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Math Anxiety

What can teachers do to help their students overcome the feeling?

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In partial fulfillment of the requirements of the Math in the Middle Institute Partnership
and the MAT degree.

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Abstract

In this action research study of my classroom of 7th and 8th grade mathematics, I investigated how math anxiety relates to the student work and behavior in the classroom, and how this can affect the student's overall relationship to mathematics. I discovered that the harder the work, the more math anxiety was displayed. The harder I pushed students to think more deeply, the fewer responses to my questions I received. I noticed a difference in the students' body language and overall behavior. As a result of this research, I plan to help my students try to overcome the feeling of math anxiety and try to teach them different methods to use when they are feeling anxious. The methods that I plan to use hopefully will help the students when they are feeling anxiety and help the students to understand the math being taught and how to apply the math they learn to everyday life.

The purpose of my action research project is to help students alleviate their math anxiety through different methods and to help them build up their confidence levels when working with math and how math anxiety can affect their learning. I am studying this because I have had math anxiety for years. I want to help the students I work with overcome math anxiety or lessen their anxiety for math. I want to show the students that they can do complex math and that using various methods to help them relax will lessen their anxiety for math. I also want to share this information with other math teachers. I want the teachers to know what signs to look for when students are feeling math anxious and to be aware that their own personal behavior has an affect on the students they teach.

This action research study gave me the opportunity to see what students go through on a daily basis when they are feeling math anxiety. I did this study in my own classroom where I have taught for nine years. I teach Special Education to 6th, 7th and 8th grade students. I am the only special education math teacher in my school for the students that qualify to be in special education. I am expected to follow the students' Individual Education Plans (IEP) as well as follow the curriculum and teach the Nebraska State Standards. I try to follow what the "regular" classroom math teachers are working on in their class. I try to stay with the teachers in the case a special education student should test out of my program. I follow and work out of the same math textbooks that the "regular" math teachers follow.

A typical day in class would consist of working on a multiplication warm up. After the warm up we then start the lesson for the day. I write down on the white board what I think will be useful for the students to do the lesson. We spend a good 20 minutes on warm ups and me teaching the students the lesson. After I have assigned the

homework, I will do about three to four examples from their assigned work. I have to do several examples to help my students get started. After we finish working out the examples, I then walk around to help the students with the work.

There were times during this study where I had to separate myself from being a teacher and then switch to the role of a researcher. When I first talked to my class about the research I was planning on doing, I told them that there would be times when I was not going to be “Mrs. Swanson.” When they started doing the journals I told them that they really needed to write what they were feeling, that I would not be mad. I told them to act like I was a research lady and not Mrs. Swanson. I wanted to make sure that I was going to get accurate information.

PROBLEM OF PRACTICE

The NCTM standards have three overarching principles that relate to my problem of practice. The first principle that applied to my study was Equity: which is high expectations and strong support for all students. This standard relates to my own classroom, because I have increased the expectations for my students. I would let my students just get by. I thought that if I did work that was too difficult that they would not be able to do the work. To my surprise my students have amazed me over and over. I also show my students strong support. I want to make sure that my students know that they can take a risk and I will be there to guide them along. Before Math in the Middle, I did not feel like I was able to give my students strong support. I now feel confident that I have the person knowledge and support to help in our math class.

The second principle that applied to my study was Curriculum: which is teaching, understanding what students know and need to learn, then challenging and supporting

them to learn it. All of my students' are on Individual Education Plan, I have to write each plan, so I know what each of my students' needs and limitation are. I also have started challenging the students more. Before Math in the Middle I never pushed my students out of their "comfort zone." I am teaching my students concept that I have never taught before, because I always thought it would be too difficult for them. I now look for work that is more difficult and expect them to be taken out of their "comfort zones."

The third principal was Learning: where students must learn with understanding, actively building new knowledge from experience and prior knowledge. Once, again before Math in the Middle I never really expected my students to fully "understand" the concepts I was teaching. I had in my head that these students were in Special Education for a reason. I no longer have this preconceived notion in my head. I know the work is going to be difficult for my students, but now I find different ways to show what I am teaching or try and explain the concept so that they will understand what I am teaching them. Since I have expected more from my students, I now expect them to pull some previous knowledge from work we have done before. Some of my students do have difficulty with their long-term memory, however they can recall bits and pieces. I will take the bits and pieces; it is better that nothing at all. I have learned that my student can do more that I think they can.

The NCTM has process standards that related to my study. NCTM states that Connections are: recognizing and using connections among mathematical ideas, understanding how mathematical ideas interconnect and build on one another to produce a coherent whole; or, recognizing and applying mathematics in contexts outside of the mathematics. These connections related to my study because I myself have had to use the

connections that I have learned from Math in the Middle and transfer my knowledge into my classroom. The better understanding I have of the math I teach, the better connection I can make with my students. I also recall information from previous lesson that I have taught to show to my students' how math needs to build on from one concept to the next.

By looking how math builds on from each concept, how they connect to each other made my lesson more challenging for my students. The students I work with never think that the math we learned in the fall has anything to do with the math we learned in the spring. I am their only math teacher for three years, so I have the advantage of knowing what we have learned and what we have not learned. Making connections from previous work is easier for me to help my students' recall the information that we need for that particular lesson.

For my study I had to do something that I never have done in my teaching career of nine years. I had to look at the current state of my classroom. I found that my classroom was not where I would have liked it to be. It has come along way though compared to where it was from previous years. I tried to observe my students and see what was causing them the math anxiety. I observed my students acting up, shutting down, not paying attention or just doing something totally different. My students would not follow my teaching like I would have liked them to. I often noticed that the harder the math was, the less effort my students gave me. I also saw my students not trying to grasp what I am teaching or even act interested in the assignments. I often wondered during my observation if this is happening because I am not making the math interesting. I also wondered if they had hit the wall and there was no more information being processed in

their brains. After looking back at my study I wondered if it was stubbornness, unwillingness, or flat out, I don't care attitude?

In my ideal classroom, I see students wanting to try to do the work. I also see myself as a more efficient teacher with meeting the needs of my students' because my knowledge of math is better. I want to be able to teach my student to the best of my ability and to help them in any way. I want to know my material inside and out. I want to be able to explain the math I am teaching in different ways, if they don't understand the first two ways. I would like to help my students get over their math anxiety, build up their confidence levels and just have them try. I want my students to at least try before they become frustrated or overwhelmed. I also want to raise the bar for my students. My special education students are not used to someone pushing him or her a little further. I want them to experience success and to see that they can do the work as long as they TRY and don't become frustrated and just give up!

Looking at what I want in my classroom and what I have, there is a big mismatch! I have to remember that I teach Special Education students. I can't expect them to soak everything in that I teach, but I would at least like them to try. Since I started the program I have pushed my students to new levels. I sometimes become frustrated with them, because they don't seem to care or want to try. I need to remember that maybe they have hit the wall in their brain. Maybe they are giving me a 100% of what they can give me. So many of the students that I work with have little to low reasoning skills and they just can't get those multi step problems. I do; however, want to keep pushing them a little to make them think more and to try more. I need to keep my ideal classroom and real classroom in check!

The purpose of my study was to help students alleviate their math anxiety through different methods and to help them build up their confidence levels when working with math. I interviewed my students and had hoped to find what they thought hindered them when working with math. I also wanted to know what they thought I could do as a teacher to help them understand the math lessons better. I collected data from my classroom. I saw a few students that struggled or put up that wall. I saw myself in a few students that I want to help so badly! I don't want them to think of math as a four-letter word. I knew some students would struggle more than others, but math doesn't have to be a feared subject. My main concern with this project was to try to weed out what behaviors were related to math anxiety, or was it their learning disability in the area of mathematics. I hoped to help my students alleviate some of their math anxiety with the activities we did in the classroom. For instance we would take deep breaths, stand up and stretch or I would tell them that the test was a worksheet and not a test. I also told them to have confidence in themselves. I would give them a pep talk before the assignments or tests.

Literature Review

The first main idea I focused on was the attitude of the teacher and how reading can play a part in students' difficulty with math. Wright, (1996) discusses the teachers' attitude and reading difficulties, and how they play a part in math anxious students. She discussed how reading is associated with having a learning disability in mathematics. She stated that so many students feel so overwhelmed that they can't think clearly when they are working on math so they tend to be labeled as having a learning disability in math.

Due to the fact that students' feelings of anxiety come into play, they are labeled LD in Mathematics. There were several good points that Wright (1996) made about what

teachers can do to help the math anxious student. Four out of the five articles I read stated that teacher attitude played a part in math anxious students. Students with math difficulties are willing to take more risks if they feel that the teacher is there for them. Positive support from the teacher is crucial to the math anxious student. Wright also discussed that math anxious students are so uptight about their math, that they are not even aware that they do have some strengths in math. The teacher needs to find the students' strengths and build on what they know. Trying to create a higher confidence level in the student will help them relax and feel better about learning math.

The next main ideas I looked at were by Furner and Duffy (2002). While I was reading the article I thought I was in my own classroom. The authors stated that only about 7% of Americans have had a positive experience with math. The authors wondered why so little is being done if so many people have a fear or loathe for math. According to the NCTM (2000), Equity is "high expectations and strong support for all students." This also includes our students with disabilities or the math anxious. The authors remind us that we need to make accommodations to help everyone learn math. Like the previous article, this article also states that having a supportive and positive teacher can make a world of difference. Journaling was another main point that the authors included in the article. They thought that journaling was an effective way to let the student express what they were feeling while working out a problem. They also thought that this would give the students an opportunity to just write down their feelings about math in general. The article also gave several methods/recommendations on how to prevent math anxiety. Some of the recommendations are: accommodate for different learning styles, characterize math as a human endeavor, let students have some input into their own

evaluations and use cooperative groups. I think one of the best comments the authors wrote was, “If teachers employ best practices for teaching mathematics, students’ anxiety is lessened.” (Furner & Duffy, 2002 p.2)

The third main idea I focused on was feeling displayed by students. Perina (2002) discusses the feelings that math anxious students experience such as, a paralyzed feeling towards numbers or a sense of panic when given a math test or test in general. Perina’s main point again was teacher attitude and willingness to help the struggling student. She stated that more students were afraid to ask for help if they felt that the teacher was giving off a negative feeling towards helping the student. Most of the articles correlated the way a teacher teaches and how their attitude affects their students.

Furner and Berman (2002) had as a main focus ways to prevent and reduce math anxiety. A great point that they made is that teachers need to get an understanding of what their students are going through in math by journaling and talking with their students. The article also states that Marzano’s Dimensions of Learning Model (1992) is based on that students must have a good attitude and perception toward learning before real learning can occur. If a student feels good about learning as a person then learning math will be less challenging for them. If the student understands the math concepts then he or she is more likely to truly understand the concepts and develop confidence when learning math.

Funer and Berman (2002) also listed accommodations for teachers to use to help prevent or reduce math anxiety. An interesting point the article addressed was that of teachers overcoming their own math anxieties. If the teacher shows less math anxiety then their students will be less math anxious. Along with positive teacher support,

positive parent involvement also plays an important role as well. Only two of my articles discussed parent involvement, but for my study I want to see how many of my students' parents are involved. The more parents are involved the better the success rate of the student. I have several parents that come visit me on a regular basis to check on how their child is doing in school. I also send out progress reports every two weeks to keep parents informed of their child's progress.

The fourth main idea was by Salinas (2004). Salinas also states the importance of journal writing in math. She states that journal writing can help the students clarify their thinking and develop a deeper understanding of what they are working on. If the students have to write down the process of what they are working on, this will help them see the work and hopefully give them a better or new understanding of what they are working on. By having the students write down what they were feeling or what was hard or easy for them, it gave the teacher and student a better understanding for each other. The author stated in her article that by doing journaling, the students felt motivated, began to evaluate themselves as learners and do better because they were able to express their feelings. Salinas gives an example of one student's journal entry. The student writes: "Actually at this moment I am feeling a little nervous because we are about to dive head first into the "real math" stuff. That is a little scary...Okay, here we go!" SPLASH! (p. 4) I am finding out that by the students being able to journal, it gives them the opportunity to reduce their math anxiety.

I hoped my own study would help to reduce my own math anxiety and helped me increase my students' confidence levels. After reading the articles I did not realize that math anxiety affects so many people. Initially, I was going to keep a journal on how the

students are did and how I thought the lesson or class went. However, after reading the articles I decided to have the students keep a journal and write in it two or three times a week as well. I hoped this would help reduce the students' anxiety and give them a sense of comfort. I also thought reading the students' journal would give me a better sense of my teaching and what I need to change. I think my study will contribute to the existing published research, because I did not come across too many articles that dealt with special education students. My whole study dealt with students that struggle with learning or those with behavioral issues. On top of their disabilities they have to cope with the feelings of math anxiety as well. I also want to share my study with the other math teachers in my building. I want them to know how much their own attitude affects the students. Since, I too, have math anxiety, I think I can relate better to the students and together we can work on ways to prevent or reduce math anxiety. I can let them see that my anxiety level is a lot lower now and that I hope to be rid of it one day soon.

PURPOSE STATEMENT

The purpose of my study was to help students alleviate their math anxiety through different methods and to help them build up their confidence levels when working with math and how math anxiety can affect their learning. Data collection took place during the spring semester, 2006 in the researcher's classroom. My study attempted to answer these research questions: How do students show math anxiety? How does math anxiety develop in students'? What can the teacher(s) do to help reduce math anxiety?

Methods

The questions that I used for my timeline helped me collect my data and answer the questions that I was studying. The first question I studied was, how do students show

math anxiety? To answer this question I kept a personal journal on the students' behavior and kept note of the students' body language. As a whole group we wrote in our journals every Wednesday before we would start our work or after an assignment. While the students would write in their journals I would write in mine as well. I did not follow any set questions in my own personal journal. I would write in my journal how a lesson went from the day before or if we wrote in them after a lesson I would write about how that lesson went on that particular day. There would be times when I would write positive comments about our lessons or there would be days when I was writing pages, because the lesson did not go well. So, my journal was a way for me to really let my frustrations out, give me time to collect my thoughts or it gave the opportunity to write down what went wrong in the lesson and what I needed to do to improve the lesson.

I also collected the students' work on Wednesday to see if I could find anything in the students' work that showed signs of math anxiety. Journaling was another method I used to help me answer this question. I had the students answer the same six questions every Wednesday. I was hoping that the students would give me some feedback that I needed to help me answer my question.

How does math anxiety develop in students was the next question I wanted to answer for my study. To try and answer this question I had the students keep a journal, interviewed three students and I had the students fill out a math survey. They filled out a survey at the beginning of February and again in May. The survey included some general questions about math.

For the journal I had the students answer the same six questions every Wednesday. I do not think I received the information I was hoping to obtain when the

students were writing in their journals. I wanted responses that showed me what the students were really feeling. I wanted to know what they were thinking, why was the math hard and if they felt like this when they were doing math. I tried to explain to the students what I was looking for in their journals; however, I did not get that information. For example one of my questions was, imagine your self doing or using math either in or out of school. What does it feel like? I was looking for what feeling they are experiences when they are at the grocery store or movies. I wanted to know if they were nervous about counting change or trying to see if they had enough money for an item. Instead I received, I can feel the sun on my face or I feel fine. I was hoping for math anxious feelings, however I did not receive that information too often. I would talk to the students to let them know what I was looking for, but they never quite got it.

The interviews gave me the opportunity to ask specific questions on what their feelings were on math. I also looked for specific answers to my main questions. My questions were, if a past teacher ever made them dislike math. Did the teacher treat them badly when they needed extra help? How they interpreted their own ability to do math was another question I looked for. I was able to see facial expressions when I asked the questions. I also watched the students' body language to see if their body language was telling me something that they were not telling me.

What can teachers do to help reduce math anxiety in their students? I do not think I really had this question answered. I interviewed two teachers and observed a teacher in her classroom. I did notice a teacher's frustration level rise when a specific student needed more explanation or kept asking questions. I also watched how I would react when a student or if my whole class did not understand what I was teaching.

I also kept a personal journal and wrote down what I was feeling when I was teaching and watched the students' behavior and body language. I often wrote in my journal after I taught a lesson or on Wednesday with the students'. I would often tell how the lesson went or what went on in classroom. There were several times when I was frustrated because the students did not understand the work or the students just gave up. I had a hard time trying to distinguish the difference between lack of trying and if the students' disability took them as far as they could go. I am still not sure if I taught to the best of my ability and no matter what I did the students' would not understand the work or if their disability in learning mathematics took a toll on them and they gave me the best work that they could.

ANALYSIS

How do students show math anxiety is the research question that I was able to see on a daily basis. When we would do work in math class that was not as difficult, the students would be willing to try. When we did work that was more difficult and challenging, the students became difficult. By being difficult I mean that the students would shut down, they would not answer my questions, or not pay attention, roll their eyes, say that the math was dumb, or stupid and they wouldn't do the work. In the past weeks that I have been watching and listening to my students, I think that the behaviors I listed are just a few of the behaviors that a student can show when their math anxiety comes into play.

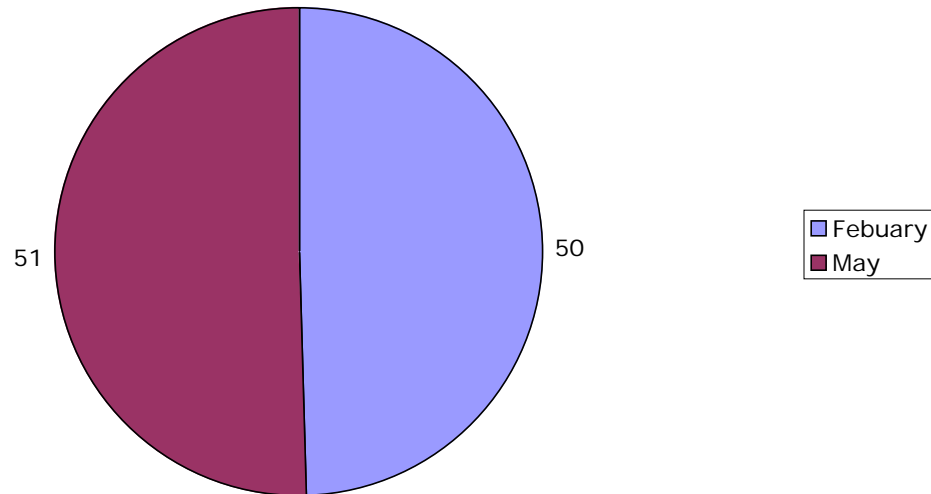
My personal journal was a good way for me to write down what I saw every day. Here are some of the behaviors I saw: a look of "oh no!" A male boy would touch the front of his hair, pat it down, heave big heavy sighs, breathing heavy, hand on forehead, a

mad look, confused look, a look of “help me!” Comments that I heard and wrote down included the following: “this is stupid!” “I don’t know how to do this!” “I can’t do this!” “Why do we have to do this!” “I am not going to do this work.” “I don’t want to do this!” “I hate this!”

All of this behavior came out when the students had multi step work that was more difficult to complete. What I see happening from my data is that the harder the work is the more negative the comments and behaviors that are demonstrated. The journals that the students kept also showed signs of math anxiety. One question that they had to answer was describe how you feel in a math class. Some of the responses were: I feel confused and lost, I feel like I am in a black hole, frustrated, mad, like a puzzle trying to put pieces together, I feel nervous, I sometimes feel embarrassed, I wish I knew how to do this, and Why can’t I do this. Looking over all the journals I had the students do a total of 90 journals as a whole class. Each student wrote approximately eight journals each. I have a total of 17 students in my 7th and 8th grade math class. Out of 17 students I had six students say that math was fairly easy for them. Two of the students were boys and the other four were girls. I had one student who was an outlier. She has made tremendous progress over the last three years. I would have placed her in the category as math being easy for her; however, she did not place herself in that category.

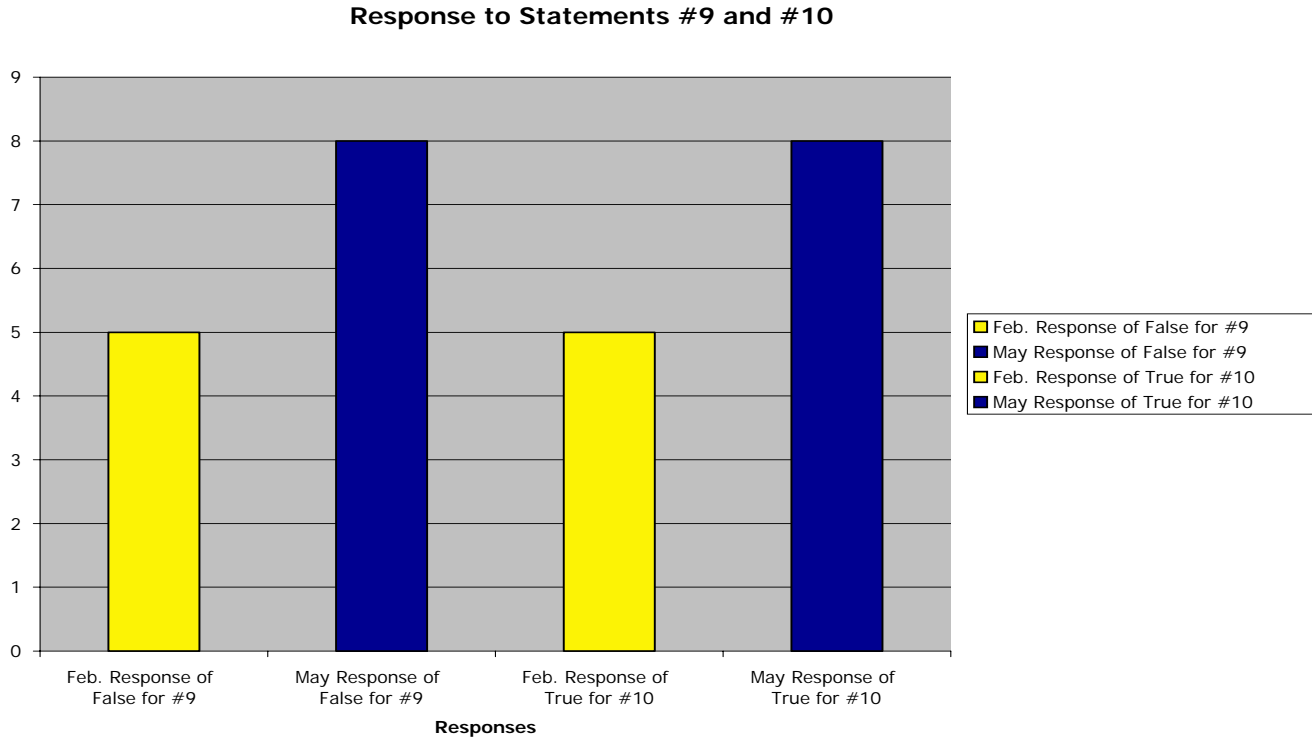
Looking at my data all my class at as a whole had a 1% increase in positive behavior from the beginning of the study in February 2006 to the end in May 2006.

Mathitude Survey



I wanted to see if from the students' journals or mathitude survey, if there was any improvement. The following graph shows that the students' attitude in math has improved from the beginning of the study in February 2006 to May 2006. I focused on two questions to see if there were any improvements in the students' math attitude. From the students' mathitude survey question nine was: Math stresses me out: True or False. Explain. Question ten from the survey was; I am a good math problem solver: True or False. Explain if you can. My graph does show that there was a positive change in the students' attitudes toward mathematics. At the beginning of the study I had five students says no that math did not stress them out. Then at the end of the study in May I had eight students that said that math did not stress them out. I had a positive increase. I had three students' behavior change for the better. For question ten at the beginning of the study I had five students' who thought they were good problem solver. In May I had eight

students say they were good problem solvers. I once again had a positive increase of three students who changed their attitude about mathematics.



My data has also showed that the more difficult the work, the lower the grades. The class averages for two difficult assignments were 58% and 54%. The class average with a 58% was when we did equivalent fraction, decimals and percents. The average of 54% was when we worked on place value and estimation. One packet was too difficult that I did not even take a grade. The scores ranged from a 90% to a 60%. Most of the scores were in the range of 60%.

What I think will happen when the students show math anxiety is less work will be produced and less accuracy will show up in their daily work. When I look at the students work, I see that less work is being done. I feel that they do not want to try and

just give up. I see that when I am teaching, if they do not get it, they just do not pay attention at all! I often wonder if my students think that this is too hard, that they will never get it, so why try? I have asked myself that exact same question. Math with multi-step problems is difficult for my students' and I have wondered, will they ever understand the concept? How do you draw that fine line of wondering if the students are not trying at all or they just really don't understand the work and never will?

I interviewed four students and asked them five questions. I interviewed the four students in April of 2006. The time that worked out best for the students was while they were in study hall. I took the students into my classroom where the student and I would have a quiet place to do the interview. One question was have you ever had a really bad experience with math? I was looking for yes, a teacher in elementary school made me dislike math. However, I did not get that answer. The students said no, that they liked math and it was "fairly" easy for them. Sure, some of the work is not as hard for them, but I don't think math will ever be "easy" for them. If math were easy for them, then they would not be in resource math. The data that I collected from the students did not show me that a bad experience with a teacher made them have math anxiety. Out of my 17 students, not one student said they had a bad experience with a math teacher. Their journals did not show any signs of how they developed math anxiety.

After talking to two fifth grade teachers earlier in the year, I thought they would be good to interview. So, in the spring of April, 2006 I interviewed two fifth grade teachers. Teacher number one cannot remember for sure if math was really hard for her or if she had a bad experience. She said, "It's not that I didn't like math, I was just afraid to be wrong, in front of the class." She feels that she has a lot of math anxiety. She went

from being a kindergarten teacher to a fifth grade teacher. She was out of her comfort zone; no one helped her with the fifth grade math curriculum. She stated that you could only get so much from the teacher's manual. I asked her the following question: If Nebraska adopted new teacher certification requirements that required all teachers to take a comprehensive test, including a whole page of story problems, how would that make you feel? She said, "I would have a stroke and die." She said that she would rather die than have to take that test. I then asked her how she thought students developed math anxiety and she said that she thought it was a mindset. That if they think they are bad in math, then you just keep telling yourself, you end up having a difficult time with math.

I then interviewed teacher number two and asked her the same questions. Teacher number two had a horrible experience with math. She said, "My math experience was, horrific and terrible." She stated that her elementary math teacher did not want to teach math the way she should have. Her 6th grade math teacher did not teach the new concepts. From the 6th grade on math became very difficult for her. Then in her algebra class the teacher did not give her any real explanations. Her teacher did not take the time to explain the math. She thinks that if her algebra teacher had explained the math better she would have made a positive effect in her math learning, rather than a negative experience. She felt that she has had math anxiety all her life. She actually feared doing math. She has fear of doing math and that this fear came from her teachers when she was in school.

I asked her as well if Nebraska adapted a new certification she stated that she would be very nervous and would look for a new career. She and teacher number 1 both had the same basic reaction to that specific question. They both agree that a teacher can have an impact whether the students learning is positive or negative. They both think that

the teacher needs to set a positive role, but also let the students know that they don't know everything and that when learning something new it can be hard, but they will get through it.

All along I have made the assumption that math anxiety did develop because one math teacher made it difficult and did not explain things the way they should have. However, in my interviews I only found one person to have such an awful experience. The journals the students did and interviews did not state that they hated math because of a teacher. So, my question of how does a student develop math anxiety has yet to be answered. The students have written about the awful feelings that they experience. A question that I asked was, When I hear the word math, I, here are some of the responses I received: stress out, I hate it, I don't want to do it because I don't get it, makes me feel kind of nervous, just sit and draw, scream in my head and feel very uncomfortable.

Another question that I asked was: Am I a good math problem solver? Here are some of the responses: "I am a good problem solver, I listen to what my teacher says and I'm good, then I just freeze on tests or assessments," "No, because I am not good at math," "No, because I think slowly, and No, because the longer I take to figure out the problem the madder I get." Another student wrote, "I feel very struggled when I get into the classroom." "Sometimes it is very hard, sometime I feel good. When I am in class I get upset and feel like I am sick, about to puke." After I read the surveys I still did not get the answer I was hoping to find. I was hoping to find that a teacher somewhere along their career in school made math awful for them. However, I never had a student tell me that they had a bad experience. I still do not know how math anxiety has developed over

the course of their math career. Was math anxiety related to their learning disability or was it a feeling of anxiety for school in general?

I took a closer look at the surveys to see if there was any improvement. I decided to compare the two surveys. One survey was given on February 7, 2006 and the second on May 10, 2006. The students in my sample are in a modified math class. Any improvement overall is more meaningful in my class. The students were given a survey of ten questions. I looked at both of the surveys and looked for positive responses to the questions. I had a total of eleven students fill out the surveys. The surveys at the beginning of the study had an average of 5 positive responses to the ten questions. At the end of the study the students had an average of 5.1 positive responses to the questions. After the end of the study I had approximately a 1% positive increase in my students' attitude toward math.

After studying the data I had collected, I was trying to find out how students develop and demonstrate math anxiety in the classroom. I needed to look at the teacher teaching the math and see if that teacher demonstrates math anxiety as well. I decided to interview two fifth grade math teachers. I wanted to know their personal feelings on math and what they thought teachers could do to help reduce math anxiety in the students they teach. I asked the teachers a total of ten questions. All the questions had to deal with their own personal history with math. I made a table so I could compare their responses with each other and my responses as well. Most of the questions that I asked were pretty comparable with each other.

One of the areas that the two teachers and I all agreed on was that teachers with math anxiety as well empathize with their own students. We all felt that it was important

to share our own math anxieties to help our students. Teachers can help minimize math anxiety to support their students by making them feel comfortable in the classroom. The students need to feel comfortable, so they will ask questions. If the students ask questions, this will help them understand the math they are struggling to understand. In my own classroom I tell the students to raise their hand or ask a question, if they did not understand the work we were working on. Another method I use is that I always ask the students, “are you with me?” “Does everybody understand what we are doing?” I check for immediate understanding. If I don’t check while I am teaching, I will find out too late and will have to re-teach what the students did not understand.

In my personal journal, I looked for a pattern in my behavior to see if I reacted differently when my students needed extra help. I know there were several times when I would become so frustrated because they did not understand the work. I do not think I would become upset because they didn’t understand the work; maybe it was because they did not try. I looked at my personal journal to try to find if I wrote down any quotes that demonstrated my frustrations. I never say any quotes that I wrote down, but I know there were several times when I could feel my facial expressions change and maybe even my voice. However, after I could feel these changes, I would take a minute, remember how I felt learning new math and then I would relax and help my students any way I could.

After look more into my journal I noticed I was frustrated from my students not trying. I hope I didn’t show how frustrated I was when working with my students. I know there were times when I could hear my voice change or be short with the students. When I felt this change I would take a deep breath and try again. I did not want my students to feel overwhelmed or more frustrated because I was becoming upset with them. I needed

to remember what my students are going through and not make them more upset by not being able to ask the one person that can help them. The two fifth grade teachers and I all believe that the teacher plays the major role in developing the students' attitude in mathematics.

INTERPRETATION

As a result of my research, I found that I needed to work more with my students on trying to reduce their math anxiety. I need to use various methods to help them and what method(s) will work best for each student. I need to talk to the students to see what they think will help them to help reduce their own math anxiety. I need to look for more methods to use with the students. I need to write down everyday after a more difficult lesson and see how I reacted and how the students' behavior changes with the work.

I will need to change my math survey questionnaire. I did not collect the responses I was hoping to receive. Going over the questionnaire more in depth and telling my students what I am looking for might change the outcome of my data. In the student journals I am going to have the students do more of a free writing rather than a set of questions. If the students are given the opportunity to write down what they are feeling when they become upset because the work is too difficult, will it help them with their math work? I think if the students write what they are feeling it will give the students time to relax and then revisit the work that is difficult for them.

My research also showed me that I need to share with other teachers that their own personal view and attitude could impact the learning of their students. I found that I do not think the teachers are aware of how their own body language and tone of their voice can raise the students' math anxiety. In my own personal journal I am going to

write down how I react when my students' behavior changes due to the fact that their math anxiety is at a higher level. I want to share with other math teachers what I found from doing my research and to give them some clues to look for when their students are feeling anxious about math. I found in journals clues that I see students do everyday and did not know that they were just showing signs of math anxiety. I thought they were not paying attention; they were just displaying some signs of math anxiety.

If I share my finding with other teachers, will this help students with math anxiety? If the teacher knows what to for instance it could help both the student and teacher. As my findings showed me, acting out, drawing and inattention can be signs of math anxiety, not just the student messing around. Will teaching teachers various techniques to use with their students, at an early age help reduce the level of math anxiety in students? Or is math anxiety something the student needs to work on?

If I were to do this study again I would give my students' a pre and post-test of a set of problems. I could measure to see what progress my students' made over the course of the school year. The test would have some easy problems then go to more complex problems that we would study later on in the school year. I would then compare the two test scores and see what I need to hit harder for the following year.

I would also do journals again. However, I would let the students write in their journal at any given time. I would have the students keep their journals at their desk so they could write in them when they needed. I would want the students to write in their journals when they felt upset or frustrated over a problem. I would want them to write down any feelings they felt while they were working on their math. I would assign some

particular questions, but I really want to know their feelings when they are upset by the math they are trying to complete,

My survey questions would be different as well. I would change my questions so I could find what I was looking for. I would be more specific in the questions and want more detail. I would ask the students if they had a bad math experience, ask them why they thought it was bad. I would also keep a closer tab on a set of students. I would watch their body language more, listen to what they are saying and keep better track of their journals. I think by looking closer at their journals I would be able to find a pattern or be more aware of what my students are struggling with and how I could help them more than I already do.

I am sure when school starts in the fall again I will follow these revisions of my study. I want to help my students' overcome their math anxiety. I know that I am now better prepared to help with their struggles. I know that if I show my students my new confidence in math, they will feel better about the math. I will use the methods I learned from my paper to help my students' with their math anxiety. I also hope to share my finding with other math teachers in the building, so that math will no longer be a feared subject.

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Appendix A

Interview Questions for Students

1. Do you like math? Why or Why not?
2. Did you like math when you were in Elementary School? Explain
3. What makes math easy or difficult for you?
4. Have you ever had a really bad experience with math? If so, what happened?
5. What could teachers do to help students in math?

Appendix B

Journal Questions for Students

1. Imagine yourself doing or using math either in or out of school. What does it feel like? Describe
2. For me, math is most like.....what?
3. Are you the type who does well in math class? Why or Why not?
4. Describe how you feel in a math class?
5. Pretend that you have to describe mathematics to someone. List all the words or phrases you could use.
6. What do you do when you can't solve or workout a math problem?

Appendix C

Teacher Interview Questions

1. If someone asked you, “What is math?” what would you say?
2. When you were in middle school, what were your two favorite subjects? Why?
3. When you were in middle school, what were your two least favorite subjects?
Why?
4. When you think about your experiences with math in elementary and middle school, are there any incidents that stand out in your memory as very positive or very negative? If yes, please explain
5. Do you think your elementary teachers and middle school teachers liked math or were anxious about teaching it? How could you tell?
6. Was there ever a time in your life that you felt lots of math anxiety? If yes, please explain. If not, why do you think you didn't?
7. If Nebraska adopted new teacher certification requirements that required all teachers to take a comprehensive test, including a whole page of story problems, how would that make you feel?
8. How do you think students develop math anxiety?
9. What do you think teachers out to do help minimize student anxiety about math?
10. If I talked to some of the students in your class, do you think they would tell me that you like to teach math or don't like to teach math?

Appendix D

Mathitude Survey

1. When I hear the word math, I.
2. My favorite thing in math is.
3. My least favorite thing in math is.
4. If I could ask for one thing in math, it would be
5. My favorite teacher for math is, was.... because...
6. If math were a color it would be.
7. If math were an animal, it would be.
8. My favorite subject is. Because...
9. Math stresses me out: True or False Explain if you can
10. I am a good math problem solver: True or False Explain