



Upper East Tennessee Council of Teachers of Mathematics

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A Mutual Respect

Don't Fear Numbers, Play With Them

By Catherine Whitson, Sullivan County Schools

I have always loved math. Algebra always seemed to have set of rules and guidelines that, if followed, produced a predictable outcome. I was great at following the rules. If school had given me a grade for following the rules, I would have gotten an A, in most grades. The other grades I could have gotten, is a story for a different article. I was taught a set algorithm and taught to think abstractly within the box, but only when needed. I was content with this. I taught like this. (To all my former students, I apologize.) I taught the rules and did not explore outside of the box called math, UNTIL I attended MathElites under George Poole.

Not only did I break out of the box of my understanding, I jumped out and started playing with the numbers! I always liked math, but I had no idea how FUN it could be.

I have taught 2nd grade math for the past 6 years. Each of those years I have taught addition with regrouping and subtraction with regrouping, like all the other good teachers. Also like all other teachers, I cried, pulled out my hair, and drank lots of... coffee. Addition and subtraction

with regrouping is such a hard concept for 2nd graders. We, like many know it all teachers, gritted our teaching, found poems, songs, bribed, and eventually decided the students just were not developmentally ready and we were pushing them too hard. Even as I write this I am embarrassed and want to shake that new teacher I once was and tell her to call George.

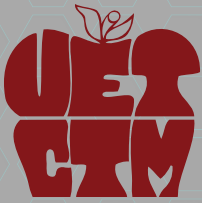
See, George is a superhero. My favorite show as a kid was Captain Planet. George is

Captain Planet of Number Mastery. He takes the talents, creativity, heart, intelligence, and flexibility of teachers, old and new, and teaches them ways to save the mathematical planet of our students. Addition with regrouping

and subtraction with regrouping does not need to be taught in the same way we have always learned it, there are Multiple ways of doing teaching this, and I am not talking about songs and gimmicks. There are MULTIPLE strategies students can use to truly understand these concepts.

One of the biggest concepts we teach in 2nd grade is place value. Students are taught that each number has a value. This





is expanded on in the teaching of expanded form. In a typical classroom, after the teaching of expanded form, there is no more mention of the concept. George taught us to embrace expanded form and to teach addition in this way. For example, the traditional problem $345 + 267$ would use the terminology carry the one, put the one on top, don't forget to add the one, and so on. In expanded form this problem become much simpler. The problem translates as:

$$\begin{array}{r} 300+ 40+ 5 \\ 200+ 60+7. \end{array}$$

The child can then add and come up with the problem: $500+ 100+ 13$. This become so much easier to add then the traditional form. This also teaches students to see numbers as their value. Did you see that? The numbers just broke out of the box of tradition. The numbers become friendly. Mental addition can be used and students have yet to have an anxiety attack. Subtraction with regrouping is about as fun to teach as going to the dentist. When we enter this concept, we have just finished telling students that they cannot have more than one digit in a place value spot. THEN we teach them to add a ten to the ones place to borrow. I feel like this turns me into a liar. George showed me a way back into the light of honesty. If a child had the problem $95- 47$, they would traditionally

take one from the tens and add ten to the ones. But why not shift the numbers to friendlier numbers? If we add 3 to both numbers, the difference will remain the same.

$$\begin{array}{r} 95 \\ -47 \\ 48 \end{array} \qquad \begin{array}{r} 95 + 3 \longrightarrow 98 \\ 47+ 3 \longrightarrow 50 \\ 48 \end{array}$$

YOU are in control of the numbers. Use multiple strategies to solve problems. Learn multiple strategies and become experts over these strategies so that you can teach your students. If a contractor only used a hammer, he would never get a house built. Why as educators are we only giving kids one type of tool to construct and solve mathematical problems? Lowe's and Home Depot hand out tool belts for free, and yet we tell kids to hold on to the traditional hammer of solving math. I say we give kids the tool belt, let them design how they want it to look, and to give them so many types of tools that they can construct, play, and build math in their own understanding and in their own creative design.

In the same way, if students only used crayons to color, how dull the world would be. My advice for teachers and kiddos, go out and color the world with your number knowledge, it will make the world more beautiful and creative. Oh, and if you get a free minute, talk to George. He will change your life and your teaching.



How to Keep Students Actively Engaged in the Math Classroom

By: Whitley Dale Grunstra, Sullins Academy School

Have you ever been in the middle of a whole group lesson or activity, and you notice that your students are completely off task and couldn't care less about becoming involved? That was how my first year of teaching began. My students found more interest in talking to their friends instead of completing the task set in front of them. I had those early finishers who were completely bored and then those students who had no idea what was going on. It wasn't long before I knew that I had to completely change my approach in teaching math.

At that time, I read an article that stressed the importance of mini lessons and rotations due to the proper attention span of students. Did you know that kids can typically only focus on one thing for the amount of minutes that is equivalent to their age? That means that my second graders can only focus on one thing for about 7 or 8 minutes before they need to move on to something else. With this new information, I restructured my class and I was amazed at the difference that arose not only in engagement, but in my ability to differentiate as well.

I began by limiting my whole group instruction time to only ten minutes. During this time, I would introduce new topics and methods that all of my students were expected to learn. Then I split my class into four groups and sent them to four different stations in the room (if you have more students you can always create more groups). I had a technology station where students would play online games that went with what I was teaching or a review of past topics. I also had a game station where they would play file folder games, flash cards, or any other

kind of game. I got most of my materials for this station on Teachers Pay Teachers. Another group would be working on independent practice at their desks and the last group would be working with me. Each station would last for only ten minutes, and then we would end by having another ten minute wrap up mini lesson with the whole group.

In keeping my students separated and on different tasks, it was amazing how much more focus they maintained. This schedule kept them moving every few minutes so they never got too bored with one activity. If students did not finish their independent work, I gave them a few extra minutes at the end of the day.

The truly amazing thing that I was able to do with this structure was provide daily differentiation. During the time that I worked with my group, I chose to work on whatever that group needed most. Sometimes that would be providing remediation or a challenge in accordance with the mini lesson I taught. Other times, I was guiding students along their own mathematical path according to their level of readiness. This was a time to truly catch those students who had fallen behind or to enrich those students who needed to move above and beyond.

I was able to do this every day, but even if you are only able to do it two or three times a week, you will be amazed at how much your students are able to accomplish in a short amount of time. Rotating my students with meaningful and fun stations was the best thing I have ever done in my math classroom in regards to active engagement and differentiation. Give it a try!

Understanding and Embracing Disequilibrium

By: Dana Green, Washington County Schools

Disequal...what??? Disequilibrium. When I first heard this word I was so confused and intrigued. In the past, I have worried and struggled with the fact that my math students were not “getting it” immediately when I taught a new concept. It was not until George Poole explained the concept of disequilibrium that I breathed a sigh of relief. Disequilibrium is simply productive struggle. It is the imbalance that occurs in learning. It takes time for students to absorb and understand new ideas and new concepts. I now understand that the initial confusion and feeling lost is a key process to the actual learning of a new skill. Feeling lost is the first and very appropriate phase of learning. Exploration is absolutely necessary in developing and understanding new math strategies. From this point on, students in my classroom will be encouraged to safely explore their own thoughts and pathways for learning. I will strive to create a safe environment where they feel safe to “dig in” to math.

The Math Elite program has been useful to me in so many ways. I have learned new mathematics strategy techniques as well as classroom management skills to incorporate the new strategies. I no longer think the “traditional” algorithm is the best/only way to solve a problem. We have explored multiple ways to solve addition, subtraction, division, and multiplication expressions. We have been taught that we are in control of numbers. This is all useful in the classroom on every grade level. This has been a wonderful opportunity to get to know other teachers and listen to ideas they have for content teaching and classroom management. The idea of disequilibrium is the foundation on which all math lessons should be taught.

MathElites

By: Kathy Huff, Washington County District

First, I would like to say how happy I was to be asked to participate in the Matheletes Program this summer. This was a great opportunity for teachers in our area. Math has never been my strong suit (as I am sure you are aware of after looking at my final exam)! I have struggled all my life with math, and I know this because I had to take 7th grade math three times. I graduated high school with having one semester of business math, which was the ‘how to balance a checkbook’ class. We knew it was for the ‘not so smart’ students. All of this, I believe destroyed me as a student, especially as a math student.

However, even though my test may not show it, I feel like I learned a great deal from your class. In all my 46 years, you are the only teacher that has made math make sense to me. I am very excited to share with my students what you have taught me in these two weeks this summer. I’m especially excited to share the ‘No More Borrowing’ strategies I have learned. I feel this Matheletes Program will improve my teaching and I look forward to starting new year and listening to “The Story” of all my new children.



Math Your Way

By: Lucretia Stephens, Johnson City Schools

I have always considered myself as being proficient in the area of math, not advanced, just proficient. I am like many people that I know; Math is not my thing. Therefore, the thought of trying to learn new strategies, made me cringe with fright. Initially, I was a little apprehensive about the class and what it would entail.

Shortly after the class began, my tension, nervousness, and fear quickly dissipated. Dr. Poole was extremely knowledgeable of developmentally appropriate ways to teach young children. His knowledge was not demonstrated in an arrogant or superior manner. Of course he was the leader of the class, but he allowed



“us” the students’ opportunities to share ideas with him. He never dictated ways that we must teach our students. He simply facilitated ways in which we could better assist our students. Dr. Poole gave true meaning to the term, “Math Your Way”. I believe the meaning of “Math Your Way” is the use of a variety of strategies in order to solve math problems. “Math Your Way” allows the student an opportunity to simply solve math problems their own ways. The “Math Your Way” concept teaches students that there is not just one standard or universal was to arrive at

solutions to a math problem. The concept is based on the premise that there are multiple strategies and one must use what best fits their level of understanding.

My participation in the MathElite program, ranks tops on my list of teacher trainings. Having been involved in this program gave me opportunities to interact with some amazing professionals, some that I otherwise would not have had an opportunity to meet. It was refreshing to have the chance to share a wide variety of strategies to help students share ownership to their learning.

I firmly believe that all children are capable of learning. However, it is unrealistic to believe that learning is going to be the same for every child. All children are equipped with the ability to learn. It is my responsibility as an educator to help my students be successful. As educators we must remember that the way we teach things is not always the only way to teach things. We must respect and appreciate other people’s way of thinking, even our little people.

Sitting on the Couch

By: Melissa McGee, Hawkins County Schools

Come on in! Have a seat on the couch! We are about to begin MathElites for the summer of 2015. We are headed for an adventurous two weeks of math fun. Not only are you going to learn more than you could ever imagine about math strategies, you are going to gain a new family, and make memories of a lifetime.

Working with Dr. George Poole (or just "George" as he would say), from ETSU, was an amazing experience. He brought a new meaning to math as I knew it. He repeatedly reminded us that "We are the boss

not just another class. He made sure that we were comfortable with what we were working on, because after all, we were family. We were sitting on the same "couch" each day, learning from each other and getting more comfortable with our new family.

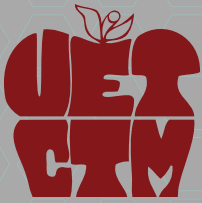
I am thankful for the opportunity that was provided by the Eastman, ETSU, and Hawkins County Schools to attend MathElites.

It was by far the most productive, innovative professional



of numbers!" He opened my eyes to many new math strategies and shared ideas and activities that I could actually walk straight into my classroom and use and know that my students would gain so much more than they ever had before. Not only was George awesome as an instructor for the 2nd and 3rd grade MathElite group, he worked diligently to make each person in the class to feel important. We were

development program that I have attended. Thank you Eastman Chemical, ETSU, and all school systems involved for making MathElites such an awesome experience. If you ever get the chance to attend MathElites, grab it! Go on in, relax and have a seat on the couch. Get ready for the experience of a lifetime.



THE RIGHT STUFF

BY: Linda Sexton, Johnson City Schools

Being a seasoned teacher, I have been to numerous workshops and trainings to enhance the way we teach our students. Somehow, I would come away with the feeling that it is the same “stuff” just a different package. I didn’t get that feeling while being a part of Dr. George Poole’s MathElites class.

Our two weeks, supplied us with “right stuff” to teach math to children. Our minds were opened to the way children think naturally and how they solve mathematical problems using their own strategies. We learned strategies and methods to help facilitate their learning. These I plan to implement and integrate into my teaching this schoolyear.

How refreshing! The theme was Pigaet’s Conservation of Number. I went to college in the late 80’s and studied many of his theories. I didn’t remember focusing on conservation of number. I now realize how important and yet simplistic this method of approaching math at the elementary level is. It goes with the grain, when children attempt to solve algorithms and word problems. I too, am guilty of forcing children to conform to the set ways to solve a problem.

This will be corrected, thanks to what I have learned in Georges’s class. I take back with me a new “freedom” for student learning in my class. I will start it with “find a friendly number”.

Math Elites Summer 2015

By: Nicole Barrett, Bristol City Schools

The opportunity to participate in Math Elites this summer was offered to me in the spring of this school year. For the first time in several years I was teaching something that was new to me RTI2. While I was enjoying my new assignment, I also found it very challenging. I had spent the last several years teaching Algebra 1A and Algebra 1B. I now found myself helping high school students with basic math skills. My Math Specialist suggested Math Elites to help provide me with more options and ideas to help my students.

I am so glad to have been given this opportunity and I think that the last two weeks have been very valuable. I feel like I have grown as a math teacher. I am really thinking about math from a new perspective. As a teacher I know I have often taught students a skill without ever addressing why. In many ways I feel like I am thinking about math in a totally different way. I have found it interesting in not only learning how to do something, but also learning why it works the way it does. I look forward to taking many of these new methods and ideas back to share with my students.

I feel that Math Elites has really added to my bag of tricks for the classroom. I have always enjoyed teaching using games and activities that allow my students to learn in a more hands on way. I feel like I am returning to the classroom with so many new activities and strategies to help my students understand and see that there are often a variety of ways to approaching the same task. It doesn’t matter which particular one we use; we all finish with the same result. I am excited for the new school year and the opportunity to share all I have learned with my students.

MathElites 2015

By: Jean Hughes, Sullivan County Schools

“Every child learns differently ... and that’s okay.” The Math Elite class discussions and activities enabled this concept to develop in my mind set. As a teacher, it is extremely important for me to incorporate this mind set in my planning, structure and lesson delivery in the classroom. The Math Elite lesson plan format emphasizes to engage, explore, explain, extend and evaluate in the development of the lesson, which, allows the teacher to accommodate the uniqueness of each student.

The strategies and applications of the different operations were beneficial for me to aid in the delivery to the students. Particularly, the subtraction strategies that included shifting, minuend shifting, hop, skip and jump, Lexie’s method and the 9’s complement method. This gave me a strategy to use to prevent students from “borrowing.”



It is imperative that students should understand what they are doing. The activity we completed to determine the student’s mistake was highly valuable. As a teacher, I need to discover the errors a student makes when developing the solution pathway to solve a problem. It may even require me, as a teacher, to change the way I present the skill.

The lesson on modifying textbook tasks will enable me to provide opportunities for students to think and reason in a more rigorous manner. Students will be challenged to think things out for themselves, as well as, challenge them. They will be forced to “go to the next level.”

Our visit to the carousel was delightful and inspired me to want to take my own class this upcoming school year. What a fun way to complete a lesson on graphing! It would be a memory maker for the students. However, I was a little challenged when it came time to get off my cat! It just wasn’t graceful at all!

I would recommend Math Elites to other teachers. I feel the concepts gained in Math Elites would enhance the teacher’s motivation and skill which would, in turn, trickles down to the students. George Poole did an awesome job and I feel that I gained a great deal from the class! A big thanks to Eastman, ETSU and Sullivan County for giving me this opportunity to attend.



Mathelites 2015

By: Laura Lewis, Sullivan County Schools

Mathelites was an extremely valuable experience. I feel fortunate to have participated in it. I was hoping to learn a variety of strategies for teaching my students different methods of adding and subtracting. I'm pleased to say that I was able to do that above and beyond my expectations, especially where subtraction is concerned. Dr. Poole introduced me to some interesting methods of subtracting that don't involve borrowing. I'm particularly excited about that, because borrowing can be such a difficult concept for students to grasp.

In addition to learning new strategies to teach my students addition and subtraction, the Mathelites class really got me thinking about standardized testing. The whole point of the Mathelites class in a nutshell is that students learn differently, and therefore, we need to be teaching differently to meet students' needs. As teachers, we hear so much about differentiated instruction. All this has me pondering over what should be a very important question to the powers that be. If all students learn differently, then why are they all forced to take the same test in the exact same way? If there are multiple solution paths to problems, why are students dictated to on standardized tests as to how they are to go about solving them? On two of our benchmark tests this past school year, students were required to show a repeated addition sentence for an array. The correct response for each of these problems was based on the number of blanks provided. There were no rows or columns circled. As a result, students might easily see 3×4 as opposed to 4×3 . Personally, I know that several of my students were confused, because they saw the array differently. If a student is able to explain their solution in a way that is mathematically correct, they should be allowed to do so. The problem is that when it comes to differentiation, we don't practice what we preach, especially when it comes to standardized tests.

Finally, I was reminded of the importance of remembering that my students are all facing certain difficulties in their own lives, just as I am in mine. Just like me, they are going to be affected by what is happening in their home lives. As teachers, we all need to be aware of that, and show a compassionate heart towards are students. This makes such a difference in how they respond to us and to learning.

Over the course of the past two weeks, I had a lot going on. My mom has been in and out of the hospital since June 10. As a result, there were a number of times when I had to step out of class to answer a call from my mom, a nurse, or a home hearth representative. I even had to leave class a few times to rush to my mom's apartment to take care of an emergency situation with her. No matter what, Dr. Poole was always so understanding and compassionate with me. His example, reminded me of how important it is that I show that same level of understanding and compassion to my own students.

In closing, I just want to stress how thankful I am to have been able to participate in the Mathelites class this summer. I would definitely recommend this class to my colleges. In the future, I'm hoping to be able to participate in Scienceletes as well.



Using a Blank Number Line to Subtract Mentally

By: Brad Johnson, Johnson City Schools

When I started teaching 2nd grade 20 years ago, I taught my students to subtract using regrouping similar to the way I'd been taught. Although when I started teaching it I realized I hadn't used that method to subtract since I was in grade school. I used a calculator or subtracted mentally. It wasn't until a few years ago when a colleague handed me an article on subtracting with a blank number line did I realize that I used a blank number line in my head when I subtracted large numbers. I also used it for dividing large numbers in my head. Now I emphasize subtracting mentally using a blank number line in my classroom.

Students should be comfortable counting forward and backward by ones, twos, fives, tens, and hundreds before introducing blank number lines. Given a subtraction problem, $71-47$, students place the minuend and subtrahend on the number line. The placement of the numbers doesn't have to be exact at this time. The students should have enough room in between to jump to the other number. Starting with the smaller subtrahend, students make a jump toward the minuend to the first "friendly" number 50. They can count up by ones – 48, 49, 50, or those more comfortable with basic facts can add 3 to the 7 to get to friendly 50. Now they can count by tens to get to 70 – 60, 70, or just make one jump of 20. All that's left is a jump of one to the minuend, 71. Now add up the jumps to find the difference – $3+20+1=24$. The difference between 71 and 47 is 24. Students can see it on their number lines and with practice they can make their number placement and jumps closer to proportion with the values of the numbers and jumps. Within a school year, most students will be able to visualize the number line in their head and make impressive calculations accurately.

Reflection 3-MathElites

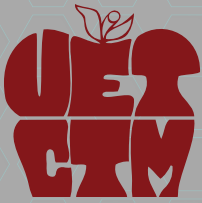
By: Tonya Sowers, Sullivan County Schools

I've never thought of myself as a "math person". It seems I always had to work twice as hard to understand half of the math concepts being taught. I've even said I'd probably be considered learning disabled in math by today's standards, but I learned in this class that I can explore numbers just like others. I learned that I can use different strategies to make numbers into manageable segments so that my brain could process them more efficiently.

I sat here in this classroom with 23 other second and third grade teachers and listened as Dr. Poole (George) explained how to separate multiplication arrays into friendly combinations with simple strips of paper. I practiced this newly found method and could see how students would be able to understand how to break numbers apart so they made sense.

I can see why an administrator would want to send teachers to this class. In order to effectively guide students, teachers need to be able to explain new concepts in such a way that students have the confidence they need to try. With support, students can explore math in a way that makes sense to them.

I can remember being taught algorithms in school, but I can't remember anyone taking the time to explain why. I can't tell you that my number sense magically appeared during these two weeks, but I can tell you that I have more confidence that I can do more than I thought. I can manipulate numbers in a way that makes sense to me. I also know that there are only two basic problems in math, counting or measuring and that learning requires a degree of productive struggle. Thank you, George!



Bring Me Back to the Basics!

By: Megan Andrukonis, Johnson City Schools

It is easy to get caught up in the state standards, get overwhelmed, or to forget how young children really are at heart. They are forced to grow up so quickly, becoming robots who pass tests with flying colors. Where is creativity going? What about laughter and enjoyment? Being in Dr. George Poole's 2nd – 3rd grade group brought me back to not only the basics of teaching math strategies, but also of teaching the most important things in the classroom—creativity, laughter, and fun.

I took one of George's classes at ETSU a few years ago as an aspiring young teacher, ready to make a difference, ready to be surrounded by creative, smart children. I knew most of all that I wanted to have a strong classroom community where children were trusting, caring, confident and supportive of each other. And even though I knew standards had to be taught, I would give my all to make sure students still had fun in their own ways! Sounds possible and easy enough to achieve, right?

In reality, my first year of teaching I was in survival mode, running off of adrenaline, and already jotting down ways to improve for the next year. Well, those 'next years' quickly arrived, and some of the adrenaline sizzled out. Standardized testing, as it miraculously seems to do, became more and more important, the pacing got faster as we had to teach more content, and the stakes got even higher! Let's not forget the obstacles that also got harder; students who were pulled out from class not once, not twice, but several times EACH DAY, and children who moved to and from schools or classrooms! Where

would we find enough time catch up these students to grade level, or at least keep them from falling behind? And why didn't anyone warn of this?

Anyone who teaches, or has ever taught, knows how stressful and overwhelming education can get—quickly! Imagine how the students feel—always sensing that there is a rush to move on because tests are, unfortunately, always right around the corner.

I often use 'Brain Break' activities to get my students through stressful times. I also keep my classroom open for discussion and ideas, especially regarding math and student thinking. During MathElites, I was refreshed on many excellent math strategies and learned about several resources, tools, and new strategies. The most important element that I was reminded of, though, the one that can be spread throughout the entire curriculum, is that "All kids think and learn differently, and... That's okay!" This statement from George reminded me of the teacher I longed to be in college. Every child is so incredibly different and deserves to be treated that way. They each need the chance to be creative with songs, videos, art, and manipulatives—whatever helps them learn best—regardless of 'standardized' pressures! Finally, we all "run off chasing bunnies" in our minds sometimes. I learned that it is important to embrace these times, and that it is okay! How else would these children de-stress? Those two ideas and statements from George are perfect summaries of what makes learning fun—definitely not the tests or even the standards. Also, these are the quotes that remind me to have fun in the classroom, resist getting bogged down in standards, and lastly, refuse to let the 'standardization' of testing control me or my classroom.



MathElites — It is more than a graduate course

By: Ruth Loving, Johnson City Schools

MathElites is a program consisting of 2 weeks training, 24 students, a wealth of knowledge, a ton of resources and top notch instructors. This is a snapshot view of this graduate course. Teachers are chosen from local schools, they go to sessions from 8:00 to 3:30 Monday through Friday for 2 weeks. But this is much more than a graduate class. It is an experience!

Let me begin with the instructors, or as they prefer, Ryan, Jamie, and George. Ryan Nivens led the middle school group of teachers. While I never received direct instruction from him, he was always willing to help and answer any questions. He actually sold me on becoming an active member of NCTM! His enthusiasm was catching. Jamie Price was the instructor for the 4th/5th grade teachers, which was the class I was to be in until I transferred to 2nd grade. Jamie led our class on 2 occasions. She provided pertinent and easy to use activities. Jamie's calm and easy going personality made working with her a pleasure. George Poole was my main instructor. He was awesome! Right away he was able to make a group of 24 strangers come together as a math family. He got to know each of us and referred often to our personal strengths. He gave us strategies that allowed us to experiment with numbers. But more importantly, he helped us to realize how important it is for our students to experiment with numbers.

To start our days, George got us going with "Jump Starters". These were mind joggers that got our brains thinking about numbers. Then we launched into activities that helped us to break down mathematics in such a way that, as George said, "the kids know they control the numbers, and not the other way around!" This for me was eye opening. What a simple, yet profound way to view math. If that was how I had been taught, I would have had a much more positive relationship with math class. And to say I was uncomfortable with math class was an understatement! I struggled in my studies of math. In fact I would even go so far as to say MathElites liberated me to change my thinking on how I will teach math. I am now excited and ready to get in the classroom and watch just how the kids will "control" numbers.

The simplicity of what mathematics is was lost on me until now. I always thought of it as numbers plugged into formulas as simple as addition to as complicated as lengthy, multi-step algorithms. Teaching math is not just about memorizing facts and applying them to set formulas. It is "the K-5 teachers' responsibility to help students count and measure in increasingly faster and more efficient ways." I underlined help because that for me was key. The students are doing the math, their own way, I am just facilitating the process they use. My part as facilitator is "to encourage the students, permit struggle, and guide them to begin trusting their own thinking!" I admit for me it is a little scary to think about 2nd graders running amuck with numbers!!! But when I think of how my role as facilitator, rather than drill master, controls the chaos and instead allows them to become problem solvers, I get excited about what they will accomplish!



Throughout the two weeks, we worked through the different standards for TN teachers in 2nd and 3rd grade learning how to help our students master them in a way that allows them to control the numbers. One of the biggest takeaways I had was students can use many different strategies to subtract and NEVER borrow. We learned how to allow students to avoid the very cumbersome and most of the time confusing concept of borrowing. There were 7 specific strategies we learned that allow the students to choose the best strategy for them and not have to worry about borrowing. Needless to say, I now feel empowered with the ability to be a successful facilitator, thanks to this course.

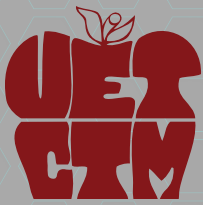
Eastman, ETSU and any other involved in this endeavor deserve a special thank you for enabling local teachers to be part of such a rigorous, yet exciting program. For those of us who have completed this course, the experience was phenomenal.

Who's the Boss?

By McKenzie Davis, Sullivan County Schools

I can remember sitting math class in the fourth grade crying over long division. My father would tirelessly work through every problem with me, encouraging me and telling me that I would get it. Numbers intimidated me. It took me until high school before I began to believe in my ability to understand math, and it took a wonderfully dedicated math teacher who spoke into my life about how talented I was at math. Fast-forward 6 years and my first teaching job was teaching fifth grade math. I was excited, but also very nervous, especially when flashes of working long division problems for hours would flash in front of me. I made it, though, making math more fun and exciting, but also teaching my students the WHY.

I ended up teaching ELA for several years, and once again found myself teaching third grade math. Fortunately, I had taught alongside a phenomenal math teacher who made me question everything I had learned about math, and inspired my love for it. These two weeks in Matheletes was a powerful experience in that I relived those moments from fourth grade and I understood how so many of my struggling math students feel on a daily basis. For so many numbers are alive and are the monsters from their dreams. Dr. George Poole stressed over and over that numbers are dead. We are alive. We are the BOSS of numbers. Numbers cannot control us. It was a powerful statement, and one that I plan on carrying back to my students. We can manipulate numbers in such a way that makes sense to us and helps us understand the problem. Teaching students that there are multiple strategies and ways to solve a problem makes them the BOSS and not the number or problem. This change in thinking during class allowed me to explore strategies that made sense to me to complete activities, and it took the pressure of having to get one right answer off of me. So many students are afraid of being wrong or not fully understanding the one way to solve a problem, but as teachers we have to show them who's BOSS, and allow them the freedom to explore multiple strategies and methods so they find one or two that makes sense to them, and gives them that moment of success. This year I plan to structure my classroom around the concept of students are the BOSSES of numbers, and I think this will make a world of difference for many.



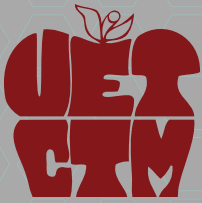
Going Deeper to See More Clearly

By: Sierra Nelson, Kingsport City Schools

As I was preparing for the beginning of a brand new school year, I also took some time to reflect on my recent learning as part of the Eastman Scholar MathElites program. Being a new teacher, I have already recognized the wealth of knowledge still to come only through years of experience. Still, others might question just “how much more” elementary mathematics I would need to study before I could sufficiently teach it to students of my own. After all, didn’t I complete thirteen years as a student in the public school system myself? Yes, I did. But, over the course of my two weeks as a MathElite, I had several brand new insights into basic mathematics that restructured my own mathematical thought processes and will no doubt impact my instruction and students starting this year.

The first and possibly the most amazing point replays in my mind as instructor George Poole told my colleagues and me that math is all about learning to “count and measure at increasingly faster speeds and with more and more efficiency.” Counting? Is that all? For the four basic operations that we teach at the elementary level, yes. Think about it. After we practice and master the counting sequence in order to attach a quantity to a set of items, we begin putting sets together. Addition puts together any amount of groups of any size, and then the sum is counted. Multiplication almost makes it simpler by adding together equally sized groups to find a total. Subtraction takes a number apart, and division takes it apart in equal increments. Again, we perform these operations because we want to find the count of something. What is the total amount of money? How many inches taller than me are you? How many Hershey kisses can I put in each treat bag before I run out of candy? If I snap some pictures in a disposable camera, how many are left to use? In every situation, the operations and their symbols are purposed to lead us to a count with efficiency. Dr. Poole summed it up nicely, “multiplication is just speedy addition, and division is just speedy subtraction.” Imagine how approachable math would seem to our students if we shared such an idea and helped them discover these connections.

Next, I learned that numbers are dead, and I am alive; therefore, I am in charge of numbers. Did I not already know this? Yes and no. True, numbers on paper are inanimate. However, I had not ever really taken to heart that I was in charge of a number as Piaget’s theory of the conservation of number suggests. No matter how I rearrange or take a number apart, it holds its amount assuming I have not lost any of its pieces. This creates a great amount of freedom in the mathematics world. No longer am I bound to a specific algorithm, but I am free to adjust numbers when adding, subtracting, multiplying, and dividing, and utilize their place values to suit my needs. This is not to say that the algorithms that have been used for years do not have their place. When they are taught with student conceptual understanding as the goal and as one of many acceptable pathways to a solution, algorithms can be beneficial. As we dig deeper into the meanings of numbers by examining place value or giving a number a label, however, algorithms will not always be the most efficient or natural. Students should know they have the choice to work with numbers and apply strategies based on their current level of understanding. Although mathematical expressions may have only one correct answer, much to the surprise of many, the road to get there is not marked “one way.” Let’s take the time to assess and



understand student strategies and not just judge answers as right or wrong.

Finally, an encouraging word to us all, struggle is more normal than one hundred percent success one hundred percent of the time. I have to admit that at times I have doubted my own abilities as a teacher when less than all of my students either successfully master a lesson goal or receive a one hundred on an assignment. Of course high expectations should be in place, and an underlying belief that students can be successful should be present. However, imagine what a classroom would look like where struggle never happened. Never a question for clarification. Never a varying strategy. Students repeatedly finishing their work without error. Could I truly say that my students were growing if this were my classroom? Probably not. Through research and my own experiences, I have found that I am most deeply impacted and changed by a challenge. Learning comes when students are presented with problems that do not have an obvious solution. If I desire to develop in them a deep understanding about how numbers work, I must plan opportunities for productive struggle and reflection. These experiences and knowledge increase the likelihood that students have a back-up plan or at least trust their own thinking when new problems arise versus reliance on a memorized procedure.

Although I could fill pages with practical tricks, a variety of new-to-me algorithms, and videos that connect math to my students' interests, I believe three general realizations will help guide me during my math instruction this year. At the most basic level, the operations are intended to help me count. Numbers are dead, and I am in charge. Last, not only is it okay to struggle, it is normal. I discovered that by looking intentionally into simple mathematical concepts I assumed I had mastered long ago, a new level of clarity and cohesiveness was found. Digging deeper instead of committing formulas to memory actually simplified the concepts. Overall, my journey as a MathElite was a useful investment of my time that I expect to see great returns from in my classroom.

Factoring Quadratic Trinomials Using “Slide and Divide”

By: Scott Lamie, Bristol City Schools

While trapped in a state training, a few of my fellow teachers and I ended up in a conversation about the “Slide and Divide” method for factoring quadratics. Out of about thirty people, we determined that significantly less than half of the teachers were aware of the method and its value as a quick way to factor, particularly when factoring is simply a component step of a larger problem. With that in mind, I felt that a quick explanation of the process might prove to be beneficial. Unfortunately, I tried to write out a quick explanation and realized that, due to the nature of the explanation, this was an overwhelming undertaking. Instead, a video feels like the best platform for this message, and I hope that it makes things easier to understand.

[Slide and Divide Video](#)