Incorporating RTI and the Mastery Model into Mathematics Tutoring Sessions

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Introduction

As I began the first semester of my student teaching, the thought of teaching math was overwhelming. My lack of confidence prevented me from having a positive outlook. After previous struggles with mathematics, I worried not just that I wouldn’t be able to teach it, but also that I wouldn’t be able to help the children who fear math like me. I was eager to learn how to boost my confidence in teaching math and the students’ confidence in learning math. This question coincides with the purpose of this paper which is to present a case study of a tutoring project in which I participated as a tutor of mathematics. The case study involved the analysis of Response to Intervention (RTI) notes from the project. There was no research question or hypothesis associated with the study, only descriptive responses that examine the tutoring process and the learning.

Tutoring Procedure

Diagnostic

The initial step in the tutoring process was having the students take a pretest which allowed me to determine the basic skill levels of the students as well as which TEKS the students struggled with. After looking at the diagnostics I determined that the highest score was a 65 and the lowest score was a 25 on a 100 point scale. Although the results were all different scores, I saw that the students struggled with almost all of the same Texas Essential Knowledge and Skills (TEKS) which included: 2.1(A) use concrete models of hundreds, tens, and ones to represent a given whole number (up to 999) in various ways; 2.1(C) use place value to compare and order whole numbers to 999 and record the comparisons using numbers and symbols (\(<, =, >\)); 2.4(A): model, create, and describe multiplication situations in which equivalent sets of concrete objects
are joined; 2.3(D): determine the value of a collection of coins up to one dollar; and 2.5 (B), use patterns in place value to compare and order whole numbers through 999.

Because of these results, I decided to group all of the students together for the tutoring sessions. The TEKS that were not yet mastered focused on or linked to place value which is essential to master before moving on to addition, subtraction, multiplication, and division. Not understanding place value could also be the reason why the students missed most of the questions involving money. I believe that the students struggled with questions that asked use patterns in place value to compare and order whole numbers through 999 not only because they had not mastered place value, but also because the concept involved algebraic thinking which might have been too difficult for the students to understand at this stage. After making these determinations from the first sessions, I created my first intervention planned that involved the Mastery Model.

**Instructional Model**

The Mastery Model consists of different steps that incorporate a variety of teaching strategies. The first step is the orientation where you first introduce the concept through a song, piece of art or a story. This enables the students to activate their prior knowledge either from other subjects or from previous math lessons. It also engages the students and attracts the interest of students who are more visual, auditory or kinesthetic learners. There was a very short amount of time where I was talking to the students. The instruction part of the model was more of a recap of the orientation in order to make sure all of the students understand what we will be learning about. Incorporating practice is another strategy that I used during the tutoring sessions. This practice included structured, guided, and independent. During structured and guided the students
practiced the concept through activities that included the whole class or partners. Independent practice enabled me and the students to see what the students know and how they can apply it. During this practice the students usually answered math problems that I could score and look over. The last step of the mastery model is the assessment which usually consists of a game. This game can be played with partners, whole class or even independently. I would try to make the games more interactive so that they students could work on their communication skills and could learn from one another. This not only helps the students with their math skills, but it also assists students in other subject areas because it is very important for the student to communicate. Communication helps the students organize their thoughts and also enables them to feel comfortable asking questions which clarifies and increases their knowledge.

**Response to Intervention – Tracking Progress**

Response to Intervention was another method that I used during the tutoring sessions. “Response to intervention (RTI) integrates assessment and intervention within a school-wide, multi-level prevention system to maximize student achievement and reduce behavior problems” (National center on response to intervention, 2011). This systematic process was conducted through the tutoring sessions, assessments, and weekly narrative responses. Although this project was not a formal RTI, it still had the same intent and goals.

The RTI system is separated into three tiers. Tier 1 is when whole class instruction is differentiated for various types of learners. Tier 2 is when a group of students are pulled out and work together under the guidance and instruction of a teacher or specialist. Tier 3 is implemented when the student or students show little success with Tier 1 and 2. This type of instruction is more explicit and in depth, and it can either be provided to individual students or small group.
The tutoring sessions are most similar to Tier 2 because it is a small group of students who are assessed and worked with over a period of time. RTI was incorporated into the tutoring process through weekly responses in which I reflected on the students’ learning, my learning and the effectiveness of the plan. These responses allowed me to see how it is imperative to consistently assess and improve the students’ learning as well as my own teaching.

**Weekly Responses (RTI)**

**Week 3**

**Reflection on students’ learning.**

1. *Description of the learning among the children:* I believe that the approach I used in teaching greater than less than was a different perspective for the students because they all discussed how they learned with the alligator. The students seemed to understand how the greater than less than symbol worked. In the beginning of the lesson, I had the students use manipulatives to compare to each other so they could actually see how one shape was greater than the other rather than just using numbers. Creating the two rows of tick marks helped show the students how the greater than less than symbol can be created and understood in a different manner.

2. *Specific details of student learning.* The students demonstrated their learning through the practice activities. First I saw that they still have a good understanding of how to use the base ten blocks as they counted up the different amounts that I gave them and separated the blocks into ones, tens, and hundreds. Then the students ordered themselves from least to greatest. At first they struggled because they weren’t looking at everyone’s numbers, but I saw how they were able to readjust themselves by figuring out which numbers were greater and which numbers were least. Seeing this thinking process
enabled me to assess their knowledge. Learning also occurred when the students had to apply
their knowledge to real-life examples because they were thinking about how greater than or less
than would occur in their own lives.

3. How the intervention plan facilitated students’ learning.
I believe that the learning was facilitated by using different approaches to teach greater than or
less than. The students demonstrated that they understood greater than or less than in both a
crude and abstract way. This is important for the students to be able to do, because then you
know that they really understand the concept. I also believe that using manipulatives, visuals,
and real life examples enabled the students to utilize different techniques so they can better
understand their learning and the process that goes along with it.

Reflection on my learning.

1. Description of the learning that occurred for me.
I learned that it was important to allow the students to discuss during the lesson. I believe that it
was important for the students to talk as much or even more than me. This allowed me to be able
to understand how the students are thinking and also know if the students are engaged or not.
Another thing that I learned is that it is beneficial to continue to incorporate certain learning
strategies such as the base ten blocks. As the students continued to practice with the base ten
blocks, the better the understanding they will have the more comfortable they will feel using
them. I also learned that it is important to incorporate a variety of techniques so that the students
are learning in a variety of ways.

2. Specific details of my learning.
I saw the learning occur for myself as I observed the students and how they reacted to my
teaching. In the past few tutoring sessions, I have realized that each one is a learning experience
because you never know what the students are going to understand and how they are going to
react. During this session, I saw the importance of having the students discuss because as they would call out answers I would ask them why they thought that rather than just saying “good job” or “that’s correct” or “try again.” The students would then explain why or how they got their answer which allowed me to see their learning and thinking process. I also learned how it is important to be consistent in using manipulatives and a variety of techniques from seeing how much more the students used the base ten blocks. This made the blocks seem less foreign to them and allowed them to continue to practice using them.

3. How the intervention plan facilitated my learning.
I think that my learning was facilitated because the intervention plan was more student-centered. I did less talking and enabled the students to see how they can figure out things on their own. I also learned from just asking the students questions about what they know and what they would like to work on. This allowed me to learn more about the students’ strengths and weaknesses which will help me create the next intervention plan.

Reflection on the plan.

1. What worked? Why?
The things that did work was having the students continue to use manipulatives, creating more of a group discussion, and allowing the students to move around during the activity. Using the manipulatives allowed the students to continue to see the concepts in both a concrete and abstract way and also made them more comfortable using the manipulatives which might encourage them to use the manipulatives in class. Discussing the concept during the lesson allowed the students to take ownership of their learning and also made me be able to scaffold more with the students. Because the students moved around during one of the activities, they were able to get their energy out as they were creating a visual image of least to greatest.
2. **What did not work? Why?**
First, I think it was a bad idea to have the students work in the conference room because they got so excited to be in a new and different place that it was hard to keep them focused. I also think that it did not work to have all 6 children together again because it was hard for me to work with each individual student. However, this week I didn’t really have a choice because the students were off on Monday. Another thing that was hard to do was to get the students to create their own word problems. Most of the students just sat there and said that they couldn’t think of anything, or they created a problem that didn’t make any sense. As a result, I worked with the students and we created a problem together on the board. I also believe that having the students work in partners during the game is not working because the students are very particular about their partner and they complain if they have to be partners with somebody that they don’t want to work with. This prevents them from staying on task and not put very much into the game they are playing.

3. **What would have made it work even better? Why?**
I believe that the intervention plan would have worked better if the students were split up into 2 groups of three. This way I could work with the students on a more one-on-one level so I can better understand their learning. Next time I will take one group of students on Monday and another group of students on Tuesday. Another way I could have improved my tutoring session was by having the students continue the activities or the game the following week rather than trying to get everything in during one session. I felt like this session was rushed and I want the students to have enough time during each activity to really grasp the concept. One last thing that would have made it even better would be to have the game a whole-group game rather than a partner game so that the students wouldn’t complain and instead really focus on what they are learning and how they are applying their knowledge.
Week 6

Reflection on students’ learning.

1. Description of the students’ learning.
This week we finished up the intervention plan from the previous week which continued to focus on double digit subtraction. The students completed a worksheet and played a BINGO game. The students were very excited to play the BINGO game which seemed to make them put extra effort onto their work. They are continuing to become more proficient in subtraction with regrouping because they are applying their knowledge to the games and math problems. The students are also continuing to use their manipulatives as aides which shows that they really are beneficial for them.

2. Specific details of students’ learning.
I could tell that learning occurred by observing the students work on their problems. They were showing improvement by answering most of the problems correctly and also by showing how they know how to work through problems. They verbalized their understanding and also showed their work on their paper. I think it was also important that the students continued to use the base ten blocks. This indicates that they feel comfortable having stuff in their hands and also that they better comprehend the concept. Although they did not use the base ten blocks during the BINGO, I thought it was also important that they were able to complete the problems without the blocks. Because I know that they understand the concept, I believe it is ok that they do not use the blocks every time.

3. How the intervention plan facilitated this learning.
I believe the intervention plan enabled the students to apply their knowledge in a fun and engaging way. All of the students loved played BINGO which was both an encouragement for them to do their work and also a way for me to further assess their understanding. I also thought
having them complete a worksheet with subtraction problems with regrouping that also included word problems was helpful because it allowed the students to practice questions that they could see in the future on standardized tests.

**Reflection on my learning.**

1. *Description of the learning that occurred for myself.*
I learned that it is important to make sure that every student is on track. During the BINGO game I decided to work with one of the students individually because I knew that the two other students were able to do the problems. This student needs extra help so I took the opportunity to scaffold with him as he played the BINGO game. I saw that this was beneficial because he got more done than he usually does during the tutoring sessions. After this experience I understand that it is important to take every opportunity to help the children and scaffold with them as much as you can. Seeing the students so excited about the BINGO game also showed me that you should incorporate fun and enjoyable activities for the children to do so they become more engaged and are able to better apply their knowledge.

2. *Specific details of my learning.*
I knew that learning occurred when I was scaffolding with the students and observing them play the game and completing the worksheet. Not only did the students show their comprehension, but they also felt a sense of accomplishment when they completed their work. This taught me how important it is to make sure your students not only understand the concept but that they are also proud of themselves. If a student does have the drive or confidence then they will perform to the best of their ability.

3. *How the intervention plan facilitated my learning.*
I think that I had more time during the intervention plan to work with the students individually which enabled me to learn more about the students’ learning. This also let me assess the students
more because they were completing individualized activities where they had to apply their own knowledge. Having evidence of this is important when you are trying to figure out where the students are in their learning. Another aspect of the intervention plan that was helpful was the fact that we were continuing the previous lesson. This allowed me to see what all the students remembered and it also gave the students more time to talk and complete their activities. In other words, the plan was centered more around the students.

**Reflection on the plan.**

1. **What worked? Why?**

I believe both of the activities worked because it allowed the students to continue to practice subtraction and subtraction with regrouping. The worksheet had the students apply their knowledge and use their higher order thinking skills to figure out word problems. Although they struggled more with the word problems, I believe this was important for me to be aware of so that I know what else the students need to work on. The students also continued to practice using the base 10 blocks as they completed the worksheet. Another successful part of the BINGO game was also successful because the students.

2. **What did not work? Why?**

I think it was difficult to get the students to do the worksheet at the very beginning. They are not used to coming in and having to get straight to work. I think I should have started off with another orientation or opening activity to get the students more engaged and also to help recap what we learned the previous week. One thing about the BINGO game that did not work very well was the fact that I didn’t have a prize or something for the winner. The students seemed to have expected it so they were pretty disappointed when they didn’t get anything.

3. **What would have made it work even better? Why?**
I believe it would have worked better if I would have incorporated a sort of “warm-up” at the beginning to get the students thinking and to activate their prior knowledge from the previous session. Another thing that would have improved the plan would be to have the students play a game where they had to interact more. This would allow me to see how the students communicate and voice their understanding and it would also allow the students to learn from one another.

Summary

Although the pretest and post-test served as formal assessments, I believe that the tutoring sessions formative assessments allowed me to get a more accurate perspective of the students’ success because I was able to work with the each student individually and also because I reflected on each session. These reflections taught me that RTI is a very important and helpful tool that I believe all teachers should implement in their classroom because it allows you to analyze the students’ learning as well as assess your own teaching strategies. Typing up responses and figuring out what worked and what didn’t work helped me to improve my sessions each week.

Learning From the Process of RTI

Implementing RTI throughout the tutoring process was extremely beneficial and also had a positive impact on the overall process. It is a common misunderstanding that RTI is only used for students who have learning disabilities, but L. Douglass and A. Horstman says “many researchers affirm that there is evidence to support RTI as a means of monitoring the progress of students with or without disabilities” (Douglass, L., & Horstman, A., 2011, pg. 24). Determining which strategies were the most effective and how the students responded to them helped me with
the RTI part of the tutoring project. I constantly made changes to my lesson so the students would be able to grasp the concepts better. I even was able to think on my feet and create modifications during the sessions. I believe that every teacher should incorporate RTI into their classroom based on the 3 tiers. This will help improve the learning of all students.

I noticed that most of the students that I tutored had the most difficulty with word problems. They might have been able to do the mathematical procedures just fine, but when they had to start applying it to different scenarios it seemed to get really confusing for them. I believe that there are two reasons for this. One, because they don’t know where to begin when they are answering a word problem, and two, because they haven’t had enough practice. In order to help the students effectively practice answering word problems, I believe that the teacher has to model the process and break it up into steps rather than long explanations. The article, *The Problem with Word Problems*, says that “Turning these lists into simple graphic organizers allows students to approach problems in a step-by-step fashion” (Forsten, C., 2004, pg. 23).

Throughout the tutoring sessions, the information was organized through the Mastery Model. The Mastery Model incorporates different types of instruction and practice in order to make the learning successful. It is essential for the students to understand why they are taking these steps and how each step affects the solution so they can apply it to everyday situations and incorporate their mathematical thinking. I also believe that this will continue to help student and teacher to assess and understand their ongoing learning and thinking.

The main focus that the article, *Using Manipulatives to Teach Elementary Mathematics*, is trying to point out is that, “educational research indicated that the most valuable learning occurs when students actively construct their own mathematical understanding, which is often accomplished through the use of manipulatives” (Boggan M, Harper S, Whitmire A, 2010, pg.
2). Other benefits of using manipulatives that the articles pointed out include improvement of students’ short-term and long-term memory of math as well and opportunity to reflect on one’s accomplishments and the prevention of math anxiety.

The theorist, James Zull conducted a lot of research on the brain (2002). He discusses the central nervous system and the complicated process of how the neurons react to certain experiences and behaviors. This reaction enables the students to better understand and retain information. This shows the importance of limiting anxiety by creating new dendrites in order to build a bridge between fear and pleasure. “Research also indicates that using manipulatives is especially useful for teaching low achievers, students with learning disabilities, and English language learners” (Boggan, M., Harper, S., & Whitmire, A., 2010, pg. 5). In today’s time it seems almost crucial to implement manipulatives in the classroom because the students’ learning and background are so diverse.

One problem that might occur with manipulatives is when they are being used without being internalized. The student might enjoy using the manipulative and seem more engaged, but that doesn’t necessarily mean that he/she understanding the concept. The article, *Examining the Role of Manipulatives and Metacognition on Engagement, Learning, and Transfer* stated, “We hypothesize that it is not only the content of the learning materials (concrete versus abstract) but also how those materials are used that is critical to learning complex cognitive skills such as those taught in mathematics and science” (Belenky, D. M., & Nokes, T. J., 2009, pg. 103).

Throughout this article I learned the importance of not only incorporating hands on activities with students, but also to make sure the students are thinking metacognitively as they learn. After working with a group of students, the article concluded that their “research suggests that pairing concrete materials with metacognitive prompts should facilitate procedural fluency as well as
conceptual understanding and transfer” (pg 108). I believe that the students have to make the connection to what they are learning and how it relates their prior knowledge. In order to facilitate this connection the students must be provided with these opportunities.

The basic goal of the tutoring sessions was clearly to determine what the students know or didn’t know and then to help them with their understanding. I used manipulatives, RTI, the Mastery Model and different assessments to determine the students’ comprehension, but what helped me the most was simply just feedback from the students. I know that the techniques I use to help teach the students do have an effect on how they learn the concepts, but the most crucial part of the learning process is to make sure that the students have utilized their mathematical thinking to help them realize how they figured out a problem. “It is important for students to be able to demonstrate their mathematical thinking as well as their method of solving a problem” (Kostos, K., & Shin, E., 2010, pg. 223). These words come from the article, Using Math Journals to Enhance Second Graders’ Communication of Mathematical Thinking which discusses an action research study involving math journals. The journalist’s process of working with the students and using manipulatives seems very similar to my tutoring project, but her approach also included documentation of the students’ mathematical thinking. This is extremely important because it helps the students show how their mathematical thinking as they solve a problem rather than just memorizing the method they use to solve a problem. If students just memorize ways to figure out the answer, then they will not truly understand why they used that method and how it relates to the overall math concept.

When teaching the students about subtraction with regrouping, it was a difficult concept for them to grasp. This is why I did not simply tell them to cross out the 6 and make it a 5 and then put the number one in front of the 2. Instead, each student would have something in their
hands, in this case base 10 blocks, and we would use the units, rods, and flats to demonstrate how 10 units in the ones place can be regrouped into a rod that moves to the tens place. Some might be able to memorize this method and determine the correct answers, but it will not help them think mathematically. If children are not thinking mathematically then they will continue to have difficulty with math concepts that are even more abstract.

**Personal Reflection**

During each tutoring session I would come across a challenge and try to overcome it or I would be working on a challenge that I noticed from the previous sessions. Some of the situations I went through would be seen as more challenging because it was something that I could not control such as only having a limited amount of time to tutor the students. In this situation, I thought about what was best for the student rather than focusing on finishing the intervention plan. If the students did not complete everything I had planned for them I would make sure to continue the lesson during the next session. I believe that it’s more important for the students to really understand the concept and be able to show the teacher their understanding rather than showing the teacher that they can rush through an activity. I observed some of the students taking their time to really apply their knowledge and understanding when they used their base ten blocks to determine the answer and even to check their answer. This showed me that the students have really taken ownership of their learning.

Although some of the tutoring sessions didn’t go exactly as plans, it gave me the opportunity to figure out how to make the next tutoring session better. I view these types of experiences as changes that I made in order to improve the students learning rather than challenges. During the first tutoring session, I had all six students attend at the same time. I decided to change it to two sessions of three students for the next time because of the results.
from the first tutoring session. There were just too many students that they were getting distracting and I wasn’t given the opportunity to work with each student individually. I also noticed that the students were on different levels both academically and behavior-wise. One of the students I worked with had a very difficult time listening and making the right choices. Although this was frustrating and disrupting to the other students, I did not give up on him. During the next tutoring sessions I worked with him rather than for him and saw his thought process and where he was getting confused. In order to help break down the concept and look at it in a more comprehensible way, I had him work with the base ten blocks and use them to complete each problem. I believe that this really did work because he would always ask for the base ten blocks during the rest of the sessions. Although this might not have solved all of his problems, I still think it was beneficial because I enabled him to stay on the right track rather than falling behind even more.

After experiencing the tutoring sessions and the challenges that went along with them, I learned that it is important to help the students take ownership of the learning. I witnessed the students take charge by following directions, staying on task, asking questions, and even helping out their peers. The students shouldn’t come in to the tutoring sessions thinking that they are there to just get lectured or play pointless game; they should realize that they are receiving help that will allow them to be able to do the math problems or figure out the concepts on their own. Tutoring also isn’t just there for the teacher to tell you the answers or make the information any easier. As a tutor, I made sure to have the same expectations I would with any other student. I just approached the content in a different way and provided the students with more one-on-one time so I could really see their thinking process. This enabled me to determine both their strengths and weaknesses so I could work with both.
I have also learned about how essential it is to include different strategies and techniques during the tutoring sessions. Using the mastery model enabled me to make sure that all of the students were provided with hands-on and engaging activities that helped the students better understand the math concepts. During these activities the students also interacted with each other and worked with base ten blocks which allowed the students to see the abstract material in a more concrete way. Overall, this model taught me that it is important to structure learning environments in this way whether it’s a small group tutoring session or a large group classroom setting. The mastery model also helped me create a more authentic and organized RTI that meets each student’s needs. Another positive experience that I gained from the tutoring project is just learning how to communicate with the students on a more personal level. When you are teaching an entire classroom, it is difficult to make sure that everyone understands the concept and is on track. The tutoring sessions helped me practice this and also helped prepare me for working with individual students in a classroom setting.

I have learned that it is crucial to provide the students with opportunities to activate prior knowledge and connect their learning to real life situations because it will help the students see how math can be applied every day. If I asked a student what 22-12 is then most likely they would be able to find the correct answer, but if I gave them a word problem where they have to figure out that you have to subtract to get the right answer, most students seem to get confused. I noticed this throughout the tutoring process, and it reminded me of what I should NOT do. Some teachers have the students remember certain words that could help them figure out if they should add or subtract such as sum, difference, how many more, etc. However, having the students memorize these words will not help their mathematic thinking where they really understand why they are adding or subtracting. This is why I always made sure that the student’s would use
manipulatives when they were trying to determine an answer to a word problem. It was also helpful to have them act out the scenario so they could make a better connection. Not only would I have the students act out the scenario, use the manipulatives, and find the answer, but I would have them tell me why they added or subtracted. Overall this method seemed to help the students reflect on their own thinking and to practice using their mathematical thinking rather than memorization.

Overall, the tutoring project was very rewarding because it allowed me to gain experience working with and assessing diverse learners. Having the opportunity of working with the students also showed me the different perspectives the students had of the concepts. As a tutor and pre-service teacher I believe that it was my duty to help the students believe in themselves by showing them that they have the capability of learning and understanding math.

**Recommendations**

During each tutoring session I discovered new things about myself and the students. I enjoyed the fact that it was a learning experiences in both situations and that I was able to reflect on myself as a tutor and a pre-service teacher. Although each session was not perfect and did not go exactly the way I planned, it gave me the opportunity to think on my feet and implement modifications that would best meet the needs of the students. Overall I believe that this is a very important skill to develop because I will experience situations such as the tutoring sessions when I have a classroom of my own.

In order to help a student solve a problem, a teacher can’t simply just demonstrate their mathematical thinking; they have to make sure the students provide evidence of their mathematical thinking as well. Using math journals could be beneficial for future tutoring
projects or even for math lesson in the classroom. Not only will math journals allow the student to reflect on their understanding, but it will also allow teachers to determine this understanding and reflect on how their students were able better understand a certain concept. I would consider the weekly responses as a sort of journal I kept up with throughout the process. These reflections helped me immensely throughout the process; therefore I would assume that the students would benefit from writing responses each week as well.

My final recommendation is to provide each student with a type of survey that asks them questions about their overall experience. I wish I would have done this because their responses could help me to better reflect on my experience. I could also have had the students fill out a type of survey after each session, because although I would ask them if the activities were helpful, I might get a more honest response on paper. Also I think it would have beneficial to have had tutoring sessions with each student individually either at the beginning or the end of the tutoring project. This would have given me a better understanding of the students’ prior knowledge or their personal growth. As for the future tutoring projects, I would recommend that more time is given to work with the students and maybe that we were given a smaller amount of students to work with. I believe that this would enable tutors to get to know the students better so that the intervention plans are more effective and geared toward each individual.
References


