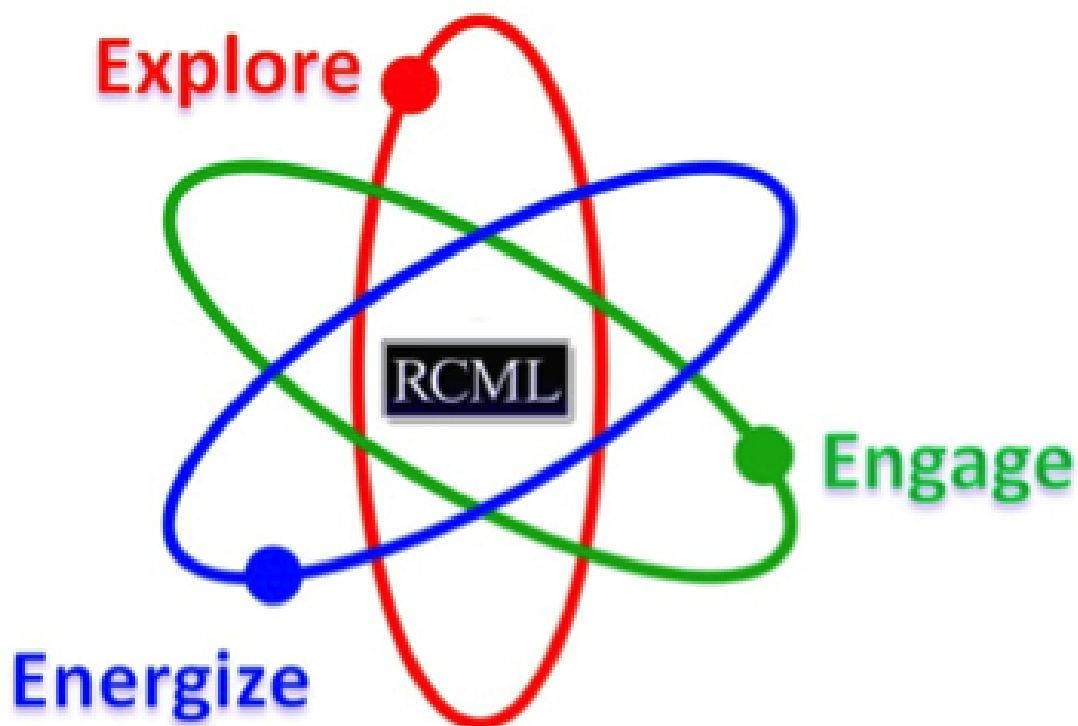




Research Council on Mathematics Learning

44th Annual Conference

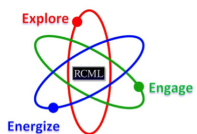
*Engage, Explore, and Energize
Mathematics Learning*



Historic Hilton Hotel

Fort Worth, TX

March 2–4, 2017



Conference Events at a Glance:

Thursday, March 2

- 3:30 PM - 8:30 PM - Registration open outside the *East Promenade on the 2nd Floor*
- 4:00 PM - 5:20 PM - The Research Poster Session in *Crystal Ballroom D*
- 5:30 PM - 6:30 PM - The Wilson Lecture by Dr. Bryant Wyatt in *Crystal Ballroom D*
- 6:30 PM - 8:30 PM - Welcome Reception in *East Promenade on the 2nd Floor*

Friday, March 3

- 7:30 AM - 4:30 PM - Registration open in the *East Promenade on the 2nd Floor*
- 7:00 AM - 7:50 AM - First Timers' Special Session in *Texas A*
- 8:00 AM - 11:50 AM - Breakout Sessions
- 12:00 PM - 1:20 PM - The RCML Business Luncheon in *Crystal Ballroom D*
- 1:30 PM - 4:20 PM - Breakout Sessions
- 4:30 PM - 5:30 PM - The Founders' Lecture by Dr. Patricia Jordan in *Crystal Ballroom D*

Saturday, March 4

- 7:30 AM - 12:00 PM - Registration open in the *East Promenade on the 2nd Floor*
- 8:00 AM - 11:50 AM - Breakout Sessions
- 12:00 PM - 1:00 PM - The Research Reflection Luncheon in *Crystal Ballroom D*
- 1:00 PM - 2:00 PM - Past President Meeting in *Texas A*

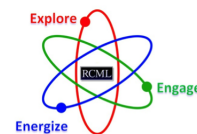


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Welcome!

Welcome to the 44th annual RCML Conference! We would like to thank all of the speakers, attendees, and contributors to 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 Fort Worth, Texas and the Historic Hilton Downtown. We anticipate you will have a wonderful experience. Please let us know if we can assist you in any way. Enjoy the conference!



Melanie Fields

Texas A&M University-Commerce



Eileen Faulkenberry

Tarleton State University



Kathy Horak Smith

Tarleton State University

Special Thanks!

Program Layout: A special thank you to Dr. Keith Emmert for his hard work preparing the layout and contents of the RCML program booklet.

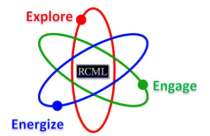
Program Materials: A special thank you to the Texas A&M University-Commerce College of Education and Human Services for donating the materials for the program booklets.

Conference Bags: ETA hand2mind for the donation of bags for the 2016 conference. They share:

“ETA hand2mind 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.hand2mind.com/math”

Additionally, we would like to thank Tarleton State University for bag goodies.

Conference Materials: A special thank you to Tarleton State University’s Center for Instruction Innovation for providing the projectors.



Welcome & Special Thanks

Wilson Memorial Lecture Reception: A very special thank you to Baylor School of Education, Tarleton College of Education, Tarleton College of Science and Technology, and Texas Christian University Andrews Institute of Mathematics and Science Education for their generous donations to support the reception.

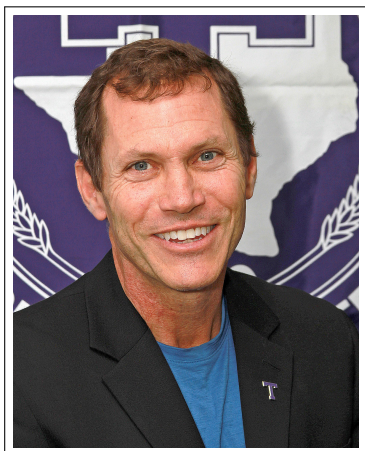


BAYLOR
UNIVERSITY



COLLEGE OF
EDUCATION

ANDREWS INSTITUTE

Wilson Lecture: Thursday, 5:30 PM Crystal Ballroom D*Leveraging GPU Accelerated Computing to Restore Credibility to the Giant Impact Hypothesis***Dr. Bryant Wyatt** - Tarleton State University, Mathematics Department

Abstract: The giant-impact hypothesis is the dominant theory as to how the Earth-Moon system was formed, but angular momentum concerns have cast a shadow on its validity. Computer generated impacts have been successful in producing virtual Earth-Moon systems that possess many of the properties of the observed system, but when tasked with addressing the isotopic similarities between the Earth and Moon they result in systems with excessive angular momentum. Ejection resonance between the Moon and the Sun has been put forth as a means of removing the excess angular momentum, but this reasoning was rejected by The Royal Society at a special session called to discuss the origin of the Moon. Here we show how to use impactor spins to create an impact that preserves all the favorable aspects of previous simulations, and produces an Earth-Moon system with the correct angular momentum. Ejection resonance is not needed. All the work is done on inexpensive NVIDIA GPUs, demonstrating how supercomputing and computational astrophysics has come to the masses.

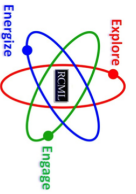
Biography: Dr. Wyatt received his PhD in applied mathematics from the University of Texas at Arlington. The title of his dissertation, “Molecular Dynamic Simulation of Colliding Microdrops of Water” along with his present work, are at the crossroads of mathematics, physics and computer science. Dr. Wyatt’s work under Dr. Donald Greenspan required extensive programming of Cray supercomputers. These computers cost upward of 20 to 40 million dollars. After graduation he went to work for Esystems (now Raytheon) as a senior software engineer optimizing parallel image processing code. After working at Esystems, he joined Bell Helicopter in 1994 as a senior computer systems analyst. Dr. Wyatt started work at Tarleton State University in fall 2001. Tarleton did not have 20 million dollars to spend on a supercomputer, so he began work on reforming college algebra courses at Tarleton and learning to become a better teacher. In 2005 Dr. Wyatt and Dr. Bowen Brawner worked with the Texas Educational Agency to create a training module on the Mathematics TEKS Reform (MTR) and presented this trainer-of-trainers module at educational service centers across the state. In 2007 NVIDIA releases CUDA which allowed the scientific community to harness the inexpensive power of modern graphics processing units. Supercomputing had come to the masses. In the fall of 2010 Dr. Wyatt became the head of the mathematics department at Tarleton State University and started Tarleton’s high performance computing lab. In the last seven years, Dr. Wyatt and his students have given over 90 presentations regarding their work on particle modeling all over the United States. Wyatt and his team have also won numerous awards for their cutting edge presentation.

Founders Lecture: Friday, 4:30 PM Crystal Ballroom D*Following in the Founders' Footsteps***Dr. Patricia Lamphere Jordan** - Oklahoma State University, Emeritus Faculty, School of Teaching and Curriculum Leadership

Abstract: We know who the Founders are, but do we know *the rest of the story*? Who are these folks - really - and how have they influenced Mathematics Education and the vision of RCML? How have they advanced the ideals of success for all learners: pK-12 learners, college learners, and mathematics educators? Where do you fit into this story? What is your academic heritage? Are you a descendent of one of the Founders or of one of the RCML Leaders? Looking at the accomplishments of our Founders and our Leaders, where will you “pick up the torch” and lead the way in stimulating, generating, coordinating, and disseminating research efforts designed to understand and/or influence factors that affect mathematics learning. [Note: Bring a copy of your academic lineage to the session.]

Biography: A short time ago lived a little girl who loved to read; in fact she began her educational lineage at three. As soon as Pat was able, she began to go to school. “She does not work well alone”, her second grade teacher lamented. However, her third grade teacher saw something different, she recognized Pat’s gift. Rather than see her inability to work alone as poor behavior, her third grade teacher asked Pat to help teach students in the lower reading groups. Pat said, “And the rest, as they say, is history...” Upon graduation from high school, Pat entered college to become an elementary teacher with a specialization in mathematics. In 1971 she graduated, quickly immersed herself into teaching 6th grade Reading, ELA, and Art (no surprise here). However, she ultimately spent some time falling in love with teaching middle school mathematics, high school geometry, and all other forms of general mathematics. Pat’s love of learning and education was far from over; in 1973 she graduated with a MS in Education Leadership and in 1988 completed her doctorate in C&I Mathematics Education. Clearly her love for how students learn math was evident in her dissertation *Hemispheric Preference in Processing Style and Problem-solving Ability in Middle School Mathematics Students*. From 1971 until January 2015, Pat shared her invaluable passion for teaching mathematics to a multitude of blessed students. Dr. Patricia Lamphere Jordan still serves as Emeritus Faculty for Oklahoma State University. As for why she continues to be a part of the “insanity of teaching mathematics” she has six wonderful grandchildren who deserve someone with her lineage.

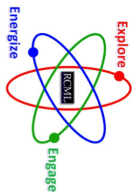


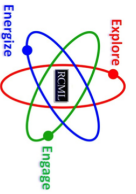


Overview of Friday Morning Sessions				
Room	8:00 - 8:50 AM	9:00 - 9:50 AM	10:00 - 10:50 AM	11:00 - 11:50 AM
Citizens A	<i>Teacher's Interpretation of Student Understanding in the Mathematics Class</i> Rachel Bower	<i>Pre-Service Teacher Peer Assessment as Preparation for Responsive Teaching</i> Teresa Salazar	<i>Elementary Preservice Teachers and Questioning Strategies in Mathematics</i> Sandra Browning	
Citizens B	<i>The Disconnect Between High School and College Level Mathematics</i> Beth Kocher	<i>Academic Abilities and Non-cognitive Traits of College Remedial Mathematics</i> Karl Kruczek	<i>Developmental Mathematics Course Redesign: Attitudes and Mindsets</i> Sarah Ives	<i>Math is not a Race: A Student's Journey From Basic Algebra to Doctoral Work</i> Jen Monastra, Sean Yee
Citizens C	<i>Rise & Fall of a Mathematical Cultural Revolution</i> Bob Drake, Kathleen Hulgin	<i>Building Teachers' Capacity for Anticipating Student Responses</i> Colleen Eddy, Sarah Pratt, Eloise Kuehnert, Minwei Wu	<i>Undergraduates Representing and Connecting in Mathematical Problem Solving</i> Kathryn Rhoads, James A. Mendoza Epperson, R. Cavender Campbell	<i>Emerging Themes for Student Mathematical Problem Solving in College Algebra</i> R. Cavender Campbell
Texas A	<i>Mastery of Vocabulary: Necessary Evil to Learning Problem Solving</i> Barba Patton	<i>Fraction Learning with iPads in Middle School</i> Tarah Donoghue, Lydia Buntin, Darlinda Cassel	<i>Examining Teachers Participation and Perspectives of Mathematics PD</i> Christie Martin, Drew Polly	<i>Using Tutors to Teach Story Driven Math Concepts to Students: The Findings</i> Carolyn Pinchback, Elson Bihm, Tori Francis
Texas B	<i>Supporting early childhood teachers to incorporate STEM in their teaching</i> Sue Brown, Sandra Browning	<i>A Tool for Evaluating Quantitative Reasoning in Elementary School</i> Lindy Crawford, Sarah Quebec Fuentes	<i>A Summer Math Academy for Early Learners: Development of Early Number Sense</i> Sandi Cooper, Keith Kerschen, Ryann Shelton	<i>Preservice Elementary Teachers' Recognition of Arithmetic Properties</i> Gayle Millsaps
Texas C	<i>Following the Trail of Mathematics Anxiety From Preservice to Inservice</i> Gina Gresham	<i>Mathematics Identity Development: Is there a place for Drake in math class?</i> Marti Cason, Nickolaus Ortiz, Jamaal Young, Marquita Foster	<i>Growing beliefs through active learning: a case-study</i> Devon Gunter	<i>Theoretical and Operational aspects of Content validity and the MMAI</i> Kenneth Butler
Texas D	<i>(Re)Considering Teachers' Promotion of the Standards for Mathematical Pract</i> Jonathan Bostic, Gabriel Matney	<i>Embracing Graphing Calculators in Algebra 2 to Facilitate CCSS Mastery</i> Elayne Bowman	<i>Flipping College Algebra Classrooms</i> Beth Cory	<i>Quantitative Literacy and Teacher Education: Improved Mathematical Training</i> Rachel Bates

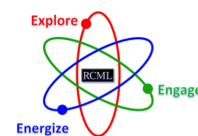
Overview of Friday Afternoon Sessions

Room	1:30 - 2:20 PM	2:30 - 3:20 PM	3:30-4:20 PM
Citizens A	<i>Initiating Student Mathematics Education Research via Projects</i> Winifred Mallam, Ann Wheeler	<i>Preservice teachers exploring prime factorization</i> Ricela Feliciano-Semidei	<i>Professional Development Modules designed for Teacher Learning and Practice</i> Seanyelle Yagi, Fay Zenigami, Linda Venenciano
Citizens B		<i>The Hidden Curriculum in Higher Education Mathematics Modeling Textbooks</i> Marnie Phipps, Patty Wagner	<i>Training Graduate Student Instructors as Peer Mentors</i> Sean Yee
Citizens C	<i>Assessment For Learning: Teachers' Questioning and Listening Strategies</i> Sarah Pratt, Colleen Eddy, Eloise Kuehnert	<i>Development and Validation of a Diagnostic Assessment for Kindergarten Math</i> Julie Herron	<i>Assessing mathematics in a technology-rich learning environment</i> Patrick Wachira, Xiongyi Liu
Texas A	<i>Preservice Teachers' Knowledge of Fraction Multiplication and Division</i> Shawn Broderick	<i>Fractions: Remediation 101 for Misconceptions</i> Estella De Los Santos, Barba Patton	<i>Fractions: 5000 years later and still difficult for many</i> Barba Patton, Estella De Los Santos
Texas B	<i>Becoming Involved with Investigations in Mathematics Learning</i> Drew Polly, Gabriel Matney, Jonathan Bostic	<i>Pre-service Teachers' Mathematical Discourse Interviews of Kindergarteners</i> Lynn Columba	<i>Ramping Up to Algebra: Supporting Teacher Content Knowledge in Grades 3-5</i> Angela Knotts
Texas C	<i>Toulmins Model to Support Middle School Mathematic Arguments Via Technology</i> Robert Wagner	<i>An Investigation of Students' Perceptions of Doing Mathematics</i> Corrinne Sullivan, Gabriel Matney	<i>Model-Eliciting Activities and Changing Mathematics-Related Beliefs</i> Cathrine Maiorca
Texas D	<i>Pedagogical and Curricular Change Through Making for Mathematical Learning</i> Steven Greenstein	<i>Common Algebra Errors that Plague Student Success in University Mathematics</i> Stacy Reeder, Kate Raymond	<i>Math Starters: High Yield Algebra Tasks that Stand the Test of Time</i> Juliana Utley, Stacy Reeder, Megan Che



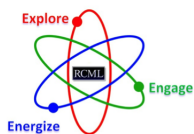


Overview of Saturday Morning Sessions				
Room	8:00 - 8:50 AM	9:00 - 9:50 AM	10:00 - 10:50 AM	11:00 - 11:50 AM
Citizens A	<i>Instructional Representations as a Gateway to Providing Targeted Professional Development</i> Michael Muzheve	<i>Supporting Preservice Teachers Use of Mathematical Reasoning as a Literacy</i> Leanna Lucero, Mary Fahrenbruck	<i>Making Meaning from Multiple Curriculum Materials in Algebra 2</i> Kate Raymond	<i>Teacher Candidates' Knowledge of Financial Literacy</i> Gwendolyn Johnson, Ali Shaqlaih, Yolanda Graham
Citizens B	<i>Draw Yourself Doing Math: Trends in Student Drawings</i> Rachel Bachman, Shawn Broderick	<i>Student Perspectives: Photovoice Methodology in Mathematics Classrooms</i> Megan Che, McKenzie Brittain	<i>Balancing Teachers' Goals and Students' Play in a Video Game Environment</i> Justin Seventko, Nicole Panorkou, Steven Greenstein	<i>Mathematics in a Fiber-Arts Context: Exploring Mathematics Experiences</i> Nichole Armand
Citizens C	<i>Promise of a Sociocultural Perspective of Emotion in Mathematics Education</i> Carlos Nicolas Gomez	<i>Developing Ambitious Mathematics Instruction Through Number Talks</i> Dawn Woods	<i>What Math Teachers Need to Know and Do for English Language Learners (ELLs)</i> Alan Zollman	<i>Universal design for learning mathematics lesson planning to advance equity</i> Paulo Tan
Crystal D		<i>Barriers to Math Teachers' Constructivist Teaching Implementation</i> Danya Corkin, Adem Ekmekci, Stephanie Coleman	<i>Impacting Elementary In-service Mathematics Teachers Content Knowledge</i> Gregory Chamblee, Georgia Cobbs	
Texas A	<i>Counting square units is not enough: Exploring area dynamically</i> Nicole Panorkou, Madhavi Vishnubhotla	<i>Analysis of Students' Geometric Thinking: Van Hiele Model</i> Jessie Store, Davie Store	<i>EGMA Spatial Reasoning and Relational Reasoning subtasks: Content evidence</i> Lindsey Perry	<i>PSTs' Knowledge of Writing Word Problems for Fraction Number Sentences</i> Nesrin Sahin, James Fetterly, Sirin Budak
Texas B	<i>Integrating Children's Literature: Fostering Understandings and Connections</i> Dittika Gupta, Amy Corp	<i>Investigating K-5 student thinking with in-service teachers</i> Kerri Richardson, Tyrette Carter	<i>Effecting Change on PSET Mathematics Teaching Efficacy</i> Elayne Bowman	
Texas C	<i>Digital Stories and their Roles in Mathematics Content Courses</i> Sylvia Taube	<i>Implementing Learning Assistants in Secondary School Mathematics Classrooms</i> David Erickson, Joshua Herring	<i>Secondary Mathematics Teachers Attitudes and Self-efficacy</i> James Telese	<i>Recruiting Secondary Math Teachers from the Elementary Education Program</i> Cynthia Orona, Kim McComas
Texas D	<i>The Teaching and Learning of the Teaching and Learning of Calculus</i> Ryan Fox, Tucker Dowell	<i>Beyond Gap Gazing: Single-Group Summaries of Using Confidence Intervals</i> Jamaal Young, Jemimah Young	<i>Engaging Students with Technology to Enhance Statistical Literacy</i> Hope Marchionda, Melanie Autin	<i>Calculus Student Understanding of Continuity and Related Topics</i> Jayleen Wangle

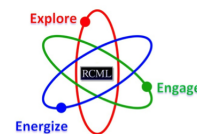


Thursday Afternoon

Time: 4:00-5:20	Room: Crystal D
Discussing the Understanding of Difference of Squares Through Area Models	
Enes Akbuga	Texas State University
We propose an activity that helps students understand the fundamental ideas behind the difference of squares factorization rather than memorizing a formula. We explore the reasons why such an alternative may be more beneficial for student learning.	
Time: 4:00-5:20	Room: Crystal D
Fluency with Multiplication Facts: Exploring Novel Acquisition Strategies	
Barbara Allen-Lyall	Manhattanville College
Multiplication facts fluency in the elementary grades provides a strong foundation for the study of rational numbers and mathematics computation throughout schooling. Fluency also supports ongoing mathematics learning due to the expansion of students' mathematics self-concept. This study was undertaken to explore the efficacy of a novel approach to facts acquisition in Grade 3. Students in two multicultural suburban schools participated in a ten-week supplementary intervention designed to improve motivation for facts memorization, capitalizing on memory pathways that assist retention. An assessment of facts retention was administered to participants the following September upon entering Grade 4. Preliminary analysis shows growth in acquisition and facts retention across study groups when compared to 4th grade students' facts retention in the study schools during September of the prior year.	
Time: 4:00-5:20	Room: Crystal D
Students' Understanding of the Concepts of Rates of Change and Functions	
Pragati Bannerjee	Texas A&M University-Corpus Christi
A cross-sectional study was conducted in a public high school with 187 Grades 7-12 students enrolled in Math-7 to Calculus. All participants completed the Diagnostic Test on Rates of Change (DTRC), an instrument that included focused problems on various representations of rates of change in physical and functional situations. The purpose of this study was to explore differences and similarities of grade seven through grade twelve students' understanding of rates of change and functions. This presentation will report the variation in students' understanding of concept of rates of change and its impact on their grasp of linear and non-linear functions.	
Time: 4:00-5:20	Room: Crystal D
Comparison of Lesson Studies that Incorporate Open Approach: Thailand and US	
Nisakorn Boonsena	Bowling Green State University
Gabriel Matney	Bowling Green State University
The study described here will compare and contrast the differences and similarities of the processes enacted by educators in two countries: Thailand and the USA. The educators in both countries sought to enact a particular style of lesson study that incorporates Open Approach (Inprasitha, 2015). In lesson studies that incorporate Open Approach the teachers meet together to create a lesson which contains an open-ended mathematics problem. During this time the teachers think about what the student's solutions might be, what the students might think about and say. Next, the teachers observe the teaching of this lesson plan and take notes about student's mathematical thinking. Then, the teachers reflect together about the observed lesson and how to improve the lesson. Although teachers from both countries enacted Lesson Study by Open Approach in this same way, there were difficulties between the overall processes due to local constraints. Teachers in both contexts described benefits of participating in Lesson Study by Open Approach. Through this poster we hope to foster conversation among mathematics educators about the flexibility of enacting Lesson Study by Open Approach in a variety of contexts.	



Time: 4:00-5:20	Room: Crystal D
Elementary Preservice Teachers' and K-8 Students' Beliefs about STEM	
Jennifer Cribbs	Oklahoma State University
Jeanine Huss	Western Kentucky University
Julia Mittelberg	Western Kentucky University
<p>This study describes an enrichment program, involving the use of LEGOS, that was conducted in the Spring of 2016. This enrichment program involved high needs elementary-aged students in after school programs and elementary preservice teachers (EPTs) enrolled in a final sequence of methods courses at a local university. Data was collected through pre- and post- surveys, interviews and artifacts. Surveys with EPTs asked about their current beliefs related to science, technology, engineering and mathematics (STEM) as well as their level of confidence in implementing content standards in their future classrooms. Surveys with elementary-aged students asked about their beliefs related to STEM and their continued interest in STEM. Interviews were also collected with both groups of participants at the end of the program. Artifacts included EPTs' lesson plans, elementary-aged students' drawings of what it means to be an engineer and pictures of students' creations in the field. Preliminary results will be discussed in the presentation.</p>	
Time: 4:00-5:20	Room: Crystal D
A Case Study of College Students' Understanding of Fractions	
Xiaowen Cui	Texas State University- San Marcos
<p>As an international student that worked as an IA in Mathematics department, I have taught developmental math, pre-calculus and calculus 1. Through the teaching experience, I found that many students have problems with 'fractions'. The purpose of this case study is to discover the college students' understanding of fractions and their perspective of learning fractions. Also by the comparison of students with different mathematics knowledge background, to find out the common problem that college students have about fractions</p>	
Time: 4:00-4:50	Room: Crystal D
One Pre-Engineering Program: Who are the students and what attracts them	
Diana Early	Oklahoma State University
<p>There is a growing need for students to either major in a STEM field in college or enter the STEM workforce after high school. To meet this demand there is an increase in pre-engineering programs at the K-12 level including those developed by the Career and Technology Education systems across the country. This study is aimed at exploring what attracts students, their characteristics (e.g. demographics, grit, and mindset) and their experiences at Tulsa Technology Center's (TTC) pre-engineering program.</p>	
Time: 4:00-5:20	Room: Crystal D
Tinkerplots	
Lucas Foster	Northeastern State University
<p>Students are often confronted with real-world situations in which they are required to make informed decisions that require a rich understanding of basic mathematics and statistics. If students are not statistically literate, then they will be unable to successfully navigate these types of decisions. Thus, statistical literacy is a vital part of a student's educational process. The purpose of this study is to determine through qualitative and quantitative methodology whether the use or Tinkerplots in a Statistics classroom significantly influences the statistical literacy of students.</p>	
Time: 4:00-5:20	Room: Crystal D
What, How, Why: Writing in the Secondary Math Classroom	
Melissa Gunter	University of Oklahoma
<p>This study-in-progress seeks to discover how, when, and why secondary mathematics teachers are using writing in their classrooms to help students learn mathematics, including how it relates to their beliefs about teaching and learning and formative assessment. Preliminary results and implications for future research will be discussed.</p>	



Thursday Afternoon

Time: 4:00-5:20	Room: Crystal D
Effectiveness of ST Math in college students learning fraction concepts	
Taro Ito	University of Nevada Las Vegas
<p>Fraction concepts are one of the most important mathematical concepts since the concepts are foundations for other mathematical concepts. However, understanding these concepts is one of the major obstacles for students. One of the major reasons for this is that learners have the natural number bias, which they tend to apply the natural number reasoning to fractions. This bias is persistent and even college students carry the bias and approach fraction problems with the reasoning. Another reason is that fractions are taught procedurally and that instructors do not implement manipulatives, models or technology. This is why many college remedial mathematics students struggle with mastering the concepts and they end up retaking the remedial course multiple of times. Although college mathematics departments have been facing this problem, they have not found the answer for it. In these days, technology usage in mathematical learning is one of the major topics in the field of mathematics education and there are so many mathematical learning apps on the market to promote an effective learning of the subject. This study investigates the effectiveness of widely known mathematical learning software Spatial Temporal Math (ST Math) in college remedial mathematics to help students master fraction concepts.</p>	
Time: 4:00-5:20	Room: Crystal D
Curriculum Leadership: Hamilton County Algebra I and Algebra II Audit	
Natasha Johnson	Georgia State University
<p>This study covers the Algebra I and II TVAAS scores and curriculum for the following three-year school period: Fall 2011-Spring 2012, Fall 2012-Spring 2013, and Fall 2013-Spring 2014. As an invested stakeholder in this particular community, I am committed to continual involvement as it pertains to the corresponding students and their connection to the summative math data. This study sought to uncover, address, and answer the following questions: What curricular gaps exist in the teaching of Algebra I and Algebra II? How do these scores truly reflect TVAAS standards? Lastly, are assessments aligned to the curriculum? Why or why not?</p>	
Time: 4:00-5:20	Room: Crystal D
Re-Presenting Distributive Property and Multiplication Facts	
Eloise Kuehnert	University of North Texas
Colleen Eddy	University of North Texas
Sarah Pratt	University of North Texas
<p>Our research reveals that teachers struggle to express the connections between integer multiplication and binomial multiplication. This study shows a series of tasks using distributive property to connect area model structures involving base-10 numbers (anchored to 10 and 5) and binomials to make sense of multiplication facts. Initial findings indicate a need for appropriately scaffolded tasks within the series to address teacher learning trajectories. This presentation will discuss the reasoning behind the order of scaffolded tasks for pre-service teachers as compared to possibilities for elementary students. Hands-on activities will be available for participants to engage in the mathematics.</p>	
Time: 4:00-5:20	Room: Crystal D
Poincare's notion of Intuition	
Lianfang Lu	University of Arkansas Little Rock
<p>Henry Poincare was a 19th century French mathematician who made remarkable contributions to the development of mathematics in history. In this paper, we will explore Poincare's notion of intuition - a dynamic, geometric view of the world and discuss its implications for mathematics education. We will also provide examples/activities to illustrate how Poincare's notion of intuition may be used specifically in K-8 mathematics education.</p>	



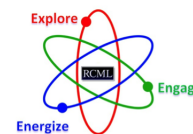
Time: 4:00-5:20	Room: Crystal D
Surveying Preservice Teachers' Knowledge of the SMPs	
Allison Marino	Bowling Green State University
Gabriel Matney	Bowling Green State University
<p>The poster will describe a research study on preservice teachers' knowledge of the SMPs before and after a pre-methods mathematics course. One of the goals of the course is to have a classroom ecology conducive to promoting preservice teachers enactment of the SMPs, experiencing them and connecting a knowledge of the SMP's with that experience. We hope to promote conversation about researching knowledge of SMPs as well as what mathematics educators can do to help preservice teachers increase their knowledge of the SMPs.</p>	

Time: 4:00-5:20	Room: Crystal D
Certification Pathway and KAT on Algebra I Teachers' Beliefs	
Travis Mukina	Oklahoma State University
<p>Research suggests that teachers' mathematical knowledge of teaching (MKT), beliefs about mathematics and its teaching, and pathways to teacher certification all have a strong impact on the level of students' mathematical success. Results of a quantitative study investigating the influence a teachers' Knowledge of Algebra Teaching (KAT) and pathway to certification has on their beliefs in the Algebra I classroom will be shared.</p>	

Time: 4:00-5:20	Room: Crystal D
Exploring Middle School Mathematics Preservice Teachers Problem Solving	
Maria Nielsen	Bowling Green State University
Jonathan Bostic	Bowling Green State University
<p>The purpose of this poster is share results of a study exploring middle school preservice teachers problem-solving performance on measures addressing 6th, 7th, and 8th grade mathematics. Insight as to why students thought they struggled on the problem-solving measures will be shared. Implications from the research aim to influence preservice teachers' mathematical experiences at the collegiate level. We hope to spark conversations with mathematics teacher educators about teacher preparation, which might in turn impact preservice teachers' future classroom teaching.</p>	

Time: 4:00-5:20	Room: Crystal D
Pre-Service Teachers: My Future Math Classroom Based on Past Experiences	
Cynthia Orona	University of Arkansas
<p>This study requires pre-service teachers to look closer at their own mathematical experiences that have impacted their view of mathematics at the beginning of their mathematics methods course. The course engages them in a variety of experiences and observations in which some students are comfortable and others continue to ponder the feasibility of a mathematics classroom in a way different from the traditional lecture-style mathematics with which they are most familiar. Pre-service teachers looked closely at their view of mathematics through several disposition assignments and some gained understanding and insight into their view of mathematics. Some pre-service teachers began to realize why they felt the way they did about math and how that feeling either continued in the same direction or took on a new direction. With this new lens of their view of mathematics, pre-service teachers are faced with a decision of whether or not they will assimilate or accommodate the knowledge and opportunities they acquire and experience within the course and think about what they want their own mathematics classroom to look like. There are no constraints, so the students can really think about what they want and how they might set up their own mathematics classroom.</p>	

Time: 4:00-5:20	Room: Crystal D
Using Literature Strategies in a Mathematics Setting	
Carolyn Pinchback	University of Central Arkansas
<p>The speakers will share literature (specifically reading and writing) strategies that have been used for the last three years. Examples of the participants work will be shared as well as their comments on the use of these strategies.</p>	



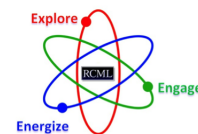
Thursday Afternoon

Time: 4:00-5:20	Room: Crystal D
Elementary Teachers Development of Rational Number Learning Trajectories	
David Pugalee	University of North Carolina Charlotte
Shelby Morge	University of North Carolina Charlotte
<p>In a southeastern state, faculty from seven campuses collaborated to create an add-on licensure program in elementary school mathematics. This licensure follows the recommendations for elementary mathematics specialists as outlined in the (2010) AMTE document, Standards for Elementary Mathematics Specialists. The program requires eighteen semester hours of course work. Each course has a content focus and an emphasis on a high leverage teaching practice. The course that is the focus of this study has a main focus on the topics of rational numbers and measurement and the high leverage teaching practice as learning trajectories. A major course assignment has the teachers develop a learning trajectory by describing a goal, laying out a developmental progression, and selecting appropriate tasks to support students' advancement through that progression as described by Sarama & Clements (2009). Faculty researchers who have taught this course analyzed common errors in the teachers' understandings of learning trajectories. The session will highlight the finding related to the course and the assignment, descriptions of teachers' difficulties with setting a goal, sequencing the trajectory, and selecting appropriate mathematical tasks correlated with instances on the trajectory. Discussion will include how these findings can inform support for teachers in demonstrating the mathematics teaching practices supported through knowledge of learning trajectories.</p>	
Time: 4:00-5:20	Room: Crystal D
Comparing Preservice Teachers' Images of an Ideal Classroom	
Adrienne Redmond-Sanogo	Oklahoma State University
John Weaver	Oklahoma State University
<p>Research has shown that teachers' beliefs have a strong influence on the way they understand and teach mathematics (Manouchehri, 1997; Thompson, 1992; Brendefur & Frykholm, 2000). Those beliefs are often instilled in teachers prior to taking their elementary or secondary mathematics methods courses (Ball, 1988; Bush, 1986). It is important that their teacher preparation programs explore and confront beliefs that may be unproductive (Jones, 2006; NCTM, 2014). This presentation will share the results of a study that compared preservice elementary and secondary mathematics teachers' drawings of their ideal mathematics and science classrooms. Students completed the drawings on the first day of their mathematics methods course and drawings and descriptions were analyzed for themes.</p>	
Time: 4:00-5:20	Room: Crystal D
Examining rural elementary teachers' self-efficacy during a summer professional development workshop	
Lisa Rice	Arkansas State University
<p>Professional development (PD) is a vital component of a practicing teacher's growth. While it is a common requirement of teachers across grade levels, it can be 'sporadic and shallow,' offering little in terms of the mathematical content they may need (Walker, 2007, p. 114). In general, elementary teachers need strong professional development to deepen their understanding of topics they encounter in the classroom. In this presentation, we describe a group of rural elementary teachers' feelings of self-efficacy regarding mathematics prior to and after completing a two-week long professional development workshop focusing on rational numbers and measurement. This study gathered data on teachers' self-efficacy through a modified version of the Mathematics Teaching Efficacy Beliefs Instrument (MTEBI) (Enochs & Riggs, 1990) with open-ended items. One goal of the study was to determine if the PD impacted the teachers' self-efficacy in general mathematics and topics addressed specifically in the PD. The results from analyzing instrument data and open-ended items will inform the professional development instructors of possible changes they can make in the future to better serve the needs of the teachers.</p>	
Time: 4:00-5:20	Room: Crystal D
Lessons learned comparing students of varying Spatial Visualization ability	
Teresa Schmidt	Middle Tennessee State University
<p>Spatial visualization skills are vital components of numerous careers and academic fields. Little emphasis is being placed on developing these skills in schools in the US. This research seeks to improve students' skills through a drawing intervention in a middle school setting via a case-study comparison of students of varying spatial visualization abilities.</p>	



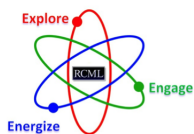
Time: 4:00-5:20	Room: Crystal D
Providing Feedback: An Embedded Signature Assessment	
Tony Thompson	East Carolina University
Kwaku Adu-Gyamfi	
<p>This session presents the development of an Embedded Signature Assessment (ESA) on written feedback in the Mathematics Education program at East Carolina University. The session will begin with an overview of ESAs and the development process. After a brief introduction on the importance of feedback and the characteristics of effective written feedback, participants will have the opportunity to experience the ESA in its current form. This session will conclude with a discussion of implementation strategies and results in spring 2016 on the impact of this ESA on mathematics education interns' ability to give written feedback as measured by the edTPA.</p>	

Time: 4:00-5:20	Room: Crystal D
Online Mathematics Teacher Networks: Assessing the Learning Potential	
Anne Wilhelm	Southern Methodist University
<p>Research on teachers' advice networks suggest that social network interactions play a role in both the interpretation and the implementation of reforms and influence teachers' knowledge and practice. Further, social network studies have demonstrated that the expertise of colleagues and the content of teachers' social network interactions have an impact on the learning within those interactions. While most of the research on teachers' instructional advice networks has focused on their networks within their schools, there is some evidence that instructional advice networks that extend beyond the walls of a school are also influential. The MathTwitterBlogoSphere (MTBoS) is a community of mathematics teachers on the internet within which mathematics teachers share teaching ideas and support one another. We are interested in understanding the potential of the MTBoS to give teachers greater access to expertise, and, hence, improve teachers' instructional practice. As a start, we set out to understand the MTBoS as a mathematics teacher instructional advice network. In this study we describe the social network structure and scope of the MTBoS, with a focus on how participation in the MTBoS ebbs and flows over the course of the school year. We discuss the implications for mathematics educators.</p>	

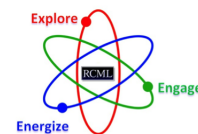


Friday Morning Sessions

Time: 8:00-8:50	Room: Citizens A
Teacher's Interpretation of Student Understanding in the Mathematics Class	
Rachel Bower	Texas State University
<p>During the 2013-2014 school year, middle school mathematics teachers in a South Texas public school district participated in a NSF funded research that produced ninety-nine recorded class periods. As part of my dissertation research, nine of these lessons, belonging to three of the middle school teachers, were used to create a case study investigating, among other things, the three components of professional mathematics teacher noticing in linguistically diverse classrooms and how these may be used to position students. The middle component, interpreting, continues to puzzle mathematics education researchers and I propose a way to evaluate this component in the classroom.</p>	
Time: 8:00-8:50	Room: Citizens B
The Disconnect Between High School and College Level Mathematics	
Beth Kocher	Ohio State University
<p>This study looks at the disconnect between what students know leaving high school and the actual knowledge and skills they need to be successful in college from the perspectives of high school teachers, college instructors, and remedial college mathematics students. Using a misalignment framework, two specific research questions were examined: 1) what are the expectations of high school teachers and college instructors regarding mathematical college readiness and how are they correlated, and 2) how do students placed in remedial mathematics courses view this placement and their prior mathematics teaching and learning? Survey data from high school teachers and college instructors rated how important various factors and skills are for students to learn in high school to be mathematically college ready. Findings from the survey revealed that both groups rated 'develop thinking skills' as the most important factor for students to learn in high school while the largest difference in mean importance occurred with 'advanced math content knowledge'. Student survey questions focused on their view of their high school and college mathematics experiences as well as how they perceive they learn mathematics. Early findings indicate that only 35% of the students felt their high school math background prepared them for college level mathematics. Initial interview analysis reveals students view their college math courses as emphasizing understanding concepts over procedural memorization.</p>	
Time: 8:00-8:50	Room: Citizens C
Rise & Fall of a Mathematical Cultural Revolution	
Bob Drake	SUNY - Plattsburgh
Kathleen Hulgin	UC Clermont College
<p>Previous research has examined factors necessary to change the mathematics teaching culture in a district. The core of this change was to de-emphasize procedural knowledge and increase e instruction on mathematical understanding. Culture changes over time, however, even if that cultural change promotes more effective instruction and helps students achieve success. This study examines factors that undermined a successful effort to promote significant achievement in one Ohio district, and serves as a warning to other schools and districts that hope to help students succeed.</p>	
Time: 8:00-8:50	Room: Texas A
Mastery of Vocabulary: Necessary Evil to Learning Problem Solving	
Barba Patton	University of Houston-Victoria
<p>Vocabulary is one of the greatest challenges facing the mathematics teacher today if students are going to master problem solving. . Vocabulary is not a new challenge as it is one which teachers have tried through the years to provide techniques to benefit their students. If a teacher is not able to guide his/her students to have the knowledge or power of words that student will not be able to be successful in today's world. Guiding students to master words specific to a discipline such as math is not as simple as just memorizing definitions and synonyms. Many words today have more than one definition thus making vocabulary in problem solving activities even more complex. The challenges facing today's students in the public school for enormous. Problem solving is more than just computations. It is vocabulary and computations. A few years ago, students could pick out the numbers in a problem and if he/she could grasp just a few words would be able to solve the problem correctly. Today it is not the case. State released math tests questions often have as many as ten or more words which are unknown to the student. This means there are approximately 250 words in 25 questions on the test. The data was collected from three different grade levels. Results were similar in each grade level. In this session, attendees will be presented with the vocabulary study of the released questions. Strategies will also be presented as to how to help both the teacher and the students.</p>	

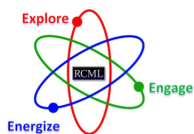


Time: 8:00-8:50	Room: Texas B
Supporting early childhood teachers to incorporate STEM in their teaching	
Sue Brown	University of Houston - Clear Lake
Sandra Browning	University of Houston - Clear Lake
<p>The researchers conducted a STEM investigation with all K-2 teachers at an area elementary school. After the investigation, the teachers identified the science, technology, and mathematics standards aligned with the activity. Two weeks later each teacher replicated the activity with his/her own students. The researchers were on campus when students completed the challenge. After the teachers conducted the activity with their students, each grade level met with the researchers during their planning period and responded to a series of focus group questions. The data presents a picture of the perceptions of STEM through the lens of primary teachers. The results of this study inform educators on supports teachers need if they are to include more STEM activities in their teaching.</p>	
Time: 8:00-8:50	Room: Texas C
Following the Trail of Mathematics Anxiety From Preservice to Inservice	
Gina Gresham	University of Central Florida
<p>Inservice teachers, participants in a prior study on mathematics anxiety were revisited to determine if their levels of mathematics anxiety still existed and/or continued to change after five years teaching experience. A 98-item Likert-type survey, informal discussions, informal interviews, and questionnaire-guided narrative interviews were conducted. Data revealed that all inservice teachers still experienced some degree of mathematics anxiety. Results have implications for teacher education programs concerning the continued professional support of teachers, measurement of mathematics anxiety levels among pre- and inservice teachers, and the determination of specific contexts in which mathematics anxiety can be interpreted and reduced.</p>	
Time: 8:00-8:50	Room: Texas D
(Re)Considering Teachers' Promotion of the Standards for Mathematical Pract	
Jonathan Bostic	Bowling Green State University
Gabriel Matney	Bowling Green State University
<p>We consider a PD model and its connections to Guskey and Yoon's (2009) framework for PD as well as NCTM's (2007) implementation standards for teaching and learning mathematics. We will present results from our research questions: (1) To what degree did teachers' promotion of the SMPs change after yearlong PD focused in this area? (2) Were there any differences between cohorts and/or grade-bands in their promotion of the SMPs' ? We intend to foster a discussion about using the NCTM implementation standards for teaching and learning mathematics as a way to help teachers promote the Standards for Mathematical Practice and ways to examine this evidence across multiple similar programs.</p>	
Time: 9:00-9:50	Room: Citizens A
Pre-Service Teacher Peer Assessment as Preparation for Responsive Teaching	
Teresa Salazar	Texas State University
<p>Responsive teaching where teacher's moves are adaptive based on student mathematical thinking is an effective teaching practice. This teaching practice is difficult to develop. Formative peer assessment allows students to assess each other work both in written and oral format. This study is a designed intervention of peer assessment for pre-service teachers in a mathematics content course. Written peer assessment prompts align to noticing of peer mathematical thinking and the peer oral conference allows pre-service teacher to practice peer conference moves that elicit, support, and extend peer mathematical thinking. This study pilots informal peer assessment with elementary and middle school pre-service teachers in a mathematics content course. Preliminary findings based on written and oral peer assessments show promise to continue research of PST peer assessment exploring the development of patterns or trajectories of PSTs responsive interactions to peer mathematical thinking.</p>	



Friday Morning Sessions

Time: 9:00-9:50	Room: Citizens B
Academic Abilities and Non-cognitive Traits of College Remedial Mathematics	
Karl Kruczek	Oklahoma State University
<p>Across the nation a growing number of undergraduate students are starting their academic journey in college taking remedial classes. Educational leaders need to understand the academic abilities and non-cognitive traits of these students before academic support strategies and interventions can be created to help serve this group of students. The purpose of this survey-design study is to understand who the students are that come to post-secondary institutions under-prepared for college-level mathematics coursework. The researcher will share the demographic characteristics, mindsets, levels of grit, meta-cognitive knowledge, academic performance, and retention rates of remedial math students at one Midwestern regional university.</p>	
Time: 9:00-9:50	Room: Citizens C
Building Teachers' Capacity for Anticipating Student Responses	
Colleen Eddy	University of North Texas
Sarah Pratt	University of North Texas
Eloise Kuehnert	University of North Texas
Minwei Wu	University of North Texas
<p>The importance of mathematical knowledge for teaching has been well documented (e.g. Hill et al. 2005) and there is a need to focus on approaches that also impact teaching practices. The research question we ask is: In what ways do algebra teachers capacity for anticipating student responses increase after two rounds of Lesson Study with Open Approach? As part of a year-long professional development, teachers take part in LSOA which incorporates the traditional elements of lesson study as well as an open-ended task. This report focuses on teacher development of anticipating student responses after one round of LSOA. In our professional development we followed the current model of lesson study used by Lewis and Perry (Lewis & Perry 2013; Lewis & Perry in press) and Inprasitha (2006). This includes providing and sequencing tasks, readings, and lessons to support teachers in the algebra concept chosen where they can focus on developing questions and anticipating student responses to questions and activities. The implementation of the lesson uses Smith and Stein's Five Practices for Orchestrating Productive Mathematics Discussions (2011) of anticipating, monitoring, selecting, sequencing, and connections. Findings from the first round of LSOA will be shared, which includes analysis of teachers' use of formative assessment using the AssessToday Observation Protocol (pre/post) (Author 2013), Lesson Study Lesson (pre/post), debriefings, and teacher reflections.</p>	
Time: 9:00-9:50	Room: Texas A
Fraction Learning with iPads in Middle School	
Tarah Donoghue	University of Central Oklahoma
Lydia Buntin	University of Central Oklahoma
Darlinda Cassel	University of Central Oklahoma
<p>Shedding light on nearly one years worth of research, this study investigates the effectiveness of iPad technology in middle school classrooms. Specifically, how use of iPads and fraction-based apps deepen (or weaken) student understanding of fraction concepts. As educators, reinforcing conceptual understanding is our focus, and this study reviews the effectiveness of this technology in middle school classrooms.</p>	
Time: 9:00-9:50	Room: Texas B
A Tool for Evaluating Quantitative Reasoning in Elementary School	
Lindy Crawford	Texas Christian University
Sarah Quebec Fuentes	Texas Christian University
<p>In this presentation, we share our work on a framework for categorizing types of quantitative mathematical reasoning demonstrated by students in the fifth-grade. Operational definitions are proposed for various types of quantitative mathematical reasoning on simple whole number computation and fraction comparison items. Definitions were based on the collection and analysis of over 5,000 responses to a minimum of 10 items completed by 523 intermediate-aged students. Definitions were used to create a five-category evaluative framework that was empirically validated through cluster analyses, hierarchical linear modeling, and a one-way ANOVA. The five categories proposed include: (1) Absence of reasoning, (2) Faulty reasoning, (3) Partial reasoning, (4) Algorithmic reasoning, and (5) Conceptual reasoning. Examples are provided as well as implications as to how this framework might be used as a formative assessment tool by teachers to inform instruction.</p>	



Time: 9:00-9:50 **Room: Texas C**

Mathematics Identity Development: Is there a place for Drake in math class?

Marti Cason	University of North Texas
Nickolaus Ortiz	Texas A&M
Jamaal Young	University of North Texas
Marquita Foster	University of North Texas

The intersections of hip-hop identity and mathematics identity can potentially carve out an academic space for creativity, social justice, and strength based instructional practices to support youth who feel mathematically disenfranchised due to the traditions of mathematics pedagogy. Hip-hop pedagogy is more than a motivational tool. The objective of this session is to present hip-hop pedagogy as an instructional framework to leverage unique funds of knowledge associated with hip-hop cultural identity to support the mathematics identity development of mathematically disinterested youth. Goals for this presentation include: 1) identify teacher concerns and misconceptions associated with hip-hop pedagogy and discuss solutions and alternative ways of thinking and 2) determine how to capitalize on hip-hop culture as a resource for teachers to better serve the diverse groups of learners in today's mathematics classrooms. The dexterity that students may potentially demonstrate within hip-hop contexts may be capitalized in the mathematics classroom and in turn creates pockets of expertise where these students can operate. This necessarily allows students to engage with content they have in other cases opposed and provides an advantage in reciprocating new mathematical knowledge.

Time: 9:00-9:50 **Room: Texas D**

Embracing Graphing Calculators in Algebra 2 to Facilitate CCSS Mastery

Elayne Bowman	Oklahoma Christian University
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Insufficient classroom time to provide mastery to Algebraic content and intense requirements to meet Common Core State Standards create frustration for many secondary mathematics educators. Additional test driven impetus to include graphing calculators in the teaching of Algebra II, as well as teacher evaluations based on student proficiency on Algebra II state mandated end of course exams provide many points for heated discussions among mathematics educators. A culmination of three studies at a large Midwestern United States secondary school combines the findings of graphing calculator use in Algebra II, Common Core State Standards for Algebra, and their combined impact on secondary Algebra teacher attrition rates poses solutions. The author believes that Algebraic projects embracing graphing calculators can ease the tensions in educators and enrich the mathematical learning in students.

Time: 10:00-10:50 **Room: Citizens A**

Elementary Preservice Teachers and Questioning Strategies in Mathematics

Sandra Browning	University of Houston - Clear Lake
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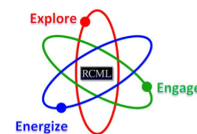
Research has demonstrated an interest in the relationship between teachers' questioning strategies and children's ability to reason (Baroody & Ginsburg, 1990; Buschman, 2001; Carpenter, Fennema, Peterson, Chiang & Loef, 1989; Fennema, Carpenter, Franke, & Carey, 1993; Fennema, Franke, Carpenter & Carey, 1993, Sousa, 2000). Helping preservice teachers develop effective questioning strategies is an important component of a teacher education program. This session describes an exploration designed to determine if EC-6 preservice teachers can (a) recognize effective questioning strategies when observing inservice teachers and (b) analyze the effectiveness of their own questioning strategies after field experiences using Webb's Depth of Knowledge.

Time: 10:00-10:50 **Room: Citizens B**

Developmental Mathematics Course Redesign: Attitudes and Mindsets

Sarah Ives	California State University Sacramento
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Developmental mathematics is an area in higher education that requires greater study. Roughly 60% of students entering 4-yr. institutions are underprepared for college mathematics and are required to enroll in pre-college courses. Of those students, less than half graduate college within six years. This presentation reports on a developmental mathematics course redesign at a 4-year Developing Hispanic Serving Institution in the West. The goal of the course redesign was to explore students' attitudes towards mathematics and provide more active learning experiences (than in the previous design). Components of the redesign included a) the addition of a Supplemental Instruction lab (in one section), b) readings and discussions on learning and specifically learning mathematics, c) completion of two surveys: one on attitudes about mathematics and one on growth mindset, and d) several reflective assignments. Students' discussions, survey responses, and reflective assignments are being analyzed for possible patterns. Preliminary findings will be reported.



Friday Morning Sessions

Time: 10:00-10:50	Room: Citizens C
Undergraduates Representing and Connecting in Mathematical Problem Solving	
Kathryn Rhoads	The University of Texas at Arlington
James A. Mendoza Epperson	The University of Texas at Arlington
R. Cavender Campbell	University of Texas at Arlington
<p>Representing and connecting mathematical ideas are central processes in the practice of mathematics, particularly in mathematical problem solving (MPS). In MPS, students engage in representing/ connecting when they bridge the problem to another idea, related mathematical approaches, or representations. Yet, it is not clear to what extent entry-level undergraduate students use representing/ connecting in the process of MPS. In the Mathematical Problem Solving Item Development Project, we have developed a novel way of assessing students' MPS through Likert-style survey items which are designed to capture MPS in five key domains, including representing/ connecting. Data for our report comes from a large, urban university in the southwest United States where we surveyed 254 students enrolled in College Algebra and 405 students enrolled in Calculus I. We also conducted individual, task-based interviews with 19 College Algebra students and 7 Calculus students. We will discuss how students used representing/ connecting in interviews, how representing/ connecting was assessed through the Likert items, and how we have revised our items to improve how they capture representing/ connecting. The results contribute to a deeper understanding of representing/ connecting and its integration with MPS at the undergraduate level.</p>	
Time: 10:00-10:50	Room: Texas A
Examining Teachers Participation and Perspectives of Mathematics PD	
Christie Martin	University of South Carolina Columbia
Drew Polly	University of North Carolina Charlotte
<p>Professional development is intended to support teachers with content and practices that directly impact classroom teaching. Teachers participate in professional development and actively engage in adopting new practices that are expected to influence student learning and increase student achievement. This relationship may be contingent on teacher perspective and whether they find the professional development opportunities afforded to them beneficial. This study examined the teachers' perspectives on professional development in mathematics. There were 98 teachers from two southeastern states surveyed. The study centered on three questions 1) What do teachers report is the focus, their participation rate, and classroom impact related to professional development experiences in mathematics? 2) What was the most beneficial professional development in mathematics you received in the last three years? 3) What do you believe the impact of the professional development was on student learning? This study revealed certain focus areas in mathematics were more useful and beneficial than others; however, there were a large number of teachers noting that they were not receiving what they would consider beneficial professional development. The teachers did respond in large percentage that professional development positively impacted student learning.</p>	
Time: 10:00-10:50	Room: Texas B
A Summer Math Academy for Early Learners: Development of Early Number Sense	
Sandi Cooper	Baylor University
Keith Kerschen	Baylor University
Ryann Shelton	Baylor University
<p>In an effort to support early number development for children from low socio-economic situations, we offered a multi-week, highly engaging learning experience during Summer, 2016. This academy was organized to provide learning experiences that are highly engaging, positive and encouraging, and nurture conceptual understanding for early learners focused on the development of early number sense. Initiated as a pilot program in Summer 2016, we hosted a 4-week experience, 4-days a week (Monday- Thursday), for 3 hours each morning. During this time block, children participated in activities targeted to build their understanding of early number concepts. A Master certified teacher leader coordinated all of the instructional experiences with a group of four preservice teachers leading small group learning experiences. For the pilot program, we focused on one age group, which was Pre-Kindergarten children (ages 4-5) about to enter Kindergarten. As the program moves forward, these children will continue to participate each summer and a new group of Pre-K children will join the Academy. Research findings revealed that there were substantial gains in students' understanding and development in early number sense.</p>	

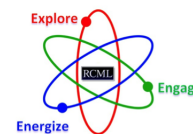


Time: 10:00-10:50	Room: Texas C
Growing beliefs through active learning: a case-study	
Devon Gunter	University of Oklahoma
<p>Active learning is a growing focal point for post-secondary mathematics classrooms. Much scholarship has examined the needs of the instructor in implementing active learning methods as well as student performance outcomes of such experiences. But what of those students who have already been successful in the traditional ‘chalk-and-talk’ classroom’ Preliminary results of a case-study examining the mathematical beliefs and attitudes of these students will be discussed.</p>	

Time: 10:00-10:50	Room: Texas D
Flipping College Algebra Classrooms	
Beth Cory	Sam Houston State University
<p>During this session, the results of a large-scale study comparing various aspects of sections of flipped College Algebra to sections of non-flipped will be explored. Background and relevant literature on the flipped classroom will be presented followed by a discussion of relevant findings, thoughts on how to effectively conduct a flipped classroom, and future endeavors.</p>	

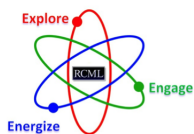
Time: 11:00-11:50	Room: Citizens B
Math is not a Race: A Student’s Journey From Basic Algebra to Doctoral Work	
Jen Monastra	University of South Carolina
Sean Yee	University of South Carolina
<p>Current STEM literature has limited narratives on students who moved slowly through early mathematics courses, enrolling in introductory college algebra coursework and yet, successfully switch into a career requiring advanced mathematics coursework. This case-study focuses on a counter-narrative of Andrew’s journey from high-school dropout to mathematics graduate student. Andrew completed all required doctoral qualifying exams and loves teaching undergraduate students. Narrative inquiry was implemented with a semi-structured interview to determine what life experiences, and in what ways those experiences influenced his pedagogical decisions. Analyzing the interview data through four narrative cycles of coding resulted in identifying three specific life experience structures that influenced Andrew’s teaching decisions. Specifically, Andrew’s decisions related to his presentation of mathematical content. This study is only a case study, yet it offers a valuable counter-narrative to the traditional mathematics educator who chose to be a teacher due to prior mathematical accomplishments. By broadening teacher’s perspectives with Andrew’s story, STEM educators may be more supportive of marginalized students. Andrew’s failures and successes in mathematics may be useful to teacher educators and those designing professional development because it reminds teachers that learning mathematics is not a race, but a choice.</p>	

Time: 11:00-11:50	Room: Citizens C
Emerging Themes for Student Mathematical Problem Solving in College Algebra	
R. Cavender Campbell	University of Texas at Arlington
<p>Studying STEM intended College Algebra students provides a meaningful window to examine mathematical problem solving. Already, research exists examining the problem solving practices of various groups. For example, Carlson and Bloom studied the problem solving patterns of expert mathematicians. However, research lacks in characterizing mathematical problem solving demonstrated by entry-level mathematics students. From ongoing work on developing a mathematical problem solving novel items that use a Likert scale to measure student problem solving, we identified four domains of problem solving, sense-making, representing/connecting, reviewing, and justification. Using these domains, through a set of interviews with multiple students enrolled in College Algebra and a modified grounded theory approach I identified emerging themes within the students’ mathematical problem solving. These preliminary observations show that College Algebra students may prefer an algebraic approach even after using other approaches to solve a problem. In addition, students persist in problem solving when working word problems despite common confusion with algebraic notation. In contrast, students seem unwilling to use similar informal procedures when working with abstract problems. We discuss how these obstacles impact the problem solving process and ways it can inform the teaching of College Algebra.</p>	



Friday Morning Sessions

Time: 11:00-11:50	Room: Texas A
Using Tutors to Teach Story Driven Math Concepts to Students: The Findings	
Carolyn Pinchback	University of Central Arkansas
Elson Bihm	University of Central Arkansas
Tori Francis	
<p>The investigators were interested in comparing students' progress of learning geometric shapes with the use of student tutors in both the experimental group and the control group. The control group was exposed to the pre-test and post-test following the activities. The experimental group was exposed to the pre-test and to assess what knowledge they previously had about geometric shapes. The activities were then conducted following a post-test to assess if they made progress. An independent sample t-test was done. In measuring the differences of each person for the pre-test and post-test, we found that the control groups mean increased by 1 and the experiment groups mean increased by 4 with a $p = 0.47$.</p>	
Time: 11:00-11:50	Room: Texas B
Preservice Elementary Teachers' Recognition of Arithmetic Properties	
Gayle Millsaps	Eastern Washington University
<p>Preservice elementary teachers (PTEs) have difficulty recognizing the properties of arithmetic in situ. This study examines the data collected during and at the end of a content course for preservice elementary teachers in which identifying the arithmetic properties is a course objective. The first activity of the course asked students to sort into categories a set of individual number statements that were designed to represent the use of each of three arithmetic properties: distributive, commutative and associative. A fourth category was included that represented the use of a definition of an operation. Individual students sorted the sentences first and then they worked as partners to revise their categories. The categories that the PTEs created were then discussed by the whole class to create a class consensus. Data was collected on the types of categories that the PTEs pairs created and what features of the number sentences were used to create their categories. Subsequent related class activities that used the properties were the same as in prior iterations of the course. Students' success with identifying the arithmetic properties from the course in which sorting and discussion occurred was compared with other iterations of the course to look for effects if any from the activity of sorting and discussion.</p>	
Time: 11:00-11:50	Room: Texas C
Theoretical and Operational aspects of Content validity and the MMAI	
Kenneth Butler	University of South Florida
<p>This study details an initial validation argument for the four-factor Motivation for Mathematics Abbreviated Instrument (MMAI) with a focus on content validity. Commentary and the selection of items measuring intrinsic motivation, mastery orientations, performance orientations, and expectancy demonstrated content validity based on the judgment of subject matter experts. This provided evidence of items content validity as a theoretical construct. Next, cognitive interviews of participants revealed evidence of content validity for the participating population utilizing an operational framework. This suggests that content validity may be a binary construct, and by referring to the validity argument for the MMAI, methods and sources of validity evidence are suggested.</p>	
Time: 11:00-11:50	Room: Texas D
Quantitative Literacy and Teacher Education: Improved Mathematical Training	
Rachel Bates	Redlands Community College
<p>Quantitative literacy (QL) is a major goal of the National Council of Teachers of Mathematics (NCTM) for teachers of mathematics (NCTM, 2000). Although QL should be an aim of education across all subjects in PK-12, a large part of the responsibility falls to PK-12 educators (Madison, 2008). QL has continued to receive attention because of the growing demands on U.S. residents to understand, utilize, and react to quantitative information in their daily lives. An important component of a stronger quantitative education experience for PK-12 students requires QL educational experiences within teacher education programs. The purpose of this session is to share the results of a study examining pre-service teacher's experiences completing a Quantitative Literacy course. Participants in this study were pre-service teachers pursuing a Bachelor's Degree in Education. The education major requires students to complete four undergraduate level mathematics courses. The participants were enrolled in the Quantitative Reasoning course taught by the speaker. Results of surveys, self-reflections and interviews regarding their experiences within the course will be shared.</p>	

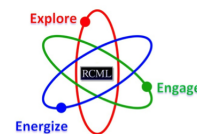


Time: 1:30-2:20	Room: Citizens A
Initiating Student Mathematics Education Research via Projects	
Winifred Mallam	Texas Woman's University
Ann Wheeler	Texas Woman's University
<p>As mathematics education faculty, we can encourage our students to initiate and conduct research as they pursue their degrees. Likewise we assign projects in our courses to facilitate or reflect on research in the field of mathematics education. We will share research-based projects that we assign in mathematics education courses for pre-service teachers. We will discuss how the projects differ according to the level of the students.</p>	

Time: 1:30-2:20	Room: Citizens C
Assessment For Learning: Teachers' Questioning and Listening Strategies	
Sarah Pratt	University of North Texas
Colleen Eddy	University of North Texas
Eloise Kuehnert	University of North Texas
<p>Currently, there is sparse research to describe, specifically, teachers' use of formative assessment in middle grades mathematics classrooms. Using a formative assessment observation protocol, we provide quantitative and qualitative data on how teachers implement and understand formative assessment. The teachers who are observed are part of a year-long professional development that is centered around algebra and inquiry-based instruction. Preliminary findings from observations conducted at key intervals throughout the professional development will be provided, along with the teacher participants' reflections on their use of formative assessment strategies in their instruction.</p>	

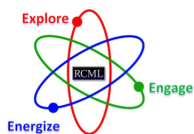
Time: 1:30-2:20	Room: Texas A
Preservice Teachers' Knowledge of Fraction Multiplication and Division	
Shawn Broderick	Weber State University
<p>In this presentation, I will explore the learning and the difficulties prospective elementary teachers (PSTs) have while deepening their knowledge of fraction multiplication and division. Historically, this topic in elementary mathematics education has been a troubled one and still persists today. Misconceptions about fraction multiplication include, but are not limited to (a) the idea that multiplication always makes things bigger, (b) misapplying a procedure like multiplying the reciprocal, and (c) complicating the solution like finding a common denominator. Dividing fractions, whether procedurally or conceptually, has also been a challenge for PSTs. Much of the challenge is likely due to the way in which typical textbooks introduce division of fractions. They simply state that dividing by a fraction is the same as multiplying by its reciprocal. There is little or no attention given to the meaning of fraction division and no connections are made between division with fractions and division with whole numbers. Each topic is treated separately. I will share the results of a study aimed to fortify PSTs' knowledge and confidence of multiplying and dividing fractions, specifically targeting common misconceptions.</p>	

Time: 1:30-2:20	Room: Texas B
Becoming Involved with Investigations in Mathematics Learning	
Drew Polly	University of North Carolina Charlotte
Gabriel Matney	Bowling Green State University
Jonathan Bostic	Bowling Green State University
<p>Participants will engage in discussions and dialogue about the RCML research journal. Information about opportunities to publish and review will be shared.</p>	



Friday Afternoon Sessions

Time: 1:30-2:20	Room: Texas C
Toulmins Model to Support Middle School Mathematic Arguments Via Technology	
Robert Wagner	University of Florida
<p>How are arguments formulated using technology and specific curriculum in middle grades mathematics? This research supports Mathematical Practice Three, 'Construct Viable Arguments and Critique the Reasoning of Others' by examining how technology provides pathways for mathematical argumentation while using SunBay technology. The SunBay curriculum was implemented in twenty-six middle school classrooms in two school districts in South Florida. According to Krummheuer (2007), 'reform of mathematics teaching seems to be a rather long-term process that is substantially based on the cooperation of the participants of the mathematics class.' (Krummheuer, 2007, p.20) Further, he explains that argumentation is a necessary component of mathematical discourse in the classroom. This research uses Toulmins model for argumentation to analyze discourse between students and SunBay curriculum using technology. The Sunbay Curriculum uses a teaching strategy of predict, check, and explain to encourage students to argue their reasoning. The predict stage begins with students thinking about a problem, then using the software to verify their thinking, and finally constructing arguments to defend their prediction. Students defend the reasons why they agree or disagree with their original prediction and how technology supported their thinking. By using Toulmins Model of Argument, this research analyzes specific intervals of how technology provides pathways for mathematical discourse in grades 6-8.</p>	
Time: 1:30-2:20	Room: Texas D
Pedagogical and Curricular Change Through Making for Mathematical Learning	
Steven Greenstein	Montclair State University
<p>In this proposal I describe a course that engages mathematics teachers in making and design practices that I hypothesized would inform their pedagogical and curricular thinking. With a focus on the design of new tools to support mathematics teaching and learning through the use of 3D digital design and production technologies, this course had teachers exploring at the intersection of content, pedagogy, and making. Specifically, they inquired about theories of how people learn in interaction with physical tools and how these tools shape and guide mathematical thinking and learning. At the conference presentation of this project, several of their final projects will be presented along with pedagogical and curricular inferences I made about them that suggest the promise of a making-oriented approach to teacher preparation and professional development.</p>	
Time: 2:30-3:20	Room: Citizens A
Preservice teachers exploring prime factorization	
Ricela Feliciano-Semidei	University of Montana
<p>Research on understanding of prime factorization suggests that preservice teachers prefer computational methods to find factors instead of reliance on unique prime factorization. This session presents a teaching intervention implemented with students (n=17) in a mathematics course for K-8 teachers in a public university in the northwestern US. We used an intervention that consisted in four worksheets that students discussed in small groups addressing the recognition of existence and uniqueness of the prime factorization. Preliminary results from pre- and post- tests show that students combine different methodologies to find the factors of a number, but they grew in their use of the Fundamental Theorem of Arithmetic.</p>	

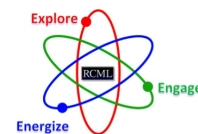


Time: 2:30-3:20	Room: Citizens B
The Hidden Curriculum in Higher Education Mathematics Modeling Textbooks	
Marnie Phipps	University of North Georgia
Patty Wagner	University of North Georgia
<p>This session explores the hidden curriculum embedded in textbooks selected for tertiary Mathematics Modeling courses. In traditional settings, the relevant mathematics is ‘taught’ by an authoritative other so that the tools can be applied to the problem at hand. Newer understandings about how students learn has led to a focus on using real world contexts as a vehicle for making sense of the mathematics. This approach allows the student to appreciate the usefulness of mathematics and optimizes mathematical learning. The students enrolled in college-level mathematics modeling courses are typically non-STEM majors fulfilling the minimal number of mathematics courses for degree completion in higher education. Many of these students experienced difficulty learning mathematics in the K-12 grade school settings and their affinity for the subject is severely diminished. The college-level mathematics modeling course is often the last opportunity to affect change in how these students view the subject and their own capabilities. Do the textbooks engage and energize these students? We investigated a randomly generated sample of required textbooks adopted for Mathematics Models from higher education institutions, with the assumption that a stratified sampling from various Carnegie classifications would provide an outlook of national trends. Our findings will be used to generate a productive discussion during this session.</p>	

Time: 2:30-3:20	Room: Citizens C
Development and Validation of a Diagnostic Assessment for Kindergarten Math	
Julie Herron	Sam Houston State University
<p>This presentation examines the development and validation of a Kindergarten mathematics diagnostic assessment. The assessment was developed and field tested for use with entering kindergarteners, but could be repeated through out the school year. The assessment was field test with 100 children at two public elementary schools. Students with identified special education need were included in the sample. Methodology for validation and results will be discussed in the presentation. Participants will have the opportunity to interact and explore the different tasks of the diagnostic assessment.</p>	

Time: 2:30-3:20	Room: Texas A
Fractions: Remediation 101 for Misconceptions	
Estella De Los Santos	University of Houston-Victoria
Barba Patton	University of Houston-Victoria
<p>Children and adults have misconceptions when working with fractions. The works of Ashlock, (2009), Reys, et.al. (2009), and Patton & De Los Santos (2014) document these misconceptions. It is important to try to remediate the fraction misconceptions of prospective teachers. The prospective teachers will be in the classroom as the teacher of record in a few short months. This early learning is indelible in many young minds and is extremely difficult to correct if the incorrect fact or algorithm is learned. It is so difficult that many times it is impossible to change. Misconceptions being addressed were identified through observations, research and experience in teaching mathematics classes for future elementary and middle school teachers. The remediation are based on best practices, methods, and strategies provided by experts in the field of mathematics education (Angel, et.al., 2013; Billstein, et. al., 2013; Reys, et.al., 2009; Van De Walle, et. al., 2012). The remediation for the misconceptions has been developed from both the informal and formal perspectives. The authors have gained from years of experience teaching the ‘old cookbook’ type ways but they have used the research of Angel, Billstein,et.al., Reys, Van De Walle and others to expand and valid many of the methods. In the presentation, the authors will address eight or more common misconception as time permits.</p>	

Time: 2:30-3:20	Room: Texas B
Pre-service Teachers’ Mathematical Discourse Interviews of Kindergarteners	
Lynn Columba	Lehigh University
<p>Mathematical discourse or purposeful and intentional math-talk is critical to mathematical development. The purpose of this session is to share preliminary data analysis on how novice teachers guided their students to explain processes, make suggestions, and justify their answers in an interview context. 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>	



Friday Afternoon Sessions

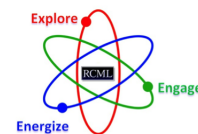
Time: 2:30-3:20	Room: Texas C
An Investigation of Students' Perceptions of Doing Mathematics	
Corrinne Sullivan	Bowling Green State University
Gabriel Matney	Bowling Green State University
<p>In this presentation we aim to generate understanding related to using drawing protocols with students to research their perceptions about doing mathematics. In particular, we collected drawing data from students of different nations to investigate across-culture similarities and differences of perceptions in doing mathematics. We build our investigation on prior research with demonstrates that drawings can be useful to gather information into students' point of view of the world (Borthwick, 2011). As upper elementary, middle, and high school students are still developing their vocabularies and means of expression, using drawings to empathize and gage their perception of a situation can be very effective (Aguilar, Rosas, Zavaleta, Romo-V'zquez, 2016, Finson, Beaver, & Cramond, 1995, Weber & Mitchell, 1996). Additionally, several studies have been done internationally with students as participants. Some examples include Mexico (Aguilar et al., 2014), England (Borthwick, 2011), Belgium (Briell et al., 2010), Canada and Australia (Chamber, 1983), as well as Finland and Russia (R'ty, Komulainen, Skorokhodova, Kolesnikov, & H'm'l'inen, 2011). We will share our analysis and results which found statistically significant differences among the students' perceptions of doing mathematics across nations and across some grade levels. We will also share student samples and open up for discussion the nature of drawings based research, its benefits and its limitations.</p>	
Time: 2:30-3:20	Room: Texas D
Common Algebra Errors that Plague Student Success in University Mathematics	
Stacy Reeder	University of Oklahoma
Kate Raymond	University of Oklahoma
<p>Our research on the algebra errors identified in the work of university students in their entry-level mathematics courses will be shared. The findings of the study include the categories of common errors and examples of the most common errors. The types of errors varied and but were persistent and plagued students' abilities to learn new mathematics concepts throughout the semester. Participants will be engaged in a discussion about the process used for coding and identifying the common errors and about possible interventions that could help prevent these errors.</p>	
Time: 3:30-4:20	Room: Citizens A
Professional Development Modules designed for Teacher Learning and Practice	
Seanyelle Yagi	University of Hawaii, Manoa
Fay Zenigami	University of Hawai'i at Manoa
Linda Venenciano	University of Hawai'i at M?noa
<p>In this session we share initial findings about the impact of an online professional development (PD) module that guides teachers through experiences to develop their mathematics knowledge for teaching (MKT). The module is designed to enhance a teacher?s conceptual understanding of the number line through foundational measurement experiences with continuous quantities and is intended to be used as a self-paced PD. Educational features of the module are: (1) interactive, engages teachers in an inquiry approach to learning; (2) encourages teachers to do mathematics; (3) provides opportunities for reflection; and (4) presents mathematics via problem solving. Design features of the module include (1) interactive simulations; (2) question prompts and feedback; (3) hyperlinks to highlight content and instructional considerations; and (4) a reader friendly text to guide the experience. This preliminary study shows that teachers interpret the module as a tool for their own learning or as a set of activities for their students. Our findings have implications for further developing the module as one of a set of online or digital PD modules with both innovative mathematical content and design features to improve the work of teaching.</p>	



Time: 3:30-4:20	Room: Citizens B
Training Graduate Student Instructors as Peer Mentors	
Sean Yee	University of South Carolina
<p>To develop graduate student instructors' (GSIs) skills and abilities as collegiate mathematics instructors, researchers at two universities implemented a peer-mentorship model where experienced GSIs completed a 15-week professional development (PD) to learn how to mentor novice GSIs in teaching undergraduate mathematics. Using pre-survey, post-survey, and semi-structured reflective interviews, we studied changes in 11 mentor GSIs' perspectives on teaching and learning practices and what aspects of the mentor PD were deemed valuable by the mentors. Results suggest that this mentor PD helped GSIs deconstruct the dichotic mathematical paradigm of statements being true or false when discussing teaching and learning. Moreover, mentor GSIs valued how the mentor PD helped guide them to facilitate novice GSI post-observation discussions. The mentor GSIs' value of facilitating discourse in prot'g' post-observations is an ideal way to begin in developing peer-mentoring programs for GSIs because this discourse stems from the foundation of a community of practice amongst GSIs within mathematics departments. This study grows the field's knowledge of GSI guidance and support by exploring how this mentor PD engaged experienced GSIs' understanding of mentorship, teaching, and learning.</p>	

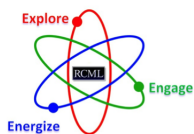
Time: 3:30-4:20	Room: Citizens C
Assessing mathematics in a technology-rich learning environment	
Patrick Wachira	Cleveland State University
Xiongyi Liu	
<p>Calls for using technology in mathematics education have been accompanied by many research projects. However there is little research or discussion on the change needed in the methods used to assess learning in such environments. Assessment methods in mathematics continue to be traditional paper and pencil, typically short answer or multiple choice, which provide limited information about a student's mathematical reasoning and conceptual understanding. The purpose of this study was to explore how mathematics assessment can change when learning in a technology-rich environment. This article describes strategies for designing or modifying assessments items to take advantage of technology thus eliciting more information about students' understanding.</p>	

Time: 3:30-4:20	Room: Texas A
Fractions: 5000 years later and still difficult for many	
Barba Patton	University of Houston-Victoria
Estella De Los Santos	University of Houston-Victoria
<p>Fractions or fractional parts have been around as long as humans have tried to maintain an existence. While not using formal (standard) measuring instruments, these early people knew many facts about measuring. Whether he was building shelters or hunting instruments, measurements were important. It has been documented that the use of fractions has been used for 5000 years; yet working with and using fractions is still difficult for many. Prospective teachers of elementary grades seem to share an anxiety about teaching math and many are just not qualified to do so. With this in mind, the authors designed this study to try to help prepare them for the educational society. Prospective teachers were given a questionnaire with relatively simple fraction questions Overall the results were frightening as these prospective teachers will be in the classrooms teaching future generation.</p>	



Friday Afternoon Sessions

Time: 3:30-4:20	Room: Texas B
Ramping Up to Algebra: Supporting Teacher Content Knowledge in Grades 3-5	
Angela Knotts	WestEd
<p>For decades, Algebra has been one of the major gatekeepers for access to economic success and higher education. However, despite increased knowledge and skill requirements, the majority of students in the U.S. fail to reach proficiency. Research suggests that one of the primary reasons is that many arrive without the rich, flexible understanding of number, operation, and algebraic thinking that serves as the foundation for success in formal Algebra. Though grade 3-5 teachers bear an enormous responsibility for equipping students with the knowledge and algebraic thinking skills necessary for success in Algebra, a number of studies have consistently identified gaps in their mathematical knowledge. Research also shows that elementary school teachers are significantly less likely than their secondary counterparts to feel confident in their ability to do and teach mathematics effectively. To address these challenges, WestEd proposes a year-long PD program designed to improve teachers' abilities to deliver high quality math instruction by focusing on two specific elements of professional practice: 1) mathematical knowledge for teaching (MKT), and 2) teachers' self-efficacy as both doers and teachers of rich mathematics. We anticipate that supporting teachers in increasing their MKT will improve teachers' confidence in their math teaching abilities directly, as well as by increasing teachers' confidence in their ability to do mathematics at a deep conceptual level.</p>	
Time: 3:30-4:20	Room: Texas C
Model-Eliciting Activities and Changing Mathematics-Related Beliefs	
Cathrine Maiorca	California State University, Long Beach
<p>As mathematics education focuses more on students' abilities to solve complex real life problems their mathematics-related beliefs will become increasingly more important to understand. The mathematics-related beliefs that students hold are important to study because they may influence not only the students' ability to problem solve but also their willingness to try to solve more complex real life problems. 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 where they completed well structured modeling activities.</p>	
Time: 3:30-4:20	Room: Texas D
Math Starters: High Yield Algebra Tasks that Stand the Test of Time	
Juliana Utley	Oklahoma State University
Stacy Reeder	University of Oklahoma
Megan Che	Clemson University
<p>Math starters are class opener tasks that provide students with an opportunity to develop mathematical understanding of a variety of concepts and ideas over time. Rich and worthwhile tasks that require only a few minutes and can be used as class openers will be presented. Participants will explore 1) key activities that when used as a part of the class routine will facilitate students' developing their understanding of foundational algebraic concepts (i.e., expressions, equations, and functions), and 2) discuss how these activities can help to infuse mathematical practices into the class routine.</p>	



Time: 8:00-8:50 **Room: Citizens A**
Instructional Representations as a Gateway to Providing Targeted Professional Development

Michael Muzheve Texas A&M University - Kingsville

This qualitative study reports on professional development efforts based on a premise that such efforts should be need-based and prolonged. Pedagogical and content needs of ten 7th and 8th grade mathematics teachers were assessed using a combination of questionnaires, interviews, and classroom observations with focus on the representations that the teachers used in the classroom to explain and explore mathematics concepts. The combined usage of questionnaires, interviews, and classroom observations helped separate perceived and actual pedagogical needs of the teachers. Once the pedagogical needs of the teachers were identified, professional development approaches used include presentations, consultations, coaching, lesson study, and mentoring. The advantages of such approaches include targeted professional development in which the needs of each individual teacher were identified and addressed. Positive outcomes include increased confidence and comfort and taking the initiative on the part of the teachers in using graphing calculators and computers to engage students in classroom activities.

Time: 8:00-8:50 **Room: Citizens B**
Draw Yourself Doing Math: Trends in Student Drawings

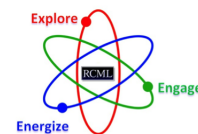
Rachel Bachman Weber State University
 Shawn Broderick Weber State University

Students from K-12 classrooms were asked to 'Draw Yourself Doing Math.' These drawings were analyzed for trends in attitudes about the nature and learning of mathematics. These drawings were also examined to determine the degree to which trends found in drawings from students in university mathematics classes were also evident in these elementary and secondary classrooms. Such trends included (a) mathematics as an unpleasant endeavor, (b) mathematics being pursued individually, (c) mathematics being studied at desk, (d) the pervasive role of symbols, and (e) the evidence of unproductive struggle. The drawings were analyzed through the use of rubrics that described attitude, location, and activity shown in the drawing.

Time: 8:00-8:50 **Room: Citizens C**
Promise of a Sociocultural Perspective of Emotion in Mathematics Education

Carlos Nicolas Gomez Clemson University

Previous research on emotions in mathematics education has placed emotions as being a part of the cognitive processes of the individual with much of the research centered on students doing mathematics (Goldin, 2014). This cognitive perspective on emotions limits emotions to being only of the individual and not influencing the interactions he or she has with others while learning and doing mathematics. I argue a sociocultural perspective on emotions needs to be considered in mathematics education. Using the work of Denzin (1984), Hochschild, (1979; 1983) and Hargreaves (2001), emotions can be considered as part of the interactions between self and an event, object, or person. The emotions felt are not the focus of the researcher but instead the processes of the emotions during the interaction. This perspective provides a space for researchers to examine emotions beyond students doing mathematics. The sociocultural perspective on emotion creates a space where the emotions of prospective and inservice mathematics teachers, as well as classroom environments, can be investigated. In this presentation, I discuss the important constructs of the sociocultural perspective on emotions (feeling rules, emotional labor, etc.) and describe the perspectives potential in mathematics education research. For example, the sociocultural perspective on emotion can provide new insight into the developing identity of prospective mathematics teachers as they progress in their program.



Saturday Morning Sessions

Time: 8:00-8:50	Room: Texas A
Counting square units is not enough: Exploring area dynamically	
Nicole Panorkou	Montclair State University
Madhavi Vishnubhotla	Montclair State University
<p>We introduce a dynamic approach to measurement aiming to address students' difficulty of moving from counting square units to the multiplicative reasoning that underlies the area formula. Dynamic Measurement (DYME) involves engaging students in dynamic experiences of measuring 2D surfaces by iteratively composing two linear measures. For instance, visualizing a meaning of area as a dynamic 'sweep' of a line segment (roller) of length a over a distance of b to produce a rectangle of area ab. This approach engages students in visualizing area as a dynamic continuous structure which is dependent on both length (e.g. of the roller) and width (e.g. the distance of rolling) as attributes that define it. We present the conduct and analysis of two iterations of teaching experiments with 3rd-grade students as part of a design study aiming to explore: a) What type of tasks and tools may be used for developing students' DYME reasoning' b) What forms of DYME reasoning are made visible and can be seen to develop as a result of students' systemic engagement in these tasks' c) How and to what extent may DYME thinking support students' development of area as a continuous structure? We discuss the tasks used for developing students' DYME reasoning as well as the forms of reasoning students' developed as a result of their engagement with these tasks. Ongoing and retrospective analyses of the data gave insight into the potential of DYME for developing the abstract notion of the area formula.</p>	
Time: 8:00-8:50	Room: Texas B
Integrating Children's Literature: Fostering Understandings and Connections	
Dittika Gupta	Midwestern State University
Amy Corp	Texas A&M University-Commerce
<p>Interdisciplinary teaching is growing but despite numerous children's books available, pre-service teachers (PSTs) still are unaware of various strategies of integrating children's literature in mathematics. The knowledge about integrating children's literature needs to be built in teacher education programs to help them develop conceptual models of integration for future teaching decisions (Cotti & Schiro, 2004; Ruiz, Thornton & Cuero, 2010; Ward, 2005). This research is a step towards providing experiences to PSTs for fostering their understanding on integrating children's literature in an elementary math classroom. The study examines attitudes and perceptions of PSTs and provides the mathematics community with a model of integration that can have significant impact in teacher preparation programs. The intervention aims to provide a model that can overcome cultural and language borders in PSTs' classrooms along with recognizing obstacles in their own thinking about using children's literature. Using multiple case study analysis along with open and axial coding, the results of the study revealed a lack of awareness and understanding of integrating children's literature as well as hesitancy and fear related to the pedagogy of integration. Results also showed that the exposure to the integration model not only led to an increase in awareness, preparedness, and understanding but also translated to interdisciplinary integration in other disciplines.</p>	
Time: 8:00-8:50	Room: Texas C
Digital Stories and their Roles in Mathematics Content Courses	
Sylvia Taube	Sam Houston State University
<p>Selected digital stories of teacher candidates in content methods semester will be analyzed and shared in order to generate discussions about the future and role of digital stories in teacher preparation programs, especially for future mathematics teachers. Access to multi-media and "high" technology should improve teacher educators' methods of assessment and at the same time meet the standards for integrating instructional technology. Our digital natives love using technology and we must nurture this passion through creative and dynamic assessments!</p>	

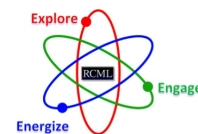


Time: 8:00-8:50	Room: Texas D
The Teaching and Learning of the Teaching and Learning of Calculus	
Ryan Fox	Belmont University
Tucker Dowell	Belmont University
<p>Mathematics teacher educators have several opportunities to explore others' teaching of mathematics when serving as instructors and as researchers. How often do we explore, and improve, our own teaching of mathematics? In this presentation, a mathematics teacher educator teaches a university mathematics course while a undergraduate mathematics major observes the instruction. Using post-lesson debriefings of and research readings on the teaching and learning of calculus concepts, we investigate how a math teacher educator reflects on his own practice of teaching while a mathematics major explores the teaching of a mathematics course outside the perspective of being a student. Join us as we share our experiences as math teacher educator and undergraduate mathematics major while encouraging discussion on how other mathematics teacher educators reflect on their own practice of teaching mathematics to support future mathematics teachers of various levels.</p>	

Time: 9:00-9:50	Room: Citizens A
Supporting Preservice Teachers Use of Mathematical Reasoning as a Literacy	
Leanna Lucero	New Mexico State University
Mary Fahrenbruck	New Mexico State University
<p>Join us as we share findings from an action research study where we examined the tensions elementary preservice teachers experienced when they worked to integrate math as a comprehension strategy into a reading lesson. The learning experience challenged teachers to use math in utilitarian ways to help readers answer a guiding question, "How can Math help us better understand this story?". That is, teachers were challenged to help children use math concepts to understand a story rather than use a story to help children learn math concepts. We believe this shift in focus serves an important purpose in that it helps us understand the connections between math being learned in the classroom and other content areas as well as to real world contexts.</p>	

Time: 9:00-9:50	Room: Citizens B
Student Perspectives: Photovoice Methodology in Mathematics Classrooms	
Megan Che	Clemson University
McKenzie Brittain	Clemson University
<p>The focus of this presentation is the photovoice methodology, which allowed the research team to generate understandings of student perspectives of being in single-sex educational environments. Participating students capture, spontaneously, images that hold significance and meaning for them relative to the question of what it is like for them to be in single-sex classrooms, and send these images with brief captions to the research team. Affordances and limitations of the photovoice methodology will be explored during our presentation, as well as some initial/emergent findings from the study that illuminate how asking students to capture images can powerfully convey meaning.</p>	

Time: 9:00-9:50	Room: Citizens C
Developing Ambitious Mathematics Instruction Through Number Talks	
Dawn Woods	Southern Methodist University
<p>In this study I examined how number talks' conversations around purposefully designed computation problems—are a mechanism that provides in-service elementary math teachers with the opportunity to learn high-leverage mathematics practices that may support students in talking about mathematical ideas. Specifically, I examined how the pedagogies of enactment and investigation (e.g., learn about number talks, rehearse number talks, enact number talks with students and reflect on the enactment) afforded teachers with opportunities to take-up the high-leverage practices that are associated with ambitious mathematics instruction. By utilizing the grounded theory approach to analysis, I searched for patterns, insights, or concepts that seemed promising about how the pedagogies of enactment and investigation generated teacher, as well as student, learning. Although, this analysis is only in the preliminary stage, early findings suggest that the pedagogies of enactment and investigation support in-service teachers during the in-the-moment work of responding to students' talk about mathematical ideas.</p>	



Saturday Morning Sessions

Time: 9:00-9:50	Room: Crystal D
Barriers to Math Teachers' Constructivist Teaching Implementation	
Danya Corkin	Rice University
Adem Ekmekci	Rice University
Stephanie Coleman	University of Houston - Downtown
<p>Guided by the 'constructivist in practice' dilemmas framework developed by Windschitl (2002), we investigated the conceptual, pedagogical, cultural, and political barriers that K-12 mathematics teachers working in a high-poverty urban district in Texas encounter when trying to implement constructivist practices taught through a professional development program offered by a private university. In addition, we identified strategies that teachers utilize to overcome these obstacles to sustain constructivist practices. Participants were 24 mathematics teachers teaching in high-poverty schools. Authors interviewed each teacher for approximately an hour using a structured interview protocol they developed. The interviews were audio-recorded and transcribed. Authors analyzed the interview data using NVivo software based on qualitative research analysis methods (Patton, 2015). Based on these interviews, consistent themes concerning political barriers, for example, have emerged that include resistance from administrators and teacher peers who are skeptical of the effectiveness of constructivist practices and who do not see the value of facilitating constructivist activities (e.g., use of manipulatives), especially during 'testing season' when emphasis is placed on workbooks designed for standardized testing preparation. It is the hope that through this research we will help further the quality of mathematics instruction, and, in turn, students' mathematics achievement.</p>	
Time: 9:00-9:50	Room: Texas A
Analysis of Students' Geometric Thinking: Van Hiele Model	
Jessie Store	Alma College
Davie Store	Central Michigan University
<p>Geometric thinking of over 120 elementary students was assessed through their reasoning with different geometric shapes. These students were from several schools and research was conducted when they were participating at a STEM camp. Van Hiele model of geometric thought guided data analysis. Findings for geometric thought levels were grouped according to grades and compared to expectations in mathematics curriculum standards. Implications for practice in both K-12 and teacher education classrooms will be discussed.</p>	
Time: 9:00-9:50	Room: Texas B
Investigating K-5 student thinking with in-service teachers	
Kerri Richardson	University of North Carolina Greensboro
Tyrette Carter	North Carolina A&T State University
<p>In this year long on-going professional development, in-service teachers from two different elementary schools engaged in bi-monthly meetings with university mathematics teacher educators during their professional learning community (PLC) times. The PD involved reading about Cognitively Guided Instruction problem types, trying them with students, and bringing student work samples back to the PLCs. At times, the university faculty members demonstrated lessons for grade level groups so the participants could have more time to engage in student thinking. Results show an improvement in student test scores in grades 3, 4, and 5. The focus of the presentation will also include changes teachers made to their own instruction.</p>	



Time: 9:00-9:50 **Room: Texas C**

Implementing Learning Assistants in Secondary School Mathematics Classrooms

David Erickson	University of Montana
Joshua Herring	University of Montana

The purpose of this research is to determine the effects of implementing a Learning Assistant Model (LAM) in a high needs high school classroom. Participating teachers worked as learning assistants (LAs) at the University of Montana (UM) for one to three semesters in a university classroom and are now implementing a LAM program during their first through third year of teaching. The LAM has students identified as LAs and students identified as learners. The theoretical framework behind this model is that peers are better able to explain difficult concepts to each other and that both the LA and learner benefit from the group work. Through experiences at the UM, participating teachers learned what type of instructional practices best fit the needs of the LAM and what skills they needed to teach to LAs in their classroom. Additionally, the LAM encourages teachers to create an active learning environment where students are working on challenging problems that require a wide range of skill sets to complete. For the LAM to be successful, teachers explained that LAs needed training in order to help guide learners to a conceptual understanding rather than simply telling students how to do something. Through this act of guiding, preliminary findings show increased understanding in both learning assistants and learners. Additionally, implementing a LAM requires teachers find engaging activities for student motivation and growth.

Time: 9:00-9:50 **Room: Texas D**

Beyond Gap Gazing: Single-Group Summaries of Using Confidence Intervals

Jamaal Young	University of North Texas
Jemimah Young	University of North Texas

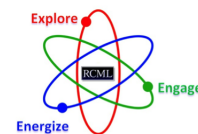
The present study proposes the use of single group summaries using confidence intervals as an alternative or extension to traditional achievement gap analysis in mathematics education. Research should be practical and interpretable. Thus, it is important that methods and discussions of results have educative import. Several scholars have engaged in a productive debate over the empirical and educative affordances of gap analysis. The ‘gap gazing’ debate suggests that more informed research practice to promote equity in mathematics education is necessary. However, explicit alternatives or extensions remain elusive. This presentation presents several arguments and an explicit example comparing the results of traditional gap analysis to the characterizations made possible by using confidence intervals. Data for this study were extracted from the Long-Term Trend (LTT) NAEP assessment. The results suggest that using CIs to create single groups summaries of achievement provide mathematics education researchers with opportunities to interpret a more complete picture of the needs of diverse mathematics learners. These pictures allow researchers to report unique strengths and challenges that are traditionally absent from many gap analyses. In conclusion, we do not advocate vacating all gap analyses, but rather hope to provide an additional analytical lens that can maximize opportunities to learn and achieve mathematics equity for all students.

Time: 10:00-10:50 **Room: Citizens A**

Making Meaning from Multiple Curriculum Materials in Algebra 2

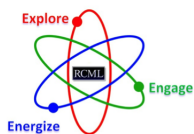
Kate Raymond	University of Oklahoma
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Researchers have long advocated a view of mathematics curriculum as evolving and responsive to the needs of students. In order to meet this call, teachers use a wide variety of curriculum materials as inspiration as they construct lessons designed to meet the needs of their particular students. How do teachers decide how much materials to adopt, which to adapt, and which do not serve their purposes? These questions are becoming increasingly important as research demonstrate that teachers are becoming less reliant on textbooks are using alternative sources of curriculum materials, such online lesson exchanges, as higher rates. Initial findings from a case study investigating the meaning making processes of Algebra 2 teachers will be shared. The finding include the sources of curriculum materials used by the teachers, as well as the factors that influence the ways in which teachers’ use curriculum materials. Participants will engage in a discussion about the processes used to study the particular ways in which meaning is made from curriculum materials.



Saturday Morning Sessions

Time: 10:00-10:50	Room: Citizens B
Balancing Teachers' Goals and Students' Play in a Video Game Environment	
Justin Seventko	Montclair State University
Nicole Panorkou	Montclair State University
Steven Greenstein	Montclair State University
<p>The use of video games as a tool for mathematics learning has increased substantially in recent years. However, difficulties abound in successfully implementing game-based learning in the classroom, particularly due to the inevitable conflicts that arise between students' play and teachers' instructional goals. Our goal is to produce a framework that teachers can use to implement gaming environments that sustain the joy and creativity of gaming, while emphasizing the purpose and utility of mathematics and harnessing the potential for students to act as agents of their own learning. This presentation describes the evolution of a task design framework for Minecraft, a sandbox-style video game, through the conduct and analysis of two cycles of design experiments. We detail our first attempts at trying to create mathematics tasks that created a space of agency for students, and then the corresponding changes we made for our second iteration. Using the data from the second iteration, we identify the essential features of the new set of tasks that generated a space for mathematical activity in which both teachers and students were afforded agency and had the capacity to exercise it.</p>	
Time: 10:00-10:50	Room: Citizens C
What Math Teachers Need to Know and Do for English Language Learners (ELLs)	
Alan Zollman	Indiana University Southeast
<p>A growing concern for mathematics teachers is the responsibility for having students who do not speak English proficiently in their content area classrooms. This paper gives a background of how mathematical literacy and ELL literacy can be used productively together as well as strategies for the teacher to help all students learn. Strategies for ELL literacy are good strategies for all students. We discuss specific strategies teachers can use that benefit all students in developing academic language and conceptual understanding in mathematics content using a hands-on experiment.</p>	
Time: 10:00-10:50	Room: Crystal D
Impacting Elementary In-service Mathematics Teachers Content Knowledge	
Gregory Chamblee	Georgia Southern University
Georgia Cobbs	University of Montana
<p>This session will describe how two United States Department of Education Mathematics and Science Projects impacted elementary mathematics teachers' content knowledge using differing delivery models. Each project taught content in these areas: number and operations, geometry, statistics and probability and algebra. Pre/post- test content test data findings along with delivery model design and implementation successes and pitfalls will be discussed. Implications for in-service and pre-service content and pedagogy courses and delivery models will be noted. Attendees will be asked to discuss how their professional development activities and courses are related to project findings and recommendations.</p>	
Time: 10:00-10:50	Room: Texas A
EGMA Spatial Reasoning and Relational Reasoning subtasks: Content evidence	
Lindsey Perry	Southern Methodist University
<p>This presentation focuses on the content-related evidence of validity collected to support the interpretations made using items developed for the Early Grade Mathematics Assessment (EGMA) Spatial Reasoning and Relational Reasoning subtasks. The EGMA is an international mathematics assessment for students in Grades 1-3 that has been administered in 22 countries. For the study, four mathematics education experts reviewed the items for the new Spatial Reasoning and Relational Reasoning subtasks for content representation, content relevance, and age appropriateness and provided feedback about the types of items used to assess these constructs. Their ratings and comments will be shared along with implications for assessing these constructs based on their feedback. While the results indicate that the Spatial Reasoning and Relational Reasoning items are, in general, age appropriate and representative and relevant to the construct, additional refinement and research should be conducted to improve the items.</p>	



Time: 10:00-10:50 **Room: Texas B**

Effecting Change on PSET Mathematics Teaching Efficacy

Elayne Bowman Oklahoma Christian University

The Mathematical Education of Teachers II found that those who teach elementary children often possess neither the knowledge nor the confidence in upper level mathematics (CBMS, 2012, p. 4). When knowledge and/or confidence wane in a teacher, it shows in his teaching. Children are perceptive of nuances that adults have learned to ignore. If a teacher does not know or like the mathematics he is teaching, he passes that dislike and deficit on to his students. Furthermore, studies show a positive relationship between both teacher achievement and attitude toward mathematics and student mathematical achievement (Schofield, 1981, p. 8); indicating that over the course of a career one inadequately prepared elementary teacher who lacks confidence in mathematics can influence the mathematical prowess of hundreds of students. Secondary mathematics teachers find it extremely difficult to reverse students' negative attitudes toward mathematics and to fill in the mathematical deficit they form in elementary classrooms. This study is part of the researcher's mixed methods case study dissertation project with a university mathematics instructor engaging PSETS with a constructivist approach to learning mathematics and with the students in the instructor's classes. The study attempts to answer questions about the pedagogical practices of the university instructor, how the PSETS respond to those practices, and uses the MTEBI to see if mathematics teaching efficacy of the PSETS is affected.

Time: 10:00-10:50 **Room: Texas C**

Secondary Mathematics Teachers Attitudes and Self-efficacy

James Telese University of Texas Rio Grande Valley

This study reports on an evaluation of a mathematics teacher professional development program offered at a distance, from a major institution. The program is a master's in mathematics program. The evaluation of the program includes surveying teacher attitudes toward mathematics, mathematics curriculum, and mathematics education. Self-efficacy is also measured. One finding is that although the teachers are enrolled in a master's in mathematics program, their view of mathematics leaned toward a growth and change view rather than a transmissive view of mathematics, or a formalist view.

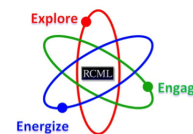
Time: 10:00-10:50 **Room: Texas D**

Engaging Students with Technology to Enhance Statistical Literacy

Hope Marchionda Western Kentucky University

Melanie Autin Western Kentucky University

Given the importance for everyone to be statistically literate in today's society, steps should be taken to use instructional methods that foster retention of the concepts that are important for living in today's data-rich world. 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 in their own learning is through the use of technology. In order to explore how the way in which the technology is implemented impacts students' conceptual understanding and retention of statistical topics, two sections of collegiate introductory statistics were compared. In both sections, online applets were used to introduce correlation, sampling distributions, the Central Limit Theorem, and confidence intervals. For each topic, one section was taught using traditional lecture, where the instructor demonstrated the use of these applets while the students watched. In the second section, students actively engaged with the applets via a guided activity in the computer lab. This study expands upon a previous study that focused solely on sampling distributions and the Central Limit Theorem. After sharing and discussing the activities with participants, results from this study will be explored and compared to the previous study. The session will conclude with a discussion regarding the implications the results have on the teaching and learning of statistical concepts.



Saturday Morning Sessions

Time: 11:00-11:50	Room: Citizens A
Teacher Candidates' Knowledge of Financial Literacy	
Gwendolyn Johnson	University of North Texas at Dallas
Ali Shaqlaih	University of North Texas at Dallas
Yolanda Graham	University of North Texas at Dallas
<p>Virtually all adults in the United States deal with finances to one degree or another. In the past, there has been an assumption that financial knowledge is taught in the home. However, many parents do not have an adequate understanding of finances to pass on to their children. Therefore, some states have added financial literacy to their K-12 mathematics standards. Introducing a new topic to mathematics standards presents a challenge to teachers. Teachers need to learn how to teach content that they have never before presented to students. In some cases, teachers are expected to teach content that they were never exposed to as students. The sudden inclusion of financial literacy standards is an example of this challenge. We will present research findings related to teacher candidates' knowledge of financial literacy and the effects of a two-week, researcher-created unit that has been used in a mathematics content course for teachers at our university.</p>	
Time: 11:00-11:50	Room: Citizens B
Mathematics in a Fiber-Arts Context: Exploring Mathematics Experiences	
Nichole Armand	Texas State University - San Marcos
<p>This study will explore the mathematizing experiences of participants when engaged in a contextualized mathematics-fiber-arts activity. Many educators and researchers are concerned about unsatisfactory academic performance and academically unmotivated children. However, research in the area of interest theory shows that, if adults and children are interested in the activities or topics they study, they are more attentive, more persistent, learn more, and enjoy their involvement than those who do not have such interest (Hidi & Harackiewicz, 2000). Brown and his colleagues (1989) posit 'that knowledge is situated, being in part a product of the activity, context, and culture in which it is developed and used' (p. 32). This learning theory is called situated cognition. This study proposes to nurture engagement and interest in mathematics with situated arts-integrated learning in a fiber-arts context, employing a convergent parallel design with three groups of participants: 1) mathematicians with varying degrees of fiber arts experience, 2) fiber arts crafters with varying degrees of mathematics experience, and 3) pre-service mathematics teachers with varying degrees of both mathematics and and fiber arts experience. During the study, participants will engage in activities or tasks, the purpose of which is to use fiber arts (in this case, knitting) to gain experience with mathematizing, learn about mathematics concepts, and create an artifact.</p>	
Time: 11:00-11:50	Room: Citizens C
Universal design for learning mathematics lesson planning to advance equity	
Paulo Tan	University of Tulsa
<p>Equitable education for students with disabilities has been a long-standing goal in education due in part to historical marginalization of these students in and out of schools. In mathematics education, students with disabilities typically participate in low-rigor curriculum emphasizing rote procedures and narrow skills. Indeed, mathematics teacher educators are central to transformative efforts toward equitable mathematics education. Yet, the knowledge base is thin at the intersection of mathematics teacher education and students with disabilities. To address this shortcoming, I employed principles of Cultural Historical Activity Theory and Universal Design for Learning to design two case studies that included pre- and in-service elementary teachers. The purpose of this proposed presentation is to discuss the analysis of these case studies using a disability studies lens with a particular focus on participants' discourse during mathematics lesson planning. Results indicated differences in the extent to which pre- and in-service teachers constructed students with disabilities as mathematics learners. These differences impacted mathematics lesson planning outcomes in terms of quality of learning experiences. I will conclude the presentation by discussing implications for practice and future research.</p>	



Time: 11:00-11:50 **Room: Texas A**

PSTs' Knowledge of Writing Word Problems for Fraction Number Sentences

Nesrin Sahin	University of Central Arkansas
James Fetterly	University of Central Arkansas
Sirin Budak	North American University

This study uses both quantitative and qualitative data to examine pre-service teachers' knowledge of writing word problems for given fraction number sentences. It is more challenging for teachers to write a word problem for a given fraction number sentence than to solve a given fraction number sentence (Ma, 1999). In the light of existing studies this study aims to achieve three goals. One goal is to re-examine the errors pre-service teachers make when they write word problems for given fraction number sentences. Another goal is to investigate pre-service teachers' misconceptions, which cause these errors. And the third goal is to investigate whether there is an improvement on pre-service teachers' knowledge of writing story problems. By examining the word problems written before and after instruction, we will be able to identify what type of errors are eliminated and what type of errors still need more investigation.

Time: 11:00-11:50 **Room: Texas C**

Recruiting Secondary Math Teachers from the Elementary Education Program

Cynthia Orona	University of Arkansas
Kim McComas	University of Arkansas

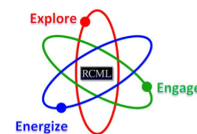
In this presentation, we share our work on a framework for categorizing types of quantitative mathematical reasoning demonstrated by students in the fifth-grade. Operational definitions are proposed for various types of quantitative mathematical reasoning on simple whole number computation and fraction comparison items. Definitions were based on the collection and analysis of over 5,000 responses to a minimum of 10 items completed by 523 intermediate-aged students. Definitions were used to create a five-category evaluative framework that was empirically validated through cluster analyses, hierarchical linear modeling, and a one-way ANOVA. The five categories proposed include: (1) Absence of reasoning, (2) Faulty reasoning, (3) Partial reasoning, (4) Algorithmic reasoning, and (5) Conceptual reasoning. Examples are provided as well as implications as to how this framework might be used as a formative assessment tool by teachers to inform instruction.

Time: 11:00-11:50 **Room: Texas D**

Calculus Student Understanding of Continuity and Related Topics

Jayleen Wangle	State University of New York at Oneonta
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Continuity is a central yet subtle concept in Calculus I. Yet very few students seem to grasp the nature of continuity. Although this was a mixed methods study, this talk will focus on the results of participant interviews. I will discuss participant displayed depth of understanding of function, limit, and continuity in terms of the constructs described by Dubinsky's (1991) Action-Process-Object-Schema theory. A prominent finding was that participants who demonstrated a stronger conception of function displayed a more in depth understanding of continuity.



Business Meeting Notes

2016 RCML Board Meeting Minutes: February 26, 2016

President Juliana Utley called the general business meeting to order at 12:30 pm.

Approval of Minutes:

Sarah Pratt presented the minutes from the RCML 2015 conference business meeting, which was also distributed in the 2016 conference program. Melfried Olson moved to approve the minutes, seconded by Keith Adolphson. No discussion. Motion carried.

Member Coordinator's Report – Sarah Pratt:

As of December 31, 2015, there were 182 members, up from 154 in 2014. As of today there are 133 members for 2016.

Treasurer's Report:

Kerri shared a beginning balance of \$47,200.76 and an ending balance of \$51,380.03 revealing a small net for the past year. Alan Zollman moved to accept the treasurer's report, seconded by Melfried Olson. No discussion. Motion carried.

Election Results – Mary Swarthout:

Conference Committee

- Ryan Fox (2016-2019)
- Cynthia Orona (2016-2019)

Publications Committee - Elected

- Keith Adolphson (2016-2019)
- Sarah Ives (2016-2019)

Publications Committee - Appointed

- Rachel Bachman (2016-2018)
- Tyrette Carter (2016-2018)

VP Conferences: Kansas Conrady (2016-2018)

Treasurer: Kerri Richardson (2016-2018)

President-Elect: Daniel Brahier (2016-2017)

Recognition of first-time attendees

Recognition of second-year attendees

Recognition of the youngest attendee

Recognition of the most conferences attended

President-Elect Call for Nominations - Mary Swarthout on behalf of Daniel Brahier:

Nominations are being sought for Secretary, Conference Committee (2), and Publications Committee (2). Onsite nomination forms can be given to Jonathan Bostic or Gabriel Matney; you may also email your nominations to Brahier@bgsu.edu

VP of Conferences – Eileen Faulkenberry:

There were 148 attendees, 92 presentations, and 14 posters. This is the second year for poster sessions. This is the first year for 2 panel presentations in a session, so please provide feedback regarding this and any other aspects of the conference. Eileen thanked the program chair, Gabriel Matney, and conference chair, Nancy Cerezo. She also thanked the reviewers of the proposals, conference committee members, and conference moderators. Gabriel Matney thanked his two master's students, Corrinne Sullivan and Megan Schlosser, who assisted in the program. Juliana Utley acknowledged the list of reviewers for the conference proposals and proceedings are listed in the conference program. Next year, the 2017 Annual Conference will be held in Fort Worth, March 2-4, 2017 at the Historic Hilton in downtown Fort Worth.



VP of Publications – Sheryl Maxwell:

Sheryl introduced RCML's new Investigations editor, Drew Polly. She also introduced Jonathan Bostic, the new newsletter editor. She mentioned that the next issue of the newsletter would be delivered in May instead of April as has been in previous years. Sheryl recognized Summer Bateiha and her work as the past newsletter editor. She then reported that the newest issue of Volume 8 Issue 3 would soon be published and distributed. 85% of our member dues goes to the supporting publication of the journal.

Gabriel will become the VP of Publications as of March 1, 2016. Sheryl served as the VP of Publications for 9 years.

Conference Proceedings – Keith Adolphson:

He reported that there were 20 manuscripts accepted, with a 40.8% acceptance rate. He thanked all of the reviewers for volunteering and providing such thorough reviews. He also thanked Travis Olson, assistant editor, and Nicholas Kaleolani Wong, editorial assistant. He requested that any suggestions can be sent to him or Travis Olson.

Past-President Juliana Utley announced that Keith recommended Travis Olson to the Board to serve as 2017 Proceedings Editor. Travis has agreed to serve.

Memorial Scholarships – Sheryl Maxwell & Juliana Utley:

Acknowledgement of the Memorial Scholarship Committee: Sheryl Maxwell, Bill Speer, Alan Zollman, and Kerri Richardson. The 2016 Awardees are as follows: in honor of Marjorie A. Speer, is Sarah Pratt - University of North Texas, and in honor of Dr. Robert Ashlock, Rachel Bachman - Weber State University. The 2017 Award will be in honor of Dr. James W. Heddens.

Recognition of RCML Service – Juliana Utley:

Keith Adolphson - 2016 Proceedings Editor

Nancy Cerezo – 2016 Conference Chair

Gabriel Matney – 2016 Program Chair

Travis Olson - Conference Proceedings Co-Editor, 2014 – 2015

Summer Bateiha- Newsletter Editor, 2012-2015

Travis Olson – Conference Committee, 2013-2016

Kansas Conrady – Conference Committee, 2013-2016

Eileen Faulkenberry – VP Conferences 2014-2016

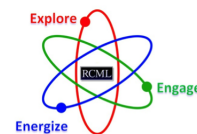
Kerri Richardson – Treasurer 2014-2016

Mary B. Swarthout – Past-President 2015-2016

Sheryl A. Maxwell – VP Publications 2007-2016

Sheryl Maxwell was honored with an award for her service as VP Publications and for your service to RCML. She received a standing ovation from the membership.

Juliana Utley reported that the constitution and bylaws need updating, but they require that the executive committee have any updates 60 days before being discussed at a board meeting. Then they should go out to the membership prior to the annual business meeting so that during the annual business meeting any suggested changes can be approved. Juliana Utley mentioned that discussions were taking place to update the status of the journal being moved to on-line



Business Meeting Notes

format. Gabriel Matney, Drew Polly and Juliana Utley have contacted publishers and are in the process of determining if any will be compatible with RCML's mission and organization.

Alan Zollman asked for Drew Polly to provide an update of the status of the journal. Since August he has received 40 manuscripts. He has honored all submissions that were approved by Vicki Schell, and they will appear in this or the next volume of the journal. Currently there is a 30% acceptance rate. Aim is for about 3 months to receive a decision.

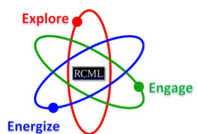
Jonathan Bostic gave an update on the newsletter and invited the membership to submit to the newsletter. Juliana Utley acknowledged the many years of service that Ryan Speer gave as the webmaster for RCML. Kerri Richardson showed the membership the new web site. The URL is www.rcml-math.org. She shared that she preserved the content from the former site. In addition the member login section will be live in the next two months. Members will receive an email to set up a user name and password to access the member only portion.

Juliana Utley recognized Ginny Usnick and her work to scan and make PDF copies of the old monographs.

Kathy Smith requested that the members take extra maps and magnets to share with colleagues.

Juliana Utley asked that if there is any new business. No new business was brought forward. Juliana encourage members to let a board member know if they had suggestions that RCML can do to continue to improve the work of the organization.

Bob Drake motioned to adjourn, seconded by Keith Adolphson. No discussion. Voted in favor. Meeting adjourned at 1:23 pm.



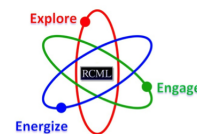
Special Thanks

Proposal Reviewers: A special thank you to all of the proposal reviewers for reading and scoring the immense amount of proposals for this conference.

Kit Price Blount	Ryan Fox	Gilbert Naizer	Beth Riggs	Sean Yee
Jonathan Bostic	Laura Isbell	Megan Obeid	Douglas Rowe	
Kansas Conrady	Leslie Leach	Cynthia Orona	Chad Tyre	
Eileen Faulkenberry	Hope Marchionda	Janine Prukop	Michael Warren	
Melanie Fields	Bill McGalliard	Shea Regian	Julie Williams	

Proceedings Reviewers: A special thank you to all of the proceedings reviewers for reading and scoring the immense amount of proceedings for this conference and to Nicholas Wong for his work as the Editorial Assistant.

Melanie Autin	Danya Corkin	Ed Keppelmann	Corrie (Leigh) Martin	Brittany Webre
Summer Bateiha	Bob Drake	Dennis Kombe	Melfried Olson	Cong-Cong Xing
Jonathan Bostic	Lucas Foster	Karl Kosko	Lindsay Prugh	Fay Zenigami
Kenneth Butler	Ryan Fox	Angela Krebs	Matt Roscoe	
Joanne Caniglia	Steven Greenstein	Lance Kruse	Amber Simpson	
Nancy Cerezo	Mary Harper	Linda Venenciano	Tracy Thompson	
Helen Columba-	Elizabeth Howell	Cat Maiorca	Travis Olson	
Piervallo	Elisabeth Johnston	Hope Marchionda	Juliana Utley	



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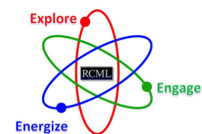
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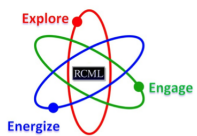
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