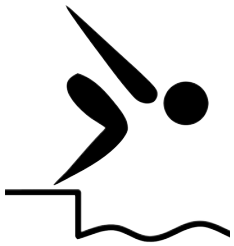
Upper East Tennessee Council of Teachers of Mathematics

NEWSLETTER VOLUME 17 ISSUE 6 APRIL 2017

INSIDE:

Dive into Webinars! Add funding to summer fun!



NCTM Webinars:
Immersion without inconvenience.

For professional development that's engaging *and* convenient, add these webinars to your summer schedule:

The Elusive Search for Balance
President's Messages
7:00 p.m. ET, May 15, 2017
For more information click here.

Taking Action: Implementing Effective Mathematics Teaching Practices
Author talks
7 p.m. ET, May 24, 2017
For more information, click here.

NCTM Grants:
Add funding to your summer fun!

NCTM grants with fall application deadlines offer a great funding opportunity!

With nearly two dozen NCTM grants now being offered for everything from research to professional development, you may want to take some time this summer to explore your opportunities. Fall deadlines allow you room to fit funding into your summer fun!

For a complete list of grants, click here.

NCTM has you covered for summer funding and career development!

Recharge with Summer Reading!

Whatever you have planned for your summer, whether it's lazy days by the pool or on-the-go activities with family or work, you'll find the rewards are rich when you "book" some time with quality literacy resources that can recharge your enthusiasm and enrich your teaching practices.

For NCTM members, free access to online professional journals means anytime, anywhere access to latest in research and teaching practices. For more information, click here.

Even easier, you need only a library card for access to outstanding children's books that are fun and fascinating aids to comprehension. Here are a few links that can help you compile your own summer reading list:

http://www.the-best-childrens-books.org/math-for-kids.html

http://www.goodreads.com/list/show/14440.Top_Rated_Educational_Math_Books_for_Children_

https://www.pinterest.com/pin/285908276320697320/

This summer, relax, read and recharge!

Do You Recognize Your Hidden Figures?

Those "hidden figures" are hidden no more. Thanks to a well-received book and smash hit film, real-life heroes Katherine Johnson, Dorothy Vaughan and Mary Jackson are at last being recognized for their critical contributions to aeronautical research. Beginning in the 1940s as part of Langley's West Computing Group the trio carried out complex computations for flight and space research as "human computers." Their story, of three African American women overcoming racism, sexism and other professional and personal challenges, is one that has now inspired millions.

Still, as NCTM President Matt Larson points out in a recent message to NCTM members, it may be easy to think of the struggles of those remarkable women as struggles of the past, when in fact access to highly qualified math instruction and to college preparatory pathways for mathematics remains problematic for some marginalized groups.

Another important lesson that might be over-looked, according to Larson, is the film's illustration of the importance of "collaboration, creativity, communication, problem solving and innovation," in the response of the "human computers" to the challenge of the new mainframe computers. As Larson points out, "Yes, students need procedural fluency and conceptual understanding, but Dorothy Vaughan's group would have lost their jobs had they not adapted, learned new skills, and been effective problem solvers—in the 1960s."

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Do You Recognize Your Hidden Figures? (continued)

Larson encourages readers to remember admonitions for inclusivity by well-known figures such as Francis Su, and suggests that teachers ask themselves four questions to recognize and engage "hidden figures" in their classrooms:

- **Do you see** mathematical potential in all your students, no matter their race, gender, or socio-economic status?
- **Do you help build** in each and every one of your students a positive mathematics identity and a high sense of agency?
- **Do you emphasize and honor** creative problem solving in your classroom alongside procedural fluency and conceptual understanding?
- **Are you working** to dismantle structural obstacles in your school or district that might be denying certain students access to upper-level mathematics courses?

For Larson's complete message, click here. ■

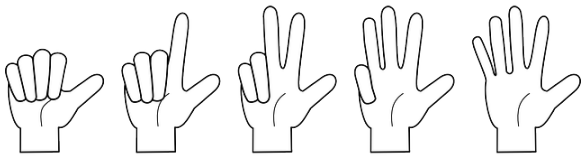
"There is no good reason to tell a student she doesn't belong in math [your class] … you see a snapshot of her progress, but you don't see her trajectory. You can't know how she will grow and flourish in the future. But you can help get her there."

Francis Sue

Help with Number Sense
by
Tricia Taylor

As a second grade teacher, I have questioned how to help students who struggle with number sense. There is an expectation that all students need to master Number and Operations standards such as fluently adding and subtracting within 100 using strategies based on place value, properties of operations and/or the relationship between addition and subtraction. But do I push students to move from using manipulatives and drawing a picture to making their representation with symbols if there is not a solid understanding of how these numbers and symbols work?

During a kindergarten to second-grade MathElites class, which was taught by Dr. Jamie Price, we discussed the stages of learning mathematics. Students who are introduced to a new concept start their learning in the concrete stage. In this stage, students will work with concrete materials like manipulatives or even just their fingers.



In the concrete stage, students will work with materials like manipulatives or even just their fingers.

The next stage of learning is the picture or representational stage. Students will draw pictures to represent their thinking and solve a problem. It isn't until students reach the third stage of learning—the symbols or abstract stage—that students use numbers, operational signs or algorithms to solve problems.

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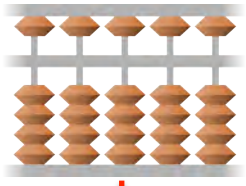
Help with Number Sense (continued)

Support for every stage:

CONCRETE



REPRESENTATIONAL

ABSTRACT

As a learner in the MathElites class, I was challenged to learn a new number system called Orpda. In Orpda we were asked to assign symbols to a new number name. I instantly connected with those children who do not understand why the number 11 is called eleven and the number 12 is called twelve. Through this exercise and as we practiced problems using different types of math tools such as 10 frames, part–part whole boards, rekenreks, base ten blocks, and number lines, I quickly saw my own need to draw pictures or use these tools to help me solve the problems. These practices have helped me identify my students' stages of learning and understand the importance of supporting my students in whatever stage is appropriate to their learning.

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Teaching with Toothpicks by Terrance Andrews

Teaching high school (9th grade) mathematics was a great experience for me this year. I noticed the children needed a visual aid illustrating what certain concepts were. Possibilities include something as small as giving a real-world example, but sometimes more in-depth and difficult problems are necessary. Arithmetic sequencing exists in my current curriculum. Until now, I lacked examples to assist the students visualize where the formulas derive from.

In MathElites, we worked "toothpick" problems among others. In these toothpick problems, my peers and I figured out patterns and generated a general rule. However, there was a catch. With each general rule, we explained physically what happened in the figure. We presented how each person's rule developed from the formation of the toothpicks. Once we discovered one possibility to describe the general rule physically, we discovered more. We continued figuring additional general formulas. The thought behind this exhibited how students perceive the problem.

One of the patterns looked like this

where each line was another toothpick.

The table describing the information is:

# of Squares	# of Toothpicks
1	4
2	7
3	10

The arithmetic sequence is t = 3s + 1 where t is the number of toothpicks and s is the number of squares. A student probably would not imagine the formula needed if they only just began working on such a problem.

Dr. Nivens asked us to describe this pattern in many different ways to interpret how students interpret the problem. One such way is shown on the following page:

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Continued on page 9

Teaching with Toothpicks (continued)

This allows us to *see* the 4, 4 + 3, 7 + 3. We produced several different possibilities of the same problem for different students' interpretations.

My students struggled with arithmetic sequences. I lacked the understanding as to why until now. I deprived them of the physical side of the mathematics behind it. I gave examples such as hourly wages and other ideas. However, ideas are all they were. I refused for the students to figure it out themselves other than in regular practice problems.

In the future, I will teach with toothpicks and other manipulatives this coming year, especially when areas of struggle are involved. ■

"I will teach with toothpicks and other manipulatives this coming year, especially when areas of struggle are involved."

Make a Ten
By
Rebecca Moriarity Smith

In first grade, it is important for students to learn the relationship between numbers to build fluency. NCTM says, "The ten-frame uses the concept of benchmark numbers (5 and 10) and helps students develop visual images for each number." The first stage of learning math is the concrete stage where students are introduced to a new concept with the aid of manipulatives and hands-on work. The second stage of learning math is the representational stage or pictures. Students are able to draw pictures to explain their reasoning used to solve problems. The third stage of learning math is abstract or symbols. In this stage students are able to use symbols to create algorithms (4+6=10). Students need to work through these stages to become fluent with composing and decomposing their math facts to 10 before working with numbers beyond 10. As Richardson has observed, "When children are given practice adding and subtracting numbers to 20 before they know the parts of numbers to 10, many develop fast counting for getting answers instead of learning the basic relationships.

Since they are successful at getting answers quickly, their teachers may not be aware that they are, in fact, counting to get those answers. Counting back or counting up does not help children know the answer the next time they confront the same problem." (p. 27). The following are a few engaging activities to help students develop fluency to 10:

Fishing for Ten

Materials: Deck of Number Cards 0-10 (four of each) with the Joker and face cards removed. Variation: Aces=1, Face Cards=10/automatic match
Players: 3 to 4

How to Play:
The object of the game is to get two cards that total 10.

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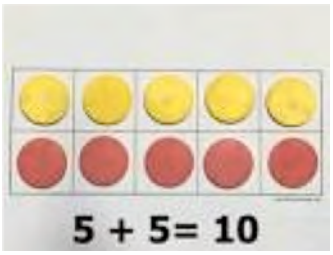
Make a Ten (continued)

1. Each player is dealt five cards. The rest of the cards are placed down on the center of the table.
2. If you have any pairs of cards that total 10, put them down in front of you and replace those cards with cards from the deck.
3. Take turns. On a turn, ask one player for a card that will go with a card in your hand to make 10. (Example: If player has a 6, ask for a 4.)
4. If you get a card that makes 10, put the pair of cards down. Take one card from the deck. Your turn is over.
Player will say, "Go fish!" if he/she does not have the requested number. If you do not get a card that makes 10, take the top card from the deck. Your turn is over. If the card you take from the deck makes 10 with a card in your hand, put the pair down and take another card.
5. If there are no cards left in your hand but still cards in the deck, you take two cards.
6. The game is over when there are no more cards.
7. At the end of the game, make a list of the number pairs you made.

Ten Frames



Ten frames can be used for routines, games, and problem solving. They are great for number talks.

"Look Quick!" is a game used to help students begin to subitize.
Materials: Ten Frames, Counters

How to Play:
The teacher will show a pattern using counters on a ten frame for 3-5 seconds. The students can tell you how many counters they saw and then discuss how they saw the pattern. This can be used to make any number on the ten frame or to make combinations to total ten.

Students could also show the pattern on their ten frames by creating the same pattern with counters and discuss ways to make different number combinations.
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Make a Ten (continued)

Friends of Ten

Friends of Ten is an app to introduce an early understanding of numbers to ten, counting objects to ten, substituting-recognizing a collection of objects without counting them, counting on from a higher number, partitioning of objects and the combinations that make ten 8+2, 2+8, 1+9, 3+7, etc. ■

Source:
National Council of Teachers of Mathematics http://www.nctm.org/

Richardson, K. (2003). *Assessing Math Concepts: Ten Frames*. Rowley, MA: Didax.

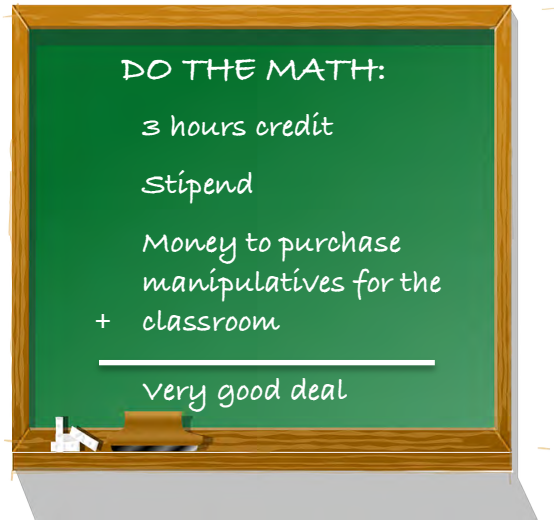
FAST COUNTING CAN BYPASS LEARNING: Some children develop fast counting for getting answers instead of learning the basic relationships. Because these students are successful at getting the answers quickly, their teachers may not know they are actually counting to get the answers.

MathElites By Rachel Boggs

When someone asked, "What I did for the last two weeks of summer break?" The answer to the "what" is MathElites. MathElites is a two-week program designed to help teachers gain a deeper understanding of math concepts and strategies to enhance their teaching skills and in turn enhance student learning. This was my expectation of what MathElites was going to be. Oh, yes, I forgot I would get 3 graduate credit hours, a stipend, and money to purchase math manipulatives for my classroom.

Now that I have completed MathElites I realize that along with what I did I must also explain why I chose MathElites. I have been challenged to look at math in a more in-depth way. I have learned about new technologies such as beebots and osmo. I have also learned new strategies using manipulatives I already have in my classroom and new manipulatives I plan to order with my money earned during MathElites.

I was challenged daily. My first challenge was a pre-test. The test showed I had a lot



of room to grow. I was also challenged to have a strong growth mindset. My instructor taught us a new number system, which replaced our numbers with symbols and our number words with names. The number system was not a base ten number system. Learning Orpda was a challenge, and I soon realized why some students had such a hard time with the numbers eleven and twelve as I found myself struggling with the Orpda numbers doozle and sholt. I was encouraged to work beyond my comfort zone, and when finding answers to a task not to stop but continue to see if I could solve using a different strategy or find a different solution.

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MathElites (continued)

Learning was challenging; however always fun. Who thought a few rolls of toilet paper could be used for so many measurement games such as: throwing rolls of toilet paper during the shot put games, relay racing using paint rollers and toilet paper, or making mummies covered with toilet paper.

I have made many new friends during my two-week course this summer. I have made plans to continue this friendship by visiting their classrooms and having them visit my classroom. I am excited to continue these friendships and gain new teaching strategies and creative ideas from them.

MathElites is an amazing program. I have always had a love of math, but this program has deepened my love for math and enhanced my ability to teach math. I have grown in so many ways this summer from just a few short weeks with great instructors and wonderful colleagues. I am excited to get my students excited about math and push them to think beyond their comfort zone.

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Complete application and return to Amy Glass with a check for $10 made payable to UETCTM. Mail completed application and check to:

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