MTCircular

Autumn 2019

Circling to Connect Building Math Joy
Small Grants Awarded News and Views
A Better World Through Math Gloria Brown Brooks
Surprising Connections

Dear Math Teachers’ Circle Network,

What connects leisure-seeking ancient Romans with two children on a playground with a single stick of sidewalk chalk? Tic-Tac-Toe! The cover article connects Tic-Tac-Toe to “Gobblet Gobblers,” which introduces a challenging twist on the familiar game that your MTC will enjoy exploring and analyzing, not to mention playing!

Throughout this issue, we explore ways of building on the community of your MTC to make new connections. For example, “Circling to Connect” describes programs and opportunities that are a relatively easy “next step” for MTCs whose members want to become more deeply engaged. We also celebrate the retirement of Gloria Brown Brooks, who was a founding member of the first MTC in 2006 and has been a true inspiration to all of us in the Bay Area MTC community as well as a leading advocate for mathematics and social justice nationally. Gloria eloquently describes how participating in MTCs can lead to a deeper understanding of the value of diversity in problem solving: “We are all the same, but we all think differently. It really opens your mind to see that. There is definitely a real-world lesson there.”

This fall, we’d like to challenge your MTC to try out something new together! Take a page from “Circling to Connect” and commit to organizing a Julia Robinson Mathematics Festival for your students and their families. Or help a local school start a Math Monday program so that more students can experience games as the “literature of mathematics,” as Math Monday founder Scott Kim describes it. Explore the living history of mathematics through doing a Math News Snapshot (MNS) as a Math Teachers’ Circle, then share the MNS with your students to ignite their mathematical imaginations. Consider forming teams to carry out scholarly or practitioner-focused projects, such as developing inquiry-oriented classroom materials that double as MTC sessions, or writing an article for the new Journal of Math Circles. Be inspired by the example of Gloria Brown Brooks and pledge to keep each other accountable as advocates for equity and social justice in your daily work.

We look forward to hearing about your experiences!

Happy problem solving!

Brianna Donaldson, Director of Special Projects
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Cover photo: neverendnoend, Flickr Creative Commons.
New Takes on an Old Classic

TIC TAC TOE 2.0

By Catherine Pullin Lane and Lynne M. Pachnowski
The game of Tic-Tac-Toe, or, as the British call it, Noughts and Crosses, has roots going back centuries. Grid-style game boards have been found in Ancient Egypt, during the Roman Empire, and in our current age on placemats at many restaurants, throwing a lifeline to parents trying to keep wiggly children entertained.

Those who have played Tic-Tac-Toe enough times may have discovered that if the player who makes the first move is strategic, that player will always either win or the game will end in a tie (also known as a “cat’s game”), as shown here:

```
O | X | X
---+---+---
X | O | O
---+---+---
O | X | X
```

Once the players know this strategy, they may lose interest. After all, it is not much fun to play if you know you cannot win! However, our Math Teachers’ Circle came across a related game called “Gobblet Gobblers” that puts the challenge back into Tic-Tac-Toe and engaged us for hours.

Warming Up with Tic-Tac-Toe

In true inquiry-based fashion, the session begins with an engaging situation. The teachers play a game or two of Tic-Tac-Toe with a partner and then are asked, “What do you notice? What do you wonder?” Their discussion typically begins with comments such as, “I noticed that the player who begins is typically the one who wins,” or “I wonder if there is a way to be the second player and guarantee a win.”

The second stage of every good inquiry-based lesson is to allow the learners to explore. So, in our session, teachers play a few more games while being more reflective about some of their questions. After a few minutes, we ask the teachers to explain their strategies, which is the third stage of an inquiry-based lesson. The discussion that follows often involves the advantages or disadvantages of various approaches. Teachers typically hypothesize that the best first play is either to play at a corner or in the center. In one session, a teacher stated that she prefers to make her first play in the center because there are more opportunities to win. Her argument was that a beginning move to the corner leaves three possible wins, but a beginning move to the center leaves four possible wins. This argument is a natural segue to the group developing a comprehensive description of Player 1’s winning strategy. Computer Science for Fun has a great unplugged computer science activity, the “Intelligent Paper” (http://www.cs4fn.org/teachers/activities/intelligentpaper/intelligentpaper.pdf), which provides a written description of the strategy. The strategy can also be encapsulated in a flow chart or decision tree, as in the figure accompanying this article. Another great direction to explore is to identify the number of distinct possible games, including the number of distinct positions of a “cat’s game.” (Spoiler alert: There are only three of the latter!)

Visit Wikipedia (http://en.wikipedia.org/wiki/Tic-Tac-Toe) for a good overview of these and many other mathematical questions involving the game.
Never Lose At Tic-Tac-Toe Again!

This decision tree, in which you are hypothetically playing the X's, outlines a strategy in which you will always either win or tie.

Go first. Go in a corner.

1. Is opposite corner free?
   - Yes: Go in opposite corner.
   - No: Go in a free corner.

   1. Is there a row with two X's and a space?
      - Yes: Go in that space.
      - No: Go in a free corner.

      WIN!

   2. Is there a row with two O's and a space?
      - Yes: Go in that space. (BLOCK!)
      - No: Go in a free corner.

      WIN!

   3. Is there no row with two X's or two O's?

      etc.

   2. Is opposite corner taken?
      - Yes: Go in opposite corner.
      - No: Go in a free corner.

      1. Is there a row with two X's and a space?
         - Yes: Go in that space.
         - No: Go in a free corner.

         WIN!

      2. Is there a row with two O's and a space?
         - Yes: Go in that space. (BLOCK!)
         - No: Go in a free corner.

         WIN!

      3. Is there no row with two X's or two O's?

         etc.
All of these discussions about Tic-Tac-Toe illustrate that it is a problem with “multiple entry points.” Whatever grade level we teach, and regardless of our particular math content background, we can build on a common experience with Tic-Tac-Toe and investigate questions about strategies.

**Tic-Tac-Toe With a Twist**

Gobblet Gobblers is a variation on Tic-Tac-Toe. The commercial version of the game, produced by Blue Orange, can be purchased inexpensively and has won several prestigious awards. Game box pieces include:

- Four bars that can be arranged into a three-by-three grid
- Six orange “gobblers” (two each in small, medium, and large sizes)
- Six blue “gobblers” (again, two each of small, medium, and large)

The game may be easily modified for a large group by making grids on large sheets of paper and using three different sizes of opaque cups in two colors. Essentially, for the cost of a few packs of cups and some large paper, a roomful of thirty people can play.

To play the game, give Player 1 the six orange gobblers and Player 2 the six blue gobblers. As in Tic-Tac-Toe, the object of the game is to line up three of your pieces. During a turn you may:

1. Place any gobbler on the board in an empty space or over a smaller gobbler, or
2. Move any gobbler already on the board to an empty space or over a smaller gobbler.

Once you touch a gobbler on the board, you must move it.

The teachers are asked to play and to be ready to describe what they notice and wonder. After playing, we have teachers share their observations, which typically include such questions as, “Is it better to start with the big gobblers or with small ones?” “Should you start in a corner like Tic-Tac-Toe?” “Which is the better defense: to block in an open space, or to ‘gobble’ the opponent?” “Is there a situation in which you should ‘gobble’ your own piece?”

Another natural question is whether there is a winning strategy or strategies in Gobblet Gobblers. Creating a decision tree like the one in our simpler Tic-Tac-Toe game can become very layered, and is a rich and interesting activity promoting investigation.

We have found that playing the game alone takes about 45 minutes, while including more investigative activities easily brings the session to two hours. In our experience, it is beneficial for teachers to play Gobblet Gobblers in groups of four. This facilitates opportunities to discuss plays out loud and observe others play. In order to develop a winning strategy, pairs or groups may need to play collaboratively and not competitively, noting choices and decisions.

After introducing Gobblet Gobblers to the MTC Network, we predict that it will become a perennial hit and one of those classic games available at immersion workshops and other gatherings. Teachers share that they have taken it back to their classrooms at all grade levels, not to mention that it has also made its way to many a kitchen table in our area.

Catherine Pullin Lane (Baldwin Wallace University) and Lynne M. Pachnowski (University of Akron) are leaders of the Rubber City MTC in Akron, Ohio.
Fundamentally, Math Teachers’ Circles are communities of mathematics professionals focused on sharing the joy and challenges of math and of teaching with one another. As such, MTCs can also provide the human resource infrastructure for concrete efforts to improve mathematics education and build joyful math culture among students, families and communities.

Here we feature two successful models that, respectively, connect MTCs with carefully designed inquiry-oriented classroom materials (Circles of Inquiry), and build on the expertise of MTC members to bring joyful math to students and families (Julia Robinson Mathematics Festivals). In addition, we also highlight three new opportunities that we believe are complementary to and synergistic with the work of MTCs: a student- and parent-focused math culture-building program (Math Monday), a program for introducing students to contemporary research in mathematics (Math News Snapshots), and a scholarly publication outlet for researchers and practitioners working in the Math Circle space (Journal of Math Circles). We hope you enjoy learning about these programs and opportunities, and that they spark new and exciting ideas to nurture your MTC’s growth.
In Upstate New York, we’ve been using Math Teachers’ Circles to promote inquiry-based learning in middle and high school classrooms. Our project, funded by a grant from the STEM education organization 100Kin10, is a collaboration among the MTC Network, the Initiative for Mathematics Learning by Inquiry, and the Greater Upstate New York Inquiry-Based Learning Consortium. To begin the project, which we call “Circles of Inquiry,” two teams were formed in the summer of 2018, one in Buffalo and one in Rochester. Each team comprises four teacher-leaders and two college faculty members. Teacher-leaders worked together with the college faculty members to develop a library of inquiry-based course modules. During the summer, we held workshops to build a shared understanding of what inquiry-based teaching means at the K-12 level, to determine which topics would be covered in the modules, to begin writing them, and later, to share our results. Some of the modules are inspired by activities the teacher-leaders have used in class before and some are brand new. Many of the topics (for example, expressions, equations, and percents) were chosen specifically because the teachers had found that their students struggled with these topics on state assessments. During the 2018-2019 academic year, the teacher-leaders used the modules in the classroom and made refinements as needed. The revised modules are available for download at the project website: https://sites.google.com/view/circlesofinquiry/.

Two Math Teachers’ Circle series were held in the 2018 – 2019 academic year, one in Rochester, focused mostly on the modules geared toward the middle school curriculum, and one in Buffalo, which largely (though not exclusively) focused on introducing the modules geared toward the high school curriculum. During a typical Math Teachers’ Circle session, one or two of the teacher-leaders showcased a module by having the participants work through some of the activities, explaining some of the motivation behind it, highlighting facets that give rise to different student strategies for solutions or interpretations, or creating ancillary activities that went beyond the student activities. The teacher-leaders also sometimes showcased creative uses of pedagogy or technology so that those in attendance got professional development value beyond just the modules. Connections to the New York Next Generation Learning Standards (akin to the Common Core) were also made explicit.

Often, more “traditional” Math Teachers’ Circle activities were included to round out the evening. These were meant to engage the attendees as mathematicians rather than provide them with materials for them to use in their own classrooms. However, we have found that trying to stick with the theme of the night (e.g., if we were talking about linear equations, we would pick an engaging activity which is “linear” in some way) has meant that usually some facets of the MTC activity could also be envisioned for classroom use. This is an ongoing project and will see further development in the 2019-2020 academic year.

“Some of the modules are inspired by activities the teacher-leaders have used in class before and some are brand new.”
In Saturday, May 11, 2019, about 100 students and their families gathered at Gwinn Elementary School in San Martin, Calif., about 25 miles south of San Jose, for a Julia Robinson Mathematics Festival (JRMF; see https://www.jrmf.org/).

JRMFs are locally organized events intended to inspire K-12 students to explore the richness and beauty of mathematics through problem solving. Founded in 2007 by Silicon Valley native and math puzzle enthusiast, Nancy Blachman, JRMFs are collaborative, community-friendly mathematics festivals intended to serve as an alternative to competitions for getting students—especially girls and underrepresented minority students—and their surrounding communities engaged in mathematics. To inspire participants to persist in mathematics, Blachman named the festivals after mathematician Julia Robinson, who was one of the solvers of Hilbert’s tenth problem and who overcame many obstacles to achieve a highly successful career as a woman in mathematics. Over 100 JRMFs are held each year at locations throughout the U.S. and the world.

The JRMF at Gwinn was special because it marked the beginning of a collaborative partnership between the American Institute of Mathematics (AIM) and the Santa Clara County Office of Education (SCCOE), which serves nearly 300,000 students in the most populous county in the San Francisco Bay Area.

The partnership focuses on bringing JRMFs to Santa Clara County’s Title I schools, like Gwinn. MTCs organized by AIM will play a critical role as the partnership develops. In particular, teachers from Santa Clara County schools will participate in AIM MTC meetings that will incorporate JRMF activities and facilitator training, so that the teachers can help facilitate students’ problem-solving during the planned JRMFs. In addition, SCCOE will help advertise and recruit key players to bring JRMFs to other schools.

It is anticipated that several additional JRMFs will be held as a result of this partnership in 2019-2020. “We envision these JRMFs, combined with MTCs and other synergistic programs like Math Mondays [see page 12], as forming the basis for strong, school-based mathematical communities,” said Brian Conrey, Executive Director of AIM. “We hope that this partnership with SCCOE can grow into a model that is of interest to other MTCs looking to connect more directly with schools.”

JRMF activities are highly accessible, yet provide opportunities for rich investigation. Two of the activities used in the Gwinn JRMF were “Puppies and Kittens” and “Queen’s Move.” (See right.) We invite you to explore this pair of activities with your MTC and see what unexpected connections you can discover. These and other resources can also be found on the MTCircular website at http://www.mathteacherscircle.org/newsletter.
QUEEN'S MOVE

In this game, a single Queen is on a chessboard. She may make three possible moves:
- Any number of spaces to the left
- Any number of spaces downward
- Any number of spaces on the downward-left pointing diagonal

One player decides the starting square for the Queen, and then the other player decides which player moves the Queen first. Two players take turns using these moves, and whichever player moves the Queen to the bottom-left square wins.

Challenges
1. Can you find a winning strategy for one of the players?
2. Play multiple games with a partner where the Queen starts on the following squares: C2, C5, G8, E8.
3. Identify starting squares for which it is better to be the first player to move the Queen, and squares for which it is better to be the second.
4. How does the game change if instead of a Queen, you and your partner are moving a Rook or a King?
Math Monday is a weekly drop-in lunchtime activity where students of all ages can get hands-on with math games, puzzles and manipulatives that help build their math skills. The program was created by puzzle designer and math joy advocate Scott Kim, who started the first Math Monday in 2017 with other members of the parent community at Washington Elementary School in Burlingame, Calif.

At Math Monday, students have the opportunity to play physical (never screen-based) mathematical board games and puzzles. Unlike competitive math clubs, Math Monday is intended to reach all students at their own pace and is meant to complement other math culture-building opportunities like Math Circles, Julia Robinson Mathematics Festivals, and Family Math Night.

Elementary schools, middle schools, high schools, and home schoolers can all benefit from starting their own Math Monday. We recommend holding the program weekly during lunch in a large public space like a multipurpose room or library, so all students can attend. The program is designed to be run by parent and community volunteers, so that it involves families and does not burden teachers. After the start-up cost of buying, printing, or making games, the program is free.

For more information, along with game and puzzle recommendations for your local Math Monday, please visit [http://www.mathmonday.net](http://www.mathmonday.net) or contact Scott Kim at scott@scottkim.com.
WORD MAZE

Draw a line from arrow to arrow that visits the letters M-A-Z-E in order, without entering any box more than once.

SUDOKU

Fill the grid so every row, column, and outlined region contains all the numbers 1 through 5. Hint: never guess!

NUMBER TILES

In each number sentence, write the numbers 1, 2, 4, and 7 in the boxes so the equation is true. You must use all four numbers in each equation.
Do you enjoy hearing a clever solution to an interesting math problem you were not able to figure out by yourself? Do you find a well-written expository paper interesting and fulfilling? Do you like a vivid presentation of a counterintuitive mathematical result you are not familiar with?

The Math News Snapshots (MNS) project is built on the premise that not only adult mathematics professionals, but also high school students, should have the opportunity to learn about and enjoy contemporary research in mathematics as part of their education. Quite often the hierarchical nature of mathematics does not make contemporary mathematics accessible to students’ active learning. On the other hand, ignoring the vivid and prolific nature of contemporary mathematics leaves students thinking that all the mathematics has been “done” already. Consequently, they often do not understand what it is that living mathematicians actually work on. We argue that learning about new findings is as necessary for widening students’ mathematical horizons as having them experience the joy of problem-solving firsthand.

MNS lessons provide a glimpse into contemporary mathematics tailored to be accessible to high school students. Each MNS is in the form of a PowerPoint presentation with suggestions for augmenting pre- and post-presentation activities. It is focused on a single result, along with its background, implications, and applications where relevant. (Please see the project website at https://mns.org.il for examples.) We suggest interweaving MNS lessons one at a time, periodically throughout the ordinary curriculum.

The MNS project started in Israel in 2012 and has become well established there. For example, in the current school year, the Israeli Ministry of Education is supporting 83 high school teachers to disseminate MNS lessons. In 2017-2019 we have been carrying out a longitudinal study supported by the Israeli Ministry of Science to investigate the long-term effects of introducing high school students to mathematical news on a regular basis throughout their three years of high school.

Currently our team is looking for pilot sites and partners who are interested in bringing MNSs to U.S. classrooms. Please contact Nitsa Movshovitz-Hadar at nitsa@technion.ac.il to learn more about the project.

More Information
MTCircular is excited to announce a new peer-reviewed, open-access journal! The Journal of Math Circles (JMC) publishes high-quality, practitioner-focused articles documenting best practices for outreach and professional development in alignment with Math Circle core values: using worthwhile mathematical tasks, fostering problem-solving habits of mind, and building communities of mathematical thinkers and problem solvers. The journal was created in response to the increased engagement of mathematics professionals in scholarly thought and action around Math Circles over the past decade. Articles are authored by and for mathematics professionals, including K-12 teachers, who organize a wide range of community-responsive programs for K-12 students and teachers across the country. JMC publishes a minimum of one issue per year with special issues on themed topics. Learn more at https://digitalcommons.cwu.edu/mathcirclesjournal/, or contact JMC’s founding Editors-in-Chief, Emilie Hancock (emilie.hancock@cwu.edu) and Brandy Wiegers (brandy.wiegers@cwu.edu), both of Central Washington University.

Write for JMC
JMC welcomes original submissions offering thorough, evidence-based reflective commentary focused on one of the following three areas:

- **Lesson Plans.** These papers are intended to support leaders of a Math Circle session or progression of sessions.
- **Outreach Programs.** These papers are intended to support individuals or organizations in starting or sustaining Math Circle outreach programs.
- **Professional Development.** These papers are intended to support leaders of K-12 Math Circle teacher professional development.

Review for JMC
Manuscript reviewers are vital to the publication process. Reviewers for JMC will gain valuable experience and help support the Math Circle community. Both experienced and first-time reviewers are welcomed.

“THE JOURNAL WAS CREATED IN RESPONSE TO THE INCREASED ENGAGEMENT OF MATHEMATICS PROFESSIONALS IN SCHOLARLY THOUGHT AND ACTION AROUND MATH CIRCLES OVER THE PAST DECADE.”
A Better World Through Math

Gloria Brown Brooks May Be Retiring, But She’s Not Slowing Down

Gloria Brown Brooks came from five generations of teachers, so naturally she was determined to never become a teacher. And yet, after a 20-year career as a math teacher in Hollister, Calif., Brooks officially retired this summer, laughing to herself about how wrong she was. “Back then, I took a substitute teaching job,” Brooks said. “It was supposed to be temporary, and yet, here I am!”

Even though her classroom days are coming to a close, Brooks has no plans to slow down her involvement in the wider mathematics community. She is a founder and leader of the San Benito County Math Talks MTC in Hollister, now in its tenth year. She was also a founding member of the first MTC that started meeting at AIM in 2006, even though it sometimes took her more than two hours to get there because of traffic. Brooks also continues to actively serve in the Instructional Leadership Corps, the California Partnership for Mathematics and Science, Delta Kappa Gamma, and TODOS: Mathematics for All. In 2018 and 2019, she was a state delegate to the National Education Association’s Representative Assembly. She is also a 2019 recipient of a Social Justice Award from Teachers 4 Social Justice, a 2006 and 2016 recipient of a Teacher of the Year Award, and a 2018 recipient of the Cathy Kinzer Professional Development Award, which honors commitment to equity in mathematics. Brooks wishes to extend a special thanks to San Benito County Office of Education, Suzie Caughey, Monterey Bay Area Math Project and AIM for helping make these various projects possible.

Congratulations on your retirement! What will you miss most about teaching?

“All my students! I particularly love middle schoolers. They’re so inquisitive and malleable. I love watching the light come on when they learn new things. I also loved teaching the high school Algebra, Geometry, and Algebra 2 classes.”

Personally, how did you bridge from a math teacher to a champion for social justice?

“I realized long ago that, as just one person, I had to start where I was. There were students right in front of me who were unacknowledged, disenfranchised, falling behind in school and in life. I did everything I could think of to make those students more aware of the beauty and joy of mathematics.”

More generally, how can mathematics be a tool for social justice?

“Students can do better in life by doing better in mathematics. You need math to be an engineer or a rocket scientist, but you also need math to be a plumber or a welder. You need math to save to buy a home, to go grocery shopping. If you grow to love math, you grow to love learning. And that’s something that will serve them well their whole lives.”

What is special about your MTC in Hollister?

“Hollister is a very rural, agricultural area, and it also has a large ‘bedroom community’ of commuters who work in the San Francisco Bay Area. There are fewer than 200 teachers in all of Hollister, and only about 20 middle school math teachers. It would be very easy for a community like ours to get left behind. One of
the teachers who has been with our MTC since the beginning told me that her involvement in the MTC has helped her grow as a teacher in ways she couldn’t have otherwise. The teachers especially benefit from the Circle bringing in outside presenters. It widens their horizons and their network. Also, the teachers collectively are really grateful that the MTC helps them become better problem solvers. It helps them to become better teachers in their classrooms. I am really proud of the work we have done, and I hope that the Circle will continue to grow in the future.”

Do you have any advice for teachers that are just starting out?

“Get to know the math behind the math. There may be that one kid in your class that asks a deep question that you can’t answer. Don’t just look in the back of the book for the answers. Research it. Foster your own deeper understanding and love of mathematics. When you love the subject, the students sense your enthusiasm and want to learn more. Math Teachers’ Circles are a great place to keep that fire burning!”

Do you have any advice for MTCs that are just starting out?

“Always have a backup plan for each session. Always bring an extra problem solving lesson with you just in case. And yes, I speak from experience.”

What is your favorite aspect of Math Teachers’ Circles?

“The community and the problem solving. It’s also a good reminder that there are so many different points of view to solve the same problems. There are so many different approaches. At a recent session, the six people at my table had three different approaches to a problem, and then the facilitator started walking us through a completely different approach. And it was all leading to the same correct answer. We are all the same, but we all think differently. It really opens your mind to see that. There is a definite real-world lesson there.”

– Interview by Jessa Barniol.

Additional reporting by Hana Silverstein.
News and Views

Math Teachers’ Circle Small Grants Awarded

The MTC Network is proud to announce that our longstanding seed grant program for new Math Teachers’ Circles was redesigned this year to focus on enhancing the diversity of the teacher and student populations served by MTCs nationally. Sponsored by Math for America, the American Institute of Mathematics, and other donors, our Small Grants Program consists of awards that support:

- New MTCs or statewide/regional networks focused on serving teacher and/or student populations traditionally underrepresented in mathematics
- Targeted efforts by existing MTCs or statewide/regional networks to enhance the diversity of the populations they serve

Congratulations to the following groups who have so far received funding through the competitive application process.

New MTCs:
- Tennessee Eastern and Appalachian MTC
- Rio Grande Valley MTC (TX)
- Middlebury MTC (VT)

Existing MTCs and Networks:
- California State University Dominguez Hills MTC (CA)
- Los Angeles MTC
- San Benito County Math Talks (CA)
- University of California, Santa Cruz MTC
- Fairfield County MTC (CT)
- Northwest Iowa MTC
- Triangle MTC (NC)
- North Carolina Network of MTCs

For more information about the grant program, please visit [https://www.mathteacherscircle.org/start-a-circle/grants/](https://www.mathteacherscircle.org/start-a-circle/grants/) or contact circles@aimath.org. Applications are considered on a rolling basis throughout the year.
Dispatches from the Circles

Local Updates from Across the Country

California • ✦
In June, the Monterey Bay Area Math Project (MBAMP) at the University of California, Santa Cruz, offered a Math Teachers’ Circle (MTC) Summer Institute under the direction of Judith Montgomery (Santa Cruz MTC), Administrative Director and Academic Facilitator of MBAMP.

The Summer Institute was attended by a mixed group of people, including K-12 teachers, K-12 math coaches, math professors, education professors, math graduate students, math education graduate students and teacher educators.

The Santa Cruz MTC won a MTC Network grant to increase access to this 3-day event, which was inspired by the format of an MTC immersion workshop. The event was also funded in part by The California Subjects Matter Project (CSMP), The Santa Cruz County Office of Education and eight school districts from Santa Cruz, Monterey, and Santa Clara Counties.

One response to an anonymous end-of-workshop survey said, “MBAMP definitely deepened my understanding in mathematics. I had so many ‘aha’ moments both as a learner and as a teacher. The teachers inspired me to teach with questions and lead students to discover answers. I felt my brain growing each morning, as I challenged myself to stretch past the limits I had subconsciously placed on myself. I am excited to return to school to do daily number talks and math games, running records to assess and help my students grow, and lesson study to observe and learn from my colleagues. Thank you!”

To learn more about the UCSC Math Project, MBAMP, visit http://mbamp.ucsc.edu.

Ohio • ✦
Chris Bolognese (co-founder of the Columbus MTC) recently completed his one-year term as Editorial Panel Chair for the Mathematics Teacher journal published by the National Council of Mathematics. He also served as a department editor for two years and has served on the editorial panel for three years. Additionally, Bolognese was recently one of 41 teachers accepted from 700 applicants into Cohort 4 of the Desmos Fellowship. He was also accepted to be part of the SIMIODE MINDE Educators Fellowship in Oregon, which is working on designing and facilitating mathematical modeling tasks using differential equations.

On April 30, Ohio University graduate student Rebin Mohammed (Southeast Ohio MTC) was recognized on the floor of Congress by Representative Steve Stivers (R - Ohio) as an example of the outstanding contributions of international students to research and education in the United States. Mohammed’s involvement with the Southeast Ohio MTC was highlighted in as follows: “Originally from Iraq, [Mohammed] is helping inspire the next generation of mathematicians by volunteering with the Southeast Ohio Math Teachers’ Circle and The Math League of Southeast Ohio, which coordinates math-related activities for diverse groups of middle and high school age kids.”

Participants at MBAMP’s Summer Institute share ideas in a problem-solving session.
MTC Network Leadership Team

- Estelle Basor, AIM
- Brian Conrey, AIM
- Tom Davis, San Jose Math Circle
- Brianna Donaldson, AIM
- David Farmer, AIM
- Mary Fay-Zenk, Consultant
- Tatiana Shubin, San Jose State University
- James Tanton, MAA
- Paul Zeitz, University of San Francisco
- Joshua Zucker, AIM and Julia Robinson Mathematics Festival

MTC Network Advisory Board

- Kristen Chandler, MATHCOUNTS
- Wade Ellis, West Valley College (Emer.)
- John Ewing, Math for America
- Richard Grassl, University of Northern Colorado (Emer.)
- Edward M. Landesman, University of California Santa Cruz (Emer.)
- W. J. “Jim” Lewis, University of Nebraska-Lincoln
- Jane Porath, East Middle School, Traverse City, Mich.
- Richard Rusczyk, Art of Problem Solving
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