

WMU Math Education Matters

Department of Mathematics
Western Michigan University
Kalamazoo, Michigan 49008-5248



WESTERN MICHIGAN
UNIVERSITY

Inside this issue . . .

- Dr. Steve Ziebarth, Chair of the Mathematics Department
- MOST Project Professional Development in Chicago
- New Mathematics Education Faculty, Dr. Mariana Levin
- Reflections on the ICUBIT Project
- About WMU and our math education programs
- Students win State and National awards
- News from Recent Graduates
- Upcoming Activities

Dr. Steven Ziebarth is the new Chair of the Department of Mathematics

Mathematics Education Professor Steven Ziebarth became Chair of the Mathematics Department effective July 1 and will serve in that capacity for the next four years. He brings to this position more than 25 years of research and evaluation experience. Most recently he served as Project Director for the multidisciplinary five-year NSF-funded *Assessment for Learning Capacity Building Project* in association with a team of WMU colleagues from the disciplines of education, science, and evaluation. He also brings experiences to the position of past Chair of the WMU Research Policies Council, a co-PI for the past decade with the Center for the Study of Mathematics Curriculum, and a year as interim chair of the Mathematics Department, and lead evaluator for numerous other NSF-funded projects.

Among the key initiatives he plans to undertake for the department are to focus on the teaching of calculus within the department offerings; a suite of courses that serves programs both within the department and provides service to many other departments including other sciences and engineering. He also plans to address recurring issues related to the developmental mathematics program that provides service to another sizeable portion of students at WMU. "These two programs need to be looked at carefully with new ideas piloted to insure their long-term success for the large number of students that they serve."

Despite the needs of these two programs, other priorities include increasing enrollments in secondary teacher preparation and graduate programs, improving connections with alumni, and making graduate programs in both mathematics and mathematics education more flexible for achieving advanced degrees. While these are all seen as current and ongoing issues to address, he insists that his most important duty is "to support the research and teaching activities of the excellent faculty we have in our department and to tout their achievements across the WMU campus. Our colleagues across campus need to know of the good things we do in our department every day to promote student success. We care about students and their interactions with mathematics at every level."



MOST Project in Chicago for Professional Development

Dr. Mariana Levin Joins the Department

At the end of July 2015, the National Science Foundation-funded *Mathematically Significant Pedagogical Opportunities in Student Thinking* (MOST) project held a two-day professional development session in Chicago for 13 secondary mathematics teachers from across the country. Over the course of the two days, teachers were introduced to the MOST framework for identifying instances of student thinking worth pursuing and to the practice of “building” on instances of student thinking that are MOSTs.

Education; Laura Van Zoest, Mathematics Education Faculty; Mary Ochieng and Liz Fraser, current PhD students; Danielle Reyser, BA in Mathematics Education; and Anna Kruienga, Master’s in Mathematics Education. The MOST project is a collaborative among WMU (Dr. Laura Van Zoest), Michigan Technological University (Dr. Shari Stockero) and Brigham Young University (Drs. Keith Leatham and Blake Peterson). More information about the MOST project can be found at LeveragingMOSTs.org

the Program in Mathematics Education (PRIME) at Michigan State University from 2012-2015. Her graduate studies and research were supported by fellowships from the National Science Foundation (NSF), Institute of Education Sciences (IES), and Bell Laboratories.

Through several activities, teachers practiced articulating “student mathematics” and the “mathematical point” of various instances of student thinking across diverse mathematical content. Teachers then discussed the “appropriateness” and “centrality” of the mathematics in the instance, as well as whether there was an “opening” and the “timing” was right to take-up that instance of student thinking. Teachers also engaged in activities related to the teaching practice of “building” as currently conceptualized by the MOST project. The participating teachers provided valuable feedback on the relevance of the project’s ideas to classroom teaching and effective ways to communicate the ideas to secondary school teachers.

Dr. Levin’s work is on mathematical thinking and learning processes particularly around critical transitions in students’ experience (algebra, in her dissertation work, and more recently proof at the collegiate level). She co-organized a research conference (funded by the AERA Educational Research Conferences Program) on possibilities for synergy and dialogue between multiple perspectives on conducting analyses of learning interactions in mathematics and science. The conference led to a research volume “Knowledge and Interaction: A Synthetic Agenda for the Learning Sciences” (co-edited with diSessa and Brown) that will be published by Taylor and Francis in December 2015.



It was great to have so many people with a WMU connection involved (see insert, clockwise starting back left): Shari Stockero, Ph.D. in Mathematics Education; Mike Verkaik, Master’s in Mathematics

Dr. Mariana Levin joins the department as an assistant professor in the mathematics education group. She earned her Ph.D. in Mathematics Education and her M.A. in Mathematics from University of California, Berkeley and was a postdoctoral fellow in

Outside of her teaching and research life, she enjoys playing the violin and being in nature with her husband and 16 month-old son. Since moving to Kalamazoo, she has formed a hiking group for caregivers of babies and young children, *Hike it Baby Kalamazoo*.



Calling all former WMU math education students . . .

Math Education Matters is interested in featuring your news and recent professional accomplishments in future issues. Brief news items can be sent to Dr. Jane-Jane Lo at jane-jane.lo@wmich.edu.

Reflecting on a NSF-Funded Project



Improving Curriculum Use for Better Teaching (ICUBiT) project, NSF-funded and led by Dr. Janine Remillard (University of Pennsylvania) and Dr. Ok-Kyeong Kim (Western Michigan University), has just ended after five years of *research and development* focusing on teachers' use of mathematics curriculum materials. The *development activities* focused on designing and refining tools that allow researchers to gather data on and measure teachers' capacities and practices required for productive use of mathematics curriculum materials. The *research activities* involved employing these tools to gather and analyze data on

teachers' curriculum use, and the capacities and supports critical to it. The ultimate aim was to develop a conceptual model of these capacities to guide future research and professional development. In an effort to accomplish the project goals, they developed an instrument to assess teachers' capacity to identify the mathematical concepts and connections embedded in resources in curriculum materials (Curriculum Embedded Mathematics Assessment [CEMA]), developed a curriculum coding scheme to analyze kinds of support for teachers provided in five elementary mathematics programs ranging from

commercially developed to NCTM Standards-based, and examined ways in which the ability to identify mathematical ideas underlying curriculum materials relates to actual classroom practice. The PIs thank the project team, advisory board, and external evaluator for the contribution to the project. The pictures are from conference presentations on this project, and include two former WMU doctoral students: Naphtalin Atanga and Dustin Smith. For more information about the project, visit the project website, gse.upenn.edu/icubit, or email the PIs, janiner@gse.upenn.edu or ok-kyeong.kim@wmich.edu.

About WMU and Our Programs

Western Michigan University (WMU), located in Southwest Michigan, is a vibrant, nationally recognized student-centered research institution with an enrollment of nearly 25,000. The Carnegie Foundation for the Advancement of Teaching has placed WMU among the 76 public institutions in the nation designated as research universities with high research activities. For more information, see wmich.edu/about.

The Department of Mathematics offers programs in mathematics and math education at the bachelor's, master's, and doctoral levels. Research strengths in math education include curriculum development and implementation, assessment and evaluation, technology, mathematical thinking (children, teachers), and teacher education (preservice, inservice). Current mathematics education faculty are: Dr. Christine Browning, Dr. Jon Davis, Dr. Theresa Grant, Dr. Ok-Kyeong Kim, Dr. Kate Kline, Dr. Mariana Levin, Dr. Jane-Jane Lo, Dr. Tabitha Mingus, Dr. Laura Van Zoest, and Dr. Steve Ziebarth. For more information, see wmich.edu/math.

Several teaching assistantships are available for the upcoming year for our graduate programs; the deadline for applications is February 15, 2016. For application procedures, see wmich.edu/apply/graduate. Also, feel free to contact Dr. Jane-Jane Lo (jane-jane.lo@wmich.edu) with any questions you might have about our programs.



WESTERN MICHIGAN UNIVERSITY

Department of Mathematics
1903 W Michigan Ave
Kalamazoo MI 49008-5248
(269) 387-45

wmich.edu/math

Heather Crull Wins \$2,500 MCTM Scholarship

The Michigan Council of Teachers of Mathematics, as part of their commitment to promoting and encouraging capable students to join the mathematics teaching profession, awards scholarships to college seniors and juniors who are enrolled in a teacher preparation program and have mathematics as their primary teaching interest. Heather Crull was one of three students in the state to be awarded a \$2,500 MCTM scholarship for the 2015-2016 school year.

Heather is a non-traditional elementary education student at Western Michigan University with a triple minor in mathematics, integrated science and language arts. As an educational garden manager at a non-profit organization, Heather works with teachers to extend classroom activities into the school garden for K-4 students at a local elementary school.

Heather spoke of how her program at WMU contributes to

her success. She said, "The coursework at WMU has done a fabulous job in preparing me to serve as a future elementary school teacher, specifically in math education. I have also deepened my knowledge of how to use inquiry and reflection to jump head first into learning."

When asked about her former student, Ms. Gina Garza-Kling stated: "Heather has exceptional understanding of mathematical concepts, yet at the same time maturely monitors her own participation in class so as not to dominate the class. She consistently listens to, reflects on, and builds onto the ideas shared by others, making valuable contributions to each discussion at just the right time. She is truly one of the strongest students I've ever had in many years of teaching math methods."

When asked how the scholarship will help her further her studies and career as an educator, Heather said, "Teaching is truly an act of service, and I am dedicated to continuing to work towards bettering the lives of others through education. With rising tuition costs and

the cost of living increasing, I still struggle to make ends meet. Through the generous support of the MCTM, I can continue to work towards making a difference in students' lives as a certified elementary teacher, ultimately helping to build a stronger community."

Heather is currently working with Dr. Kate Kline on her sabbatical project, "Characterizing the Nature of Elementary School Students' Mathematical Arguments," in which they are studying the types of claims children make about place value and the number system as well as how they support those claims when trying to convince their classmates that their ideas have merit.



Mary Ochieng Awarded Susan Gay Graduate Student Travel Grant

The Susan Gay Graduate Student Conference Travel Scholarship was established to provide financial support to graduate students to attend the AMTE annual conference. This year, Mary Ochieng was one of four graduate students nationally to receive the award to support their attendance at the 19th Annual AMTE conference in Orlando, FL. Mary was part of the team presenting on the MOST project directed by Dr. Laura Van Zoest.

When asked about her experience at the conference, Mary stated, "Attending AMTE 2015 was a privilege that provided me with an opportunity to interact with a supportive community of researchers, judging by the feedback and comments during presentations...From the talks I attended I realized that I too can make

my contribution to research in mathematics education even as a graduate student. I also realized there is a lot to learn from the work of other researchers."

Attending talks at the conference pushed her thinking about the work she is doing in the MOST project. Mary said, "One of the talks I attended was on the use of rehearsal to support PSTs in leading class discussions that reach a mathematical point. It was interesting that the presenters' idea of mathematical point was more aligned to Sleep's 2012 definition than that of the MOST project's. The presenters saw mathematical point through a lens of focusing class discussion and we saw it through a lens of the mathematics embodied in student mathematical thinking. I did not see this as a contradiction, but rather as an opportunity to better understand our definition and clarify the distinctions



between our work and theirs. "There are many benefits that come from attending conferences such as AMTE. Two of the benefits Mary highlighted were the "opportunity to connect with people who are exploring similar [research] areas" and "the deliberate sense of nurturing, mentoring and support experienced throughout the conference, even in the informal events."

News from Recent Graduates

Karen Fonkert (2012)



I am the first and only Mathematics Education professor at Charleston Southern University in Charleston, South Carolina. Therefore, I have developed the math education program for pre-service teachers from the elementary to the secondary levels. Since my first position at Grand Valley State University was exclusively elementary math education, I gained the experience needed at the elementary levels with the help of my mentors Dr. Pamela Wells and Dr. David Coffee (WMU alumni). My doctoral program at WMU and my own 11 years of secondary teaching experience gave me the preparation necessary to be proficient at teaching the secondary pre-service teachers. I now have graduates of our program at many of the area schools who are being asked to be on curriculum committees their first year of teaching, who are becoming teacher-leaders at each of their respective schools, and who are earning *Teacher of the Year* and *Rookie Teacher of the Year* frequently. One of my graduates, Elizabeth Fraser, is even in the mathematics education graduate program at Western Michigan University. So I feel that my goal of making an impact on the state of mathematics education in K-12 schools is being realized.

I have also kept active in professional endeavors. I reviewed proposals for the 2016 NCTM Research Pre-Session. I was on the planning committee for the national Association of Constructivist Teaching conference, which happened to be held in Charleston December 4-6, 2014. I facilitated a session at that conference entitled, "Constructing Mathematical Knowledge in Secondary Mathematics Classes" in which I modeled how to teach a lesson from *Core-Plus Mathematics* (Hirsch, Fey, Hart, Schoen, & Watkins, 2008). Additionally, I share my education knowledge with the professors in my own institution through workshops like the following: "Alternative Teaching Strategies: How to Avoid the Lecture-Only Method" (2014), "Using Technology in Math Education"—Seminar for the CSU Mathematics Department (2014).

For the community of Charleston, I facilitate "Mathematics and Problem Solving" workshops for area K-12 students in the summer; I am on the planning committee for the annual Charleston STEM Festival and organize CSU's involvement in that festival including securing the funding, mascot, and student and faculty participants. On the national level, I was awarded a grant from CSMC to lead a research group to study "Teachers' Evolving Perceptions of the Common Core State Standards for Mathematics and its Impact on Their Teaching Practices," I presented at the NCTM Research Pre-session in 2013 on "Students' Interactions and Mathematical Thinking while Using *CPMP-TOOLS*," and published an article in *Mathematics Teacher* entitled "The Nature of Students' Interactions in Technology-Rich Classrooms" (Fonkert, 2010). With the help of my Mathematics Education degree from WMU, I feel that I am making a difference locally in Charleston where there is a desperate need, and also on a broader level.

AJ Edson (2014)

I am a postdoctoral Research Associate in the Program in Mathematics Education at Michigan State University. My primary responsibilities include teaching and research in mathematics education. Currently, I am teaching a graduate course, *Critical Content in School Mathematics: Algebra*, which focuses on the mathematical foundations, historical development, and curriculum development of school algebra, including research on its teaching and learning.

For a majority of my time, I work with the Connected Mathematics Project (CMP) on development and research activities related to the middle grades problem-based curriculum materials. Specifically, our research activities include: (a) formative assessment as an ongoing and integral process of problem-based instruction, (b) student-, teacher-, and curriculum-generated student work as contexts for student learning, and (c) an Arc of Learning resource for understanding the mathematics embedded within problems and across sequences of problem-solving tasks. Additionally, the project is exploring the opportunities and challenges of creating a fully electronic version of the CMP instructional materials for students and classroom teachers.

My preparation at Western Michigan University was instrumental to my teaching and research responsibilities at Michigan State University and to the connections between research and practice. This preparation includes coursework, curriculum development and research projects, and dissertation experiences related to problem-based mathematics teaching and learning. The professionalism of the mathematics education faculty at Western Michigan University modeled for me the practices embodied in the mathematics education community.



Left to right: AJ Edson, Yvonne Grant and Betty Phillips.

Upcoming Activities

WMU will host the first annual meeting of the Michigan affiliate of the Association of Mathematics Teacher Educators, MI-AMTE Conversations Among Colleagues, on March 19, 2016. The purpose of the conference is to bring together people who are involved in the preparation and professional development of teachers—including mathematicians and mathematics educators from universities and colleges and curriculum and professional development directors from school districts and regional service centers—to engage in discussions related to mathematics teaching and learning. The 2016 conversations will focus on *Bringing the Standards for Mathematical Practice to Life*. The keynote speakers will be Emma Trevino and Edward Silver. On the evening of March 18, 2016, there will be a pre-conference opportunity to learn more about the Standards for Mathematical Practice and network with others interested in the preparation and professional development of teachers. Christine Browning (christine.browning@wmich.edu) and Laura Van Zoest (laura.vanzoest@wmich.edu) are conference co-chairs. Look for MI-AMTE on the [MyWMU Events](#) page for further details after Nov. 6.

Presentations

TeMaCC, Ann Arbor, MI, October 2015

Grant, T. Keynote Address: *Laying the Foundation for Productive Struggle*.

PME-NA, Lansing, MI, November 2015

Atanga, N., & Kim, O. K. *Communications in Curriculum Materials and Types of Student Autonomy Promoted*.

Grant, T. *Reflecting on a Decade of Curriculum Design: The Importance of Setting the Tone*.

Son, J.-W., **Lo, J. &** Watanabe, T. *Intended Treatments of Fractions, Fraction Addition and Subtraction in Mathematics Curriculum from Japan, Korea, Taiwan and U.S.*

Stockero, S.L., **Van Zoest, L.R.**, Rougee, A., **Fraser, E.H.**, Leatham, K.R. & Peterson, B.E. *Uncovering Teachers' Goals, Orientations, and Resources Related to the Practice of Using Student Thinking*.

Van Zoest, L.R., Stockero, S.L., **Atanga, N.A.**, Peterson, B.E., Leatham, K.R., & **Ochieng, M.A.** *Attributes of Student Mathematical Thinking That is Worth Building on in Whole-Class Discussion*.

AEA, Chicago, IL, November 2015

Ziebarth, S. *A Mixed-Methods Evaluation of a K-12 Mathematics Course Designed for non-STEM Intending High School Seniors*.

AMTE, Irvine, CA, January 2016

Browning, C., Van Zoest, L.R., and others. *Transforming an Idea into an AMTE Publication Manuscript*.

Cox, D., **Lo, J.**, Cirillo, M., Rathouz, M. *Preparing Preservice Teachers (K-8) To Teach Geometry*

Van Zoest, L.R., Fraser, E.H., & Ochieng, M.A. *Engaging Teachers in Identifying the Point of Student Mathematical Thinking*.

Peterson, B.E., **Van Zoest, L.R.**, Stockero, S.L., & Leatham, K.R. *Productive Use of Student Mathematical Thinking is More than a Single Move*.

Joint AMS/MAA meeting, Seattle, WA, January 2016

Levin, M., Smith, J., Levin, A., Satyam, R., Bae, Y. *The Transition to Proof in Collegiate Mathematics: Examining A Hybrid Lecture/Laboratory Approach at a Large Public Research University*.

Publications

Davis, J. D., & Fonger, N. L. (2015). An analytical framework for categorizing the use of CAS symbolic manipulation in textbooks. *Educational Studies in Mathematics*, 88(2), 239-258.

Davis, J. D. (2015). Prospective mathematics teachers' interactions with CAS-based textbook elements. *International Journal for Technology in Mathematics Education*, 22(3), 107-113.

diSessa, A. A., **Levin, M.** & Brown, N.J.S. (2015). *Knowledge and Interaction: A synthetic agenda for the learning sciences*. New York, NY: Routledge.

Edson, A.J., Rogers, D.M, and **Browning, C.A.** (2016). Formative Assessment and Preservice Elementary Teachers' Mathematical Justification: Using Digital Tools for Convincing and Assessing. In Niess, M., Driskell, S., & Hollebrands, K. (Eds.) *Handbook of Research on Transforming Mathematics Teacher Education in the Digital Age*. Hershey, PA: IGI Global. Manuscript accepted.

Harrington, R.A., Driskell, S.O., Johnston, C., **Browning, C.A.**, & Niess, M.L. (2016). The impact of TPACK: What does the literature show? In Niess, M., Driskell, S., & Hollebrands, K. (Eds.) *Handbook of Research on Transforming Mathematics Teacher Education in the Digital Age*. Hershey, PA: IGI Global. Manuscript accepted.

Roth McDuffie, A., Drake, C., Choppin, J., **Davis, J. D.**, Vidrio, M., & Carson, C. (in press). Middle school mathematics teachers' perceptions of the Common Core State Standards for Mathematics and related assessment and teacher evaluation systems. *Educational Policy*.

Son, J.-W., & **Kim, O. K.** (accepted). Teachers' selection and enactment of mathematical problems from textbooks. *Mathematics Education Research Journal*. (DOI 10.1007/s13394-015-0418-9)

Orrill, C. H., **Kim, O. K.**, Peters, S. A., Lischka, A. E., Jong, C., Sanchez, W. B., Eli, J. A. (2015). Challenges and strategies for assessing specialised knowledge for teaching. *Mathematics Teacher Education and Development*, 17(1), 12-29.

van Es, E., Stockero, S.L., Sherin, M.G., **Van Zoest, L.R.**, and Dyer, E. (2015). Making the most of teacher self-captured video. *Mathematics Teacher Educator*, 4(1), 6-19.

Leatham, K.R., Peterson, B.E., Stockero, S.L., and **Van Zoest, L.R.** (2015). Conceptualizing mathematically significant pedagogical opportunities to build on student thinking. *Journal for Research in Mathematics Education*, 46(1), 88-124.