

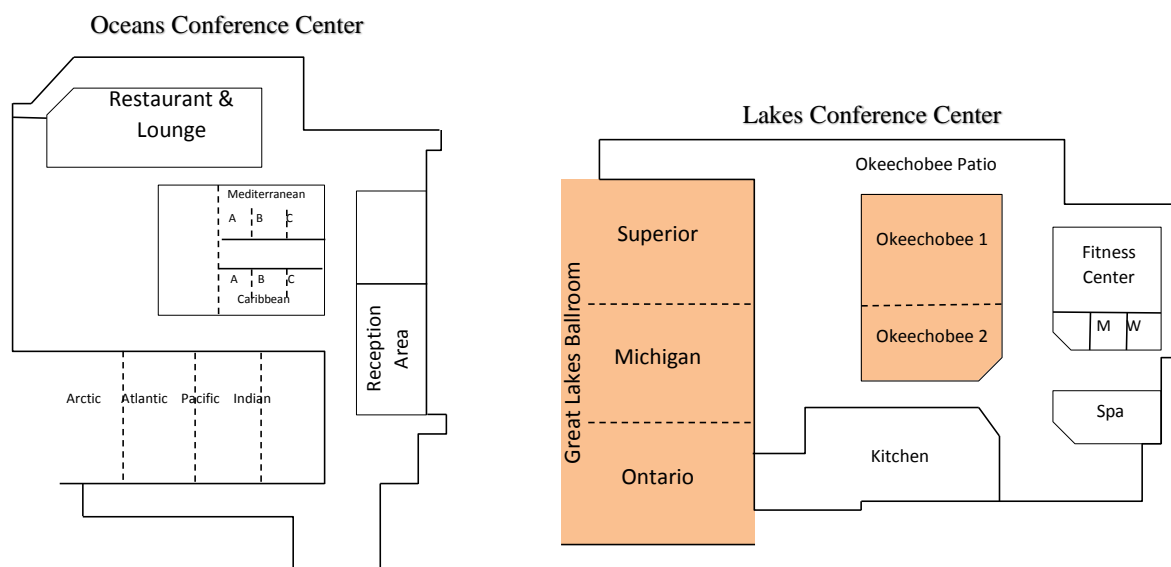
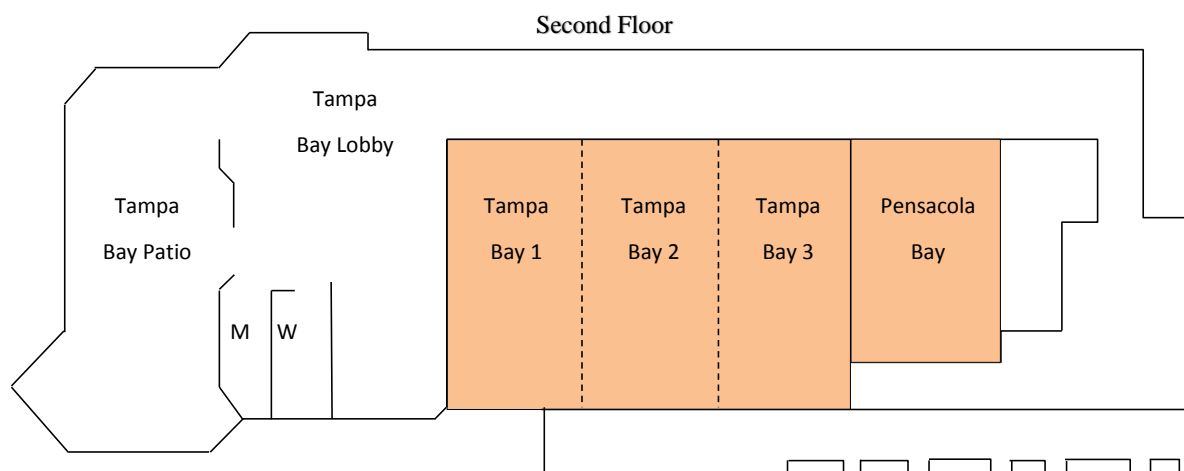
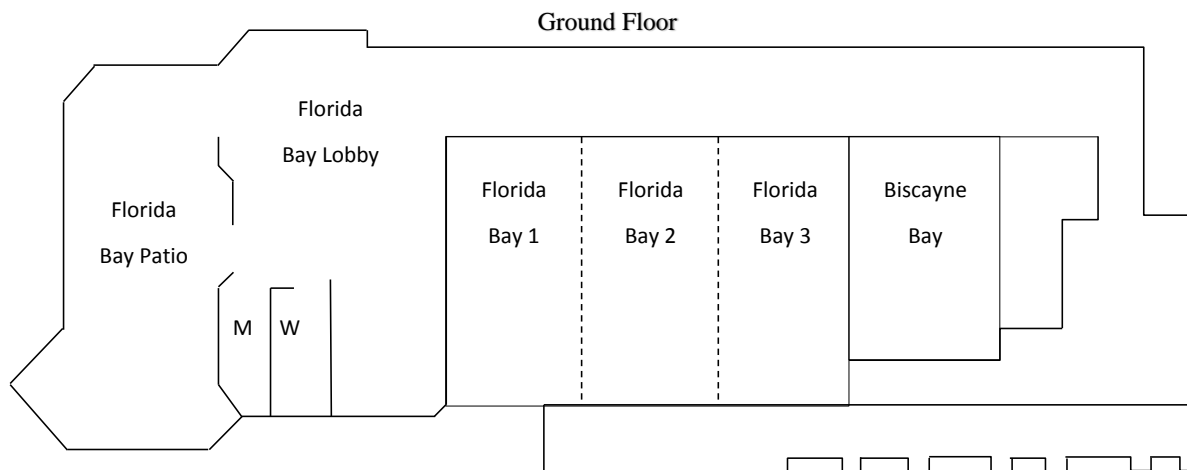


Research Council on Mathematics Learning
43rd Annual Conference
Shining a Light on Mathematics Learning



The Double Tree by Hilton Hotel
Orlando, FL
February 25–27, 2016

The Double Tree by Hilton Hotel



Shaded rooms will be utilized during the conference.

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Welcome to the 43rd annual RCML Conference! We would like to thank all of the speaker, attendees and contributor of the conference. We hope you enjoy all of the sessions and receive valuable information that you can share with your colleagues. We welcome you to Orlando, Florida and the Double Tree by Hilton Hotel. We anticipate you will have a wonderful experience. Please let us know if we can assist you in any way. Enjoy the conference!

Gabriel Matney

Bowling Green State University



Nancy Cerezo

Saint Leo University



Special Thanks!

Program Layout: A special thank you to Dr. Keith Emmert, Megan Schlosser, & Corrinne Sullivan for their hard work preparing the layout and contents of the RCML program booklet.

Program Materials: A special thank you to the College of Education and Human Development of Bowling Green State University for donating the materials for the program booklets.

Conference Bags: A special thank you to EAI Education for the donation of bags for the 2016 conference. They share:

“EAI Education appreciates the opportunity to be a sponsor for the Research Council in Mathematics Learning’s Conference. To see our entire line of math resources for Grades K-12, please visit our website www.eaieducation.com”

Conference Materials: A special thank you to the Saint Leo University Education Department for the donation of trifold poster boards and resources for registration and the UCF College of Education and Human Performance for the use of projectors for presentations.



Special Thanks Continued!

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Conference Events at a Glance:

Thursday, February 25th

- 3:30 PM – 8:30 PM - Registration open outside the *Tampa Bay Meeting Rooms*
- 4:30 PM – 5:30 PM - The Research Poster Session in *Tampa Bay 1*
- 5:30 PM – 6:30 PM - The Wilson Lecture by Dr. Mike Hynes in *Tampa Bay 1 & 2*
- 6:30 PM – 8:30 PM - Welcome Reception with small appetizers in *Tampa Bay 2 & 3*

Friday, February 26th

- 7:30 AM - 4:30 PM - Registration open in the *Great Lakes Conference Center*
- 8:00 AM – 11:50 AM - Breakout Sessions
- 12:00 PM - 1:20 PM - The RCML Business Luncheon in *Ontario*
- 1:30 PM – 4:20 PM - Breakout Sessions
- 4:30 PM – 5:30 PM - The Founders Lecture by Dr. Alan Zollman in *Ontario*

Saturday, February 27th

- 7:30 AM - 12:00 PM - Registration open in the *Great Lakes Conference Center*
 - 8:00 AM – 11:50 AM - Breakout Sessions
 - 12:00 PM - 1:00 PM - The Research Reflection Luncheon in *Ontario*
-

Committee Meetings at a Glance:

Friday, February 26th

- 11:00 AM - 11:50 AM Past Presidents Meeting in *Tampa Bay 1*
- 11:00 AM - 11:50 AM Publications Committee Meeting in *Tampa Bay 2*
- 11:00 AM - 11:50 AM Conference Committee in *Tampa Bay 3*
- 1:30 PM - 2:20 PM Memorial Scholarship Committee Meeting in *Tampa Bay 3*
- 2:30 PM - 3:20 PM Nominations Committee Meeting in *Tampa Bay 3*

Wilson Lecture: Thursday, 5:30 PM Tampa Bay 1 & 2**Mike Hynes** – *Applications of a Virtual-Reality Classroom in Mathematics Education*

Introduction by William R. Speer.

Abstract: Educators, particularly mathematics educators, have long been adopters of new pedagogies and teaching tools that have the potential to improve student and teacher performance in the content area of mathematics. The field of Modeling and Simulation has been an important part of training in aerospace, the military and industry; however, effective applications for education have not been available. For the past ten years a research team at the University of Central Florida has undertaken the task of developing a virtual-reality classroom, TeachLivE, and it has proven to be successful in changing teacher behaviors and show promise as a tool for students learning mathematics. The presentation will include audience interaction with TeachLivE as well as discussions of the uses of TeachLivE in mathematics education and education, in general.

Biography: Dr. Hynes attended Kenyon College and received a Bachelor of Science in Education from The Ohio State University. He taught mathematics and science in Akron, Ohio public schools for seven years. While teaching, he completed a Master's degree in Mathematics Education at Kent State University. After completing his Ph.D. in Curriculum and Instruction at Kent State University, Dr. Hynes joined Florida Technological University in Orlando as an Assistant Professor in the Elementary Education Department. Dr. Hynes has been promoted twice in his tenure at the university, and now holds the rank of Professor. Dr. Hynes professional interests relate to mathematics education, science education, the use of technology in instruction, problem solving, and the improving the preparation of teachers. He has been very active in obtaining external funding for research. He has received over \$4,000,000 in funding in over his career. Dr. Hynes directed a joint project of NASA and the National Council of Teachers of Mathematics, Mission mathematics, that resulted in three books for teacher of mathematics, and directed the program associated with the NASA. Educator's Resource Center at Kennedy Space Center. Over the years, Dr. Hynes has been published in many journals related to mathematics education and has consulted on several basal mathematics series for elementary schools.



Pegasus Professor Emeritus Hynes is the founding director of the Lockheed Martin/UCF Academy for Mathematics and Science. This endowed program continues to prepare teachers of mathematics and science from elementary and middle schools for leadership roles in the improvement of mathematics and science teaching. Since 2004, his research and development activity has been focused on the development of a simulator for education known as TeachLivE. With colleagues Charles Hughes and Lisa Dieker, Hynes received \$1.5 in funding to accelerate the development of TeachLivE. The simulator is now licensed by UCF to Mursion, Inc. for commercialization.

Founders Lecture: Friday, 4:30 PM Ontario**Alan Zollman** – *Mentoring of the Profession: The Legacy of RCML*

Introduction by Gabriel Matney.



Abstract: A few years ago I co-wrote an NCTM Yearbook chapter Identity Development: Critical Component for Learning in Mathematics. In this chapter we discussed the eight stages of psychosocial development of an infant to a mature adult, as described by developmental psychologist Erik Erikson. Stage seven is “generativity vs. stagnation” where, hopefully, adults nurture and support the next generation. Students, teachers, and researchers – we all need mentors that nurture and support us. RCML is where we look for supportive professional and personal relationships. RCML is also where, as mature adults, we reflect on a life with a sense of fulfillment. This is one of the foundational characteristics of the Research Council on Mathematics Learning; we are a mentoring organization. This is our legacy.

Biography: Dr. Alan Zollman is the role model for education. Dr. Zollman grew up on a small farm in rural Indiana, beginning his education in a two-room schoolhouse. His father only finished the 8th grade.

He served as a Peace Corps mathematics teacher in Ghana, West Africa, and later he as a middle school teacher. He continued his graduate work while teaching at University of Wyoming and Bowling Green State University. After finishing his Ph.D. at Indiana University, he taught at the University of Kentucky and then for 21 years in the Mathematical Sciences Department at Northern Illinois University. Since 2007, he has over 30 national and international articles and given over 30 national and international presentations. Dr. Zollman has served on the editorial board for RCML’s *Investigations in Mathematics Learning*, and for *Focus on Learning Problems in Mathematics*, the forerunner of *Investigations*. On the Mathematics Genealogy Project, he has 5 “children” and 17 “grandchildren.”

In leadership, Dr. Zollman was President of School Science and Mathematics Association, and Vice-President of the Research Council on Mathematics Learning. He has received several awards including Northern Illinois University’s Excellence in Undergraduate Teaching Award – quite unusual for a professor in the mathematics department. Four years ago he was presented with SSMA’s Outstanding Leadership Award. Last year, the Illinois Council of Teachers of Mathematics presented him with the Max Beberman Mathematics Education Award, the state’s highest award for teaching, research and service – possibly because he left the state. Dr. Zollman is faculty emeritus at Northern Illinois University, but retirement was not something he understood. Currently, he is a secondary education faculty member at Indiana University Southeast, ironically near the southern Indiana farm he grew up on many years ago.

Overview of Friday Morning Sessions				
Room	8:00 - 8:50 AM	9:00 - 9:50 AM	10:00 - 10:50 AM	11:00 - 11:50 AM
Michigan	<i>Algebraic Reasoning: A Challenge for Pre-Service Elementary Teachers</i> Carol Lucas, Adele Hanlon	<i>Factors that Influence Teachers' Geometry Learning for Teaching</i> Barbara Allen-Lyall <hr/> <i>Formative Assessment Strategies and Student Mathematics Achievement</i> James Telese	<i>But Wait, What do I Say? Blogging to Build Confidence</i> <i>Talking to Parents</i> Kansas Conrady	<i>Two Paths Converged: The Story of a Math Teacher and a Math Phobic</i> Marcia Fletcher, Justin Fletcher, Darlinda Cassel
Okeechobee 1	<i>Using Tutors to Teach Story-Driven Math Concepts to Students</i> Carolyn Pinchback, Elson Bihm, Tori Francis <hr/> <i>How Do Struggling Third Graders Make Sense of Fraction Concepts?</i> Rebecca Gault	<i>The Nature of Prospective Middle School Teachers' Responsiveness</i> Kadian Callahan <hr/> <i>Preservice Teachers Self Efficacy for the Use of Graphing Tools in Math Ed</i> Patrick Wachira, Xiongyi Liu	<i>Algeblocks to Image Integer and Binomial Multiplication</i> Sarah Pratt, Eloise Kuehnert, Colleen Eddy	<i>Using Apps to Develop Students' Understanding and Attitudes about Fractions</i> Darlinda Cassel
Okeechobee 2	<i>Preservice Teachers' Ability to Invent Computational Strategies</i> Sue Brown, Sandra Browning	<i>Construction of Arguments in Middle School Digital Mathematics Curriculum</i> Hagit Sela, Robert Wagner	<i>Developing Teacher Autonomy and Understanding Through Inquiry & Discussion</i> Patrick Brown, Hope Marchionda	<i>Teacher Reflections on a Curricular Activity System</i> Karina Hensberry, George Roy
Pensacola Bay	<i>Assessing Students' Math Learning while Developing Equitable Practices</i> Kerri Richardson, Tyrette Carter <hr/> <i>Developing Mathematics Teacher Leaders: Oklahoma's Elementary Mathematics</i> Stacy Reeder, Juliana Utley	<i>Reading Together from Afar: Professional Development by Video Conference</i> Ryan Fox <hr/> <i>Online Interactive Math: Does it Enhance Pre-service Teachers' Knowledge?</i> Nancy Cerezo, Deborah Banker	<i>Developing a Peer Mentoring Culture among Mathematics Preservice Teachers</i> Gabriel Matney	<i>Examining Preservice Teachers' Culturally Relevant Teaching</i> Nickolaus Ortiz
Superior	<i>Examining Teacher Preparation Through the Lens of Transfer of Learning</i> Melanie Fields, Eileen Faulkenberry	<i>An Investigation into First Grade Students' Mathematical Discourse</i> Seanyelle Yagi <hr/> <i>Preservice Teachers' Defining and Implementing Mathematical Discourse</i> Lynn Columba	<i>The Impact of Clinical Interviews on Pre-service Teachers</i> Sandra Trowell	<i>Implementing the edTPA in Mathematics: "A Wonderful, Awful Idea"</i> Tony Thompson, Kwaku Adu-Gyamfi, Maureen Grady

Continued on next page.

Overview of Friday Morning Sessions				
Room	8:00 - 8:50 AM	9:00 - 9:50 AM	10:00 - 10:50 AM	11:00 - 11:50 AM
Tampa Bay 1	<i>Learning About Elementary Preservice Teachers From Their Observations</i> Megan Burton	<i>Developing Math Teacher Candidates' Abilities, Skills, and Understandings</i> Alan Zollman	<i>Tools for Success: Preparing PSTs to Effectively Differentiate Instruction</i> Carolyn Mitten	<i>Past Presidents Meeting</i> RCML Past Presidents Only
	<i>Examining Prospective Elementary Grades Teachers' Mathematical Reasoning</i> William McGalliard	<i>Co-Teaching vs. Student Teaching to Develop Teacher Candidates in Education</i> Alan Zollman		
Tampa Bay 2	<i>Exploring STEM Curriculum in an Integrated Physics and Algebra 2 Course</i> Elayne Bowman, Clay Bowman	<i>The Impact of Formative Assessment on Primary Students' Number Sense Skills</i> Drew Polly	<i>Developing Mathematical Content Knowledge for Teaching Using Modeling Tasks</i> Farshid Safi	<i>Publications Committee Meeting</i> RCML Publications Committee Only
	<i>V-STEM: Visualizing Science, Technology, Engineering & Mathematics</i> Mary Baker	<i>Mathematics in the CHARMED World: Teaching through Robotics</i> Megan Nickels		
Tampa Bay 3	<i>Mathematics and Science Teachers' Perspectives on History and Culture</i> Roland Pourdavood	<i>Understanding the Motivation to Study Mathematics</i> Jenny Peters	<i>Improving Online Students' Learning in Statistics Using Curricular Supports</i> Taylor Jensen, Jeffrey Sadler	<i>Conference Committee Meeting</i> RCML Conference Committee Only
	<i>Full-Time Interns: A New Paradigm For Teacher Education?</i> Sheila Brintnall, Dena Walker			

Overview of Friday Afternoon Sessions			
Room	1:30 - 2:20 PM	2:30 - 3:20 PM	3:30-4:20 PM
Michigan	<i>Facilitating Mathematical Conversations in Diverse Classrooms: A Case Study</i> Mercedes Sotillo-Turner	<i>An Alternative Route to Bypass Developmental Mathematics</i> Linda Venenciano, Fay Zenigami	<i>Mindset and Mathematics</i> Eileen Faulkenberry
Okeechobee 1	<i>Asking the Right Questions – Young Children’s Perception of Number</i> Pat Jordan	<i>Identifying and Reducing Mathematics Anxiety in Preservice Teachers</i> Gina Gresham	<i>From Manipulatives to Social Justice: An Ecological Model for Relatedness</i> Kenneth Butler
Okeechobee 2	<i>Identifying Barriers to Pre-Service Teachers’ Mathematical Confidence</i> Ryan Fox, William McGalliard	<i>Mathematics Course Pathways: Insights and Experiences of a Redesign</i> Rachel Bates	<i>Implementing Reform Initiatives: A Case Study of a High School Teacher</i> Kwaku Adu-Gyamfi, Tony Thompson
Pensacola Bay	<i>Changing the Mathematics Teaching Culture to Improve Instruction</i> Bob Drake, Kathleen Hulgin	<i>Using Measurement to Develop Proportional Reasoning in a Cultural Context</i> Melfried Olson, Judith Olson	<i>iPad Apps for Early Math Learning</i> Amy Adkins, Lina DeVaul, Taro Ito
Superior		<i>The Effectiveness of Professional Development: Retention of Teacher Content</i> Makini Campbell-Sutherland	<i>Publish in the Investigations Journal!</i> Drew Polly
Tampa Bay 1	<i>Integrating Algebra and Literature in a Mathematics Education Course</i> Ann Wheeler, Carole Hayata	<i>Breaking or Perpetuating Perceived Norms in Content Courses for PSETs?</i> Kansas Conrady	<i>Mathematics Knowledge for Secondary Teaching?</i> Bob Mann, Anita Reid
Tampa Bay 2	<i>Student Understanding of Traditional and Simulation-based Inference Methods</i> Catherine Case	<i>The Development of Exemplary Statistics Teachers’ Professional Identities</i> Douglas Whitaker	<i>The Elephant in the Room: Students’ Mathematics-Related Beliefs</i> Cathrine Maiorca
Tampa Bay 3	<i>Memorial Scholarship Committee Meeting</i> RCML Memorial Scholarship Committee Only	<i>Nominations Committee Meeting</i> RCML Nominations Committee Only	

Overview of Saturday Morning Sessions				
Room	8:00 - 8:50 AM	9:00 - 9:50 AM	10:00 - 10:50 AM	11:00 - 11:50 AM
Michigan	<i>Let's Get Graphic! Learning About Student Understanding With Frayer Models</i> Mary Swarthout, Valerie Sharon	<i>Role of Support Structure in the Success of Developmental Math Programs</i> Elizabeth Howell	<i>Students' Conceptions of Negative Integers</i> Karen Zwanch	<i>Improve Elementary Teachers' Understanding of Base-ten Place Value System</i> Lina DeVaul, Amy Adkins, Carryn Warren
Okeechobee 1	<i>Beliefs about Social Justice among Elementary Mathematics Teachers</i> Brian Evans	<i>Pre-service Teachers' Implementation of Physical and Virtual Manipulatives</i> Enrique Ortiz, Heidi Eisenreich, Laura Tapp	<i>Is Change Possible? Practicum as a Way to View Math Ability Differently</i> Carolyn Mitten	<i>Colligation and Unit Coordination in Mathematical Argumentative Writing</i> Karl Kosko, Rashmi Singh
Okeechobee 2	<i>Our Emporium Model in Precalculus: Another Year of Learning and Growing</i> Tracey Howell, Carol Seaman	<i>Blending Divergent Approaches to Learning and Teaching Algebra—A Case Study</i> Fay Zenigami, Linda Venenciano	<i>A Latent Class Analysis of Algebra I Students in Florida</i> Thomasenia Adams	<i>Pre-service Teachers' Acceptance of Number Concepts Instruction in Base 8</i> Katie Harshman, Heidi Eisenreich
Pensacola Bay	<i>Math Dance: A Study of Effectiveness</i> Rachel Bachman, Erik Stern	<i>Diagnostic Case Study: Similarities between Mathematics and Reading</i> Nichole Smith, Kimberly Erwin, Tyrette Carter	<i>Exploring Mental Models of "Doing Math" through Drawings</i> Ben Wescoatt	<i>Draw Yourself Doing Mathematics: Assessing a Mathematics and Dance Class</i> Rachel Bachman
Superior	<i>Association between Students' Strategy Use and their Math Achievement</i> Nesrin Sahin, Juli Dixon		<i>Purposefully Planning for Mathematics Discourse</i> Andria Disney, David Erickson	<i>Academic Rigor in Single-sex and Coeducational Middle Grades Math Classes</i> Dennis Kombe, Megan Che
Tampa Bay 1	<i>Helping Student Interns Think Critically About Their Teaching Lessons</i> Cynthia Orona	<i>Reform-Statistics in the Middle Grades</i> Natasha Gerstenschlager	<i>First Look! A Validation Study of the SMPs Look-for Protocol</i> Jonathan Bostic, Gabriel Matney	<i>Instructional Practices Related to Developing Productive Disposition</i> Maureen Grady
	<i>What Went Wrong: Pre-Service Teachers' Reflections on Lesson Planning</i> Glenn Phillips	<i>Deepening Statistical Content Knowledge for the Common Core</i> Jacqueline Wroughton, Brooke Buckley		
Tampa Bay 2	<i>Parent Workshops on 2nd, 3rd, and 4th Grade Whole Number Operation Tasks</i> Heidi Eisenreich	<i>Tinkerplots and K-8 Mathematics Education</i> Lucas Foster	<i>Examining an Instrument Designed to Measure the Quality of Instruction</i> Kristopher Childs, Juli Dixon, Makini Cambell-Sutherland, Haiyan Bai	

Continued on next page.

Overview of Saturday Morning Sessions				
Room	8:00 - 8:50 AM	9:00 - 9:50 AM	10:00 - 10:50 AM	11:00 - 11:50 AM
Tampa Bay 3	<i>Using Technology to Engage Students in Introductory Statistics Topics</i> Hope Marchionda, Melanie Autin	<i>Guided Reinvention of Sequence Convergence: A Study of Two Students</i> Beth Cory, Ayse Ozturk		
	<i>The Challenge of College Algebra: Year Two</i> Jodi Frost	<i>Framework for Assessing College Students' Duality Conception of Infinity</i> Grace Babarinsa-Ochiedike		

Time: 4:30-5:30 PM	Room: Tampa Bay 1
Teacher Candidates' Burning Questions Collected from Poster Presentations	
Amy Adkins	University of Nevada, Las Vegas
<p>This research seeks to stimulate the mathematics education community by summarizing teacher candidates' burning questions about the teaching and learning of math education. Using a poster presentation, teacher candidates identified these questions and their rationale for questions. The burning question posters provided a summary of what burning question was explored and synthesized information from journal citations to arrive at a conclusion for the topic being investigated. The researcher collected fifty-five posters over a two year period. Qualitative methods were used to analyze the data in which emerging themes were identified. This research will generate conversation about topics that teachers are interested in learning in elementary math methods classes. This research seeks to coordinate and generate themes that can be discussed in further depth with teachers.</p>	
Time: 4:30-5:30 PM	Room: Tampa Bay 1
Number and Operations Knowledge: A K-5 Endorsement Perspective	
Gregory Chamblee	Georgia Southern University
<p>This session will discuss numbers and operations content knowledge of K-5 teachers enrolled in a K-5 mathematics endorsement professional development initiative. Content pre-/post- test data will be discussed. Implications of the data will be discussed.</p>	
Time: 4:30-5:30 PM	Room: Tampa Bay 1
Math Teachers' Knowledge and Self-efficacy for Instructional Technology Use	
Danya Corkin	Rice University
<p>It is unequivocally believed that emerging instructional technologies have the potential to bolster mathematics learning and instruction at urban schools (e.g., International Society for Technology in Education, 2007; National Council of Teachers of Math, 2008). With appropriate use, instructional technology can help teachers enact their teaching-related tasks more effectively, and in turn, facilitate students' learning of math (Mishra & Koehler, 2006). The main aims of this study are to investigate the extent to which a) teachers' self-efficacy for integrating technology (TI) in the classroom and their technological pedagogical content knowledge (TPACK) relate to their frequency of use of technology in the mathematics classroom, and b) perceptions of professional development about instructional technology in the classroom predict changes in teachers' TI self-efficacy and TPACK. We surveyed 80 K-12 math teachers from urban school districts before and after a 3-week summer PD program. Results showed that TI self-efficacy and TPACK significantly correlated to frequency of technology usage. Regression analyses indicated that teachers' perception of instruction about the use of technology through PD was a significant predictor of their TPACK but was not a statistically significant predictor of their TI self-efficacy. This study has implications for teacher preparation and PD programs related to training teachers in instructional technology for math teaching.</p>	
Time: 4:30-5:30 PM	Room: Tampa Bay 1
Mathematics Trail at Eastern Kentucky University	
Kari Everett	Eastern Kentucky University
<p>How do you get students to do mathematics without them realizing they are doing mathematics? A Math Trail! A math trail is a predetermined course in an environment where students examine real-world mathematics. The math trail would bring local elementary students to campus to explore while applying their mathematical knowledge to real-world situations. Pre-service teachers enrolled in a content mathematics course develop the problems for the math trail as part of a project for their class. The problems are based on various buildings on campus and the Kentucky Mathematics Curriculum standards for elementary grade-level mathematics. The project brings the community to campus and engages students in learning more about various places on campus thru mathematics. The pre-service teachers advance their knowledge about writing real-world problems at appropriate grade levels for elementary students. Through the project, the pre-service teachers are able to use their creative side to develop the problems that are informative and provide interesting information to elementary students. All students are able to give their feedback thru reflections about the project and math trail.</p>	

Time: 4:30-5:30 PM	Room: Tampa Bay 1
Exploring Validity Evidence for the PSM7 and PSM8	
Tim Folger	Bowling Green State University
Jonathan Bostic	Bowling Green State University
<p>This poster presentation aims to share key features from evaluation of seventh- and eighth-grade students' mathematical problem solving as well as their feelings towards two classroom-based problem-solving measures (PSM7 and PSM8). Evidence related to content and consequences of testing validity was explored through cognitive interviews. Results from analysis of these data sources were further explored with implications shared for using the PSM7 and PSM8.</p>	

Time: 4:30-5:30 PM	Room: Tampa Bay 1
Exploring Preservice and Inservice Educators Sensemaking of the SMPs	
Lance Kruse	Bowling Green State University
Megan Schlosser	Bowling Green State University
Jonathan Bostic	Bowling Green State University
<p>The purpose of this poster is to share findings of undergraduate preservice mathematics teachers' and inservice mathematics teachers' understanding of the Standards for Mathematical Practice (SMPs) (Common Core State Standards Initiative [CCSSI], 2010). The SMPs express what it means to do mathematics and "therefore permeate mathematics instruction across grade levels and content areas" (Koestler, Felton, Bieda, Otten, 2013, p.ix). Our poster presentation shares preservice and inservice teachers' ideas about observable factors related to the SMPs, connects these factors to the SMP look-for protocol (Bostic, Matney, & Sondergeld, 2016), and offers validity evidence related to the protocol.</p>	

Time: 4:30-5:30 PM	Room: Tampa Bay 1
Structural Connections of Base-10 Numbers and Binomials Using an Area Model	
Eloise Kuehnert	University of North Texas
Sarah Pratt	University of North Texas
<p>Our research reveals that teachers struggle to express what is a binomial and the structural foundations involving them. This study shows a series of tasks using the distributive property to connect area model structures involving base-10 numbers and binomials. Initial results indicate a need for additional tasks within the series to scaffold teacher learning trajectories. Conversations will focus on the mathematical concepts and future implications for professional development. Hands-on activities will be available for participants to engage in the mathematics.</p>	

Time: 4:30-5:30 PM	Room: Tampa Bay 1
Attitudes about the Use of Digital Games among Pre-service Teachers	
Xiongyi Liu	Cleveland State University
Patrick Wachira	Cleveland State University
<p>The purpose of the present study is to explore the attitudes among pre-service teachers about the use of digital games in math teaching and learning. Teacher education students at a Midwestern university will be administered a survey with questions on their perceived usefulness of digital games in math education, self efficacy for using digital games in math education, and motivation for learning about educational uses of digital games in math classrooms. Data from the survey will be analyzed to describe the participants' attitudes about digital games. Preliminary analyses will also be conducted to examine whether such attitudes are related to the participants' age, gender, or major.</p>	

Time: 4:30-5:30 PM	Room: Tampa Bay 1
Designing and Teaching Courses to Satisfy K-8 Certifications	
Winifred Mallam	Texas Woman's University
<p>This session focuses on how a mathematics department revised their mathematics courses to reflect the mathematics that pre-service teachers preparing to be certified for kindergarten to grade 8 need. We will review the structure of the courses offered and how they address state and national mathematics standards for teaching mathematics.</p>	

Time: 4:30-5:30 PM	Room: Tampa Bay 1
Pre-Service Teachers' Dispositions Towards Mathematics	
Cynthia Orona	University of Arkansas
<p>Elementary pre-service teachers are preparing for future careers in classrooms where teaching math will likely be a part of their teaching assignment. How do these pre-service teachers view mathematics? As with all people, responses lie on a continuum with a range from positive experiences to negative experiences. Based upon prior experience, people conjure thoughts and feelings when they hear the word mathematics thus framing a distinct disposition towards the subject of mathematics. In particular a teacher's disposition can be influential on their students' dispositions towards mathematics, especially in the elementary grades when students are building a mathematical foundation for future learning. The mathematical foundation itself can lead to a range of mathematical dispositions depending on experiences the student has with mathematics. Elementary pre-service teachers were asked to respond to the following question at the beginning of a mathematics methods course: What do you think of when you hear the word mathematics? Responses varied and provided an initial glimpse into their dispositions towards mathematics. These responses were cross-referenced with autobiographies that the students wrote about their mathematical experiences, beliefs about learning mathematics, and thoughts on qualities they feel the ideal mathematics teacher should embody. This presentation will discuss the dispositions that these students have towards mathematics.</p>	
Time: 4:30-5:30 PM	Room: Tampa Bay 1
Increasing Student Engagement in Math with Online Games	
Diana Perdue	University of Trinidad & Tobago
<p>Do you have students who are present in body but absent in every other sense? Do your students sometimes resemble zombies rather than interested, engaged people? Technology can help! In this best practices session, I will present three specific strategies for increasing student engagement in your math classes by using online games. Gamification is not a new concept, but its application to education and mainstream classes is in a rather nascent developmental stage. Research is clear: students (well, all of us really) are more interested in learning when it doesn't feel like drudgery, when it is fun, and when there is a significant degree of control and autonomy. Game designers have spent a great deal of time figuring out the "sweet spot" between hard fun and an almost addictive level of engagement. In my session, we'll discuss aspects of this that can be easily applied to the typical math classroom. Come ready to play and learn!</p>	
Time: 4:30-5:30 PM	Room: Tampa Bay 1
One on One: What I Learned from Teaching in a Specialized Private School	
Glenn Phillips	Texas A&M University
<p>For one semester, I taught seven students at a private, one-to-one school in the south. The school catered to home-schooled students, students with learning differences, students with emotional or physical challenges, and students whose extracurriculars kept them from traditional schools. Having taught in public schools (high school) as well as college, I thought I would be well-prepared for the stripped-down classroom. I was wrong. This presentation uses an auto-ethnographic lens to explore my semester. I was the teacher of record for geometry, algebra II, pre-calculus, and finite mathematics. In addition I did after school tutoring for calculus, pre-algebra, algebra, and trigonometry. The experience taught me that many of the challenges teachers associate with larger classrooms (behavior, disassociation, staying on track, and assessment) are still prevalent in a one-on-one classroom. However, other lessons learned (student-pacing, student-led curriculum, and attention to unique student needs) helped redefine how I teach larger classrooms.</p>	
Time: 4:30-5:30 PM	Room: Tampa Bay 1
Secondary Mathematics Teacher's Beliefs and Practices and NCTM Principles	
Roland Pourdavood	Cleveland State University
<p>This qualitative and descriptive case study is part of a larger study focusing on two Introduction to Calculus classes taught by the same teacher. The study is grounded in constructivist inquiry and is context specific. Data sources include transcripts of audio tape recordings from one-on-one interviews with the participating teacher, from classroom observations, students' written responses to various non-routine problems, and the field notes of the researchers. The study does not intend to generalize the findings to all settings. Rather, it intends to share the ideas, experiences, and practices of the classroom teacher in the hope that readers may identify with the research context and apply the findings to their own particular settings. The focus of this paper is to describe one secondary mathematics teacher's evolving beliefs and practices relative to the NCTM six principles. In addition, the paper discusses the implication for teacher education, curriculum change, and school transformation.</p>	

Time: 4:30-5:30 PM	Room: Tampa Bay 1
Impacts of the Launch of Professional Development on Teachers' Instruction	
Corrinne Sullivan	Bowling Green State University
Gabriel Matney	Bowling Green State University
<p>This poster presentation shares the teaching instructional strategies and mathematical concepts shared during a “two day”, thirteen hour, professional development workshop for the sixth through eighth grade teachers of a district in Northern Ohio. Observations from exit ticket reflections during the professional development and videos of the teachers' instruction are then reported. An analysis of these observations versus the elements and aspects of the professional development will determine whether this thirteen hour professional development workshop impacted the teachers' instructional techniques between one and two months after the workshop.</p>	

Time: 8:00-8:50 AM	Room: Michigan
Algebraic Reasoning: A Challenge for Pre-Service Elementary Teachers	
Carol Lucas	University of Central Oklahoma
Adele Hanlon	Jacksonville University
<p>Algebraic reasoning needs to be developed throughout a students' mathematics education yet many elementary teachers see this as a topic reserved for algebra classes. This presentation will provide examples of making algebraic connections to current elementary mathematics curriculum that have been used with pre-service elementary teachers. Results of surveys of these teachers to gauge their attitude towards the importance of algebraic reasoning as well as their algebra content knowledge will be shared.</p>	

Time: 8:00-8:50 AM	Room: Okeechobee 1
Using Tutors to Teach Story-Driven Math Concepts to Students	How Do Struggling Third Graders Make Sense of Fraction Concepts?
Carolyn Pinchback, University of Central Arkansas	Rebecca Gault, University of Central Florida
Elson Bihm, University of Central Arkansas	
Tori Francis, University of Central Arkansas	
<p>The speaker will share the findings of the pilot study by discussing the comparison of the three groups: (1) a control group of four students who will not receive the training at first (but who will be given the training once the two intervention groups below have received theirs), (2) a group of four students who will be read-to and tutored by a multimedia-trained tutor (the multi-media program will consist of live modeling and didactic training with a PowerPoint presentation with a voice-over narrator), and (3) a group of four students who will be read to and tutored by a tutor-this tutor will only be given the story-book to read and limited typed instructions on conducting the reading/activities with the students. The speaker will also share her observations of the activities, games, and play that the children were engaged in during this study. Furthermore, special attention will be noted on the effects of using an illustrated story-book, Captain Invincibles and the Space Shapes by S. Murphy, Pre and post results will be presented.</p>	<p>Although many researchers in mathematics education have studied the conceptual thinking and reasoning of elementary mathematics students and the need for conceptually based instruction prior to instruction in procedures, studies that have specifically addressed the thinking or instructional needs of students who struggle in mathematics have been less common. At the same time, research in exceptional education has tended to focus on procedural interventions and quantitative results. Although some researchers have sought to understand the sense-making process of struggling students in mathematics, few studies have attempted to qualitatively document how struggling third grade students make sense of beginning fraction concepts such as representation, comparison, and equivalence.</p>

Time: 8:00-8:50 AM	Room: Okeechobee 2
Preservice Teachers' Ability to Invent Computational Strategies	
Sue Brown	University of Houston, Clear Lake
Sandra Browning	University of Houston, Clear Lake
<p>The purpose of this session is to share the results of a study examining preservice teachers' ability to invent computational strategies. Participants in the study were 57 preservice teachers pursuing a Bachelor's Degree in Education with early childhood through grade 6 initial certification. The candidates were enrolled in Mathematics Methods courses taught by the speakers. On the second day of class, preservice teachers were given a pre-assessment consisting of four multi-digit computations, one for each of the operations. Formative assessments with similar problems were administered on four different days in the middle of the semester. A final summative assessment using the same problems as the pre-assessment was given on the last day of the course. Data indicate that preservice teachers have minimal skills in creating invented strategies. The percentage of preservice teachers who were able to solve a computational problem using invented strategies on the third assessment varied from 7% for multiplication to 93% for subtraction.</p>	

Time: 8:00-8:50 AM		Room: Pensacola Bay
Assessing Students' Math Learning while Developing Equitable Practices	Developing Mathematics Teacher Leaders: Oklahoma's Elementary Mathematics	
Kerri Richardson, University of North Carolina at Greensboro	Stacy Reeder, University of Oklahoma	
Tyrette Carter, North Carolina A&T State University	Juliana Utley, Oklahoma State University	
Our research focuses on a growth model of how teachers developed their ability to assess student learning as a result of their growth in creating equitable instruction for students in informal school settings within the context of algebraic reasoning. We describe data collected as part of a study focusing on the mathematical reasoning of students in grades, 3, 4, and 5. Our research context took place in six elementary schools located in both rural and urban settings. We describe how teachers began their instruction and over time, how they developed their assessment strategies to ensure that students obtained access to algebraic reasoning, mathematical content, and discourse.	The mathematics education programs at two large state research universities embarked on implementing an Elementary Mathematics Specialist program with the goal of developing mathematics teacher leaders and increasing the mathematical content and pedagogic knowledge of elementary teachers. The program development and coursework were included as part of an ongoing joint research project. Research efforts and findings related to the development of teacher leaders as a part of these programs will be shared. Hallmark features of the program and coursework that significantly impacted the development of teacher leadership will be presented.	

Time: 8:00-8:50 AM		Room: Superior
Examining Teacher Preparation Through the Lens of Transfer of Learning		
Melanie Fields	Texas A&M University-Commerce	
Eileen Faulkenberry	Tarleton State University	
The instructional practices of six graduates from a secondary math and science preparation program were examined. Teachers were in either their first or second year of teaching. Haskell (2000) outlined eleven principles of transfer of learning principles, which were employed to examine the levels of transfer demonstrated from preparation to practice. The Concerns Based Adoption Model (CBAM) was used for data collection; all three components were used to triangulate the findings. Assumptions were generated through the use of the program's own teacher observation protocol, the program's own replication manual, and alignment with Haskell's eleven principles. The findings from this study demonstrated that when the principles of transfer were applied, initial levels of transfer were observed. If a teacher educator wants their future teachers to transfer what they learned about teaching to the classroom, we must first understand what facilitates transfer and purposefully incorporate those principles. We will explore the principles, the findings from the study, and ultimately the implications of the findings.		

Time: 8:00-8:50 AM		Room: Tampa Bay 1
Learning About Elementary Preservice Teachers From Their Observations	Examining Prospective Elementary Grades Teachers' Mathematical Reasoning	
Megan Burton, Auburn University	William McGalliard, University of Central Missouri	
This study examined elementary prospective teachers' professional noticing of the mathematical thinking of students. Prospective teachers observed students in multiple settings and documented their noticings in a journal, through interviews, with student artifacts, and through reflections of their lessons. The analysis of these data sources provide a snapshot into their perceptions. Insight into the pedagogical needs of prospective teachers to support their ability to effectively attend, assess, respond to the needs of all students are found. Comparisons are made to the noticings that occurred while prospective teachers were instructing students versus while observing mathematics lesson. Findings provide insight into the need to support prospective teachers as they move from observers to teachers.	This mixed methods study investigated undergraduate preservice elementary grades teachers' mathematical reasoning. I examined two aspects of mathematical reasoning, strategy and generalization and sought to understand the relationship between them through analyses of one hundred and fifty students' strategies for enumerating and their generalizations of these strategies in the context of combinatorics tasks. Findings suggest little relation between the teachers' enumeration strategies and their generalizations. Many teacher candidates did not draw upon the strategies used in their explorations of the tasks when generalizing, often recalling a numeric formula that was unrelated with their enumeration strategy. These results suggest that teacher educators should encourage teacher candidates to make sense of the mathematics that they learn so that they in turn can help their future students.	

Time: 8:00-8:50 AM		Room: Tampa Bay 2	
Exploring STEM Curriculum in an Integrated Physics and Algebra 2 Course		V-STEM: Visualizing Science, Technology, Engineering & Mathematics	
Elayne Bowman, Oklahoma Christian University		Mary Baker, University of North Dakota	
Clay Bowman, Mustang High School			
<p>Normally a prerequisite to Physics, Algebra 2 can often be a tedious course for high school sophomores to master. However, to be able to complete the pre-engineering set of courses, including the Advanced Placement Calculus and Physics series, both Physics and Algebra 2 must be completed by the end of students' sophomore year. Two secondary teachers from a large high school forged a team and a plan to integrate and teach the two courses during one fifty minute class period during the 2015-2016 school year. Beginning with the teachers' conceptualization of what the course would like, how the teaching would be shared, and what assessments might look like, this study follows the process of forging new paths in STEM curriculum in the secondary classroom.</p>		<p>Visualizing STEM: What does that mean? Motivating students to learn mathematics and science and to be excited about how they can and will be using this knowledge in their future careers is often a complex problem teachers are confronted with on a day-to-day basis. In this session, we will share how one group of university faculty interacted with middle school science and mathematics teachers and students in a Mathematics and Science Partnerships Grant that was designed to motivate students to engage in and enjoy more mathematics and science lessons that are related to the topic of solar energy. From building solar ovens and houses to building a solar city, students interacted with scientists and mathematicians from the university as they explored how the problems associated with American's energy generation and consumption could possibly be addressed through the use of solar energy. Additionally, students and teachers interaction with university faculty also exposed them to the exciting career opportunities that exist in STEM-related careers. In this session we shall share, not only the curriculum developed, but also the student impact results of our study. Visualizing STEM: Seeing is believing!</p>	
Time: 8:00-8:50 AM		Room: Tampa Bay 3	
Mathematics and Science Teachers' Perspectives on History and Culture		Full-Time Interns: A New Paradigm For Teacher Education?	
Roland Pourdavood, Cleveland State University		Sheila Brintnall, Northwestern Oklahoma State University	
		Dena Walker, Northwestern Oklahoma State University	
<p>This presentation focuses on five years of data collection and data analysis of secondary mathematics and science teachers' perspectives on the importance of history and culture for teaching and learning as they took a course with me. Data collection includes the researcher's field notes, classroom discussions, participating teachers' writing and presentations. The findings of the study suggest that although most of the participating teachers acknowledged the importance of teaching and learning mathematics and science from historical and cultural perspectives, actualization of their beliefs and their classroom practices faces many challenges and problems such as policy, politics, ontological, epistemological, and methodological issues.</p>		<p>The current teacher shortage is forcing more school systems to hire alternatively certified teachers and look to colleges and universities to find viable candidates to fill classroom positions. This will be a presentation with an open discussion concerning the placement of interns into full-time positions before fully completing an accredited education program.</p>	

Time: 9:00-9:50 AM		Room: Michigan	
Factors that Influence Teachers' Geometry Learning for Teaching		Formative Assessment Strategies and Student Mathematics Achievement	
Barbara Allen-Lyall, Manhattanville College		James Telese, University of Texas, Rio Grande Valley	
<p>This study examined cognitive and affective factors that influence teachers' geometry learning for teaching. Although teachers of all aged students are expected to possess both pure geometry content knowledge and pedagogical content knowledge necessary for teaching, research reveals that few experience sufficient instruction or gain adequate understanding of the geometry they must be able to model and discuss with their students. In this study, a multi-measure approach was used to investigate potential relationships between teachers' spatial ability (specifically mental rotation and spatial visualization), attitudes about geometry, and geometry content learning. Participants were students in two sections of a geometry course in a non-licensure college mathematics education program. The participants were also teachers in underperforming schools where improving student mathematics achievement is essential. Findings revealed geometry attitudes predicting geometry content pretest scores and spatial ability predicting growth of geometry understanding during the study period. Importantly, results suggest addressing both affective and cognitive factors from the earliest stages of geometry learning.</p>		<p>This session reports on a NAEP database analysis. The study examined the relationship between formative assessment strategies and eight grade students' mathematics achievement using the NAEP mathematics composite scale score as the dependent variable. Moreover, the performance of English Language Learners was compared to non-English Language. The results indicated that performance for English Language Learners was lower, and statistically significant, than for non-English Language Learners.</p>	

Time: 9:00-9:50 AM		Room: Okeechobee 1	
The Nature of Prospective Middle School Teachers' Responsiveness		Preservice Teachers Self Efficacy for the Use of Graphing Tools in Math Ed	
Kadian Callahan, Kennesaw State University		Patrick Wachira, Cleveland State University	
<p>This session shares information on a research study that is currently in the data analysis phase. The study examines the nature of how prospective middle school teachers (PMSTs) listened responsively to their peers in an undergraduate mathematics content course. In particular, the study is concerned with describing the nature of prospective teachers' listening responsiveness to their peers' mathematical ideas with regards to the level and function of their responses. Preliminary results suggest that prospective teachers were primarily operating in the responsive listening phase as they listened carefully to and gave serious consideration to others' mathematical thinking, and worked hard to actively support and extend that thinking in meaningful ways that helped to move the mathematical goals of the lesson forward.</p>		<p>Xiongyi Liu, Cleveland State University</p> <p>The purpose of the present study is to examine self-efficacy for the use of graphing technology when used in the context of learning and assessment among middle school pre-service teachers. Data sources include survey, interviews with selected teachers, classroom observations, and student written responses to problems solved with the use of graphing calculators. It is hypothesized that pre-service teachers will show improved self-efficacy for using graphing tools in math teaching.</p>	

Time: 9:00-9:50 AM		Room: Okeechobee 2	
Construction of Arguments in Middles School Digital Mathematics Curriculum			
Hagit Sela		University of Florida, College of Education	
Robert Wagner		University of Florida, College of Education	
<p>SunBay Math is an innovative mathematics curriculum integrated with software and pedagogy focused on enhancing understanding. It is designed to help students understand middle school challenging math concepts. The technology-based activities use dynamic representations intended to stimulate discussions around these concepts. The software allows manipulating the objects and provides feedback by displaying immediate changes that occur. These activities encourage students to predict a result before checking it online. As students work on the software in small groups, encountering multiple predictions by different members of the group motivates students to make arguments to support their prediction, and critique explanations of peers. SunBay is implemented in 30 middle schools in South Florida. It is based on SimCalc, a predecessor curriculum that was implemented previously and focused on Algebra. Research on SimCalc demonstrated significant impact on student learning of core algebra concepts including both procedural and conceptual problems. These findings raise a need to investigate the nature of the processes that take place in these classrooms, and the nature of reasoning used, in particular. This research aims at looking closely at five SunBay math classes in order to characterize the nature of explanations and arguments constructed, while comparing them to explanations and arguments constructed in five non-SunBay math classes learning the same concepts.</p>			

Time: 9:00-9:50 AM		Room: Pensacola Bay	
Reading Together from Afar: Professional Development by Video Conference		Online Interactive Math: Does it Enhance Pre-service Teachers' Knowledge?	
Ryan Fox, Belmont University		Nancy Cerezo, Saint Leo University	
		Deborah Banker, Texas Southmost College	
<p>How do teacher educators support pre-service and novice teachers outside of—or in addition to—the university classroom setting? Previous research suggested implementing methods of asynchronous communication. However, what methods are available to teachers and educators when the teacher educator and the novice teacher are available simultaneously but unable to meet at the same location? This session will report on the findings of a self-study involving a novice teacher of mathematics and a junior university faculty member. We are both interested in learning how we grow professionally in our respective roles in terms of both content and pedagogical knowledge bases. The professional development experience associated with the self-study is a discussion on a set of readings within mathematics education literature. We used video conference technology to engage in fruitful discussions on teaching mathematics and teaching future mathematics teachers. In this presentation, we will share how interactions by video encouraged each of us to integrate our selected readings with our growing base of practical experiences in order to strengthen our respective mathematical knowledge for teaching. We encourage session participants to share their insights in working with pre-service and novice teachers in a distance education setting or the viability of incorporating our work in their own mathematics teacher preparation programs.</p>		<p>Using the online interactive math game website, Platinum Math, pre-service elementary teachers provide feedback on their efficacy of math skills. Students work within the math website utilizing the games feature as well as the teacher resource pages to enhance their math knowledge as well as build their efficacy towards designing lessons. Analysis of survey results will be shared.</p>	

Time: 9:00-9:50 AM	Room: Superior
An Investigation into First Grade Students' Mathematical Discourse	Preservice Teachers' Defining and Implementing Mathematical Discourse
Seanyelle Yagi, University of Hawaii at Manoa	Lynn Columba, Lehigh University
<p>Although a large body of research looking at aspects of mathematical discourse exists in the literature (Ball,1993; Cenzig, Kline, & Grant, 201; Hiebert & Wearne, 1993; Lampert, 2001; Wood, 2002) there has been very little study into the development of whole group discourse with young children. This year-long study utilized an ethnographic case study design to look at the development of whole group mathematical discourse within a first grade classroom. Observations were conducted at three points during the course of the year to study the discourse development. The findings indicate the challenges associated with orchestrating whole group interactions with young children, and provide a portrait of the teacher and students "in development." A challenge continues to be the competing goals of engaging students in student-centered discussions, yet ensuring that they learn the required mathematics described in standards documents, an issue particularly relevant in the current educational climate. Descriptions of first grade students' whole group interactions provide insight into what it means to be student-centered and implications for defining the teacher's role in orchestrating student-centered discussions, with the Common Core State Standards for Mathematical Practice (SMPs) in mind. Issues and possible areas for future research related to the current educational climate, including implementation of the SMPs, will also be discussed in this presentation.</p>	<p>Mathematical discourse or purposeful and intentional math-talk is critical to mathematical development. The purpose of this session is to share research on (1) what are the best techniques to teach math-talk in the classroom to pre-service elementary teachers? (2) what instructional activities have an impact on helping teachers to plan, teach, and reflect on mathematical discourse in the classroom practices? and, (3) how can novice teachers be guided to build a comfortable learning environment so that their students explain processes, make suggestions, and justify their answers while their students are making mistakes and learning from their peers? Let's guide teachers to go beyond explaining solutions and strategies and assess the quality of discourse. The tool of language merits the same attention in teacher education that manipulatives receive. The mathematics teacher's ability to cultivate serious mathematical thinking in students rests on the nature of classroom discourse.</p>

Time: 9:00-9:50 AM		Room: Tampa Bay 1	
Developing Math Teacher Candidates' Abilities, Skills, and Understandings		Co-Teaching vs. Student Teaching to Develop Teacher Candidates in Education	
Alan Zollman, Indiana University Southeast		Alan Zollman, Indiana University Southeast	
<p>There is a wide body of research that recognizes the importance and benefits of mentoring new teachers as they enter the field. Therefore, it makes sense that we also examine the need to mentor teacher candidates as they embark on their journey of becoming secondary mathematics teachers. Teaching middle and secondary school mathematics is an incredibly complex and demanding profession. Mentoring teacher candidates to reach their potential may be even more so an arduous responsibility.</p>		<p>There is a large body of research that recognizes the importance and benefits of mentoring new teachers as they enter the profession (New Teacher Center, 2005; Darling-Hammond, 2000). We also need to support and mentor Teacher Candidates as they begin to practice their craft (Heck, Bacharach, & Dahlberg, 2007). By shifting from a traditional model of student teaching to a co-teaching model, we no longer expect Teacher Candidates to learn the complex art of teaching by leaving them alone to sink or swim. Instead co-teaching can provide them with the involvement, preparation, leadership opportunities, modeling and coaching they will need to develop their knowledge and skills in a nurturing environment. There are specific advantages in content, structure, assessment, and diversity, in co-teaching mathematics, as well as science, English/language arts, and social sciences at the secondary level, by having two pairs of knowledgeable hands in the classroom (Dieker & Murawski, 2003). The P-12 Clinical Educator partners with the Teacher Candidate, rather than relinquishes responsibility to a student teacher. Co-teaching, first developed in the 1990's at St. Cloud College (Heck, Bacharach & Dahlberg, 2008) focuses on student learning more than content or teacher development. While there are possible problems, we have found specific benefits of co-teaching for the student, the Teacher Candidate and the P-12 Clinical Educator.</p>	

Time: 9:00-9:50 AM		Room: Tampa Bay 2	
The Impact of Formative Assessment on Primary Students' Number Sense Skills		Mathematics in the CHARMED World: Teaching through Robotics	
Drew Polly, University of North Carolina at Charlotte		Megan Nickels, University of Central Florida	
<p>This presentation will provide the findings of a study that evaluated a year-long professional development program focused on supporting teachers' use of an internet-based formative assessment tool. Data collected using the tool was analyzed using multi-level modeling. Findings indicated that consistent use of the tool and associated formative assessment practices led to significant student growth compared to students whose teachers used the tool less frequently. Further, the use of formative assessment was associated with greater gains in student achievement with students from poverty and those who were identified as struggling learners.</p>		<p>In a 52-week ethnographic study, I investigated an intervention for children with chronic illnesses (e.g., cancer, sickle-cell disease) using Lego EV3 and WeDo Robotics kits, and a tangible-graphical programming language, Creative Hybrid Environment for Robotics Programming (CHERP). The intervention addresses issues of children's mathematical learning. I will present three cases studies of children (ages 3, 14, and 16) with acute lymphocytic leukemia (ALL), to depict how robotics contributed to significant conceptual growth across mathematical domains.</p>	

Time: 9:00-9:50 AM	Room: Tampa Bay 3
Understanding the Motivation to Study Mathematics	
Jenny Peters	Oklahoma State University
<p>Higher education institutions typically use quantitative methods to ‘know’ their student body. This study uses qualitative methods to attempt to understand the illuminate pieces of the student experience in the mathematics and physical sciences department at a small university centrally located in the U.S. While many elements play a part in the student experience, this study seeks to answer the question of how a student’s past experiences, attitudes and beliefs, and the instructor and the instructional techniques employed affect the success of the students. A successful mathematics education program seeks to produce students who are mathematically proficient and who show “interest and curiosity... throughout the study of mathematics [to] spark a lifetime of positive attitudes toward the subject” (Leinwand et al., 2014). Students who are successful in a mathematics program will exhibit some or all of these qualities. Interpretations of the qualitative data gathered (e.g. stories) through transcribed interviews, observations and questionnaires illuminate the effects of past experience, attitudes and beliefs and instruction strategy on the success of students in the program. The presentation will discuss the findings of the study and discuss implications for future research into improving mathematics education for a general student population.</p>	

Time: 10:00-10:50 AM	Room: Michigan
But Wait, What do I Say? Blogging to Build Confidence Talking to Parents	
Kansas Conrady	University of Oklahoma
<p>The Personal Choice Project completed as part of a methods course provides the opportunity for students to personalize an assignment and explore a topic of their own choosing in greater depth. One of the options available to the students is to work as part of a group to develop a post for an existing blog for parents of elementary children. The PSETs then complete a written reflection about their overall experience and the impact of the assignment on their future classrooms. While the overall purpose of the assignment is to seek out professional development of their own choosing, many select this topic because they want to learn how to effectively communicate with parents or improve their understanding of a particular aspect of mathematics content. The reflective paper provides insight into their perceptions of the assignment and overall quality of their experience. Information from these assignments will be synthesized to provide preliminary evidence of effectiveness of the assignment as well as additional directions or information for the blog.</p>	

Time: 10:00-10:50 AM	Room: Okeechobee 1
Algeblocks to Image Integer and Binomial Multiplication	
Sarah Pratt	University of North Texas
Eloise Kuehnert	University of North Texas
Colleen Eddy	University of North Texas
<p>Teachers’ knowledge of mathematics and their skills in teaching mathematics are critical to students’ learning of mathematics (Hill et al., 2005). The research question we ask is: In what ways do prospective middle grades teachers’ understandings of integer and binomial operations change when they are guided through a series of scaffolded tasks that utilize hands-on models to provide images of the mathematical concepts? Assisting PSTs in the purpose for why area models can represent integer and polynomial multiplication is an important undertaking. The specific focus for this report is what changes have occurred in their understandings with respect to multiplication of integers and polynomials. A series of design experiments with middle-grades mathematics PSTs have been conducted, using base-10 blocks, Algeblocks and the quadrant mat. The tasks are scaffolded in such a way that builds on number sense to enhance algebraic reasoning. Preliminary findings from the most recent experiment reveal a more robust understanding of binomial operations than previous studies. These will be shared, along with an outline of the changes that were made across the four experiment. The overall objective of this research is to model an effective set of activities to teach integer and binomial operations to prospective middle grades mathematics teachers in a way that impacts their conceptual understandings. This, in turn, leads to their abilities to listen more flexibly to their own students.</p>	

Time: 10:00-10:50 AM	Room: Okeechobee 2
Developing Teacher Autonomy and Understanding Through Inquiry & Discussion	
Patrick Brown	Western Kentucky University
Hope Marchionda	Western Kentucky University
<p>The lack of content knowledge for teaching mathematics among pre-service and in-service teachers at all grade levels is well documented. Few teachers, even those whose mathematical skills appear relatively strong, have a firm grasp on the true nature of mathematics as a discipline of problem solving through exploration, struggle, argument, and, ultimately, understanding. In addition, studies have shown that many teachers, particularly in the primary grade levels, have profoundly negative feelings about mathematics which translate into lower levels of achievement among students. In an effort to develop teachers who possess deep conceptual understandings of and more positive attitudes about mathematics, and to prepare teachers to successfully navigate a classroom environment where autonomy is the norm, inquiry- and discussion-based lessons were developed for use in existing geometry classes for preservice teachers at two levels (elementary/middle and secondary). These lessons utilize high-level mathematical tasks and are built around the CCSSO Standards for Mathematical Practice in an attempt to get students to interact with problems as mathematicians do, and to engage them in learning mathematics in the way that they will be expected to teach mathematics. In this session, we share selected lessons from these courses, along with teacher and student reflections from the courses. In addition, we examine whether and how students' attitudes changed over the course of the semester.</p>	
Time: 10:00-10:50 AM	Room: Pensacola Bay
Developing a Peer Mentoring Culture among Mathematics Preservice Teachers	
Gabriel Matney	Bowling Green State University
<p>The purpose of the session is to share evidence from an exploratory program evaluation study done for a university in Southeast Asia on their mathematics education program. We will explore the research that reveals the facets of the program that led to a strong peer mentoring culture among the mathematics preservice teachers. The peer mentoring culture led to increased responsibility among the preservice teachers in their study of teaching, the teaching of younger preservice teachers, and the engagement of K-12 students in mathematics. These ideas will set the stage for a group discussion about field experiences for PST and ways in which US programs might nurture PSTs professionally prior to internship.</p>	
Time: 10:00-10:50 AM	Room: Superior
The Impact of Clinical Interviews on Pre-service Teachers	
Sandra Trowell	Valdosta State University
<p>In a mathematics content course for pre-service early childhood and special education students, students were asked to conduct clinical interviews with P-8 students in their practicum experiences. The pre-service students were asked to focus upon their students' mathematics and sense making rather than teaching or correcting the P-8 students. This presentation will focus upon case studies of these pre-service teachers during their interview process – what they learned about listening to and questioning students.</p>	
Time: 10:00-10:50 AM	Room: Tampa Bay 1
Tools for Success: Preparing PSTs to Effectively Differentiate Instruction	
Carolyn Mitten	University of Florida
<p>With the increasing diversity of classrooms and pressure for all students to be proficient in mathematics, differentiated instruction has become a hot topic for math educators. Meeting the needs of all learners seems commonsense, but it often takes years of experience to effectively reach this goal. Is it possible to provide differentiation tools to pre-service teachers (PSTs) before entering the demanding field of teaching? This session presents a dissertation study aimed at determining if explicit instruction and implementation of formative assessments to differentiate instruction can better equip future teachers to deal with the reality that all students learn math differently. During a course on formative assessment, PSTs will implement learned strategies in a practicum setting and reflect on knowledge and self-efficacy gained from their experiences. Successful strategies and implications for mathematics teacher preparation will be discussed.</p>	

Time: 10:00-10:50 AM	Room: Tampa Bay 2
Developing Mathematical Content Knowledge for Teaching Using Modeling Tasks	
Farshid Safi	University of Central Florida
<p>Teacher education programs seek to engage prospective teachers in meaningful mathematical experiences that prepare them to teach mathematics with a deep understanding while learning effective ways to prepare future students. Models and mathematical modeling simultaneously present a challenge and an opportunity in a world full of interdisciplinary connections. Recent research efforts have begun to describe ways in which prospective and practicing teachers' conceptions of models and modeling would be enhanced through engagement with mathematical tasks that purposefully integrate the use of dynamic technologies. In addition, modeling represents a critical aspect in rigorous national standards both as an integral mathematical practice as well as a conceptual category. This presentation focuses on the impact of modeling tasks in addressing mathematical misconceptions while highlighting the significance of content knowledge crucial in modeling with connections to other disciplines. In order to effectively engage in mathematical modeling, standards for mathematical practice involving the strategic use of tools – such as dynamic technologies - and attention to precision will also be discussed. Lastly, future implications for teacher education as well as ideas to generate and disseminate such modeling tasks will be discussed.</p>	

Time: 10:00-10:50 AM	Room: Tampa Bay 3
Improving Online Students' Learning in Statistics Using Curricular Supports	
Taylor Jensen	Western Governors University
Jeffrey Sadler	Fort Hays State University
<p>Because of convenience, low relative cost, and other factors, more and more students—especially non-traditional students—are opting for online introductory statistics courses over face-to-face courses. For such students, the addition of curricular supports which might enhance students' learning of the material is desirable, since the traditional interaction with an instructor afforded in face-to-face classrooms is absent. The effectiveness of any such supplementary curricular supports, however, needs to be tested through the collection and analysis of appropriately gathered data. To that end, the CAOS Pre-Test and Post-Test were given to n=440 students over the course of four semesters at a public university in the Midwest. Of these students, 93 were enrolled in an online course with extant curricular supports, with the remaining 347 students enrolled in a face-to-face course utilizing traditional pedagogy. The curricular supports for online students consisted of activities comprised of open-ended questions involving real-life data in order to promote statistical thinking. Gain scores for each group were computed (6.27 percentage points for the online group versus 1.02 for the face-to-face group), and although the difference was not statistically significant, the results suggest that the online students learned statistical concepts to the same or better extent as the face-to-face students. The implications of these results to both research and practice will be discussed.</p>	

Time: 11:00-11:50 AM	Room: Michigan
Two Paths Converged: The Story of a Math Teacher and a Math Phobic	
Marcia Fletcher	L W Westfall Elementary Choctaw
Justin Fletcher	Choctaw Middle School
Darlinda Cassel	University of Central Oklahoma
<p>A preservice math teacher and a math hater begin a journey that took them through a variety of challenges but ended in a love of math for both. Come hear the story as told first hand by this couple.</p>	

Time: 11:00-11:50 AM	Room: Okeechobee 1
Using Apps to Develop Students' Understanding and Attitudes about Fractions	
Darlinda Cassel	University of Central Oklahoma
<p>Students struggle with understanding fractions. With many schools moving to one-to-one iPad implementation, it is important to determine if apps are effective in developing middle school students' understanding of fractions and their operations. Additionally, it is essential to examine how students' attitudes towards learning fractions are affected by using fraction apps. This mixed methods study explored how students' dispositions toward fractions and understanding of fractions were affected by having experiences with fraction apps in their mathematics classes. We will share our findings as well as the apps we used during the study.</p>	

Time: 11:00-11:50 AM	Room: Okeechobee 2
Teacher Reflections on a Curricular Activity System	
Karina Hensberry	University of South Florida St. Petersburg
George Roy	University of South Carolina
<p>In order for teachers to enable students to engage in rich content and mathematical practices, professional development (PD) providers must support teachers to develop (a) their mathematical knowledge for teaching (Hill, Schilling, & Ball, 2004), (b) their use of appropriate tools and technology, and (c) curricular resources that align with the CCSSM. To this end, curricular activity systems (Roschelle, Knudsen, & Hegedus, 2010) align PD, curricular materials, and technology. We describe a research effort in which we developed interactive simulations and accompanying curricula to teach middle grades mathematics topics (e.g., rates, ratios, proportions, linear expressions) and provided PD to support sixth and seventh grade teachers in deepening their mathematical knowledge for teaching and their Technological Pedagogical Content Knowledge (Niess, 2005). We then investigated their teaching of the mathematics content as they implemented the curricular activity system in a large, urban school district in Florida. Based on these results, we modified the curriculum materials, technology, and PD experiences for a new group of teachers. In this session, we specifically explore middle school teachers' perceptions of the curricular activity system, and in particular, their reflections on implementation of two of the technology-based units. We describe successful aspects of the PD, as well as areas needing modification.</p>	

Time: 11:00-11:50 AM	Room: Pensacola Bay
Examining Preservice Teachers' Culturally Relevant Teaching	
Nickolaus Ortiz	Texas A&M
<p>The present research is an examination of teaching for equity approaches within a virtual simulation classroom. Pre-service teachers taking a mathematics problem solving course were challenged to create a lesson plan grounded in one of the following conceptual schemes: situated learning, culturally relevant teaching, or critical pedagogy. A primary focus of the Knowledge for Algebra Teaching for Equity (KATE) Project is to help prospective teachers design equity-rich lesson plans that serve the needs of all mathematics students. The lessons created by pre-service teachers are examined for a variety of features, but the focus of the present research is on those elements which facilitate and promote equity. Lesson plans submitted to the instructor are constructed with the admonition that a commitment to one of the three conceptual frameworks should have vestiges of this framework evidenced in their write-up. This research discusses the trends that permeate lessons identified as culturally relevant and compares data from two semesters to determine whether pre-service teachers proffered identical justifications. The analysis uses the Culturally Relevant Teaching Rubric (CRTR) to rate the level of cultural relevance within each lesson plan. We note pretentious intuitions of culturally relevant lessons and offer suggestions in how to help pre-service teachers develop teaching for equity strategies.</p>	

Time: 11:00-11:50 AM	Room: Superior
Implementing the edTPA in Mathematics: "A Wonderful, Awful Idea"	
Tony Thompson	East Carolina University
Kwaku Adu-Gyamfi	East Carolina University
Maureen Grady	East Carolina University
<p>The East Carolina University mathematics education program is currently in its 4th year implementing the edTPA (educative Teacher Performance Assessment). This presentation explores the perceptions and experiences of pre-service teachers and university faculty regarding the edTPA, aspects of the edTPA that are challenging to pre-service teachers, and the impact the edTPA has had on university coursework and policies. Data were collected using interviews, surveys, and edTPA artifacts. Findings indicate that pre-service teachers struggle most with assessment and academic language as well as articulating their ideas, particularly with respect to differentiating conceptual understanding, reasoning, and procedural fluency. Although many pre-service teachers felt "overwhelmed" completing the edTPA, most agreed that it helped make them better and more reflective teachers. University faculty have conflicting perceptions on the edTPA and its role in teacher development with some seeing it as "wonderful" and others "awful". Recommendations for implementing the edTPA in mathematics education programs will be provided.</p>	

Time: 1:30-2:20 PM	Room: Michigan
Facilitating Mathematical Conversations in Diverse Classrooms: A Case Study	
Mercedes Sotillo-Turner	Full Sail University
<p>The researchers in this case study sought to explore the use of culturally responsive teaching (CRT) practices to determine the ways that teachers support their students to create viable arguments and critique the reasoning of others (SMP3). To achieve this goal, the self-conceived classroom roles of two teachers, one experienced and one novice, were elicited and compared to their actualized roles. Both teachers were provided with professional development (PD) centered on CRT practices focused on improving student engagement in SMP3. This PD was informed by the guidelines that describe the behaviors students should exhibit as they are engaged in SMP3 as well as CRT components, such as teacher characteristics and instructional strategies. The teachers were observed, video recorded, and interviewed during, immediately after, and four weeks after the PD. The marked differences in each case added to the robustness of the results. The cross-case analysis established that the support that teachers are able to provide to students depends on (a) teaching experience, (b) shift in teacher practice, (c) depth and breadth of the knowledge of CRT and SMP3, (d) teacher content and pedagogical knowledge, (e) teacher expectations, reception, and reflection, and (f) classroom management. Study results provide implications regarding the kinds of support teachers might need as they attempt to motivate culturally diverse students to engage in SMP3.</p>	
Time: 1:30-2:20 PM	Room: Okeechobee 1
Asking the Right Questions – Young Children’s Perception of Number	
Pat Jordan	Retired from Oklahoma State University
<p>Harking back to the questions Piaget developed as a measure of young children’s understanding of number, area, volume, and linear measures, this study focuses on young children’s ideas of number and counting. Their responses reflect their understanding, not the preconceived “right” answers the researcher expected. Accepting the children’s responses meant letting go of long-held ideas of what young children know and how they learn. Although a very small sample, the results reinforced the notion that asking the right questions means rethinking the right answers. Listening to children’s responses to what a number is or asking why a child shifted when counting between English and Chinese counting opened new ideas about what per-number skills young children understand.</p>	
Time: 1:30-2:20 PM	Room: Okeechobee 2
Identifying Barriers to Pre-Service Teachers’ Mathematical Confidence	
Ryan Fox	Belmont University
William McGalliard	University of Central Missouri
<p>Mathematics education researchers have long been interested in pre-service elementary teachers’ struggle with mathematical content. Although prior research suggests specific deficiencies in their mathematical knowledge, pre-service elementary teachers are asked to complete tests or task-based interviews. We want to capture their mathematical struggles in their own words. We interviewed pre-service teachers in two different university settings to gain broader perspectives of the challenges facing mathematics educators. In our presentation, we will present findings of our initial study of pre-service teachers. Not only are future elementary teachers fearful of teaching mathematics, but there are certain mathematical concepts they are particularly fearful in teaching. Our goal is to provide a set of mathematical concepts identified by the participants to move the discussion—and research—forward. We encourage session participants to provide feedback on our results and to suggest future research based on our findings.</p>	
Time: 1:30-2:20 PM	Room: Pensacola Bay
Changing the Mathematics Teaching Culture to Improve Instruction	
Bob Drake	SUNY Plattsburgh
Kathleen Hulgín	University of Cincinnati - Clermont
<p>Workshops to improve mathematics instruction rarely alter the fundamental view towards teaching mathematics. A different approach with a longer lasting and more significant impact involves altering the mathematics teaching culture in the school and district. Cultural change requires more than merely presenting a few teaching ideas to emphasize the importance of mathematical understanding and problem solving. It involves changing the beliefs of teachers and administrators, as well as the practices based on those beliefs. This much larger challenge is absolutely requisite in establishing improvement in mathematics teaching. This study describes the elements required to change the mathematics teaching culture in a small Ohio school district. Over a three year period, the mathematics teaching culture was altered, standardized test scores improved by a standard deviation, and – more importantly – a change in instructional emphasis that lasted for an additional three years beyond the study was obtained.</p>	

Time: 1:30-2:20 PM	Room: Tampa Bay 1
Integrating Algebra and Literature in a Mathematics Education Course	
Ann Wheeler	Texas Woman's University
Carole Hayata	Southern Methodist University
<p>During this session, the presenters will discuss a course assignment developed for preservice teachers focused on the integration of mathematics and literacy. The preservice teachers were enrolled in a university mathematics education course which focused on middle school mathematics (Grades 6-8) content. The assignment under study involved the creation of a problem-solving, multimedia, storybook that combined operations with integers and literacy. The purpose of this assignment was to provide preservice teachers with the opportunity to 1) extend their own understanding of early algebra concepts, 2) develop strategic competence by formulating, representing, and solving mathematical problems arising in every day life, inside and outside of the classroom (Principles to Action, TEKS Process Standards, CCSS-MP), and 3) utilize a differentiated instructional strategy focused on increasing student engagement by situating the task based on student interests. The specific components of the assignment were revised over 3 semesters based on feedback from current 6th grade students who reviewed the final storybooks and reflections from the preservice teachers enrolled in the course. The details of the revised course assignment and sample storybooks will be presented. Comments from session participants will be considered for future iterations and dissemination.</p>	

Time: 1:30-2:20 PM	Room: Tampa Bay 2
Student Understanding of Traditional and Simulation-based Inference Methods	
Catherine Case	University of Florida
<p>At the recommendation of several prominent statistics educators, most notably George Cobb (2007), simulation-based inference methods have begun to replace or complement traditional inference methods in many introductory statistics courses. To explore how complementing traditional inference with simulation-based methods impacts conceptual understanding of the core logic of inference, task-based interviews were conducted with seven AP Statistics students familiar with both inference methods. During the interviews, students were asked to "think aloud" as they used traditional inference methods (z-tests or t-tests) and simulations (using coins, cards, and computer applets) to estimate p-values and draw conclusions about statistical significance in the context of real research studies. Students were then prompted to compare and contrast the approaches, describing the connections perceived between the two. In ongoing research, students' written work and verbal explanations are being analyzed using inductive qualitative methods. This session will present the preliminary findings of the data analysis and solicit feedback for theory development and future research directions.</p>	

Time: 2:30-3:20 PM	Room: Michigan
An Alternative Route to Bypass Developmental Mathematics	
Linda Venenciano	University of Hawaii at Manoa
Fay Zenigami	University of Hawaii at Manoa
<p>Prior research has shown that developmental education, particularly in mathematics, has failed to prepare students for college credit-bearing courses (Achieving the Dream, 2008; Bailey et al., 2010; Bettinger & Long, 2005). Although the intent of developmental education is to provide underprepared students with support, two of three community college students referred to a remedial mathematics sequence do not complete the courses (Bailey et al., 2010). This poses a serious threat to opportunities and access to STEM careers, where a basic aptitude in college mathematics is a prerequisite. An experimental, college credit-bearing algebra course was designed as an option for a developmental mathematics course. It addressed the set of required topics using an approach that provided additional support to struggling students while incorporating modeling investigations from A Modeling Approach to Algebra to emphasize mathematical modeling as creative and productive for problem solving. Instruction diverged from a more traditional lecture-based approach and students were encouraged to work in groups and justify their thinking. In this presentation we will describe adaptations made to the course content and instruction and share findings from class observations, instructor interviews, surveys on attitude and engagement, and student work. Implications from this study could lead to developmental mathematics course alternatives at the community college level.</p>	

Time: 2:30-3:20 PM	Room: Okeechobee 1
Identifying and Reducing Mathematics Anxiety in Preservice Teachers	
Gina Gresham	University of Central Florida
<p>Limited research studies exist which use pre-post measurement, interviews, and classroom observations to examine the effectiveness of a university mathematics methods course for pre-service teachers. The purpose of this study was to present research concerning the effects of mathematics anxiety among pre-service teachers, and to discuss ways in which mathematics anxiety can be reduced among pre-service teachers and their future students. This study utilized both quantitative and qualitative techniques in a quasi-experimental design to investigate the effects of mathematics anxiety among pre-service teachers. Heavy emphasis was placed upon concrete learning of mathematical content by use of manipulatives, cooperative learning strategies, constructivism, and other techniques during the mathematics methods and materials courses for pre-service teachers. The qualitative data suggested that pre-service teachers had high levels of mathematics anxiety and that the mathematics methods course with emphasis on hands-on instruction did relieve and reduce their anxiety. Through questionnaire guided interviews, pre-service teachers indicated they were better able to understand the mathematics material when presented on the concrete or pictorial levels. The quantitative data from the pre-and-post mathematics attitude survey indicated a significant difference in pre-service mathematics anxiety levels.</p>	

Time: 2:30-3:20 PM	Room: Okeechobee 2
Mathematics Course Pathways: Insights and Experiences of a Redesign	
Rachel Bates	Redlands Community College
<p>The traditional developmental mathematics course pathway is a barrier for many students rather than a road map to mathematics success. With the goal of remediation, developmental mathematics courses continue to fail students. The data largely shows that remediation in higher education mathematics has failed to help large numbers of students achieve a college degree. For many decades, college algebra has been the gateway course for undergraduate education. Most degree options require college algebra although most non-STEM careers require very little algebra. The need to reform undergraduate mathematics is upon us. It is time to provide parallel pathways for undergraduate students. Current and future non-STEM careers will require educated people that can understand how to analyze data or quantify uncertainty. A Pathway to Student Success was initiated at RCC. This involved reviewing assessment tools used in placement of students, advising and student services and support. A multiple pathway approach was designed to allow students to move through their respective degree or certificate pathway. Non-STEM students were provided with an alternative undergraduate mathematics course. This presentation will provide participants with various resources such as enrollment numbers, DWF rates, graduation rates and student demographics. Additionally, resources that outline the various aspects of the student success pathway will be made available during this presentation.</p>	

Time: 2:30-3:20 PM	Room: Pensacola Bay
Using Measurement to Develop Proportional Reasoning in a Cultural Context	
Melfried Olson	University of Hawaii
Judith Olson	University of Hawaii
<p>This session will discuss the development of curriculum materials that use measurement in a cultural context as the foundation for learning mathematics. These materials are initially based on non-numerical comparisons. Because measurement as a comparison of two quantities inherently is a ratio, 'ratio reasoning' is key for early development of mathematics. Using attributes of length and area, we will describe how measurement sets the stage for mathematical operations, mathematical properties, and algebraic reasoning. The cultural context is built around Indigenous Knowledge from Yup'ik Elders, with specific emphasis on connections to geometric ideas. While Indigenous people across geographical and cultural boundaries do not prize exact or precise use of numbers, they hold within their knowledge a way of approaching the teaching of rational number concepts through the use of symmetrical measuring and measuring as comparing. We illustrate how symmetrical measuring from the center is part of a spatial-locative system that enables individuals who must perform a wide range of everyday tasks a way to minimize cognitive load and stress through a generative way of thinking and doing. We will provide a number of different examples across activities that establishes the centrality of related concepts of center, symmetry, measuring, halving, and relative measures leading to a way to teach aspects of elementary school mathematics within the practice and context of measurement.</p>	

Time: 2:30-3:20 PM	Room: Superior
The Effectiveness of Professional Development: Retention of Teacher Content	
Makini Campbell-Sutherland	University of Central Florida
<p>This presentation describes the methods to be undertaken in conducting research on teachers' retention of content overtime after being involved in professional development activities. Gersten et al., (2014) highlight the need for more research in the area of effectiveness of professional development activities as school districts are unable to use the limited information available to make the needed informed decisions. Processes that will be included in this research include collecting data immediately before and after the professional development activities and then at intervals over the period of the following school year. As the many professional development activities take place, there is the need to measure how sustainable these training efforts are as it relates to the retention of teacher content knowledge. Knowing the effectiveness of these efforts measured over a period of time will help to inform the frequency and emphasis of professional development activities. Ideas for improvement will also be ascertained from mathematics educators.</p>	
Time: 2:30-3:20 PM	Room: Tampa Bay 1
Breaking or Perpetuating Perceived Norms in Content Courses for PSETs?	
Kansas Conrady	University of Oklahoma
<p>There is a need for high quality elementary teachers that are both knowledgeable and confident in mathematics content. The CBMS acknowledged the complexity of this task and provided the Mathematical Education of Teachers II as a guide for developing the teacher's Mathematical Knowledge for Teaching. This exploration into math content courses for pre-service elementary teachers completing a traditional route to certification in a mid-western state consisted of both an analysis of courses offered as well as syllabi provided for each course by nearly every program in the state. Findings suggest that even though the state requires all PSETs to complete 12 hours of mathematics content that "meet the standards proposed by NCTM," most programs fell short of not only the state requirements but also the ideas presented in MET2 for the development of the teacher's MKT. Content courses have the opportunity to set the stage for a different way of teaching and learning mathematics, however this analysis suggests that courses may instead reinforce perceived norms for the effective teaching and learning of mathematics. Continued research is needed to explore not only the long-term impact of these courses on the overall development of the teacher but also the actual enactment of the ideas presented in the syllabus. Lastly, there is also a need to share the variety of strategies employed by universities facing different relationships between pedagogy and content instructors.</p>	
Time: 2:30-3:20 PM	Room: Tampa Bay 2
The Development of Exemplary Statistics Teachers' Professional Identities	
Douglas Whitaker	University of Florida
<p>Statistics and probability represent about one-fifth of the standards in the widely-adopted Common Core State Standards for Mathematics (CCSSM). For many states, this represents an increased emphasis on statistical topics. This statistics and probability content will be taught by mathematics teachers who, by and large, have received little statistical training. In order to teach statistics in a way that is faithful to its position as a discipline distinct from mathematics (Moore & Cobb, 2000), teachers may need to change their beliefs, attitudes, values, and instructional practices related to mathematics and statistics. This study conceptualizes these changes as identity development. The identity framework used is informed by communities of practice (Lave & Wenger, 1991; Wenger, 1998) and the work of Gee (2000), among others. Beliefs, attitudes, values, and other affective constructs (Philipp, 2007) are included as components of identity in this conception. The primary research question addressed by this study is, "What learning trajectories help to explain the identity of exemplary statistics teachers?" The focus on exemplary in-service statistics teachers – recommended for participation by experts in the field – represents a type of critical case sampling (Patton, 2002). Semi-structured interviews were conducted with participants. Data are being analyzed using inductive analysis (Hatch, 2002), and this presentation includes preliminary results.</p>	

Time: 3:30-4:20 PM	Room: Michigan
Mindset and Mathematics	
Eileen Faulkenberry	Tarleton State University
<p>Carol Dweck introduced the idea of fixed vs. growth mindset in her 2006 book <i>Mindset: the new psychology of success</i>. One who believes that intelligence or ability is something that can be developed exhibits growth mindset while one who believes intelligence or ability is inherent, or fixed, exhibits fixed mindset. Many studies have shown that a person's mindset can impact his/her achievement. This presentation will explore the early literature on mindset and its impact on the learning of mathematics. In addition, we discuss a study currently in progress that is attempting to determine if there is a relationship between mindset and numerical fluency. In this study, participants complete tasks to classify their mindset, assess their numerical fluency, and determine their level of mathematics anxiety. Data will be analyzed using a linear regression model to determine relationships among mindset, numerical fluency, and mathematical anxiety. Preliminary data will be presented during this presentation.</p>	

Time: 3:30-4:20 PM	Room: Okeechobee 1
From Manipulatives to Social Justice: An Ecological Model for Relatedness	
Kenneth Butler	University of South Florida
<p>Welcome to a discussion on a new framework for relatedness of mathematical content. As one of the three psychological needs described by Ryan and Deci (2000), relatedness of content is key to motivating students to engage in mathematics. During this presentation, levels of relatedness beginning with using manipulatives, to simulating real world situations, to incorporating social justice issues, relationships between students and mathematical content will be discussed utilizing Bronfenbrenner's ecological model of development (1998). During the presentation you will get the opportunity to engage in mathematical tasks that mirror these various levels of relatedness. We will work with and discuss using toys as manipulatives, using peer collaboration to collect and interpret data, simulating local shops to create educational opportunities, and incorporating social justice issues to demonstrate the power of mathematical and statistical thinking. By developing an ecological framework for relatedness it may be possible to affect learning by incorporating multiple developmental levels into mathematical tasks in an effort to engage many types of learners. Bronfenbrenner, U., & Morris, P. A. (1998). <i>The ecology of developmental processes</i>. Ryan, R. M., & Deci, E. L. (2000). <i>Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being</i>. <i>American psychologist</i>, 55(1), 68.</p>	

Time: 3:30-4:20 PM	Room: Okeechobee 2
Implementing Reform Initiatives: A Case Study of a High School Teacher	
Kwaku Adu-Gyamfi	East Carolina University
Tony Thompson	East Carolina University
<p>This research involved a case study of a high school teacher's endeavor to teach mathematics with fidelity to reform initiatives in the CCSS-M and the principles to actions document of the NCTM. Over a three year period, data were collected via observations, interviews, surveys, and artifacts (e.g., lesson plans, activities, student work). Results indicate that after initially struggling to understand and implement the CCSS-M, the teacher made significant changes which ultimately impacted her teaching and career as a math educator. Areas most strongly impacted were incorporating higher-level reasoning, academic language, assessment and teacher leadership.</p>	

Time: 3:30-4:20 PM	Room: Pensacola Bay
iPad Apps for Early Math Learning	
Amy Adkins	University of Nevada, Las Vegas
Lina DeVaul	University of Nevada, Las Vegas
Taro Ito	University of Nevada, Las Vegas
<p>The use of iPads are more prevalent in early elementary classrooms and can provide opportunities for young children to learn foundational math skills. In this study researchers look at math content addressed through iPad apps which includes subitizing, ordering, counting, cardinality, identifying numbers, comparing, place value, adding, and subtracting. Developing these skills in children promotes successful math progression. iPad apps allow children opportunities through play to develop knowledge of early math concepts. Attendees will be provided a framework that examines the tasks in the apps for scope of mathematics content and cognitive demand of the tasks. In this session, we will share what we have learned about iPads apps design to amplify learning experiences for young children.</p>	

Time: 3:30-4:20 PM	Room: Superior
Publish in the Investigations Journal!	
Drew Polly	University of North Carolina at Charlotte
This session will provide participants with the opportunity to dialogue about the process of submitting articles to the Investigations in Mathematics Learning journal. There also will be opportunities to learn more information about reviewing for the journal and becoming more involved with RCML publications.	
Time: 3:30-4:20 PM	Room: Tampa Bay 1
Mathematics Knowledge for Secondary Teaching?	
Bob Mann	Western Illinois University
Anita Reid	Lewistown High School
Assessments have been created and widely distributed to measure elementary teachers (K-8) Mathematical Knowledge for Teaching (MKT). In particular, the Learning Mathematics for Teaching (LMT) project has produced many such assessments and related research (Ball, Bass, Blunk, et. al.). Yet, are there similar assessments to measure the MKT for secondary teachers? Should there be? Why have such efforts been limited? What aspects and item types might be included on such assessments and what sort of research would be needed or valuable? The presenters addressed these questions when trying to create such an assessment as part of a Mathematics Science Partnership grant this year. They intend to share what they learned within this process as well as samples from this assessment. They will also discuss and hopefully identify what elements should be included on such assessments and with what objectives and purpose? The dialogue will also include potential barriers to such an assessment for secondary teachers, the ability to evaluate such assessments in an efficient manner and the need for related research and analysis.	
Time: 3:30-4:20 PM	Room: Tampa Bay 2
The Elephant in the Room: Students' Mathematics-Related Beliefs	
Cathrine Maiorca	University of Nevada - Las Vegas
The mathematics-related beliefs that students bring to the classroom can impact their performance on non-routine problems. In order for researchers and teachers to completely understand students' mathematical performances they need to understand students' mathematics-related beliefs. This presentation discusses the findings of a study that examined the mathematics-related beliefs of fourth and fifth grade students who participated in an after school STEM program.	

Time: 8:00-8:50 AM	Room: Michigan
Let's Get Graphic! Learning About Student Understanding With Frayer Models	
Mary Swarthout	Sam Houston State University
Valerie Sharon	Sam Houston State University
<p>Graphic organizers, including Frayer models, are important tools that can be used to provide opportunities for learners to reflect and synthesize what they know and understand about a topic, concept, or idea. This session will discuss what a Frayer model is, how it was used with preservice and non-preservice undergraduate students, why this tool was used during the study, and beginning results of what was learned about student understanding of logarithms. Examples of student-created Frayer models will be used to discuss techniques of assessing and evaluating Frayer organizers as a useful approach to improve student understanding of mathematical concepts.</p>	

Time: 8:00-8:50 AM	Room: Okeechobee 1
Beliefs about Social Justice among Elementary Mathematics Teachers	
Brian Evans	Pace University
<p>The purpose of this study was to measure teacher beliefs about social justice over the course of an elementary mathematics teaching methods course. The participants in the study came from three unique groups of in-service and preservice teachers in a master's degree program at a medium-size university in New York: New York City Teaching Fellows (NYCTF), Teacher Education Assessment and Management (TEAM) program, and traditional preservice teacher preparation program. Findings revealed that while there were no differences in beliefs over the course of the semester, NYCTF teachers had more positive beliefs about social justice than did TEAM teachers. Teachers felt most positively about incorporating diverse cultures and experiences into classroom lessons and discussions; self-examination of attitudes and beliefs about race, class, gender, disabilities, and sexual orientation; and teaching students to think critically about government positions and actions.</p>	

Time: 8:00-8:50 AM	Room: Okeechobee 2
Our Emporium Model in Precalculus: Another Year of Learning and Growing	
Tracey Howell	University of North Carolina at Greensboro
Carol Seaman	University of North Carolina at Greensboro
<p>Our goal for the presentation is to engage participants in discussions around the successes and challenges of using an Emporium model of instruction in our undergraduate Precalculus classes, which serve as the introductory mathematics course for STEM majors. In the mathematics classrooms of colleges and universities across the United States, the Emporium model of instruction has become a popular alternative to traditional lecture courses for introductory-level mathematics classes and we believe our Emporium model at UNCG is a successful alternative for hundreds of students. These blended courses combine online components, task-based class meetings, and weekly computer lab attendance requirements to provide a unique learning experience and promote student understanding. We feel strongly that the pedagogical changes we have implemented are better serving our students and enabling them to become both stronger mathematically and more confident in their abilities to understand and "do math". We will build our previous conference presentation and discuss the results of the changes we implemented over the past year.</p>	

Time: 8:00-8:50 AM	Room: Pensacola Bay
Math Dance: A Study of Effectiveness	
Rachel Bachman	Weber State University
Erik Stern	Weber State University
<p>Learn how mathematics and dance were combined in an innovative general education college classroom. Participants will join an interactive demonstration of one of the physical motion activities used to explore the mathematics content in the course. The presentation will highlight the key elements of the course and report on the analysis of the research methods used to investigate the effectiveness of this integrated project. The analysis will compare results on standard mathematical questions, an attitudinal survey, a drawing prompt, and a problem solving interview of students in this project with the performance of students in a traditional general education mathematics course.</p>	

Time: 8:00-8:50 AM		Room: Superior	
Association between Students' Strategy Use and their Math Achievement			
Nesrin Sahin		University of Central Arkansas	
Juli Dixon		University of Central Florida	
<p>This observational study uses empirical data with a large sample of first and second grade students to investigate association between students' use of strategies in a mathematics interview and their mathematics achievement. Previous research on student strategies has generated strong theoretical claims informed by small-scale empirical study and analysis. The present study provides an opportunity to test whether the hypotheses generated through those smaller-scale studies are confirmed with a larger and more diverse sample of students. The results of this study will yield important insights that may inform policy concerning curriculum standards, assessment, and testing conditions. The results will also inform education research by gaining new insight into the association between students' use of strategies and their mathematics achievement.</p>			

Time: 8:00-8:50 AM		Room: Tampa Bay 1	
Helping Student Interns Think Critically About Their Teaching Lessons		What Went Wrong: Pre-Service Teachers' Reflections on Lesson Planning	
Cynthia Orona, University of Arkansas		Glenn Phillips, Texas A&M University	
<p>Pre-service teachers are required to complete an internship which eventually requires them to independently teach in their placement classroom. The lessons that they have created in prior methods courses have not been as realistic as they were visitors in the classroom and the expectations were different. During their internship, the expectation shifts as they become the lead teacher in the classroom and are more aware of the needs of the students. In order to create effective lessons, teachers need to think more critically about the design and implementation of the lessons they are teaching. As teacher educators working with these student interns, this study was conceptualized to help get the interns to think more critically by using practice and feedback loops to guide their lesson planning and implementation. This presentation will provide the overall framework of the practice and feedback loop model. In addition, initial results from the study will be discussed to determine how the study can be refined for full-scale implementation.</p>		<p>As pre-service teachers begin to plan lessons and classroom engagement strategies, it is important to note where their assumptions conflict with reality. Relying on data from 60 students over 7 semesters, this presentation explores students' experience with planning and executing a middle school mathematics lesson. The lesson, presented to a virtual class using a Second Life platform, was to run approximately 20 minutes. The findings suggest that students do not manage time appropriately, present examples that are either too complex or too simple, and do not properly anticipate questions that classroom attendees may have. The implications of this work can be used to better prepare pre-service teachers as they draft their first lesson plans. Additionally, these warnings can be used by observing teachers to evaluate peers' or colleagues' lesson plans.</p>	

Time: 8:00-8:50 AM		Room: Tampa Bay 2	
Parent Workshops on 2nd, 3rd, and 4th Grade Whole Number Operation Tasks			
Heidi Eisenreich		University of Central Florida	
<p>The purpose of this study was to investigate the extent to which parents of first, second and third grade students who attend a two day workshop on mathematics strategies differ on average and over time as compared to parents who did not attend in the following areas: mathematics content knowledge, beliefs about learning mathematics, ability to identify correct student responses, and ability to identify student errors. In addition, the researcher wanted to investigate the difference between groups when looking at how familiar they were with manipulatives and whether they used the standard algorithm or a new strategy to solve the problems. Both were not part of the original research questions, but after conducting the research, these two areas were of interest to the researcher. For each of the four research questions, the researcher used SPSS to run a two-factor split plot ANOVA. The results will be discussed to demonstrate the need for more parent workshops that include parents engaging in the mathematics their children are learning about by using similar strategies. By helping parents through workshop focused on parents constructing their own knowledge and making sense of each other's solutions they are experiencing mathematics as their child does. This will help them to understand what their child experiences in the classroom so they can make sense of their child's solutions instead of encouraging their child to use the strategy that makes sense to the parents.</p>			

Time: 8:00-8:50 AM		Room: Tampa Bay 3
Using Technology to Engage Students in Introductory Statistics Topics	The Challenge of College Algebra: Year Two	
Hope Marchionda, Western Kentucky University	Jodi Frost, Indiana State University	
Melanie Autin, Western Kentucky University		
There is a belief that when students engage in their own learning, their understanding and retention of the content is greater. One way to engage students is through the use of technology. To explore the use of technology in a student-centered learning environment, two sections of collegiate introductory statistics were compared. Online applets were used to investigate sampling distributions and the Central Limit Theorem. One section was taught this content using traditional lecture, where the instructor demonstrated the use of these applets while the students watched. In the second section, students actively used the applets in the computer lab. Students were assessed three different times over this content. In this talk, the student-centered activities and the applets will be shared. In addition, results will be discussed.	College algebra is a critical course for many students. The current pass rate at our university is only around sixty percent and many students require remedial math courses before being able to take college algebra. Failing college algebra or being forced to take a remedial course can negatively impact student retention and degree completion. Hoping to improve the success rate, a summer mathematics bridge program was developed and piloted during the summer of 2014. Based on information obtained from the pilot study, the bridge program was rolled out to a larger audience during the summer of 2015. The program's purpose was to refresh students' prior mathematical knowledge and introduce them to some of the technology used by the university. The results of the second year of the program will be presented along with an interactive discussion on how to enhance and improve the program moving forward.	

Time: 9:00-9:50 AM		Room: Michigan
Role of Support Structure in the Success of Developmental Math Programs		
Elizabeth Howell	Southern Methodist University	
Developmental mathematics is increasingly scrutinized by leaders in higher education, many of whom have lost confidence in the ability of developmental mathematics programs to successfully prepare students for college-level mathematics courses. In the current study, students' successful completion of a prescribed developmental math sequence and their success in passing a credit-level math course are examined in the context of several potential predictor variables, including course format, demographic variables, and variables related to student support structures such as tutoring and other developmental coursework. A large longitudinal data set of community college students over a five year period provides rich insight into factors associated most strongly with successful outcomes for developmental math students. This paper extends previous work by focusing on two different analyses of student pathways through developmental math. The first analysis examines the support structure of tutoring for students beginning college in any level of developmental mathematics, and a secondary analysis focuses on factors that promote success for students who most need assistance – i.e., those starting college at the lowest levels of math remediation. This study provides valuable insight into the complex issues of developmental mathematics students and contributes to the exchange of ideas that ultimately will allow educators to better serve struggling mathematics learners in higher education.		

Time: 9:00-9:50 AM		Room: Okeechobee 1
Pre-service Teachers' Implementation of Physical and Virtual Manipulatives		
Enrique Ortiz	University of Central Florida	
Heidi Eisenreich	University of Central Florida	
Laura Tapp	University of Central Florida	
<p>With the accessibility of virtual manipulatives (apps and applets) in classrooms, it is necessary to reassess how these advancements may impact the learning process and research efforts. A possible approach is a framework that combines the well-known concrete (C), pictorial (P) and abstract (A) learning levels (CPA) with a proposed Virtual-level (V) (CPAV). The V-level includes digital and dynamic (non-static) components, which allows students' virtual interaction with digital tools such as images, words, numbers and graphs. It also involves different sublevels: Virtual-Concrete, Virtual-Pictorial and Virtual Abstract. The framework will be discussed and demonstrated using easily available apps and applets (for example, NCTM Illuminations and National Library of Virtual Manipulatives). It is very important to understand what is involved in a virtual manipulative tool in order to provide for students' learning needs. We will discuss mathematics pre-service teachers' understanding and possible misconceptions of the framework while developing lesson plans and assessment activities. Several improvements are recommended in order to avoid participants' misunderstandings. Most pre-service teachers demonstrated the ability to identify the levels involved in the instructional activities for the C, P and A levels in pre-, post and follow-up-tests, and lesson plans, but had a harder time with the V-sublevels. Participants are encouraged to bring their own iPads and computers.</p>		

Time: 9:00-9:50 AM		Room: Okeechobee 2
Blending Divergent Approaches to Learning and Teaching Algebra—A Case Study		
Fay Zenigami	University of Hawaii at Manoa	
Linda Venenciano	University of Hawaii at Manoa	
<p>This presentation reports on a case study of an eighth-grade teacher's use of lessons selected from a curriculum with a modeling and problem solving approach to algebra into a traditional Algebra I course. The study examines the process the teacher used for choosing the modeling lessons, the planning and adaptations the teacher incorporated into the lessons prior to teaching them, questions the teacher asked to engage students in the investigations, and teacher reflections on the impact of the lessons. When a new, more traditional, middle grades textbook was adopted for alignment with the series used by the high school grades, the teacher felt the need to supplement the program with investigative lessons to provide opportunities for students to explore algebra topics through the use of contextual, mathematical modeling. Data were collected from teacher interviews, teacher notes and reflections, classroom observations, and student exit passes. We will share specific results and then discuss the implications of these results including other research questions that these data suggest: How might implementation of the investigations focused on modeling be limited by the traditional program on which the course is based? What teacher supports, such as suggested questions, might address components of the modeling cycle to facilitate student use of models to solve problems?</p>		

Time: 9:00-9:50 AM		Room: Pensacola Bay
Diagnostic Case Study: Similarities between Mathematics and Reading		
Nichole Smith	North Carolina A&T State University	
Kimberly Erwin	North Carolina A&T State University	
Tyrette Carter	North Carolina A&T State University	
<p>This presentation will provide experiences from both graduate and undergraduate teacher education candidates as they create a diagnostic case study. The purpose of the Diagnostic and Prescriptive Case Study is to determine how effectively candidates address the content proficiency of learners within their classrooms through diagnostic and prescriptive instruction. Candidates must assess student proficiency rates or skill level of a content area, then design and implement one remediation strategy age- or level-appropriate content specific instruction to address the learner's ability level. The candidate must construct a case report to detail the findings from the assessments and the intervention plan for instruction, and the candidate will finally reflect on the learning experience. This presentation will describe the overall findings and how the project affected student achievement.</p>		

Time: 9:00-9:50 AM		Room: Tampa Bay 1	
Reform-Statistics in the Middle Grades		Deepening Statistical Content Knowledge for the Common Core	
Natasha Gerstenschlager, Western Kentucky University		Jacqueline Wroughton, Northern Kentucky University	
Statistics appears early in and often throughout the Common Core Standards for Mathematics and has been evident in Principles and Standards for School Mathematics for almost 15 years. Unfortunately, many teachers who are expected to teach statistics do not have adequate content knowledge nor do they feel prepared to teach statistics in the way that is envisioned in these documents. In this presentation, results will be shared from a study that aimed to better understand how reform-oriented statistics lessons are implemented on a daily basis. The study revealed supports and barriers that affected the implementation fidelity of a reform-oriented statistics unit in the middle grades. Specifically, the teacher in the study identified several supports and barriers that demonstrated a need for improved content knowledge and pedagogical content knowledge for teachers expected to teach this content. Participants in this session will brainstorm ways to address the specific supports and barriers revealed from this study.		Brooke Buckley, Northern Kentucky University	
		With the adoption of the Common Core State Standards by Kentucky legislators, many in-service middle and secondary teachers find themselves with a shortage of statistical content knowledge to teach the statistics standards. The development and implementation of an intensive professional development workshop was undertaken with the following outcomes: create content focusing on statistical content knowledge as it relates to the Common Core State Standards; deepen middle and secondary in-service teachers' statistical content knowledge; increase middle and secondary in-service teachers' self-efficacy for teaching statistical content in the Common Core State Standards; and improved attitude towards statistics for middle and secondary in-service teachers. To evaluate the success of these outcomes several validated instruments were used in a pre/post assessment. This presentation will address the initial offering of the workshop, including the content covered and assessment results. A portion of the presentation will consist of a discussion of the research design and its limitations.	

Time: 9:00-9:50 AM		Room: Tampa Bay 2	
Tinkerplots and K-8 Mathematics Education			
Lucas Foster		Northeastern State University	
K-8 Mathematics Educators are frequently exposed to real-world situations in which they are required to make decisions that require a deep understanding of mathematics and statistics. In order to be adequately prepared to make informed decisions, teachers and their students need to be able to think and reason statistically. Thus, statistical literacy is a vital part of the educational process of students. The purpose of this study was to determine through both qualitative and quantitative methodology whether the use of Tinkerplots™ in a mathematics modeling classroom influenced pre-service teachers' level of statistical literacy. With this information, K-8 teachers may be able to offer their students an alternative approach to learning statistical concepts.			

Time: 9:00-9:50 AM		Room: Tampa Bay 3	
Guided Reinvention of Sequence Convergence: A Study of Two Students		Framework for Assessing College Students' Duality Conception of Infinity	
Beth Cory, Sam Houston State University		Grace Babarinsa-Ochiedike, The University of Texas at El Paso	
Ayse Ozturk, Sam Houston State University			
Attendees will learn how a pair of calculus students developed a rigorous formal definition for the limit of a sequence during an 11-day guided reinvention teaching experiment. The experiment involved an iterative refinement process during which the pair created a definition, evaluated their definition against examples and non-examples, acknowledged a problem(s) with their current definition, discussed potential solutions, and attempted to incorporate a solution(s) into a new definition, thereby restarting another iteration. Although neither student had received prior instruction on formal limit definitions, they were able to reinvent definitions consistent with formal theory. Specifically, this session explores the emergence of errors and error bounds in their definitions.		This qualitative study examines college students' conception of duality in understanding and representing infinity using two different formats: the written questionnaire and the interview. The study found that coding and assessing college students' conception of duality is challenging and complex process due to the dynamic nature of the conception that is task-dependent and context-dependent. The existence of fluctuation in students' views of infinity posits challenges for researchers in interpreting students' perceptions of infinity as either a process or an object, and especially in determining the students' process-object duality conception. The purpose of this paper is to present a framework for assessing students' duality conception of infinity. Data for the study were collected from N=5 college Calculus I students at one of the southwestern universities in the U.S. Data was triangulated using multiple measures analyzed by three independent experts using self-designed coding sheet to assess students' externalization of the duality conception of infinity.	

Time: 10:00-10:50 AM		Room: Michigan	
Students' Conceptions of Negative Integers			
Karen Zwanch		Virginia Tech	
The concept of negative integers is necessarily one which students must master prior to entering algebra. It is also one with which students traditionally struggle past the age of developmental preparedness. The present research modeled one third grade student's conception of negative integers within the theoretical framework of Central Conceptual Structure of Numbers (CCSN). The purpose of this research was to better understand how students conceptualize negative integers prior to any instruction on the topic. The participant demonstrated a conceptualization of negative integers consistent with a formal mental model of integers' order and value. The participant did not, however, demonstrate understanding of the three distinct meanings of the minus sign. An understanding of students' mental models of integers' order and value is beneficial to mathematics teachers at all grade levels, as it is one component of students' readiness for accepting instruction on both the integer system and algebra.			

Time: 10:00-10:50 AM		Room: Okeechobee 1	
Is Change Possible? Practicum as a Way to View Math Ability Differently			
Carolyn Mitten		University of Florida	
Teacher beliefs can significantly impact both teaching practices and student learning opportunities. How are these beliefs formed and can they be changed? Teacher education programs provide a unique opportunity to influence the beliefs of future mathematics teachers in ways that benefit student learning for all kinds of learners. In this session, we will take an in-depth look at how one practicum experience impacted pre-service teachers' beliefs about the math abilities of high-needs students. Beliefs surveys were conducted to identify changes in beliefs and pre-service teacher reflections were analyzed to identify why and how these changes occurred. A discussion on how findings can inform future practicum experiences and support the learning of high-needs students will follow.			

Time: 10:00-10:50 AM	Room: Okeechobee 2
A Latent Class Analysis of Algebra I Students in Florida	
Thomasesia Adams	University of Florida
<p>Algebra Nation is an online algebra resource that has been developed with a two-fold purpose: prepare algebra students for the Algebra 1 Florida Standards Assessment and help algebra teachers improve their instructional practice. The purpose of this study is to 1) identify classes of Florida Algebra I students based on race, gender, socioeconomic status, location in the state, and Algebra 1 achievement and 2) determine the relationship between Algebra Nation use and outcomes. These class identifiers were chosen because of their interdependence with one another and the confounding effects that they have in regards to differential achievement in mathematics (Reyes, L. & Stanic, G., 1988).</p>	

Time: 10:00-10:50 AM	Room: Pensacola Bay
Exploring Mental Models of “Doing Math” through Drawings	
Ben Wescoatt	Valdosta State University
<p>This preliminary study explores the mental models that pre-service teachers have of doing math. Mental models are cognitive structures people use while reasoning about the world. Mental models related to mathematics held by a teacher could influence a teacher’s pedagogical decisions and thus influence the mental model of mathematics that his or her students construct. These mental models could then affect career choices made by the students, influencing whether or not they enter a mathematical field. In this study, pre-service elementary teachers (PSTs) drew images of mathematicians doing math and of themselves doing math. Using comparative judgments, the PSTs selected the image that best represented a mathematician doing math. Representing a mental model shared by the PSTs, this image, along with most of the other highly-selected images, was of a man in front of a blackboard filled with mathematical symbols. The mathematicians generally appeared happy. Many images of the participants doing math showed them to be unhappy or in confused states and in schooling or learning situations. The preliminary results suggest that the PSTs’ shared mental model of doing math is naïve and shaped by limited experiences with mathematics in the classroom, leading to the belief of mathematics as merely a school subject.</p>	

Time: 10:00-10:50 AM	Room: Superior
Purposefully Planning for Mathematics Discourse	
Andria Disney	University of Montana
David Erickson	University of Montana
<p>How can we support teachers to create more opportunities for their students to engage in mathematics discourse? This research study explores how a professional development program impacts teacher learning around purposefully planning for mathematics discourse and its impact, if any, on the nature of the discourse during mathematics instruction in elementary classrooms. The professional development was designed with three primary goals in mind: (1) to honor, leverage, and develop teacher expertise in facilitating mathematics discourse; (2) to work within the school and classroom context by using and enhancing the adopted non-reform mathematics curriculum; and (3) to create a system of collegial support for making instructional changes around mathematics discourse practices that is both sustainable and transferrable. During the session, we will share research in best practice around facilitating productive mathematics discourse, examine this study’s professional development design, and share the preliminary results of the data collection. Through these efforts, we hope to identify promising practices in supporting teacher learning and instructional change around mathematics discourse that can be incorporated in professional learning communities without outside experts or increased costs to a district.</p>	

Time: 10:00-10:50 AM	Room: Tampa Bay 1
First Look! A Validation Study of the SMPs Look-for Protocol	
Jonathan Bostic	Bowling Green State University
Gabriel Matney	Bowling Green State University
<p>The purpose of the session is to share evidence supporting validation of a Standards for Mathematical Practice (SMPs) look-for protocol. The Common Core State Standards (CCSSI, 2010) suggests eight SMPs, which characterize mathematical behaviors and habits that students should express during mathematics instruction, and conversely, behaviors and habits that teachers’ instruction ought to encourage during lessons. Tools such as the Reformed Teaching Observation Protocol, Instructional Quality Assessment, and Mathematical Quality of Instruction offer a breadth of resources to explore teachers’ instruction but none accurately or appropriately allows users to code teachers’ instruction for such behaviors and habits described in the SMPs. We will share initial results from a validation study that may inform others seeking to explore teachers’ instruction in both real-time and video recorded instances.</p>	

Time: 10:00-10:50 AM		Room: Tampa Bay 2
Examining an Instrument Designed to Measure the Quality of Instruction		
Kristopher Childs	Texas Tech University	
Juli Dixon	University of Central Florida	
Makini Cambell-Sutherland	University of Central Florida	
Haiyan Bai	University of Central Florida	
<p>This research will focus on determining the reliability and validity of the Instructional Quality Assessment (IQA) Classroom Observation Tool with a primary grades population. According to Boston (2012), the mathematics rubrics of the IQA assess on four observable indicators: cognitively challenging instructional tasks, task implementation or opportunities for students to engage in high-level thinking and reasoning throughout an instructional episode, opportunities for students to explain their mathematical thinking and reasoning in mathematical discussions or in written responses, and teachers' expectations for students' learning. They are organized within two rubrics, Academic Rigor (AR) and Accountable Talk (AT). The description of these rubrics provided here is based on the explanations provided by Boston and Wilhelm (2015). Previous studies have found a relationship between cognitively challenging tasks and students opportunity to learn mathematics. We will seek to determine if prior studies reveal similar results to our present study.</p>		

Time: 11:00-11:50 AM		Room: Michigan
Improve Elementary Teachers' Understanding of Base-ten Place Value System		
Lina DeVaul	University of Nevada, Las Vegas	
Amy Adkins	University of Nevada, Las Vegas	
Carryn Warren	University of Nevada, Las Vegas	
<p>The base-ten place value system is the foundation for modern math. The ancient Egyptian number system can be used as a comparative number system to improve students' conceptual understanding of the current Hindu-Arabic number system. Different student activities have been carried out based on the Egyptian number system to improve students' conceptual understanding of the place value system, such as Time-Travel Days, and Math through the Ages. However, few professional development programs were found to use the Egyptian number system as a training resource for teachers. This study designed a professional development activity based on the Egyptian number system to deepen primary teachers' conceptual understanding of the place value system and Hindu-Arabic base ten number system. Teachers may also utilize this activity in their own classroom following this presentations. The presentation will have three sections. First, introduction of this professional development activity. Second, handouts will be sent out and audiences will go through the professional development activity by using ancient Egyptian symbols to regroup base-ten multi-digits numbers, to do addition and subtraction, and to transform numbers between Egyptian numbers and Hindu-Arabic numbers. Third, the professional development activity has already been carried out during the summer 2015, in the Clark County School District in Nevada. Research findings and conclusion will be presented and discussed.</p>		

Time: 11:00-11:50 AM		Room: Okeechobee 1
Colligation and Unit Coordination in Mathematical Argumentative Writing		
Karl Kosko	Kent State University	
Rashmi Singh	Kent State University	
<p>This study reports on 2nd and 3rd grade students' use of colligation in mathematical argumentative writing (MAW). According to Pierce (1903), colligation is what allows for connecting various warrants for a claim into a singular proposition. In children's MAW, colligation is represented by students' ability to reference given information from a task within their writing, and to operationalize those references to support a mathematical claim. This study examined students' ability to successfully enact colligation in relation to their unit coordination in multiplicative contexts. Students in a Midwestern state (n=163) completed an assessment of unit coordination for multiplication and also completed a set of mathematical writing prompts. Writing prompts included three tasks that related to multiplicative contexts via length models, and three tasks that related to addition and subtraction within 100 (e.g., $a + b = c + d$). Our findings suggest that students who are able to iterate and partition non-1 units (i.e., skip-counting) are better able to operationalize given information from both types of tasks in their MAW. Students with less advanced unit coordination were more likely to interject new information not presented in the tasks.</p>		

Time: 11:00-11:50 AM	Room: Okeechobee 2
Pre-service Teachers' Acceptance of Number Concepts Instruction in Base 8	
Katie Harshman	University of Central Florida
Heidi Eisenreich	University of Central Florida
<p>Teacher preparation is an area in which there should be constant revamping. Research is continually showing us better ways to educate students, so in turn, teacher preparation programs should be changing as well. Pre-service teachers can enter universities with certain beliefs about teaching and learning that are not congruent with current reforms in education (Stohlmann, Cramer, Moore, & Maiorca, 2014). Research suggests that teacher beliefs are critical to student success (Achieve, 2012), and that while those beliefs are rooted in years of learning in a specific fashion, through proper training, those beliefs can be changed. The purpose of this grounded theory study was to discover the reason pre-service teachers in an elementary mathematics content course accepted instruction on mathematics in another base system. Results from this study showed pre-service teachers felt instruction in base 8 was useful to them in preparing to enter the teaching profession. Learning in base 8 made them remember the frustrations and struggles they encountered as elementary school students. Results suggest that pre-service teachers could be more prepared to teach concepts and more likely to be patient with their future students if taught in base 8.</p>	

Time: 11:00-11:50 AM	Room: Pensacola Bay
Draw Yourself Doing Mathematics: Assessing a Mathematics and Dance Class	
Rachel Bachman	Weber State University
<p>Learn how recent RCML-developed drawings prompts were adapted for use in a general education mathematics classroom to understand the affective factors influencing the learning of mathematics, trends in stereotypical views of the subject, and changes in views toward mathematics over a semester. This prompt was used as part of a larger study to assess the effectiveness of a mathematics and dance course. Some elements of the larger study will be shared for context. This presentation will showcase trends in the drawings, changes in pre to post drawings, differences in drawings from the traditional and experimental classrooms, and efforts to develop standardized coding instruments for this drawing prompt. Participants will be encouraged to provide feedback about future development of the coding instruments.</p>	

Time: 11:00-11:50 AM	Room: Superior
Academic Rigor in Single-sex and Coeducational Middle Grades Math Classes	
Dennis Kombe	Clemson University
Megan Che	Clemson University
<p>This study examines differences in academic rigor between single-sex classes and coeducational classes in public school, middle grades mathematics classrooms. Data for this study include 122 video recorded instructional sessions from all-boys, all-girls and coeducational mathematics classrooms. Each instructional session was evaluated and rated for academic rigor using the Instructional Quality Assessment (IQA), which considers academic rigor, accountable talk, and teacher's clarity of expectations. Scores from the IQA were then analyzed using ANOVA. Findings suggest there are no significant differences in academic rigor between single-sex and coeducational mathematics classroom settings. We question the veracity of implementing single-sex educational options in coeducational public schools and posit that it is teachers, rather than settings, that are greater influencers of academic rigor in middle grades mathematics classrooms.</p>	

Time: 11:00-11:50 AM	Room: Tampa Bay 1
Instructional Practices Related to Developing Productive Disposition	
Maureen Grady	East Carolina University
<p>This study examines instructional practices related to the development of one critical aspect of productive disposition, the tendency to see mathematics as sensible. In this study, I looked at the conceptions of mathematics of a 9th grade beginning algebra class and at the instruction practices that appeared to be related to the development of a conception of mathematics as sensible in these students. Results from this study indicate that such a conception of mathematics can develop in a diverse student population and that specific instructional practices seem to be related to this development. This session will explore some of those instructional practices with a particular focus on practices related to helping students see and value connections both within mathematics and between mathematics and students' everyday lives.</p>	

2015 RCML Board Meeting Minutes: February 27, 2015

Past-President Mary Swarthout called the general business meeting to order.

Attendees raised their hands for those who were first time attendees, first year members, tenured faculty, and those who have attended 10+ years

Mary Swarthout introduced the new officers and newly elected committee members:

Sarah Pratt, Secretary

Hope Marchiando & Bill McGalliard, Conference Committee Members

Mary Swarthout introduced and welcomed the new president, Juliana Utley, and turned the business meeting over for her to conduct.

Approval of Minutes: Darlinda Cassel presented the minutes from the RCML 2014 conference business meeting, which was also distributed in the 2014 Newsletter. Melfried Olson moved to approve the minutes, seconded by Keith Adolphson. No discussion. Motion carried.

Treasurer's Report: Kerri Richardson, Treasurer, presented the budget report for 2014. Kerri showed that RCML netted money in the two accounts held by RCML, the Publications account and Regular account. Kerri reported that by allowing PayPal as an option to pay for membership, there was an ease in the accounting of membership dues paid. She provided a three year overview of the accounts and showed an increase in 2014 due to more journal subscriptions. Bob Drake moved to approve the minutes, seconded by Alan Zollman. No discussion. Motion carried.

Membership Report: Sarah Pratt delivered the membership report. As of December 31, 2014, the membership of RCML is stable at 154 members (up from last year's membership of 130). In 2015 as of the time of the conference there are 170 members. She reported that by using online membership registration and Paypal as an option, the membership roster and collection of dues is much smoother. She looks forward to continuing to use this process.

Publications Report: Sheryl Maxwell Business manager Sheryl reported that the most recent newsletter was emailed in February 2015; sent by Summer Batieha. She then reported that the newest issue of Volume 7 Issue 3 will soon be published and that any new members can write their name on the list and will receive this copy in the mail. Sheryl also relayed that editor Vicki Schell is asking for those who want to review articles for the journal. Please contact her and include 2 areas of expertise. Sheryl then conducted a prize drawing – 17 journals to give away: Jacob Musal, Laura Tapp, Sarah High, Lauren Wells, Maureen Grady, Keith Hubbard, Nicole Bamford, Trina Davis, Molly Weinburgh, Matt Roscoe, Rebecca Gault, Ken Butler, Stephanie Capen, Nickolaus Ortiz, Danya Corkin, Carolyn Mitten, Susie Morrissey were the winners.

VP of Conferences: Eileen Faulkenberry reported that there were 160 registrants for this conference. She then discussed that this was the first year for poster sessions, and that it seemed to be a success. She followed by saying there have been great sessions already. She informed the attendees that the Founders Lecture will be at 4:30, and asked that the posters be taken down at that time.

Eileen announced that the 2016 Conference Chair is Gabriel Matney, with Messi as the local contact. The hotel and conference is booked near Sea World. The dates for the conference are last weekend in February 25-27, 2016. She informed the group that proposals are due September 15, 2015, and encouraged members to also submit proceedings paper.

She concluded by giving thanks to the 2015 Program Chair, Christa Jackson, and to the 2015 Conference Co-Chairs, Jeff Shih & Travis Olson.

Proceedings Editor and Co-Editor: Megan Che & Keith Adolphson offered their thanks to reviewers and asked for those who volunteered to raise their hands. Megan gave her thanks to Keith and working together, to share and distribute effort. She also thanked Traci Carter as editorial assistant. She concluded by thanking the organization for the opportunity. Keith reported that there was 40% acceptance rate; 23 accepted from submissions. Proceedings given

in flash drive at conference check-in. A question was asked about how one can become a reviewer, Keith answered by informing the membership to send him an email to Keith Adolphson if you are interested.

Eileen announced a change to program: Darlinda & Landa was scheduled at 8:00 am will now be in Apollo 7 at 3:30 pm.

Mary Swarthout, Past-President, made a call for nominations, stating that nomination forms on tables. She suggested that any questions about what these positions entail, please talk to officers. Self-nominations are accepted. Mary announced that nominations will be provided in the October newsletter.

Recognition and awards: Juliana Utley, President, gave recognition of service and awards for the following:

Conference chair, Travis Olson & Jeff Shih

Program chair, Christa Jackson

Awards for past conference chairs, Angela Kribbs and Thomas Faulkenberry

Proceedings chair and co-chair: Megan Che & Keith Adolphson

Secretary: Darlinda Cassel

Past-President: Mary Swarthout

Recognition of the Memorial Scholarship recipient for this year

In honor of David Davison

The winner is Jonathan Bostic

Juliana Utley, President, asked for any new business. One statement made is that in the future we will be cleaning up the new by-laws

Jonathan Bostic asked if there is any consideration for moving to paper and online format for the journal. Discussion of this led to the membership being informed that the Board is exploring all options and more information will be forthcoming, hopefully by the 2016 RCML conference.

Bob Drake motioned to adjourn, seconded by Gabriel Matney. No discussion. Voted in favor. Meeting adjourned.

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