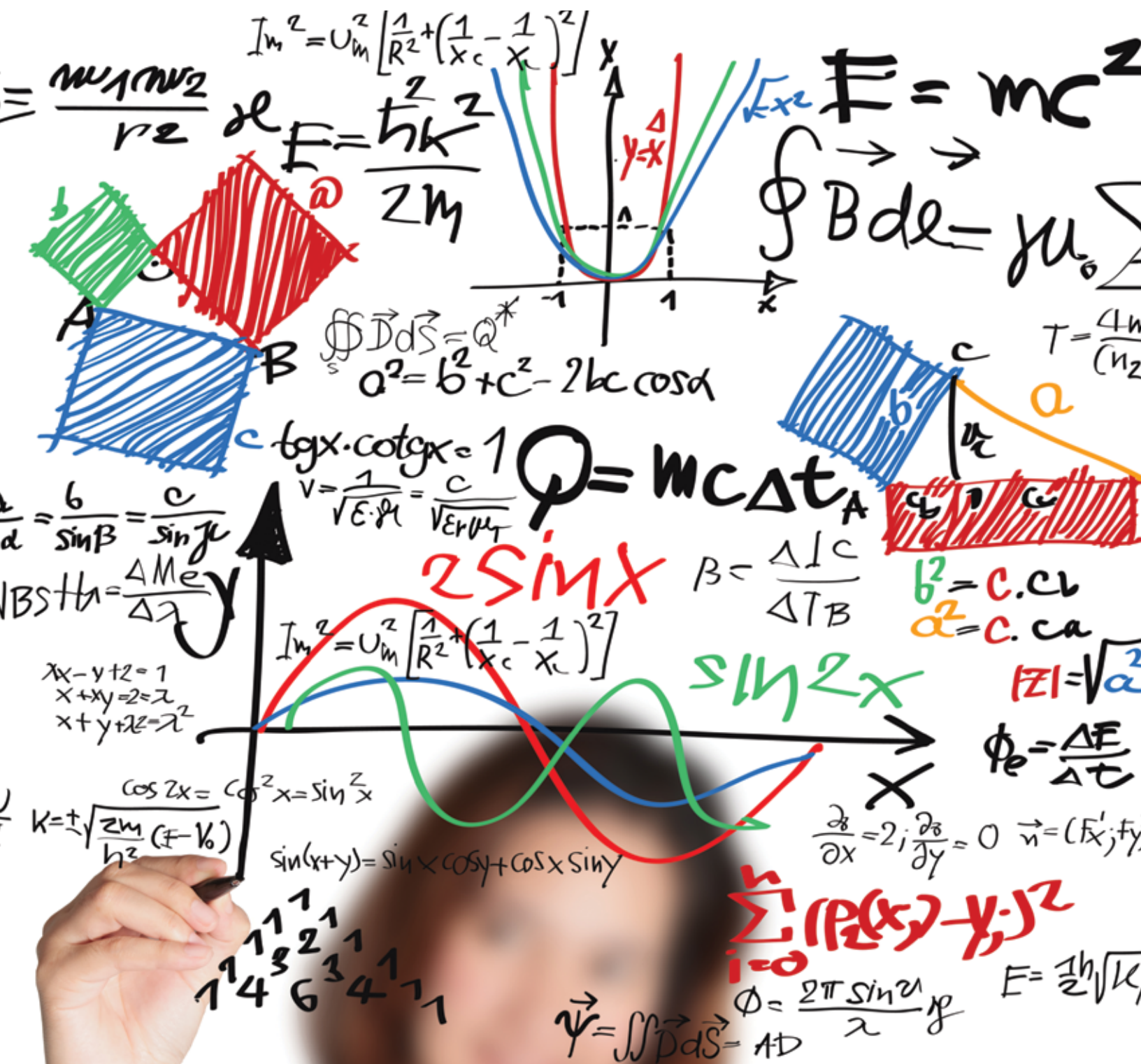


# MATH MATTERS

CENTER FOR MATHEMATICS EDUCATION + COLLEGE OF EDUCATION





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.

**EVEN AS SOME STATES**, like Maryland, move forward with the implementation of the Common Core State Standards, the standards are being more roughly criticized and the process that brought us the standards is also receiving increased scrutiny. At the same time, the National Council for Teacher Quality brought out its second annual ranking of teacher preparation programs in *U.S. News and World Report*. The use of Value Added Assessment in reviewing teachers continues to be discussed.

In this time of turmoil and change, we at the Center for Mathematics Education persist in our research, our collaborations with schools, and our work in teacher preparation. Center faculty members are investigating the role of math coaches in school improvement and the role of technological environments in supporting practice-based teacher education. The MAC-MTL Quant group recently published a pair of linked studies on teacher knowledge and student achievement in the *Journal for Research in Mathematics Education*. Drs. Clark and Chazan, alongside Professor Pat Herbst of the University of Michigan, have authored a chapter on the role of context in instruction that is soon to appear in the American Educational Research Association's latest Handbook of Research on Teaching.

CfME's collaborations with local schools are bearing fruit. Our work in both the District of Columbia Public Schools and Prince George's County Public Schools (PGCPS) has garnered Improving Teacher Quality grants. At PGCPS, this funding will provide support for the second year of the Standards for Mathematical Practice Project (StaMPP). We are recruiting a fifth cohort of Montgomery County Public School teachers for our master's program in middle grades mathematics teaching. And this summer Dr. Clark brought his expertise and enthusiasm to the second year of MIMAUE's Mathletics camp for middle school students.

Our undergraduate and graduate grades 4-9 certification programs are rolling out on track, promising to deepen our commitment to teacher education. In summer 2014, CfME and PGCPS put forward a proposal to the U.S. Department of Education for four years of support for Maryland Science and Mathematics Resident Teachers (MSMaRT) and for exploring the feasibility of its replication. CfME faculty and colleagues in the College of Computer, Mathematical, and Natural Sciences won a National Mathematics and Science Initiative grant to support the creation of Terrapin Teachers, a next-generation pathway whereby undergrads majoring in science and math can simultaneously earn 712 teacher certification. Drs. Anisha Campbell, Catherine Vanetta, and Anita Sanyal have all been recently hired to participate in this initiative. We welcome you all!

In other comings and goings, Carolina Napp defended her dissertation this summer and was hired as a clinical faculty member in the College's Department of Teaching and Learning, Policy and Leadership. Nancy Tseng completed her Ph.D. this summer and moved to San Francisco State University. Congratulations to the two of you! We are also happy to welcome Vincent Bonilla, joining us as a new Fey-Graber fellow, and Eileen Drusjack, who came on board at CfME as a research associate in the fall of 2013.

Daniel Chazan



# Teachers Clark and Walkoe Chosen As *LessonSketch* R&D Fellows



**LESSONSKETCH.ORG** has joined the Center for Mathematics Education as a 100Kin10 partner! Lawrence Clark and Janet Walkoe

are two of nine teacher educators who have been chosen as *LessonSketch* Research & Development Fellows. As part of the third phase of the Thought Experiments in Mathematics Teaching (ThEMaT 3) research project, each Fellow will develop an instructional module using the online LessonSketch.org platform, targeting important practices or the knowledge base relevant to mathematics teaching.

*LessonSketch* supports a practice-based, blended pre-service teacher education classroom. The instructor chooses or creates a representation of practice and creates an online experience. Working through the experience, the pre-service candidate is provided opportunities for interaction with various forms of rich media, such as animations, depictions, and videos.

Selected following a nationwide search, *LessonSketch* Fellows are diverse in terms of their institutions, cultural

communities, research interests, and the achievement levels of their mathematics students. In addition to Drs. Clark and Walkoe here at CfME, this year's fellows are: Emina Alibegović, University of Utah; Joel Amidon, University of Mississippi; Kristen Bieda and Sandra Crespo, Michigan State University; Woong Lim, Kennesaw State University; Robert Wieman, Rowan University; William Zahner, Boston University and San Diego State University.



Lawrence Clark

*LessonSketch* R&D Fellows are recruiting colleagues around the country for an inquiry group that will pilot materials and provide critical feedback. At the end of the project, *LessonSketch* modules will be shared with end users throughout the country. If you have questions about ThEMaT 3 or are interested in participating as an inquiry group member, please contact our project coordinator, Eileen Drusjack, at [drusjack@umd.edu](mailto:drusjack@umd.edu).

## Noyce Scholars Program: Providing Pathways into Teaching by Jennifer Richards



**UMD'S NOYCE SCHOLARS PROGRAM** in math education is wrapping up its third year. Headed by Dr. Lawrence Clark, and now supported with a new grant in science education awarded to Dr. Andrew Elby, the program aims to recruit and support future secondary math and science teachers prepared to teach in high-needs schools.

We are now far enough along to evaluate whether Noyce-funded tutoring and internship opportunities offered to freshmen and sophomores support the recruitment of students into UMD's teacher certification programs and Noyce's junior, senior, and graduate scholar programs. Early tutoring experiences in partnering middle and high schools show

particular promise. For students already interested in teaching, these experiences typically validate their interest. For other students, the experiences can be eye-opening.

"I entered this experience with a small feeling that maybe one day I would like to teach and came out feeling like there was no doubt that one day I will become a teacher," a current math tutor says. "I think it was interacting with the students and the feeling of success when a student understands material."

One third of our 2014-2015 Noyce scholarship applicants served as tutors. For more information, visit [bit.ly/umdnoyce](http://bit.ly/umdnoyce).

# Faculty Focus

## Dr. Janet Walkoe



The CfME community is delighted to welcome Dr. Janet Walkoe to her new post as an assistant professor this Fall. For the past two years, as a Clinical Assistant Professor at CfME, Dr. Walkoe has made significant teaching and research contributions to the university.

Dr. Walkoe is a former high school math teacher, most recently in the

Chicago Public Schools, where she received her National Board Certification in 2003. Her experience as a teacher motivates her work, and she is dedicated to bridging theory and practice and improving mathematics access for all students. Her dissertation at Northwestern University focused on how teachers in Algebra I classrooms attend to a wide range of algebraic thinking, and she also used video clubs to extend teachers' noticing practices. Building on that research, Dr. Walkoe has worked with Science Education

faculty at UMD to explore the range of ways teachers can attend to the substance of student thinking.

This spring, Dr. Walkoe led a professional development seminar for teachers in a local urban school district as one component of CfME's Standards for Mathematical Practice Project (StaMPP). The project's goal is helping teachers support their students' engagement in the Common Core Standards for Mathematical Practice. Dr. Walkoe incorporated video tools and technology such as LessonSketch to connect the professional development in the seminar with what happens in teachers' classrooms. She has also recently been appointed a LessonSketch Fellow and, beginning this fall, will be collaborating with Dr. Chazan and his team on the *Thought Experiments in Mathematics Teaching (ThEMaT)* project. Her fellowship will focus on designing a LessonSketch module to support teachers' work in the classroom. Looking to the future, Dr. Walkoe will be working with Dr. Lawrence Clark on a new project to consider other aspects of teacher attention, such as attending and responding to students' mathematical dispositions.

The CfME is fortunate to have a faculty member with such commitment to the work of supporting math teachers, and we are excited to have the opportunity to build on the insights that her work provides!

## MSMaRT: Improving Educational Outcomes in Middle School Math and Science

*"I was looking for a program that would allow me to make the transition into the classroom easier and sooner than going the traditional route. I wanted to teach to give back...because teaching has shaped who we are, and I wouldn't be who I am without teachers."*

~ MSMaRT candidate



In the United States today, mastering mathematics and science has become more important than ever. Students with a strong foundation in math and science have an advantage in academics and in the job market. Middle school is a critical point in mathematics and science education. Achievement at this stage clears the way for

students to take rigorous high school courses – keys to college entrance, success in the labor force, and overall improved critical thinking skills. However, many middle school students lag so far behind in the classes they take that getting on the road to college is difficult.

Faculty in the College of Education have mobilized to meet this need in several ways, one of which is the innovative Maryland Science and Mathematics Resident Teacher (MSMaRT) program. Partnering with high-needs middle schools in Prince George's County, MSMaRT recruits individuals with a mathematics or science background seeking to change careers and make a difference in the lives of students. Among other things, MSMaRT participants have backgrounds in pharmacy, engineering, finance, laboratory science, computer programming, and education.

The MSMaRT program grows with each passing year. This year, we worked with PGCPs to prepare 12 teachers for middle school mathematics and science classrooms. Currently, MSMaRT supports five cohorts of aspiring teachers. We are very proud of our MSMaRT teachers and the difference they are making in Prince George's County Public Schools.



# The Standards of Mathematical Practice Project (StaMPP) by Sam Reheard



**IMAGINE TRYING A NEW APPROACH** to teaching with five other adults and two cameras watching you. Keisha Bennaugh, an eighth grade math teacher (*pictured*) at Walker Mill Middle School in Capitol Heights, Maryland, takes it all in stride. As a demonstration classroom teacher, Keisha has opened up her room to her colleagues and to CfME this year to promote the Common Core Standards of Mathematical Practice. As excited as Keisha is about moving toward a model in which her students get to figure out and argue for their own solution methods, she is just as excited about sharing this journey with her math department and fellow teachers beyond her home school.

A collaboration between CfME and Prince George's County Public Schools, the Standards of Mathematical Practice Project (StaMPP) is designed to support middle school math

teachers as they transition to Common Core. In addition to helping demonstration classroom teachers, like Keisha, plan units reflective of the practice standards, StaMPP supports the school's math department as they strive for quality instruction in all mathematics classrooms.

StaMPP also provides weekly seminars for math teachers from a number of middle schools in Prince George's County. These seminars are designed around supporting teachers as they learn more about the Common Core Mathematical Practices and how to engage students in them. Through StaMPP, CfME faculty and graduates are helping teachers at Prince George's County Public Schools align their math instruction to the new standards.





## The QUANT Project: Recent Findings

The QUANT project team has been both busy and productive despite the expiration of the MAC-MTL grant, which had provided support for the project. Since the grant ended in the fall of 2013, we have authored two articles that were accepted for publication in the *Journal for Research in Mathematics Education (JRME)*.

Our first article, published in the March 2014 issue of *JRME*, investigates relationships between teacher characteristics, teachers' beliefs about mathematics teaching and learning, and teachers' awareness of students' mathematical dispositions. We found that more mathematically knowledgeable upper-elementary teachers believe more strongly that students should struggle with problems prior to teacher intervention, as compared to their relatively less mathematically knowledgeable colleagues. In addition, findings at both the upper-elementary and middle-school levels suggest that teacher education efforts focusing on moving the beliefs of prospective and practicing teachers away from instructional techniques privileging memorization and incremental skill mastery may prove to be more effective if they integrate opportunities for teachers to deepen their mathematics knowledge.

Our second article, published in *JRME* in July 2014, reports on a set of multi-level analyses investigating the relationships between teachers' mathematical and pedagogical knowledge, teachers' beliefs, and student achievement. We found that both mathematical content knowledge and pedagogical content knowledge were significantly and positively associated with student achievement, with a statistically significant interaction between teachers' knowledge, beliefs, and student achievement. Our findings suggest that teachers' beliefs and awareness of their students' mathematical dispositions may act as mediators between teacher knowledge and instructional practice. We found no evidence that emphasizing mathematical procedures and routines during instruction will compensate for a middle-grade teacher's weak understanding of mathematics content or pedagogy. Similarly, while we found that schools are identifying specialized math teachers in the upper-elementary grades, there was no indication that students of these teachers had higher mathematics achievement.

The following individuals contributed to the work that produced the articles: Patricia Campbell, Lawrence Clark, Toya Jones Frank, Masako Nishio, Toni Smith, Darcy Conant, Amber Rust, Jill Neumayer DePiper, Matt Griffin and Youyoung Choi. Although many of these UMD faculty and former CfME fellows are no longer at UMD, many of us continue to collaborate on endeavors utilizing the rich data set collected for the QUANT study. We have recently completed an analysis examining the relationship between teacher knowledge and teachers' certification status, completed coursework, and attainment of an advanced degree. This work will inform teacher preparation programs, as the analytic model characterizes the differing mathematics courses and mathematics education courses completed by the teachers.



## Our Faculty



*Pictured (front row), are CfME faculty members Patricia Campbell, Orly Buchbinder, Janet Walkoe, and Beatriz Quintos. Back row: Lawrence Clark, Daniel Chazan, Rodrigo Gutiérrez, and Andrew Brantlinger.*

## QUANT Team



*Pictured here are QUANT team members Patricia Campbell, Matthew Griffin, and Lawrence Clark.*

## Our Grad Students



*Pictured here are CfME grad students Dana Grosser-Clarkson, Elizabeth Fleming, Matt Griffin, Nancy Tseng, Carolina Napp-Avelli, Diana Bowen, and Angela Stoltz.*



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## IMAGINE...

**Imagine sending your child to school, only to discover that there are no teachers.**

Or imagine struggling with life's challenges, seeking counseling, only to find that there are no counselors or psychologists to go to. Imagine for a moment that your child is being bullied at school, only to learn that there is no one advocating for measures to discourage bullying.

This really happens to someone, somewhere, each and every day. But here at the College of Education, we are committed to teaching and learning, equity and social justice. Our dedicated faculty, students, and alumni strive to address these problems by producing educational leaders in a variety of professional fields.

It is because of the tremendous support from our donors that we are able to reach greater heights and continue our important work. By contributing to our **Greatest Needs Fund**, you are supporting the next generation of educators, counselors, psychologists, administrators, researchers, and policymakers.

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