The TMTA Bulletin

Volume 68, Issue 2 Winter 2024

TMTA Executive Committee

President: Ellen Matheny
Pellissippi State Community College
Email: ebmatheny@pstcc.edu

Past President: Andy Stultz
Hixson High School
Email: stultz_william@hcde.org

Secretary: Steve Gadbois
Memphis University School
E-mail: steve.gadbois@musowls.org

Treasurer: Stephanie Kolitsch
University of Tennessee at Martin
E-mail: skolitsc@utm.edu

NCTM Representative and Parliamentarian: Marylu Dalton
Austin Peay State University
E-mail: daltonm@apsu.edu

Vice-President for Elementary: Jessica Willings
Jefferson County School System
E-mail: jwillings@jcboe.net

Vice-President for Middle Schools: Jenna Freeman
E-mail: freeman_jenna@hcde.org

Vice-President for Secondary Schools: Jennifer Axley
Webb School of Knoxville
Email: Jennifer_axley@webbschool.org

Vice President for Two-Year Colleges: James Adair
Dyersburg State Community College
Email: adair@dscc.edu

Vice-President for Colleges/University: Jennifer Meadows
Tennessee Technological University
E-mail: jrmeadows@tntech.edu

Examinations Director: Brian Wagner
University of Tennessee at Martin
E-mail: bwagner@utm.edu

Contest Coordinator: Daryl Stephens
East Tennessee State University
E-mail:stephen@mail.etsu.edu

Contest Awards Chair: Jackie Vogel
Austin Peay State University
Email: vogelj@apsu.edu

TMTA Bulletin Editor: Teresa Agee
Martin Luther King Magnet School
E-mail: teresa.agee@mnps.org

Membership Coordinator: Stephanie Kolitsch
University of Tennessee at Martin
Email: skolitsc@utm.edu

Social Media: Jessica Willings
Jefferson County School System

Inside This Issue

President's Message

Fabulous Teachers of Tennessee,

I am honored and excited to serve as your President of TMTA. This is an important role, and I will do my best to uphold the mission and values of our great organization. I consider our roles as educators the most important of all. It's not just about imparting knowledge. It's about inspiring minds, fostering creativity, and cultivating critical thinking. We are shaping future generations of innovators and leaders. (No pressure, right?!)

As we navigate the challenges and the ever-changing landscape of education, I want to take a moment to express my deep appreciation and respect for everything you do and have to endure. It takes resilience, adaptability, and dedication to survive in this profession. It is worth the effort because the impact we have on students is immeasurable. Thank you for your tireless efforts and perseverance.

As we move forward, let us continue to support one another, share resources, and collaborate to provide the best possible learning experiences for our students.

Ellen Matheny

Public School Teachers:
The state has a website for teachers. It includes the standards for each discipline and other resources available so that we may increase student success. As many of you know, middle and high school standards have added more statistics standards. Now the website has included videos that address those standards as a refresher for us who may not have taught or practiced this content since our own college days. The link to the website is:
https://bestforall.tnedu.gov/
On the homepage is a link to the revised standards. You will find the information that you need when you go to your grade band. Another useful feature on the website is a standards crosswalk so that you can see what you have been doing and where you are going.
They also have a website with release items that you can use with your students to prepare for TCAP or the EOCs. It is at: TN Department of Education: Assessment Development - LiveBinder (livebinders.com)

Affiliates

CAMTA
Chattanooga Area Mathematics Teachers' Association
Emily McDonald
Hixson High School
mcdonald_emily@hcde.org

MAC-O-TOM
Memphis Area Council of Teachers of Mathematics
Elizabeth Kirby
Shelby County School System
kirbyea@scsk12.org

MT^{2}NW
Mathematics Teachers of Tennessee – Northwest
Crystal Johnson
East Junior High School
crystal.johnson@fcsk12.net

(MT)^2
Middle Tennessee Mathematics Teachers
Lea Keith
East Robertson High School
Teresa.Agee@mnps.org

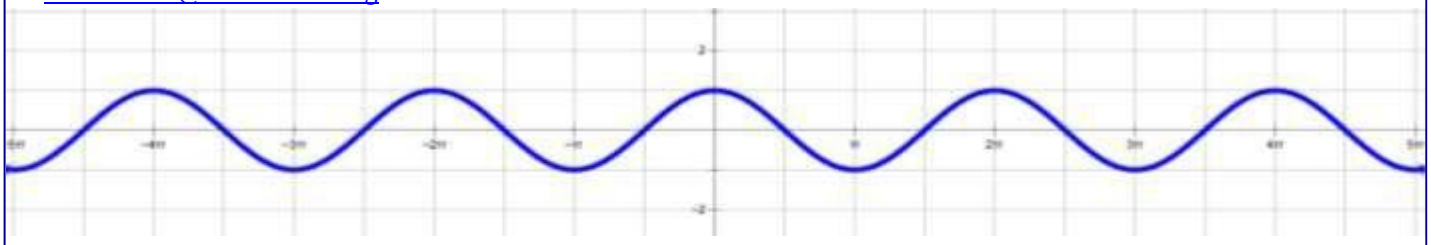
SM^{2}EA
Smoky Mountain Mathematics Educators' Association
Alice Carson
Powell High School
Alice.carson@knoxschools.org

TAMTE
Tennessee Association of Mathematics Teacher Educators
Becky Darrough
Austin Peay State University
darroughr@apsu.edu

TMATYC
Tennessee Mathematics Association of Two Year Colleges
James McCoy
Chattanooga State Community College
james.mccoy@chattanoogastate.edu

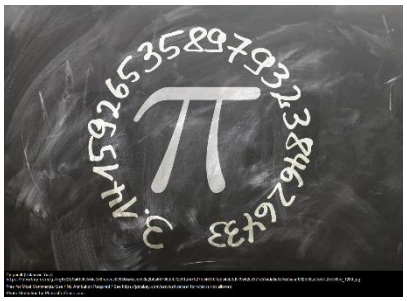
UETCTM
Upper East Tennessee Council of Teachers of Mathematics
Pam Stidham
Kingsport City Schools
pstidham@k12k.com

TATM Student Affiliate
Tennessee Aspiring Teachers of Mathematics
Susan Conner
Austin Peay State University
Sconner6@my.apsu.edu



Calendar of Events

Middle School Math Contest	April 4, 2024
High School Math Contest	April 2, 2024
NCTM Annual Conference	Sept 25 –28, 2024 Chicago, Ill.
TMTA Mathematics Conference	September 27-28, 2024 Martin, TN



Desiree McCullough

Advanced Degree Scholarship Award

Are you pursuing an advanced degree to improve your mathematics teaching? There are scholarship funds available to support your learning!

The TMTA Desiree McCullough Advanced Degree Scholarship Award is awarded to a TMTA member currently teaching in Tennessee and pursuing either a Masters, Ed.S., or doctoral degree to improve his or her mathematics teaching.

The award includes a $1000 Scholarship and free TMTA membership for a year.

All you need to do is click on this link: https://tmta.wildapricot.org/page-18062 and follow the directions on the application.

The deadline for the application is May 1. Don't delay! *We want to support you in your pursuit of teaching excellence!*

Congratulations to the 2022 recipient: Craig Carter
No award was given in 2023 – don't miss out on this opportunity!

TMTA Scholarship Opportunities

Dr. Henry Frandsen Scholarship for Teachers

Criteria:

- Applicants must be committed to teaching mathematics in Tennessee at either the secondary or elementary level
- Applicants must have declared an appropriate major at their institution
- Deadline May 1st

Recent Past Winners:

- 2014: Leanna Ruth Murdoch
- 2015: Elizabeth Barlow (UT Knoxville)
- 2016: Courtney Wright (MTSU) and Hillary Grant (UT Knoxville)
- 2018: Allison Brown and Jenna Dula
- 2019: Isamar Rachal (Austin Peay State University)
- 2020: Kaycie Hartwig (APSU) and Maggie Weaver (UM)
- 2021:
- 2022: Shelby Gibson Breighner (APSU) and Charis Johnson (Bryan College)
- 2023: No award given
- 2024: Now accepting applications at **https://tmta.wildapricot.org/page-18062**

TMTA Grant Opportunities

$1000 Classroom Mini-grant

Criteria:

- Applicant's school or district must demonstrate need
- Applicant must attend the TMTA Fall Conference to receive your award
- Applicant must speak at the next TMTA Fall Conference about your use of the mini-grant
- Application deadline is September 1st

Recent Past Winners:

- 2013: Tammi Terry
- 2014: Lea Keith
- 2015: Emily McDonald
- 2016: Deana Secrest
- 2017: Teresa Agee
- 2018: Tabitha Rainwater; Dewaine Gleeton and Marvin Jones
- 2019: No award given
- 2020: No award given
- 2021: Kendra Poszywak
- 2022: Samantha Deems
- 2023: Leigh Ann Henry
- 2024: NOW TAKING APPLICATIONS at **https://tmta.wildapricot.org/Grant**

Join the TMTA Facebook page at Tennessee Mathematics Teachers Association – TMTA!

Tennessee Mathematics Teachers Association

Test Writers Needed!

High school math test writers are needed! Each of the six exams (Algebra I/Integrated I, Algebra II/Integrated III, Geometry/Integrated II, Precalculus, Calculus and Advanced Topics, Statistics) is a 40 question multiple choice test, with each question having five possible responses. Writers should include additional questions for consideration. TMTA will pay a single stipend of $500 to the author once the test has been submitted, reviewed, corrected if necessary, and accepted for use. Qualified applicants should work in a post-secondary setting and have at least a year of experience. A test writer guideline is available for interested applicants.

If you are interested, please e-mail the Examinations Director.

Examinations Director
Brian Wagner
Department of Mathematics and Statistics
E-mail: bwagner@utm.edu

If you would like copies of some previous tests, these are available on the TMTA website: https://tmta.wildapricot.org/Contests.

If you would like to share information, lesson plan ideas, or tips for instruction, please email Teresa Agee at teresa.agee@mnps.org. Please note the photos used are from NCTM, TMTA, or creative commons. Here are a some things shared by our members this time:

The APSU Math Trail: An affordable school field trip

A math trail is an opportunity to observe, wonder, and engage in mathematics that occurs in everyday objects and occurrences. The activity is designed for participants to discover mathematics by taking notice of the beauty and patterns of mathematics all around them (Shoaf et al., 2004). Students are more likely to make connections when learning with contextualized forms in the physical world, where they can see and understand the connections to mathematical concepts by immersing themselves in authentic, relevant contexts (Crompton, 2020). Students may think mathematically in a different way in a situation in contrast to classroom learning. This can enhance their learning experience and their understanding of mathematical concepts (Williams, 2014).

There are existing math trails worldwide, including the Bronx Zoo in New York City, the Bob Moses Math Trail in Massachusetts (City of Cambridge, 2023), the city of Melbourne, Australia (Shoaf et al., 2004), the city of Semarang in Indonesia (Cahyono, 2018), and a whole network of trails in locations across Europe and Africa (Erasmus+ Programme, 2018; MATIS I, 2012). Austin Peay State University in Clarksville is now home to a math trail with an emphasis on topics typically explored in middle school grades.

Those who participate in the APSU Math Trail are encouraged, through a guidebook, to notice, discuss, and solve interesting mathematical problems. There is no competition between participants, or grading for school credit, just an opportunity to look at mathematics through a different lens (Shoaf et al., 2004). Some of the activities and problems may be completed as the participants walk the trail, and others might be done once some data has been collected (Richardson, 2004). Yet other activities encourage participants to just consider the mathematics they experience.

The APSU Math Trail is a self-directed twelve-stop tour which begins and ends at the same

point for the participants' convenience. Some of the items are part of the architecture of the campus: the binary code on the façade of the mathematics and computer science building, a sundial on the corner of the technology building, and a cupola that had blown across campus during a tornado years ago. These items pique the interest of many visitors to campus. How far did that cupola travel to its current resting place? How far is the walk from one building to another on campus? How tall is the water tower? The math trail provides answers to some of these questions. The APSU Math Trail includes mathematical concepts such as number systems, number sense, estimation, circumference, the coordinate plane, ratio of areas and volumes, circles, Pythagorean Theorem, and classic problems such as Euler paths and the handshake problem.

Along the math trail, students are engaged in mathematics and in ways to use concepts with which they are familiar. The youngest elementary students can find circles in the courtyard or count the windows in an array. Middle school and high school students can calculate distances using the Pythagorean Theorem, proportion and similar triangles, or trigonometry with angles of elevation or depression to measure the height of a water tower.

At each stop along the trail, the guidebook provides pictures and diagrams so that participants can orient themselves. It also introduces them to the area and the concept to explore. They can answer a few questions within the booklet about the mathematics they encounter. Then, the students are entertained with some facts or trivia about the particular stop. They are prompted to consider the mathematics, but it is not necessary to work any problems as they walk the trail. Each trail stop concludes with directions to lead the participants to the next stop.

The city of Clarksville, where APSU is located, is host to about 20 Challenge Trails for participants to explore their interests, including historic sites, public art, scenic spots, and unique shopping (Challenge Trails, 2022). Most of these trails are intended for the adult population. This inaugural APSU Math Trail, which is geared toward middle school students, allows children to explore mathematics on their own terms and at their own level. The plan is to expand the APSU Math trail to encompass more grade bands, and possibly, to other areas in Clarksville.

We invite teachers to consider a field trip to Austin Peay State University to experience the APSU Math Trail. It is an affordable mathematics field trip for students from the local schools. Currently, there is no cost for participation in the APSU Math Trail. This means that the only costs would be for transportation and possibly a snack or lunch.

The APSU Math Trail engages students in using many of the Standards for Mathematical Practice (National Governors Association Center for Best Practices, 2010) in the moment and in their surroundings at each stop. A math trail gives students the connections to real life that can help them make sense of the mathematics that they are learning and to enhance their understanding of those mathematical concepts. This non-traditional learning experience is an opportunity to increase relevance, interest, and motivation for all students.

Acknowledgments

The APSU Math Trail is developed by Drs. Marylu Dalton and Jennifer Yantz.

We thank TIDES Foundation for providing our Math Trail project with funding through the Google Community grant program. We thank Austin Peay State University for providing additional funding and support for this project.

Works Cited

Cahyono, A. M. (2018). Mobile technology in a mathematics trail: how does it works? *Unnes Journal of Mathematics Education*, 7(1), 24-30.

Visit Clarksville TN. (n.d.) *Challenge Trails*. Retrieved April 28, 2023 from https://www.visit Clarksvilletn.com/things-to-do/challenge-trails/

City of Cambridge. (n.d.) *Bob Moses Math Trail*. Retrieved April 8, 2023, from https://www.cambridgema.gov/steam/MathTrail

Crompton, H. (2020). Conceptualizing STEM learning: Frameworks and Strategies. *Research on Outdoor STEM Education in the digiTal Age:* Proceedings of the ROSETA online conference, (pp. 13-22).

Dalton, M., & Yantz, J. (2024). Austin Peay State University Math Trail. *AP136/10-23/250*. Austin Peay State University.

Erasmus+ Programme. (2018). *Mobile Math Trails in Europe*. Retrieved April 28, 2023, from MoMaTrE: https://momatre.eu/

Math for America. (n.d.). *A Math Trail at the Bronx Zoo*. New York.

MATIS I (IDMI, Goethe-Universität Frankfurt a.M.). (2012). *Math City Map*. Retrieved April 28, 2023 from https://mathcitymap.eu/en/

National Governors Association Center for Best Practices. (2010). *Common Core State Standards*. Retrieved January 15, 2019, from https://learning.ccsso.org/common-core-state-standards-initiative.

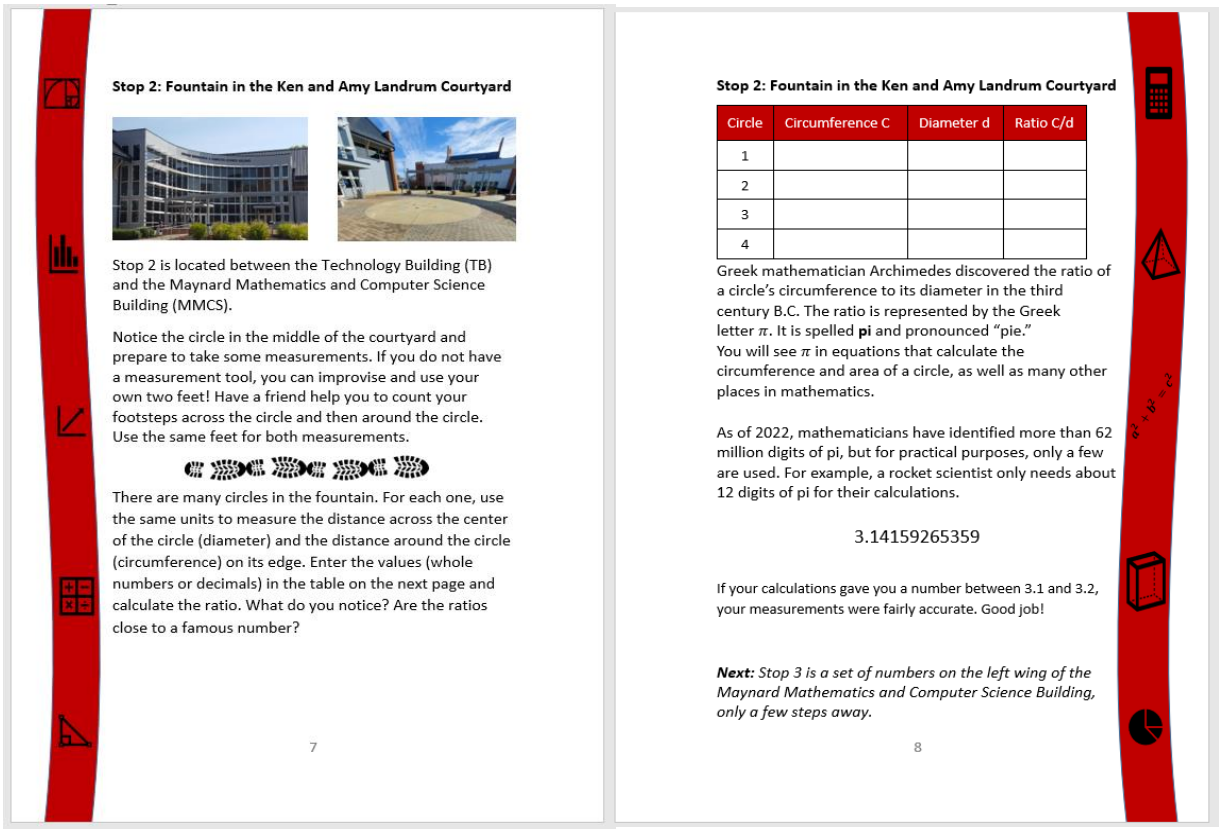
Richardson, K. (2004). Designing math trails for the elementary school. *Teaching Children Mathematics*, 11(1), 8-14.

Shoaf, M. M., Pollak, H., & Schneider, J. (2004). *Math Trails*. COMAP (The Consortium for Mathematics and Its Applications).

Williams, D. R. (2014). Making sense of 'place': Reflections on pluralism and positionality in place research. *Landscape and Urban Planning*, 131, 74-82.

Booklets are available at the Maynard Mathematics and Computer Science Building. For more information please contact:

Dr. Marylu Dalton daltonm@apsu.edu or Dr. Jennifer Yantz yantzj@apsu.edu



Stop 2: Fountain in the Ken and Amy Landrum Courtyard

Stop 2 is located between the Technology Building (TB) and the Maynard Mathematics and Computer Science Building (MMCS).

Notice the circle in the middle of the courtyard and prepare to take some measurements. If you do not have a measurement tool, you can improvise and use your own two feet! Have a friend help you to count your footsteps across the circle and then around the circle. Use the same feet for both measurements.

There are many circles in the fountain. For each one, use the same units to measure the distance across the center of the circle (diameter) and the distance around the circle (circumference) on its edge. Enter the values (whole numbers or decimals) in the table on the next page and calculate the ratio. What do you notice? Are the ratios close to a famous number?

7

Stop 2: Fountain in the Ken and Amy Landrum Courtyard

Circle	Circumference C	Diameter d	Ratio C/d
1			
2			
3			
4			

Greek mathematician Archimedes discovered the ratio of a circle's circumference to its diameter in the third century B.C. The ratio is represented by the Greek letter π. It is spelled **pi** and pronounced "pie."
You will see π in equations that calculate the circumference and area of a circle, as well as many other places in mathematics.

As of 2022, mathematicians have identified more than 62 million digits of pi, but for practical purposes, only a few are used. For example, a rocket scientist only needs about 12 digits of pi for their calculations.

3.14159265359

If your calculations gave you a number between 3.1 and 3.2, your measurements were fairly accurate. Good job!

Next: *Stop 3 is a set of numbers on the left wing of the Maynard Mathematics and Computer Science Building, only a few steps away.*

8

(An excerpt from the APSU Math Trail guidebook)

Math Manipulatives for Special Education Students

Samantha Deems, Austin Peay State University
Dr. Mary Dalton, Austin Peay State University

Abstract

Using a mini-grant I received from the Tennessee Mathematics Teachers Association (TMTA), our team purchased math manipulatives that will help special education students to learn math with pop-its, magnetic numbers, Learning Resource clocks, and fidget game cards. This is helping 10 children currently and many more who will being coming to Stuart Burns Elementary in years to come. The students use these math manipulatives every day. The hands-on activities are designed to help those with special needs who already struggle to learn. These tools help to strengthen their math skills in basic areas such as counting, adding and subtracting, telling time, and identifying shapes. Learning with manipulatives will expand their learning by helping them understand and grasp concepts in different ways. In the short time that we have been using these items, their teachers have already seen improvement in every student.

Introduction

I applied for this grant because every child deserves the best education they can receive no matter what. Teachers can only put so much money out of their pocket for items they need for their classroom. I wanted to help as much I can even if it is just a little bit. So, I applied for this grant to help a local elementary special education teacher get Math Manipulatives for her classroom. I am so blessed and thankful to have won this grant and to see these new Math Manipulatives be put to use and helping these children grow and learn more and more everyday.

Methodology

The teachers use these math manipulatives in the classroom in many ways. They use the hundred chart poppets to help students learn how to count. The magnetic numbers and symbols are used on a white board to form equations. This helps students to better visualize it and they can write all around it. They can use the poppets to help them understand and visualize the equations and expression that are formed with the magnetic numbers. The fidget game with 3-D shapes and colors helps them be able to start learning to identify and sort their colors and shapes. The hands-on clocks help them learn about time. They are able to move the hands and see the clockwise action of the hour hand when you move the minute hand. The telling time fidget game helps them be able to test their ability to tell time while playing a fun interacting game. All these manipulatives can be used in very different ways and can even be used together. While playing a game and having fun they may not even realize that they are learning.

Qualitative Results

The teachers have observed that the students are learning and progressing more with all these new experiences. Every student learns differently, and the teachers are now able to adapt to help every one of their students' needs. The kinesthetic and tactile needs of the special education students are being met through these hands-on experiences.

The teachers are realizing that the students are grasping and understanding the addition, subtraction, counting, telling time, colors, and shapes so much more now because of the hands-on experiences. The students seem to be more engaged in learning with the colorful manipulatives and games. They are able to identify numbers and count to higher numbers now with the poppets and using the magnetic numbers. The teacher noticed that students who struggled before are now more engaged and are making strides in their mathematics skills and knowledge. The teacher notices improvements for the students every day.

Discussion

The students' attitudes have changed drastically over these last few months. Special education students sometimes feel defeated because they do not understand, or they might be having a bad day. Now, they come into class ready to learn and ready to see what they are going to do in math today. They are excited to learn every single day. They are ready for hands-on activities and ready to do math with the poppets and games.

The students are more engaged in everyday activity now that the teacher has them more focused and ready ; this was difficult to accomplish without these tools. The teacher would try to incorporate coloring, however, that is not always enough to help the student stay engaged and focused. The teachers can adapt what she has planned for them to best fit their needs because they have more options to incorporate into the lessons and keep the students engaged and interested. For some students, poppets can help sooth them or give them some calmness.

Student learning has changed to more hands-on experiences, games, and being able to move around and interact with each other and the teacher. Special education students learn in so many different ways, so the teacher has to find the best way to help and teach all the students that walk into their classroom everyday and every year. You never know what kind of mood they will be in or if they are ready to learn and engage. With these new manipulatives, the teacher is better able to fit their needs and still have them learn regardless of the students' moods. When the students are engaged in using the manipulatives, they are having fun and don't even realize that they are learning math at the same time.

References

Tennessee State Standards (tn.org)

Acknowledgements

I would like to thank the Tennessee Mathematics Teachers Association (TMTA), for the mini grant that is helping this school and students!

Arielle Vankin, a senior at Dickson Co. High School did a research project for a dual-enrollment English Class entitled ***Impediments to Math Comprehension in Primary and Secondary Education.*** She presented her research to teachers at the Middle Tennessee Math Teachers conference and this is well worth the read. The research is too long to be included here, but here is a link to her paper:

https://tmta.wildapricot.org/resources/Vaknin%20Math%20Comprehension%20Research%20Paper.pdf

Do you need to find a support group specific to your teaching?

Check out the following Facebook Groups.

- Teach With Tech
- Teachers using Canvas
- AP Statistics Teachers
- Distance Learning For Upper Elementary Teachers
- Technology In The Classroom With Google Tools And More
- Canvas For Secondary Educators
- https://www.facebook.com/groups/HyperDocs
- https://www.facebook.com/groups/breakoutedumath
- https://www.facebook.com/groups/MidTNMath
- https://www.facebook.com/groups/1653035008300751
- https://www.facebook.com/groups/GCforTeachers
- https://www.facebook.com/groups/MathTeacherCoach
- https://www.facebook.com/groups/445786889466638
- https://www.facebook.com/groups/135807663706569
- https://www.facebook.com/groups/234085607832150
- https://www.facebook.com/groups/BMMmembersOnly
- https://www.facebook.com/groups/STEMteachersgroupMSHS
- https://www.facebook.com/groups/147158235484661
- https://www.facebook.com/groups/147158235484661
- https://www.facebook.com/groups/BuildMathMinds
- (3) AP Precalculus Teachers | Facebook
- (3) AP Calculus TEACHERS - AB/BC | Facebook

TMTA Annual Conference Information

Sponsored by:
TMTA and MT^{2}NW

Location:
University of Tennessee at Martin
September 27-28, 2024

This year's theme is Perseverance and Ingenuity in Mathematics. Speaker proposal forms, registration forms, and more information is available at https://tmta.wildapricot.org/.