were just underlining everything, and other students, even when they are able to follow her instructions, get confused when there are multiple steps involved to solve the word problem (Wilson, 2013). Ms. Tahja was becoming increasingly frustrated with the progress her students are making in the area of word problems, but there is an obligation to adhere to the Common Core State Standards for mathematical practice that highlights the importance of having students successfully solve real-life mathematics applications (Wilson, 2013).

Wilson states that the ability to tackle a mathematics word problem requires the ability to read, decipher the problem, determine what is unknown, understand arithmetic operations, choose appropriate operations, attend, hold information in working memory, understand vocabulary, adjust thinking, and access metacognitive and self-regulation skills (2013). “In addition, to successfully solve word problems, students must use one step as the foundation for the next step by breaking down a problem into its component parts, as well as recognizing what is similar and novel to the problem (Wilson, 2013).” All of these complex steps to solving word problems can lead students with disabilities to have difficulties solving mathematics application problems (Wilson, 2013).

Wilson speaks of the math frame that the field of special education has documented at the power of systematic strategy instruction (2013). Wilson explains that the math frame allows teachers to use successful math learning strategies to incorporate procedures for reading and paraphrasing, as well as techniques for visualizing, estimating, computing, and checking (2013). It is essential to include proficient problem solving, verbalization of the thought process, guided practice, corrective feedback, and frequent cumulative review (Wilson, 2013). The framework

allows students to visually scaffold the problem-solving process in logical steps, incorporate visualization of the problem, and provide opportunities for students to see the similarities and differences among various problem schemas (Wilson, 2013). The math frame is essentially an organizer through teacher modeling, guided practice, and independent use. The six steps to the math frame include: 1) What information is given?, 2) What are you asked to solve?, 3) What strategy might help you to solve this problem?, 4) What steps are needed to find the solution?, 5) What calculations are needed to find the solution?, and 6) What is the solution to the problem? Make sure your answer makes sense.

Wilson did not provide any information pertaining to Ms. Tahja's classroom and how the math frame worked in her room, or if it was successful for her. Wilson did state that teachers can customize the math frame to address the needs of each student who struggles to successfully complete math word problems and can customize the level of support accordingly (2013). Teachers can adjust instruction by assessing where individual students are having difficulty by asking themselves these questions (Wilson, 2013):

- Did he or she not understand what had to be solved?
- What steps were needed?
- How to do the calculations?
- Was he or she able to successfully set up a series of calculations that led to the solution but unable to describe in writing what was done?

Wilson explained that reflecting on these questions while evaluating the steps of the math frame allows teachers to use this tool to provide scaffolding for students to learn word problems while creating a way to assess gaps in student thinking in the process (2013).

## **Gaining Independence in the Classroom**

Independence in the classroom is important to have, although it is difficult to identify meaningful tasks that students with disabilities can complete with full independence (Fraser, 2013). Fraser gave the example of Mrs. Davis, an elementary school teacher, who teaches students with moderate to severe disabilities (2013). Mrs. Davis hoped to find a way to incorporate independent activities that her students can complete, that meet their unique needs, are evidence-based, address the goals and objectives of their individualized education programs, and use readily accessible materials (Fraser, 2013). Fraser does not state the results of Mrs. Davis implementing the aforementioned strategies, but does give the tips and strategies to use in the classroom to help gain independence for students with disabilities.

Fraser expressed that independent work activities can be developed that rely on readily available items in schools, grocery stores, and craft stores, are tailored to meet the student's needs, correspond to the Common Core State Standards, provide tactile learning opportunities, and enhance students' fine motor skills (2013). One technique that can be used to foster independence is visual organization of structured work systems. The structured work systems will provide necessary supports by visually answering four questions for the student (Fraser, 2013): 1)How many tasks do I need to finish?, 2)What tasks do I need to do?, 3)How will I know when I am finished? And 4)What do I do when I am finished with my work?

Hands-on activities to enhance student understanding is another way that teachers can support independence in the classroom while addressing academic content (Fraser, 2013). Fraser stated that Mrs. Davis needed to incorporate academic concepts into meaningful independent work based on the general curriculum while also addressing students' IEP goals. Hands-on



activities allow students to have engaging opportunities while still meeting the current CCSS. The five tips discussed by Fraser, indicated that teachers, like Mrs. Davis, could use these to feel confident they are teaching to general education standards (2013). The first tip is to take advantage of using math manipulatives such as unifix cubes, links, counter chips, sorting bears, pattern blocks, tangrams, decks of cards, etc. (Fraser, 2013). The second tip is to use unifix cubes to practice a variety of math skills - one example being having students assemble sets of odd and even numbers and then place the cubes in containers labeled *odd* and *even* (Fraser, 2013). The third tip is getting creative with using clothespins in mathematics by writing a word problem on an index card and providing answer choices written on clothespins (Fraser, 2013). Teachers could also visit their local craft store and find inexpensive material that can easily lend them to creating independent tasks (Fraser, 2013). Fraser mentioned that buttons can be used for sorting by color, size, and number of holes (2013). The final tip that Fraser gave was using grocery store items for academic, daily living, and vocational skills (2013). The ordinary items purchased at grocery stores can be used for independent work tasks. Plastic cups can be used for sorting colors and patterns, counting, and stacking (Fraser, 2013). These tasks help promote independence and will be an asset to students with disabilities who are better with visual aids to help in their math instruction and gaining independence.

## **Summary**

Supporting students with disabilities in math instruction is important to their learning and increased academic success and progress. After reviewing the literature related to math instruction and intervention, I have gained an understanding of strategies that teachers can use with students who struggle with math. I have also found ways to incorporate these strategies into my daily lessons. I will use these strategies and interventions in my work as a long-term

substitute teacher in a sixth-grade self-contained classroom to help in effectively addressing students' needs while also aligning my lessons to the CCSS.

## **Chapter Three: Research Design**

Throughout this current year as the long-term substitute in the sixth grad self-contained classroom, and throughout my years as a substitute teacher subbing in inclusive classrooms, I have noticed how hard it is for students with disabilities to complete math problems aligned with the Common Core State Standards with no differentiation provided. It is heartbreaking to watch a student who is struggling in math feel helpless because they are not being given the support that they need to aid in their understanding to complete the problem. My goal was to provide the students with a variety of strategies to use when solving problems, and for myself as a teacher to gain insight into the interventions that I could use in the classroom to help support my students with disabilities.

I conducted this self-study to become more effective at teaching students with disabilities mathematics that aligns with the Common Core State Standards for sixth grade. Through this six week self-study, I sought answers to the question: How will I facilitate math instruction to include the Common Core State Standards of sixth grade math to effectively differentiate the instruction to meet the needs of my students?

### **Participant**

I conducted a self-study so I was the sole participant. I am the long-term substitute teacher in a sixth grade self-contained classroom in a suburban school district in western New York. I am in the classroom every day and teach mathematics to thirteen students each morning for an hour. I am free to incorporate my educational practices with the students as long as I am following the standards for sixth grade and the district core beliefs. My students like to be hands-on and enjoy having visual aids when they are learning. By conducting this self-study I will be

able to further my knowledge on how to differentiate the Common Core State Standards for sixth grade mathematics and bring interest to the students.

## **Setting**

I conducted this study in a large middle school in a suburban school district in western New York. The middle school in which I conducted my research consists of grades 5 through 8. My study was conducted in a sixth grade self-contained classroom with the 13 students I have for mathematics. All of the students have an Individualized Education Plan (IEP) that includes mathematics goals. There are 7 boys and 6 girls in the room. Two of the girls have a behavior intervention plan and two of the boys also have a behavior intervention plan. Six of the students qualify for free and reduced lunches and are considered in the poverty range by the district.

In my room, I follow the Common Core State Standards for sixth grade math curriculum, but I also focus on improving their number sense and basic math fact fluency. My goal is to show growth in the students from where they began the beginning of the school year. The middle school follows the principles of learner-centered instruction, which is aligned with their mission statement of challenging all students to strive for excellence while developing their unique talents and becoming respectful, resourceful citizens and contributing members of an interconnected global society. In my classroom I am striving to provide a learner-centered approach to the instruction. The administrators use the Pearson grading rubric for effective teaching that includes professional responsibilities and professional growth when they are observing in the classroom.

## **My Positionality as the Participant and the Researcher**

I am a 25 year old white female. I was raised in a middle class family in a suburban neighborhood in western New York. Math was not an easy subject for me but I worked hard at it and was lucky enough to have supportive teachers that took the extra time to explain things that made sense to me. My fourth grade teacher was incredibly effective because she always had us moving and we were not just sitting there completing endless worksheets in math class. We used manipulatives and talked about real-world problems. I completed my undergraduate studies at The College at Brockport, State University of New York. I earned a Bachelor of Science degree in health science and teaching certification in childhood inclusive education. I have my initial teaching certification in first through sixth grade in general education and students with disabilities. At the moment, I am pursuing my master's degree in curriculum specialist at The College at Brockport, State University of New York. I am in my first year as a long-term substitute teacher for the entire year in a sixth grade, self-contained classroom.

My philosophy as a teacher is to instruct in a way that the students are more actively involved in the learning process. I believe that when students are able to master concepts, share their opinions and ideas, they are given more opportunities to understand the concepts being taught. In my experiences, when I allow students to use manipulatives, be hands-on with the activities and talk with their peers, they are more inclined to understand the material. I believe that the teacher should provide a base for the students to go off of, and model the ways to complete the problems. After that, students should be given the opportunity practice their learning through problem solving on their own or in groups. This allows me to see how the students are understanding things and what I need to focus on for the next portion of the learning. Assessment should be continuous and ongoing in the learning process which allows the teachers

to not only see how students are mastering the math concepts, where the students are in their math learning, but to also see what the teacher needs to change in their instruction to better address the needs of their students.

## **Procedures**

My data collection took six weeks. I taught every day in those six weeks, with the exception of any professional development that I had to attend. I wrote in my researcher journal 2 times a week, which resulted in 12 journal entries. On the days that I wrote in my journal, I made sure to write down any information that I wanted to include directly after math class during my planning block, so that the ideas were fresh in my mind. At the end of each day, I collected data, wrote a reflection on how it went, including positive and negative things, and what I would do next time, or if I want to change anything. The steps looked something like this:

1. Teach my lesson in my math class.
2. Immediately following math class, write down anything that I do not want to forget.
3. After the school day is over, write a reflective piece in my researcher journal.
4. Include anything that I might change.

## **Data Collection and Analysis**

Two times a week, for six weeks, I will focus on the strategies and interventions that I used during math class those days. In my researcher journals, I will discuss what strategy I used in the lesson, why it is significant to my research, what went well, what was challenging, and what I would do differently next time.

### *Data Analysis*

In order to become a more effective teacher I know that I need to reflect on my own teaching. I used a teacher researcher journal as my source of data collection which allowed me to examine how successful the math instruction was and inform my thinking as to what differentiated math instruction should contain and allow for regarding student learning outcomes. As a part of the data collection, I looked at the students' work from math class to see what they are doing well, what they are struggling with, and what I need to do adapt or modify my instruction. And possibly allow for accommodations. I made sure to ask questions during my instruction to get a better understanding of their experiences with these interventions and strategies. I recorded any questions or comments that the students had in my researcher journal.

### **Criteria for Trustworthiness**

It is of high importance that I accurately conduct this self-study in an ethical and unbiased manner. I learned through the process of self-reflection using a research journal to reflect on my teaching. To ensure trustworthiness, I conducted observations on multiple occasions, two a week, for six weeks. During my self-study I continually looked at my research question to make sure I was reflecting on the correct information and changed things as needed.

## **Chapter Four: Findings**

This chapter will discuss the findings of my research, after incorporating I used an intervention strategy in the classroom. In journaling my observations, I first stated the strategy used, then talked about the significance of the strategy to my research - what went well, what was challenging, and what I would do differently next time.

### **Journal Entry #1**

**Monday, February 9, 2015**

**Strategy Used:** Fruit Loop Activity Packet for ratios and rates instruction unit. Hands-on and real world problems.

#### **Significance to Research:**

The Fruit Loop Activity was significant to my research because it was a hands-on activity to be used as an intervention strategy that helps students to physically touch and manipulate things. This helps students because they are able to visually see what they are working with and are able to touch and manipulate the materials to aid in student understanding and reinforcement of the math concepts being taught. In this case, the students were able to move the fruit loops around to break them into colors. Once in colors, the students compared the colors to find the ratios. For example, a group might have had to compare the ratio of orange fruit loops to green fruit loops.

#### **What went well?**

The students were actively engaged and I was able to circulate around the room and check for accuracy in their packets. When students were struggling with any of the problems in



the packet, I was able to redirect their thinking and physically have them show me the ratios. The students seemed to enjoy the lesson because they were actively engaged and we talking about math and had pleasant looks on their faces, and they were comfortable with the content because of their prior exposure to mathematical ratios. I liked that the lesson was self-explanatory because the packet included directions and I just read through the directions at the start of the lesson and did not have to model each step with the students. The students understood what they had to do because they were able to tell me the directions and the order of what they had to do when I asked what the task was. Providing the hands-on material worked to further, deepen, and reinforce their understandings of ratios. The students relied more on their peers than me because they were working in groups.

### **What was challenging?**

I found it hard for me to not interrupt groups when I saw they were doing something incorrectly and just observe to let them figure it out for themselves because I wanted to step in and help.

### **What would I do differently?**

Next time, I would do this lesson at the beginning of the unit on day one. It would have been a great lesson to get them interested in ratios using a real-world example.

### **Journal # 2**

**Thursday, February 12, 2015**

**Strategy Used:** Modeling for study guide. The class was split into two groups; I worked with one group, and my teaching assistant worked with the other group.

### **Significance to Research:**

Modeling and making smaller groups were significant to my research because as an intervention strategy, it was recommended to use modeling to help students understand the concepts and as a visual aide for them when working on problems on their own. During the study guide, I would model the first question in a section, and then allow the students to work individually on the rest of the problems in that section that were similar to the one I modeled. I did this for each section of the study guide because when modeling was not done for previously used study guides, I often had to go back and re-do many problems. The anticipated result was to eliminate the number of questions we would have to re-do because of incorrect answers.

Also, by splitting the class into two groups I was able to split according to ability levels and have two groups that could be better managed. This is significant to my research because it shows an intervention strategy facilitated to meet the needs of my students.

### **What went well?**

The smaller groups allowed for more participation and more questioning from the students. I was able to better assist the students when they were working individually to make sure they were answering the problems and using the modeled problems that I did with them as a reference. I knew learning was occurring because they were asking questions to further their understanding on the concept. After questioning, the students were able to complete the problem they had a question on. It did take some students 2-3 problems on their own before they had no more questions and could successfully complete the problem independently. Their questioning did rely heavily on me for this lesson due to the modeling that I had to do.

### **What was challenging?**

Even with the modeling of the study guide, and a review of the concepts that were already taught, a lot of my students struggle to retain information that they have learned. The biggest challenge was modeling all of the sections and giving enough time for students to complete the problems on their own. Time was my biggest challenge.

### **What would I do differently?**

Manage my time better by pre-planning and having at least two days set aside for study guide work in the classroom. This will allow for more opportunities for discussion and explicit instruction when things are confusing to the students. I will also have extra problems for each section for my students who finish early and need another challenge, rather than just sitting there and waiting for us to go over the answers.

### **Journal # 3**

**Monday, February 23, 2015**

**Strategy Used:** Smart Board activity, using technology in the classroom with real-world problems. Hands-on activity for the whole group.

### **Significance to Research:**

The Smart Board activity, real-world problems, and hands-on activities were significant to my research because one of the intervention strategies that I learned of in my literature review was to provide hands-on activities and incorporate technology. This strategy also helps to gain independence in the class room according to the research in my literature review. The Smart Board activity was a presentation introducing the next unit of study, rational numbers. The Smart Board activity allowed students to see rational numbers visually and they were able to be

engaged through technology and come up to the front of the room to participate by writing in numbers, answers and moving things around on the Smart Board.

### **What went well?**

All of the students were engaged in the lesson. The slides talked about rational numbers and what they were. The slides also had problems for the students to fill-in-the-blank with the correct rational number. There were real-world examples used in the slides. For example, the student had to put the rational number down that meant 20 degrees below zero, and 20 degrees above zero. I knew learning was occurring because they were understanding the concept of the lesson and answering questions correctly. There was an abundance of participation for the whole group. I had to randomly select names from popsicle sticks to keep it fair because the students wanted to come up to the Smart Board. If the students had questions, I had them talk about it as a group or with the partner sitting next to them so it was more student-based learning. This has impacted my thinking and facilitation because I can tell that the students like to use the Smart Board and be interactive with their learning so I will try and use the Smart Board for more lessons.

### **What was challenging?**

I did not have any challenges during this lesson; it was a successful lesson with strategies!

### **What would I do differently?**

I would not change anything about this lesson, it was entertaining to do and the students liked it, they also were able to tell what rational numbers were on an exit ticket and provide their own example to me.

#### **Journal # 4**

**Wednesday, February 25, 2015**

**Strategy Used:** Using manipulatives in the classroom for a hands-on activity. Using index cards to create a number line of rational numbers, using numbers  $-7$  through  $7$ .

#### **Significance to Research:**

Using manipulatives was significant to my research because this allowed students to be hands-on with the index cards and get up and out of their seats. Each student was given a number and they had to correctly line themselves on a human number line. They needed to talk with each other and figure out the rational number line and put themselves in the correct order.

#### **What went well?**

The students discussed with each other where they thought they should go on the number line and where their index card fit in the number line. They needed to discuss with each other so they could communicate where they needed to go so the reliance of questioning was heavily placed on their peers. I was able to take a step back and allow them to work as a class and not be interrupted by me saying they were in the wrong spot. This gave the students the opportunity to raise questions together and come up with a solution to their problem. They worked well as a group and there were minimal arguments if a student was in the wrong place. This lesson helps to inform my thinking in regard to the use of manipulatives because using the manipulatives of

the index cards allowed the students to move and physically see where they needed to stand. Peer learning heightened their understanding of the content because they worked together, and worked off of each other's ideas and thinking.

### **What was challenging?**

The challenging part was having the students quiet down once they were in their correct spots because they wanted to discuss with their peers next to them about their spot.

### **What would I do differently?**

I will make sure in my directions that I talk about voice level and trying to do this as quickly and quietly as possible. I will also make other sets of index cards. I did switch the cards that students had, but if I made different set of rational numbers (a set going by 5's) then they would have a new challenge to do instead of using the same rational numbers each time.

### **Journal # 5**

**Monday, March 2, 2015**

**Strategy Used:** Using real-world examples to facilitate math instruction.

### **Significance to Research:**

Using real-world examples was significant to my research because my literature research suggested that students would make better connections to the material if they could connect it to their own life and real-world examples were used. I used this strategy during my facilitation of lessons addressing rational numbers and looking at the opposite of integers. For example, I would give a problem that said something like: A 102 yard gain. The students would then have to

tell me what integer that represented (102), the opposite integer (-102), and the meaning of the opposite (A 102 yard loss). I also created problems with positive and negative temperature, money, deposit and withdrawal from bank accounts, and above and below sea level. This allowed me to use real-world problems so they could make a connection to their own lives and know that rational numbers are used in everyday life.

### **What went well?**

The students were able to make the connections to the real-world examples and this helped them to see rational numbers as numbers they will use outside of the classroom when telling the temperature, talking about money, etc. The boys especially liked creating their own examples for gain and loss using football as their topic. I knew there was learning occurring because most students were able to create their own examples and it was done correctly.

### **What was challenging?**

There were students that did not understand the vocabulary of some of the words like deposit and withdrawal because they do not have bank accounts yet. Or some of the students did not understand a gain and a loss of yards because they do not play sports. This impacts my thinking and facilitation because I cannot just assume that students understand all “common” vocabulary words and need to ask for clarification on what a word means.

### **What would I do differently?**

I will start out by talking about the meaning of the terms I used in the problems. Terms like above, below, gain, loss, deposit, and withdrawal. This needs to be addressed because I

found that some students did not know the meaning of these terms and were confused when we were talking about the problems.

## **Journal # 6**

**Tuesday, March 3, 2015**

**Strategy Used:** Reteaching and repeated practice with rational numbers using real-world examples.

### **Significance to Research:**

Reteaching and repeated practice were significant to my research because during my research, it was said that students need to be exposed to material multiple times in order to understand and master the material. Also, by using real-world examples, students are able to make a connection to their everyday life and know that they will be using these concepts outside of school. The same as the day prior, I used real-world examples with rational numbers. For example I said, "A withdrawal of 20 dollars." The students would then have to tell me what integer that represented (-20), the opposite integer (20), and the meaning of the opposite (A deposit of 20 dollars).

### **What went well?**

The kids benefited from a day of repeated practice and reteaching. At the beginning of the lesson, I made sure to talk about the terms used in the problems (deposit, withdrawal, gain, loss, above, below). This served as a reteaching of the terms. Then the students were able to work on problems that were similar to the day prior but with different numbers and scenarios. There was also more participation because the students felt comfortable with the material. I



could tell the students felt comfortable with the material because they were raising their hands and their answers were for the most part correct.

### **What was challenging?**

Even with the reteaching, there were students that were lost on the problems because the content is difficult for them to grasp. Even with reteaching and working with the students who were struggling, it was hard for me to word the problems in different ways. It was challenging for me to try and explain the material in different ways for them to understand. Also, with questioning, the students relied heavily on me to answer their questions instead of trying to work it out with a student who sits near them.

### **What would I do differently?**

I would have the students who were still struggling come in for even more practice during lunch or have them continue work with my teaching assistant during fluency practice in math so they can be exposed to the material again to have more reteaching and repeated practice. Also, to reduce the amount of questions asked to me I can start the “three before me” policy that will have students ask their question to three other students and if the question is still not answered after going to three peers, they can come to me.

### **Journal # 7**

**Monday, March 9, 2015**

**Strategy Used:** Individualized learning objectives for multiplication fact work.

**Significance to Research:**

Individualized learning objectives were significant to my research because it was important for work to be individualized to the students' needs. I started out by giving students at the beginning of the year, a blank multiplication chart and gave them four minutes to fill it in. Every few weeks I have been tracking their progress of how many facts they get correct in the four minutes. Looking at the chart, I am able to see what multiplication facts the students know and which facts they are getting incorrect or not attempting to fill in first because those facts are not automatic for them. For this lesson I gave a new blank multiplication chart to see where the kids are currently. From there, I was able to assign worksheets and center activities that align to their individualized multiplication needs. In a few weeks after doing these worksheets and center activities I will give them another blank multiplication chart to see if there was growth.

### **What went well?**

I was able to collect the data from each student and split them into various groups depending on which multiplication facts needed work. I had a group that needed to work on their times 4 facts, a group for times 6 facts, a group for times 7 facts, and a group for times 9 facts. I then pulled my materials for those multiplication facts. I had worksheets for multiplication facts with those numbers and different center activities like multiplication bingo or capture (a spinning wheel game that has you multiply by the fact you are working on with a number and capture the card that is the answer).

### **What was challenging?**

The most challenging part was making sure I was putting the students into groups that were at their level but also in groups that the students would work well together. I have some students that are in the same multiplication level, but they struggle to work cooperatively

together so I will have those kids work on worksheets instead of playing games together where competition causes tension. This impacts my facilitation because I need to know for the future what good pairings for students to work together are.

**What would I do differently?**

I would not do anything different as this was just the assessment piece and preparing the materials for individualized objectives.

**Journal # 8**

**Friday, March 13, 2015**

**Strategy Used:** Polya Strategy (using graphic organizers to solve word problems).

**Significance to Research:**

Using the Polya Strategy was significant to my research because the use of graphic organizers allowed students to break down the problem and see what important information was and what they do not need to use in order to solve the problem. It also allowed the students to understand the vocabulary of the word problem. With the Polya Strategy, students break down a word problem into four boxes. The first box is, “Do you understand?” The students’ need to write down all of the information they need to solve the problem and what the problem is asking them to answer. The second box is, “Plan.” In this box the students plan out what they are going to do to solve the problem. The third box is, “Execute/Carry Out.” In this box the students solve the problem. Then in the fourth box, “Check Your Answer,” the students need to check that their answer makes sense. I introduced this graphic organizer in a previous unit but this was the first time using it in the rational numbers unit with word problems.

**What went well?**

The students recalled using the Polya Strategy in the previous units so minimal explanation was needed regarding what each box meant. The students all did a great job with pulling the information with box one. They were highlighting and underlining key words that would help them to understand what to put in box one, which is quite the improvement from them doing this at the beginning of the year.

**What was challenging?**

The challenge was getting the students to make sure they checked their work. A lot of the students just put a check mark in box four and said, “Yup... I checked it.” But they failed to show the work on checking their work even with prompting. This facilitated my instruction because I know to focus on box four for next time.

**What would I do differently?**

I will model how to complete a word problem for rational numbers so the students can see how I correctly used box four to check my work and why.

**Journal # 9**

**Monday, March 16, 2015**

**Strategy Used:** Polya Strategy (using graphic organizers to solve word problems). Modeling, real-world examples, and repeated practice.

**Significance to Research:**

Using the Polya Strategy again was significant to my research because the use of graphic organizers allowed students to break down the problem and see what important information was and what they do not need to use in order to solve the problem. It also allowed the students to understand the vocabulary of the word problem. With the Polya Strategy, students break down a word problem into four boxes. The first box is, “Do you understand?” The students’ need to write down all of the information they need to solve the problem and what the problem is asking them to answer. The second box is, “Plan.” In this box the students plan out what they are going to do to solve the problem. The third box is, “Execute/Carry Out.” In this box the students solve the problem. Then in the fourth box, “Check Your Answer,” the students need to check that their answer makes sense. The students used this strategy last week and this is a repeated practice using this graphic organizer.

### **What went well?**

Modeling of the Polya strategy and how to use the fourth box correctly went over well. I felt that a lot of the students had a light bulb click in their head that they do not just put a check mark in the fourth box to say it is correct. They now understand that they need to show work of why they are correct. This allowed me to see the work and whether or not the students completed the work correctly.

The students were able to quickly go through the first three boxes of the Polya strategy. The majority of the students were comfortable with using rational numbers in word problems. The fourth box took more effort. I decided to partner the students up to work together to figure out the problems. There were a few students who struggled with the Polya strategy as a whole,

but I pulled them aside and worked with them in a small group setting and modeled again while the other students were working in pairs.

**What was challenging?**

The challenging part of this lesson was being in the small group with the students who were struggling while keeping an eye on the work that the other students were doing because my teaching assistant was not there to help.

**What would I do differently?**

Next time, hopefully my teaching assistant will be there. That would eliminate the challenging part of me keeping an eye on the other students when I am in the small group. If not, I will circulate more through the room to check on the groups to be sure they are on track.

**Journal # 10**

**Friday, March 20, 2015**

**Strategy Used:** Follow-up Multiplication Facts Assessment for individualized student objectives.

**Significance to Research:**

A follow-up multiplication fact assessment was significant to my research because it allowed me to see how my students have grown with the interventions that I have provided since the previous multiplication fact assessment. The previous assessment was completed on March 9<sup>th</sup>. Doing this assessment also allowed me to see if students were still struggling with certain multiplication facts, or if they had become more fluent with their facts. From there, I was able to

determine their fluency work for the next few weeks. It is important to do this assessment every few weeks to make sure you are using the right interventions with your students. If I did these assessments every few months, students could be missing the real interventions that they need. It will also tell me if the intervention strategies that I am using are not working.

### **What went well?**

There was growth in a majority of the students. Many of the students raised their facts in the four minutes by 5-10 facts. There were some students who stayed the same with the amount of facts correct in the four minutes, and that is okay because they did not regress. It was good for me to see that the intervention games and worksheets that I am using in the classroom are working and know that my facilitation of fluency is where it needs to be.

### **What was challenging?**

The challenging part of this was seeing some of the students stay at the same fact knowledge. After seeing the students work so hard during fluency, it is hard to see that some students did not make any improvements.

### **What would I do differently?**

For the students that did not make any progress with their facts, I am going to try different strategies with them. I will use different games and worksheets with the students because maybe they do not understand what is being done in the strategy. I will also work with them during fluency and make sure that I am watching what they are doing in that time and completing the work correctly.

### **Journal # 11**

**Monday, March 23, 2015**

**Strategy Used:** Modeling with a study guide and repeated practice.

**Significance to Research:**

Modeling and repeated practice were significant to my research because as an intervention strategy, it was recommended to use modeling to help students understand the concepts and as a visual aide for them when working on problems on their own. During the study guide, I would model the first question in a section and then allow the students to work individually on the rest of the problems in that section that were similar to the one I modeled. I used this intervention strategy previously on February 12<sup>th</sup> and it was successful with my students so I wanted to use this again when reviewing for the rational number unit. Using this strategy again will also allow me to see if it works for a second time and that my students favor modeling as a form of review.

**What went well?**

Modeling of the study guide was yet again another successful strategy with my students. It met their needs and the review was beneficial to our time and the students seemed to comprehend what was being taught. This time, I split the group into two groups by their pace of work. The students who normally do not need a lot of time to complete an answer were paired with me (mastering the concepts presented after 1-2 problems), and then the students who need a little more work time were paired with my teaching assistant in the back of the room (mastering the concepts presented after more than 2 problems). My teaching assistant was able to go at a slower pace and I was able to move at a steady pace so the faster students would not be sitting around and waiting for the next section to start. I feel that this set up was better for my students



because time was used wisely for both groups and I will continue to structure review with study guides this way.

### **What was challenging?**

The challenging part was for the group of students who work at a slower pace. It was a challenge for them to finish the study guide in the two-day period that I gave for study guide review. Due to working at a slower pace, they were unable to get to all of the problems during the class period.

### **What would I do differently?**

Next time, I will speak with my teaching assistant beforehand and let her know of problems that can be eliminated because they are similar to others in the study guide. That way, if on day two of review and still far behind, she can eliminate problems at her leisure.

### **Journal # 12**

**Wednesday, March 25, 2015**

**Strategy Used:** Snowball review game on Smart Board for hands-on activity while incorporating real-life problems.

### **Significance to Research:**

The Snowball review game was significant to my research because I wanted to use the Smart Board technology to create a hands-on activity to review for the rational number unit test. Instead of just doing a study guide packet, I wanted to create a more hands-on activity that would allow the students to be actively engaged. This game had questions on slides in Smart Notebook.

Each student was given small pieces of paper and a pencil to write with. The problem was put on the smart board and students were given three minutes to put their answer on their sheet of paper along with their name. Once they were finished, they crumpled their paper to look like a snowball. When time is up, I stood at the front of the room, closed my eyes, and had the students throw their snowball at me. I picked any snowball on the floor and read the answer to myself. If the answer was correct, that person got a point for the reward system and I said who it was that got it correct. If the first snowball I pulled was incorrect, I did not say whose paper it was and just picked up the next snowball from the ground. This allowed me to randomly select students and kept all students actively engaged rather than just calling on one specific person to complete a problem.

### **What went well?**

The students were actively engaged because each student was doing every problem. They all enjoyed that they had the opportunity to get called on because it was a random selection. I was able to discuss the correct answer after I found a snowball with a correct answer. This also allowed me to see what problems students were struggling with.

### **What was challenging?**

The challenging part of this lesson was that although I did see what problems the students were struggling with, I did not have work created with those problems to have as an extra study guide for the test the next day.

### **What would I do differently?**

Next time, I will have extra problems created for each section of the rational numbers unit. That way, if I see students are struggling with certain problems, I can send them home with the problems they struggled on for extra practice.

I didn't allow for students to ask questions because I wanted to see their ability level to do the problem independently. I would allow questions next time because it is only hindering the student by not allowing questions. If they cannot ask questions and just sit there confused it is not helping them to master the concept.

## **Summary**

Through my observations in my data collection period I was able to pull out several common themes or strategies that I gravitated towards. In order to differentiate the math instruction for my students that still incorporated the common core state standards, I focused on using modeling, reteaching and repeated practice, real-world examples, and hands-on activities. Using these practices allowed me to meet the needs of my students. Modeling was important for my students because most of them are visual learners and it helps them to visualize what I am asking them to do before they try it on their own. On the days that I did not model, I found that I was continuously going to each student to correct their work because they did not understand what was being asked. Reteaching and repeated practice were key in the success of my students learning. This allowed my students multiple looks at topics in their unit of study. The repeated practice and reteaching also allowed the students to grow as a student. They were able to see their own growth in their work. I had students mention to me that they first thought they were never going to understand something and now they know how to do it easily. That right there proves that the repeated practice and reteaching gave them the opportunity to understand the

math instruction of sixth grade. Hands-on activities also helped to have instruction that incorporate the common core state standards effectively and still made my students engaged in the material. The Smart Board hands-on activities are the popular hands-on work for my group of students. Finally, real-world examples were essential in differentiating the math instruction to meet the needs of my students. This strategy made it easier for the students to picture the problems in their head or draw pictures on their worksheets. It was a connection to their everyday lives and it made the students feel that they would actually use these concepts outside of math class. Without these strategies, the students would not have been as successful with the sixth grade content.

## **Chapter Five: Conclusions and Recommendations**

Throughout the entirety of this study my goal was to observe my students and use different strategies and interventions in the math classroom to effectively meet the needs of my students while incorporating the Common Core State Standards. I was able to accomplish my goal through research, data collection, and working as a long-term substitute teacher in a sixth grade self-contained classroom. I was able to take note of my teaching, the significance of the strategy being use, and what went well while being used in the classroom. I was also able to reflect on what was challenging during the lesson and what I could do differently for next time. As a result of this study I wanted to observe growth in myself as an educator through the data I collected. With this research I learned it is helpful for teachers to use modeling and reteaching/repeated practice in the classroom. Modeling the material for the students allowed them to visually see what was being asked of them. They were also able to use the model as a guide while they were working on guided and independent practice and refer to it as needed if I was too busy to come over and give support at that moment. Reteaching and repeated practice was important for my students because it gave them the opportunity to see the content again and fix mistakes that they may have been making. It is also helpful to use real-world examples during word problems. This was proven to be beneficial in my classroom because it caught the attention of the students. The students were able to relate to the problem and see that something that they were learning in math could help them in the real-world to figure out solutions to problems that may arise in their life. The students' active involvement in the lessons deepens the ability to differentiate math instruction to incorporate the Common Core Standards and effectively address the needs that the student has.

I completed this project solely on my own. I was never observed, I could only go by my own personal observations. Being observed by an administrator or even another teacher would have been extremely helpful in me reaching my goal of improving my teaching methods. When being observed by an administrator earlier in the year, I was given feedback on what I was doing well and things that I could try for next time. I believe it also could have been interesting to see what the students thought of the lessons. If they thought the strategy was working for them or what may have been too challenging for them. I could get this feedback with an anonymous exit ticket to be handed in at the end of the lesson. The students could write down their thoughts without feeling like they were going to get in trouble for writing a certain answer down.

I have seen growth in myself as an educator in the six weeks of study. One of the biggest ideas I can take away from this study is the fact that things are not going to go as perfect as planned. Things are not going to go according to plan. There will be times that the lesson feels like it is moving in the wrong direction. The important thing to do would be to take a breath and learn from it. As long as you have confidence in yourself, the students will not know that things did not go as planned.

### **Implications for Teachers**

If a teacher is going to try to implement new strategies in order to effectively differentiate for students to incorporate the Common Core Standards, it is my recommendation that teachers first research the different strategies that can be used with the Common Core State Standards and differentiation. Not all strategies will pertain to the lesson you are facilitating instruction for, so you need to first see what will effectively work in your classroom.

When you are implementing the strategies in your classroom, be sure to immediately reflect on the lesson prior to teaching it. This will help to make sure the most accurate recollection of events will be recorded. It would be wise to write down your thoughts about the lesson for data collection so they do not get lost. Reflect on what went well, what was challenging, and what could be done differently next time. There are no implications for students because this was a self-study and I did not focus on the students, just myself as a teacher.

### **Recommendations**

Further research should be conducted in order to explore and understand the best strategies to use in differentiating math instruction to incorporate the Common Core State Standards. It would be beneficial to teachers and educators because it will allow for more research to see what is successful in the classroom. It also allows teachers and educators to see what might be unsuccessful in the classroom and why and that can help to determine which strategies a teacher or educator will use in their classroom to differentiate the math instruction.

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## Appendix i

### Journal Format:

Journal # \_\_\_\_:

Date

Strategy Used:

Significance to Research:

What went well?

What was challenging?

What would I do differently?

## Appendix ii

### Days of Journal Entries

Journal Number	Date
1	Monday, February 9, 2015
2	Thursday, February 12, 2015
3	Monday, February 23, 2015
4	Wednesday, February 25, 2015
5	Monday, March 2, 2015
6	Tuesday, March 3, 2015
7	Monday, March 9, 2015
8	Friday, March 13, 2015
9	Monday, March 16, 2015
10	Friday, March 20, 2015
11	Monday, March 23, 2015
12	Wednesday, March 25, 2015