

FACULTY FOCUS: Dr. Imani Goffney by Tarik A. Buli

Dr. Imani Goffney (center) with her students.

DR. IMANI GOFFNEY has spent much of her career researching the equitable teacher: a teacher that helps students develop mathematical proficiencies and helps students feel empowered to deploy their knowledge. Her hero, Dr. Gloria Ladson-Billings, describes this type of teacher as catching lightning in a bottle – when you see it, you know it. But Dr. Goffney is not quite satisfied with this answer. Can we identify the teacher practices that enable diverse learners to access mathematical content, and observe it using a protocol? If so, then can't we teach equitable teaching? Can we direct the lightning to strike? These are the questions that motivate her research.

To investigate these questions, Dr. Goffney developed the Mathematical Quality and Equity Observation Protocol (MQE). The MQE is a rubric designed for preservice teachers to gauge whether or not these teachers can notice and identify equitable teaching practices through observation of another teacher. Dr. Goffney led the Validation of the Mathematical Quality and Equity (MQE) Observational Rubric Workshop, where she invited researchers from a variety of institutions including Stanford, Michigan, and Wisconsin to discuss and use the observation protocol, to ensure its validity and reliability. For Dr. Goffney, the workshop helped her receive significant research support from colleagues and provided her with feedback on how to incorporate the protocol into teacher preparation.

Dr. Goffney began developing the framework for using the protocol for teacher preparation through an NSF grant titled, "Mathematical Knowledge for Equitable Teaching: Exploring Opportunities to Enable Pre-Service Teachers to Develop Ambitious and Equitable Teaching Practices." Dr. Goffney served as the

Principal Investigator on this exploratory study which researched how to improve the preservice elementary teachers' mathematical content knowledge and enabled them to use the MQE observation protocol to analyze teaching videos. The protocol is used to help understand teacher's instructional practices and then teach their equitable teaching practices to preservice teachers.

The goal of understanding and then teaching equitable teaching practices became the basis for the Elementary Methods course Dr. Goffney first taught at the University of Houston and now teaches at the University of Maryland. Working with Drs. Deborah Ball and Kara Suzuka, who at the time were at the University of Michigan, Dr. Goffney was able to break down Dr. Ball's elementary methods class into usable chunks and modules and infuse a deliberate focus on equity into the course. Dr. Goffney now teaches this course, with a team of two graduate students and two co-instructors, at the University of Maryland to pre-service elementary teachers.

This brings us back to our original question: can't we teach equitable teaching? Can we direct lightning to strike? For Dr. Goffney, the answer is a resounding yes. We can observe and teach equitable teaching practices. However, the magic happens, the lightning strikes, when the teacher builds relationship with the students. She teaches the practices which work in conjunction with what Dr. Goffney describes as a teacher who cares and is "deeply invested in the academic success and personal fulfillment of the kids." She explains that "for the kids who have had a rough go at life so far, and needs someone to care about them first before they're able to be pushed hard, you can see" that relationships make a difference.



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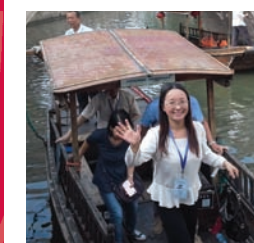
CENTER FOR MATHEMATICS EDUCATION + COLLEGE OF EDUCATION

CfME Explores Greater International Engagement

Over the last two years, faculty from the Center for Mathematics Education have been working with Teachers2Teachers Global, a nonprofit organization, to explore possibilities for collaboration on programs for inservice and preservice teachers from our area. This issue will highlight the work of faculty and graduate students with teachers from Guatemala, Ecuador, and Kenya.

There are a number of reasons that CfME faculty members value having an international component to the Center's activity. I will focus on two. First, perhaps pragmatically, our local area is rich in immigrant communities and the energy and diversity of perspectives, languages, and experiences that immigrants bring to a region. Working with T2T may be one way that we can help teachers in our community learn more about the home countries of many of the students we work with and to use that knowledge for the improvement of mathematics education in our community. While we will greatly miss Rodrigo Gutierrez as a Clinical Faculty, who returned to Arizona with his family this summer, CfME remains committed to working with our local school partners on providing English Language Learners in our community with supportive experiences in mathematics classrooms. We will be searching this spring for a clinical faculty member to help us move this work forward.

Second, visiting other countries and learning about mathematics education in those countries helps us all become more conscious of how mathematics education is a societal endeavor that reflects the society in which it takes place. For example, CfME has done work that explicitly pays attention to issues of race in the mathematics classroom. In this issue, the piece on Mathletics highlights the critical implications of our social and racial identities as participants in academic practices. Such a focus seems crucial in the U.S. Visiting other countries helps us consider how the role of race in U.S. mathematics education is but one manifestation of the ways in which mathematics education is embedded in societies.



Dr. Binyan Xu

As a member of the International Planning Committee for ICME 14, I am particularly interested in the Thematic Afternoon for the conference, during which international

CfME continues to explore how to provide our faculty and doctoral students with international experiences that will enrich our perspectives. Last spring, we hosted Dr. Binyan Xu (*pictured left*) from East China Normal University and co-chair of the local organizing committee for ICME 14 in Shanghai in July (a very hot month!) of 2020. Hopefully, we will have opportunities over the next decade to host some of her doctoral students, as well!

For nearly 50 years, the

CENTER FOR MATHEMATICS EDUCATION

in the College of Education has served as a scholarly voice for excellence and innovation in mathematics education, while nurturing the next generation of mathematics educators and researchers.



The First IPC Meeting for ICME-14, September 10-17, 2017 in Shanghai, China.

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Early elementary teachers from Galapagos at the end of a week-long professional development course.

Through Teachers2Teachers Global, UMD Faculty Partnered with Local Teachers in Three Countries

by Jenny and Chadd McGlone, *Teachers2Teachers Global*

THROUGH THE NONPROFIT TEACHERS2TEACHERS GLOBAL, seven University of Maryland faculty have stepped out of their classrooms to partner with local teachers in other countries. The UMD faculty offered support in STEM education by leading workshops and providing coaching.



Galapagos' elementary teachers working on data analysis investigations.

In early February, Dan Levin traveled to the Guatemalan beachfront community of El Paredon. The town's water tower had collapsed the week before he arrived, so he led the local teachers through a scientific investigation of why that happened. He also introduced them to the concept of exploration-before-explanation and the 5E instructional model. At another stop on his trip, Dr. Levin worked with indigenous Mayan teachers in a remote village in the southern highlands. Thanks to his coaching, educators there are now delivering science lessons that include student-centered tasks based on real-world phenomena.

The threesome of Drs. Carolina Napp-Avelli, Beatriz Quintos, and Ms. Alice Cook journeyed to the Galapagos Islands to join with a team of U.S. educators in delivering a week-long institute sponsored by the Galapagos Conservancy. Dr. Napp-Avelli worked

with all middle school mathematics teachers on the islands to develop a deeper understanding of rational numbers. Dr. Quintos and Ms. Cook led elementary educators through a study of geometry and data analysis. Their positive impact led one teacher to postpone his retirement, saying he wanted more time with his students to use what he had learned.

In July, Drs. Andrew Brantlinger, Anita Sanyal, and Carolina Napp-Avelli spent two weeks in Guatemala. During the first week, they shared their expertise with teachers at schools near the historic city of Antigua. They co-taught in the mornings and led workshops in the afternoons. During the second week, they mentored STEM teachers at a Mayan girls' leadership academy near one of the world's most beautiful lakes, Lago Atitlán.

Also during July, Dr. Daniel Levin led a team of six educators to a jungle village in Ecuador, accessible only by motorized canoe. Settled by escaped African slaves, this community's teachers have little training and are often learning the topics as they teach them. The feedback gathered by T2TGlobal after Dr. Levin's visit conveyed deep appreciation for his team's mentorship.

Venturing into East Africa, Dr. Lawrence Clark conducted workshops in Kisumu, Kenya, with three other teacher trainers from the U.S. During their two-week stay, they led professional development in three area schools and built partnerships in advance of a comprehensive T2T Global project in 2018. While exploring the area's culture, Dr. Clark paid a visit to former president Barack Obama's grandmother, who reported that he looked "an awful lot" like her famous grandson.

Throughout 2017, UMD faculty spent 93 days in direct contact with teachers from Guatemala, Ecuador, and Kenya. With successes in STEM education like the above, who knows what 2018 will bring? **For more information about T2TGlobal's travel opportunities, go to t2tglobal.org.**



MATHLETICS 2017: A FAMILY

by Sean Gruber

PROFESSIONAL ATHLETICS HAS LED TO massive industries, family traditions, and, for some, dreams of one day being on a professional athletics team themselves. Lawrence Clark of the Center for Mathematics Education realized that this dream of being a professional athlete was especially prevalent among young African American males. In a joint effort with Executive Director for Maryland Institute for Minority Achievement and Urban Education (MIMAUE), Stephanie Timmons-Brown, the Mathletics Summer Camp offered at UMD provided middle school students with a three-week experience of engaging in middle school students in mathematics and statistics by drawing on students' interest in professional athletics. Mathletics has been held on the UMD campus every summer beginning in 2012.

"I've always had a fascination with how to engage students outside of school in mathematics in untraditional ways," Dr. Clark shared during my interview with him.



The goal of Mathletics is to merge the fields of athletics and mathematics, engaging students in sports data analysis, survey collection procedures, sports challenges (including a mini-sports columbine), interactive trips (such as collecting statistics of players at a Washington Mystics game), and interactions with University of Maryland sports faculty and coaches. Through Mathletics, participants (Mathletes) have been exposed to additional sports-related professions (data analysts, commentators, coaches) that they could view as possible alternative routes for a career, while also engaging with middle school mathematics and statistics throughout the camp's activities.

"This is the best camp I have ever been to in my life."

With the help of high school teachers from surrounding counties, as well as UMD undergraduates, students not only explored the logistics of collecting statistical data, but also learned how to interpret the data for practical purposes. One example included groups of students going to the Stamp Student Union to ask students about their feelings regarding current UMD investment in athletics (entering the Big 10 Conference, construction of the newly remodeled Cole Field House, etc.) Students gathered demographic data, such as the gender and year in school of the person they questioned, and analyzed responses to check for statistical trends.

"We really wanted to get them focused on the data analysis process and ask themselves the question 'now that you have this information, what are you going to do with it?'," Dr. Clark said.



Statistical analysis is touched on in various topics throughout the Common Core State Standards; Mathletics provided a fresh way for students to engage with these same topics, but in a fun and relevant setting.

At the end of the program, students presented their findings for an end-of-camp project that asked students to analyze statistical data from a topic that the students found interesting. During the science fair-style presentations, students provided descriptions of their projects to family members and friends, with the program ending with reflections on the summer experience. Here are some of the responses that the students shared with Dr. Clark:

"The distributions were new to me, and I learned what type of graph is for [different] types of data."

"I saw firsthand how we can use statistics."

Dr. Clark followed up these responses by asking what type of profession the students thought they would want to pursue when they grew up. Responses included: a pediatrician, an accountant, a software engineer, a computer engineer, and several other suggestions. Based on these responses and what Dr. Clark shared in our interview, it was clear that students left the Mathletics camp with a newfound interest in mathematics and statistics and an understanding for the relevance of

Integrating disciplines to encourage exploration and discovery

by Daniel M. Levin, Elizabeth Fleming, Carolina Napp-Avelli, Amber Storer



Mountain Yellow-Legged Frog

frog in the Sierra Nevada Mountains. Students are given a set of data on the populations of frogs in lakes around the region over several years and a letter from the conservation group asking them to analyze the data, present graphical representations, and draw inferences about the causes of the decline. Students have to decide if any descriptive statistics would be helpful (e.g., measures of central tendency, range), how they will represent the data, and how the mathematical data relate to the field notes. They write an informative and persuasive letter to the conservation group, summarizing their findings and recommending actions for conservation of the frogs.

WERE YOU EVER ASKED TO BE A CONSULTANT to a nature conservation group when you were in middle school? In one interdisciplinary project created by Amber Storer, middle school students are asked to understand the causes of the decline in the population of the mountain yellow-legged

mathematics and statistics in various careers. The camp experience seemed to strike a balance between learning about math and enjoying summer vacation, especially while hanging out at the unanimously popular TerpZone on campus.

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visitors may have opportunities to experience, in translation, some unique Chinese practices in mathematics education: Teaching through Variation, Teaching Competitions, Teacher Research Groups, and Teachers' Office Work.

I encourage you to read this year's newsletter to keep current with the work of the Center. As always, we are interested in your thoughts and comments. Please also remember that the annual NCTM meeting in the spring of 2018 is in Washington, D.C. We look forward to seeing many of you at either the Research Conference or the annual meeting.

In closing, I would like to note a number of milestones for members of our community. First, a warm welcome to Tarik Buli and Sean Gruber who are the newest Fey-Graeber fellows! Second, congratulations to Drs. Tom Coleman and Elizabeth Fleming, who defended their dissertations last spring. Finally, congratulations to Dr. Dana Grosser Clarkson on the birth of her son, William David Clarkson.

Daniel Chazan, Ed.D.
Director, Center for Mathematics Education

Or did you ever use statistics to estimate the size of an animal population in middle school? In a different project, students have the opportunity to use probability, ratios, and statistics in exploring the "capture-recapture" method used by ecologists to sample a population of fish in order to estimate the overall population in a lake. This project provides a meaningful context for learning about sampling methods, as well as giving students an opportunity to practice thinking like a scientist.

These activities are just a few examples that our colleagues, Daniel M. Levin, Elizabeth Fleming, Carolina Napp-Avelli, and Amber Storer, give to imagine an education that is challenging, exploratory, integrative, and relevant. Their hope is to provide a useful approach to integrating different disciplines in middle grade lessons, as a way to go beyond teaching in silos and to offer an education that will be useful beyond the walls of schools.

For more details: Levin, D.M., Fleming, E., Napp-Avelli, C., Storer, A. (2016). "Mathematics and Science in Middle Level Classrooms. Integrating disciplines to encourage exploration and discovery." *Association for Middle Level Education, AMLE Magazine, Vol 4, No 4, p. 28-30.*