Becoming a Teacher of Mathematics to Elementary Students

By Wynona Walker

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As a future teacher, I would like to say that my experience with every content subject has been a beautiful and uplifting one. Truth be told, that is just not the case. From elementary school to high school and from high school to college, Math and I have been on an ongoing battle with one another. In fact, Math was winning considerably, until I completed my first semester in Professional Development School at the University of North Texas in the fall of 2011. A new and glorious change occurred in me that semester that changed my entire outlook on Math and me as a teacher of mathematics to young children.

What follows is an autoethnographic study of my transformation. “Autoethnography is a qualitative research method that utilizes data about self and its context to gain an understanding of the connectivity between self and others within the same context.” (Ngunjiri, 2010, p. 2). With this in mind, I used an analytical approach to examine where in the sixteen-week semester change occurred, and the evidence that supported the change. Sarah Wall, states that “initial engagement with a research topic occurs with the discovery of an intense interest, a passionate concern that is not only personally meaningful but has broader social implications” (2006, p.4). Math was my passionate concern. Professional Development School allowed me to immerse myself into math. Immersion involved me focusing and concentrating completely on Math and learning how to effectively teach it. Every week in that semester, I had to write a narrative response to a prompt from my professor in regards to experiences that I had as pre-service teacher in the classroom, field, and/or mathematics class. I used these narratives, artwork, and tables of documentation as my data for this autoethnography. I have reviewed the data and found where my transformation occurred in the sixteen weeks, as well as what influenced the change. This is my lived experience, a journey into a familiar land, where I gained a new perspective from having been on that journey.
Going into my senior year of college and my very first semester of Professional Development School, I was terrified. So many rumors had buzzed in my ear about the amount of work I was in for and it included a tremendous amount of Math. I prayed and prayed it was not true. On the very first Tuesday of my Math Methods course my prayers were squashed and thrown into the trashcan with these words, “You will be tutoring elementary students in Math during your second rotation of PDS 1” and “You will create a Math game that actual students will play.” Instantly my mind was in a state of panic. “How in the world am I, someone who is absolutely terrible at Math, going to pull this off?” By the end of the semester I would pull both of these things off and come out a changed person.

The very first assignment, in the first week of the semester, I was required to do in my Math Methods course was to find a piece of art work that resembled me as a math learner at that point in time. I chose a piece called “Murnau-Garden II” by Wassily Kandinsky.
This piece of art has an abstract, floral feeling to it, where all the colors collide and blend together. Although a beautiful and colorful piece, it left me confused and made me feel somewhat lost. I related this to my Math learning because the way the colors ran together reminded me of my inability to remember terms, types of math, or ways to solve mathematical problems. The painting was blurry in its abstractness and related to my forgetfulness when it came to Math. It was a subject I hated and could never conquer, so remembering or even trying to remember anything about it was never important to me before. With all these aspects of the painting, I strongly believed that it represented me as a Math learner. The earliest years of Math I could handle, like basics of addition, subtraction, multiplication, and division but anything beyond that I was lost. This first connection of my math learning to a piece of artwork helped me realize that I did not want to look at Math this way anymore. If I was going to be an effective teacher, I needed to gain passion for all subject areas. Little did I know that this small response was going to lead me on the first step toward a transformation on this journey.

The very first stop on my journey took me out of the university classroom and into the field. In three Denton ISD Elementary, Title I schools, I met and greeted hundreds of predominately Hispanic children and parents in what was known as Fiesta Math Night. These were nights full of math games that reflected cultures from Mexico, Central America, or South America based on trade relationships and economics. My pre-service teacher colleagues and I had to create a mathematics games that tied the economics/trade of a Latin American country to the U.S. I had to formulate my own game and make it completely culturally relevant to the country I chose. To describe my game simply, it dealt with identifying place value of culturally relevant imports and exports from El Salvador. The students spun a spinner two times and landed on either an import or export. They would draw two cards, read the facts on the cards,
complete the mathematics/economics tasks required, and then win a prize. It seemed easy to me but in reality, not so much.

On September 24, 2011, the first Fiesta Math Night, was the very first debut of my Math game, “Spin It”. This night was discouraging and a down right beating. Walking into the night I already had predetermined that my game was going to fail. That attitude made it easy for me to get flustered and anxious as students of all ages tried to play my game. When parents and teachers came over to the table where my game was I felt ashamed for them to see it. I went home nearly in tears because none of the students seemed to understand my game plus many of my game pieces failed to work properly, for example my spinner, which was one of the most important pieces. Throughout my reflection that week I wrote over and over about the need to fix my game to make it more enjoyable and playable by the children. There were two game nights left and I was determined to revise my game and make it work for every student next time. I needed those two nights too because they would turn out to be incredible confidence boosters.

As a second field assignment, which started in the fifth week of the semester, in the Professional Development School and my Math Methods course, I was required to tutor a group of elementary students in mathematics for about eight weeks. These tutoring sessions would be based on the response to intervention model (RTI). RTI helps identify students with learning disabilities by using “a problem-solving process that uses curriculum based measures to identify students whose level and rate of learning are below those of their peers” (Stickney, 2005, p. 1). Students who experience this model receive evidenced based instruction in the general education classroom that is modified to meet their needs. During the RTI process, “if the student's rate and level of learning increase, the student would not be considered for special education. If the student's rate and level do not improve, the student would be considered for special education
services or for a special education evaluation” (p.1). The outcome of my tutoring sessions would not completely determine if students needed to be referred to special education or not, but it would be a great source of data/information for the students’ teachers in the future if they just so happened to need it to help provide evidence of the students’ learning. These sessions helped me see a hands on example of the RTI process. Two out of the eight week tutoring sessions would be testing weeks (pre-tutoring and post-tutoring). This showed where the students were before intervention began and after intervention. My tutoring class consisted of students from three different third grade classrooms. There were a total of six students, three boys and three girls. Along with students, I was also given my very own room to work with them in. There were dry erase boards I could use, desks, paper, pencils, and many mathematics manipulatives.

First week, September 30, 2011 was the diagnostic testing that checked to see where my students were struggling the most. The scores ranged anywhere from 10% to 70% accuracy on a 100 point scale. None of the students made a perfect score. From the scores, each student appeared to be on different levels. Overall, they all appeared to struggle a great deal with place value, which affected their performances in addition and subtraction. This made me nervous, because I was not sure how I would meet all of their needs. After studying the overall results, I found that every student struggled in similar areas. From there, I looked at the specific Texas Essential Knowledge and Skills (TEKS) and saw where I needed to focus on the most and progress to as the tutoring sessions went on. In the university math methods course we learned to structure the diagnostics and how to read them to know what to tutor on first, second, etc. The very first week that I actually began tutoring my students was quite eventful. Like the first Fiesta Math Night I went in with a not so positive attitude. I just could not wrap the thought of me, someone who is absolutely horrible at Math and who could not even remember most of what
she learned as a student herself, was going to tutor elementary students. So can you guess how it went? Awful. Rushed, stressed, nauseous, and frustrated were all the feelings I took away from that first week of tutoring. I was angry and upset because I could not, for the life of me figure out what I was doing wrong. Changing only a few things I pressed on to the next week. Things went better, but I still did not feel like I was being an effective teacher.

When I went into my Methods course the following week I was miserable and unsure what I would teach my students the following weeks to come. Looking through my Math notes I realized “Hey! What we’re doing in Methods is exactly what my students need help with! Use it!” Dr. Tunks, my professor for Math was constantly shoving manipulatives into our hands for just about everything we did. It was fabulous! Never had I understood Math as well as I did in her class. We took Math concepts apart piece by piece and studied them by relating them to Real World things and using physical objects to bring the problems to life. From that day on, I knew what I had to do in tutoring. Relating the tutoring content to the real world and using manipulatives in every lesson would prove to be an effective strategy for the progression of my students later on. My reflective notes on my teaching and the students’ learning, October 21, 2011, shows that I had figured out that I needed to give them things to manipulate, had interacted with them more, supporting their learning, and began to feel more and more confident about helping students learn mathematics.

The second Fiesta Math Night, October 23, 2011, came shortly after my tutoring sessions began. After weeks and weeks of tearing apart my game and revising it, I truly believed I was ready for round two. I made so many worthwhile changes to my game. For instance, the spinner that would not cooperate at the first Math Night now was fully functional. Also, I changed the wording on the draw cards where every student could understand it or at least have it explained
to them more easily. Providing more choices seemed like a logical idea. Instead of just solving place value the students could now compare or add numbers. With all these changes how could the game not work? With that thought, I marched into that second school thinking, “Tonight will be a success!” And it was. The students seemed to understand the game much better. They loved having a choice. Several students even came up to me and said it was their favorite game of the whole night, which caused a huge boost to my confidence level. Parents even complimented me on my game and said it was great practice for all levels. The night ran a lot smoother than the first. I was not stressed out or overwhelmed, in fact I was enjoying every minute of the night. Hearing feedback from the parents and students warmed my heart and truly made me feel like I was heading in the right direction with this Math game. I was excited to see what the last Math night would have in store for me the following month.

One of the strongest Math transformations I had came on the very last day of tutoring, November 11, 2011. This was a day for the students to review everything we had learned by playing games related to the content we went over during each session. It was also a way to help them prepare for the post diagnostic test they would be administered the following week. During this week I learned a lot about the progress of my students. Having them play games that went all the way back to what we learned in the first few weeks worried me a great deal. But, my students surprised and shocked me at how well they did on all the games. I even adapted some of the games as we played them, asking the students extended questions that met different TEKS than the game originally did. This was to see if they could see the relationship between the concepts. That was something I would not nor could have done in the beginning. It was such a big indicator of my growth as a teacher. Witnessing my students dig out prior learning and knowledge to help them solve the problems and situations in the games was incredible. They
referenced past tutoring sessions as they were playing the games and made connections.

Students who in the beginning didn’t try to answer questions at all were raising their hands and participating. The success of this day for my students spilled over into the following week when they took their post diagnostic exam. Looking at the results, I was nearly put to tears. Every student had progressed. This chart from November 18, 2011 shows the progress of my students during the entire tutoring time frame, including the pre-diagnostic test, the six tutoring sessions, and the post-diagnostic.
Table 1. Tutoring data

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<th>Student</th>
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<th>Post-diag score</th>
<th>Overall gain</th>
<th>Concept(s) tutored</th>
<th>Concept(s) tested gain</th>
<th>Concept(s) tested loss</th>
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pv=place value, add=addition, sub=subtraction
The effects of this tutoring project went far beyond just the help the students got, their improvement and the results of the diagnostic testing. It was an unforgettable learning experience for my teaching career. I learned that using real world items and ideas is one of the most effective ways to teach math concepts. It was not only helpful for my students but for me as well to discover this. Middleton (1995) suggests, “when children are motivated intrinsically to perform an academic activity, they spend more time engaged in the activity, learn better, and enjoy the activity more than when they are motivated extrinsically” (p. 1). Research has also shown that when students can relate to the topic they are learning about they will perform better.

Students need to know why they are learning about a topic and how it relates to them. In relation to real world items using manipulatives is also important. Toni Battle sums it up best when he says, “manipulatives are the way to our future and the way to new knowledge. No matter where we turn or what we do, we as a society are using some form of manipulative in our lives” (2007, p.4). Children need to have these extra tools to help them master mathematics. For example, in my tutoring sessions I utilized base ten blocks and place value charts to help my students understand place value. This helped them see the physical value of the numbers they saw written on the white board in front of the classroom and their worksheets. Base ten blocks along with counters aided the students in physically constructing addition and subtraction problems as well. It is important that manipulatives are used to help increase students' academic achievement and my growth in mathematics helped me see this.

Also, teaching should always be about the success of the students and should never just be about the teacher. When I first started tutoring, I was not putting the students first. I was just worried about making it through the lesson. Once I realized what I was doing and stopped it, learning began. It is important to take note of what works and does not work when working with
your students so you can better meet their needs. The weekly postings forced me to do this, and as I analyze those reflections in this autoethnography, I am reminded of the importance of reflection for improved teaching. Another important learning growth I acquired was realizing that teachers need to familiarize themselves with the math concepts they are teaching and create a good relationship with those concepts no matter if they like the subject or not. According to research, “the mathematical knowledge of most adults is weak. We are simply failing to reach reasonable standards of mathematical proficiency with most of our students, and those students become the next generation of adults, some of them teachers” (Ball et. al, 2005, p.14). When teachers understand the concepts it is more likely that the students will understand them too. By working to understand the parts of Math, I ironically strengthened and redeveloped a positive relationship with it. Finally, I loved how my Math methods course was there for me to use as a resource. The comments from my teacher every week helped extend my realizations and helped me think in a different way. This opportunity was truly a blessing in disguise and a great learning experience.

Round three of Fiesta Math Night, November 17, 2011 was perfect. My confidence was up and I was excited to be in the presence of students and parents, eager to play Math games. Every student seemed to enjoy my game a lot. Each one played it more than once. In fact, I had several who played it at least four times in a row. I challenged them by adding more to what they originally had to do in the game. They loved it; I loved it. The game contestants were mostly children of teachers, which made for a great night as well. The confidence I acquired from previous game nights allowed me to go and grab students who were just standing around the cafeteria (I was nice to them of course). I allowed myself to carry on conversations with the students as they played too. Teachers even came up and talked to me about all the games and
expressed how great they looked. This made me feel appreciated and good about all of my hard work.

When I wrote up my reflection to Dr. Tunks, I explained the change that occurred through me after experiencing all three Math Nights. It was just so exciting for me. Her response was, “It is so exciting to read that your confidence level was so elevated, even to the point of collaring children to play your game. It is wonderful to see how you felt you had progressed across time and the differences your adjustments made each time you presented. This is marvelous indeed. It is the early energy that sees you through offering new ideas. Don't let your quietness keep you from taking a stand and offering ideas. You have a taste of success, at your own hands, so run with it.” These words brought me to the realization that I was no longer as afraid of math as I had been at the beginning of the semester. With tutoring a mini class of students and putting on game nights I had overcome that fear and proved to myself that I could learn and teach about Math.

By the end of the first semester in Professional Development School, Math and I had created a truce. We both waved the white flag of surrender and began a friendship. I started out the semester being terrified of the idea of learning Math again, and having to teach it. After experiencing the sixteen-week semester and having to do Fiesta Math night and tutoring sessions I developed a new love for Math. If you were to ask me a year ago if I would ever like Math I would have said, “Absolutely not! It’s the worse subject known to man and woman, for that matter.” The painting below, “Square Sierpenski Subdivision Variation #1” by Michael A. Coleman represents my learning and feelings about Math now.
In the bottom left corner is a blank square, which represents how my learning of Math started. Empty and blank, because I felt like I knew nothing. As the semester went on more shapes/concepts were added in, making a beautiful collection of shapes that join together to make other shapes. Dr. Tunks summed up my transformation best on her reply to my December 10, 2012 response, “It was as though I was glimpsing into the soul freed from pain and suffering and renewed by the love of seeing children learn. It is marvelous to read that the darkness you encountered at the beginning has been brightened by so much complex of light and embedded shapes.” Math will no longer put me to tears again.

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saying that we go through four different stages of learning, “We have a concrete experience, we develop reflective observation and connections, we generate abstract hypotheses, we then do active testing of those hypotheses, and therefore have a new Concrete experience, and a new Learning Cycle ensues” (A. Fernandez, personal communication, October 12, 2006). This means that we get information, create an understanding/meaning of that information, create new ideas from these meanings, and act on those ideas. That being said, Zull proposes that the pillars of learning are gathering, analyzing, creating, and acting. Being able to learn like this requires us to step out of our comfort zones and put forth a lot of effort.

Fiesta Math Night and Mathematics Tutoring were definitely two courses required, long-term events where I had to step outside of my comfort zone and work hard to improve my performance in each of them. It was a necessity in order to create a better relationship with Math. In order to really learn, an individual needs to be self motivated and driven. Being self-motivated and willing to try to improve was one of the biggest aides in my transformation. Zull continues, “To feel in control, to feel that one is making progress, is necessary for this Learning Cycle to self-perpetuate” (A. Fernandez, personal communication, October 12, 2006). He goes on to say that when we initially learn about something and develop fear against that learning it takes our brains a while before it will see it as anything less than frightening. Once we have a positive, real-life experience the negative experience becomes more overshadowed by that positive, real-life experience. In my case this holds true for me and Math.

My real life experiences involved me, math, children, parents, my colleagues, mentor teachers, and my math methods instructor. The negativity I felt toward math was surrounded by challenging, engaging, and motivating experiences that forced me to reconcile with the dreaded fear of my nemesis, math. I gained new information about how mathematics works in my
methods course, created an understanding through practice and reflective thought each week, created games, lessons, and acted on all of it week after week in the field. I was in control throughout, although a bit shaky initially, but by the end of the sixteen weeks, had transformed. “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. I was a lost explorer in the never-ending rough and jagged Math journey. Now that I have seen that I can effectively teach Math to learners and understand it myself, I know I can be an effective teacher of Math. I am thankful for Professional Development School, my professor, my students and most of all for Math. It gave me a second chance to love it.
References:


