

Research Pre-session Planning Committee

NCTM Research Committee

James E. Tarr (2010–2013), Chair

University of Missouri

Chris L. Rasmussen (2010–2013)

San Diego State University

Karen F. Hollebrands (2011–2014)

North Carolina State University

Erica Walker (2011–2014)

Teachers College, Columbia University

Kathryn B. Chval (2012–2015)

University of Missouri

Cliff Konold (2012–2015)

University of Massachusetts Amherst

**Robert Q. Berry, Board Liaison
(2011–2014)**

University of Virginia

**Karen D. King—Staff Liaison
(2011–2012)**

NCTM

**David Barnes—Staff Liaison
(2012–2013)**

NCTM

AERA–SIG/RME Executive Board

Eric Knuth (2011–2013), Cochair

University of Wisconsin

Maria Blanton (2012–2014), Cochair

TERC

Shuhua An (2012–2014), Treasurer

*California State University,
Long Beach*

**Mary Q. Foote (2011–2013),
Communications**

Queens College, City University of New York

Dan Battey (2011–2013), Electronics

Rutgers University

Denise Spangler (2012–2014), Awards

University of Georgia

Ann Ryu Edwards (2011–2013), Events

University of Maryland

Announcements

- The Research Pre-session will be held at the Colorado Convention Center in Denver.
- Registration will be held in Lobby A.
 - Monday, 4:00 p.m.–7:00 p.m.
 - Tuesday, 7:30 a.m.–3:00 p.m.

Registration is required for attendance, and badges must be worn for all sessions.

- On Wednesday, the Research Pre-session is open to all registered attendees to the NCTM annual meeting and the NCSM annual conference. Badges from these conferences will be required for attendance for all sessions on Wednesday.
- A light reception will be held on Monday evening in Lobby A, 8:30 p.m.–10:00 p.m., following the opening session at 7:00 p.m. in room 205/207.
- Two sets of Research Poster Sessions will take place in Lobby A
 - Monday, 5:30 p.m.–6:45 p.m.
 - Tuesday, 4:45 p.m.–6:00 p.m.
- As of next year, the Research Pre-session will become the NCTM Research Conference.
- The Call for Papers for the 2014 NCTM Research Conference, April 7–9, New Orleans, will be available online in early June 2013.
- The NCTM Bookstore will be open on Wednesday, 10:00 a.m.–7:00 p.m., in the Exhibit Hall.

The publications and programs of the National Council of Teachers of Mathematics present a variety of viewpoints. The views expressed or implied in this publication, unless otherwise noted, should not be interpreted as official positions of the Council. Reference to particular commercial products by a speaker should not be construed as an NCTM endorsement of said products(s). NCTM reserves the right to change speakers, change facilities, or modify program content.

Invited Sessions

Opening Session

Educational Entrepreneurship, Disruptive Innovation, and the Struggle for the Soul of Teaching and Teacher Education

Monday, April 15, 7:00 p.m.–8:30 p.m.

Room 205/207

Are We Reaching Equity in Mathematics Education?

Tuesday, April 16, 10:30 a.m.–12:00 p.m.

Room 102

Recruiting and Retaining K–16 Students in STEM

Tuesday, April 16, 10:30 a.m.–12:00 p.m.

Room 104

Embodied Cognition: What It Means to Know and Do Mathematics

Tuesday, April 16, 10:30 a.m.–12:00 p.m.

Room 105

Writing and Reviewing for *Mathematics Teacher Educator*

Tuesday, April 16, 3:00 p.m.–4:30 p.m.

Room 106

The Life of a *JRME* Manuscript, through Three Lenses

Wednesday, April 17, 8:30 a.m.–10:00 a.m.

Room 108

Plenary Session

Using Research to Make a Difference

Wednesday, April 17, 10:30 a.m.–12:00 p.m.

Room 205/207

Turning Your Research into an Article for Teachers

Wednesday, April 17, 1:00 p.m.–2:30 p.m.

Room 108

Research Insights from the 12th International Congress on Mathematical Education

Wednesday, April 17, 3:00 p.m.–4:30 p.m.

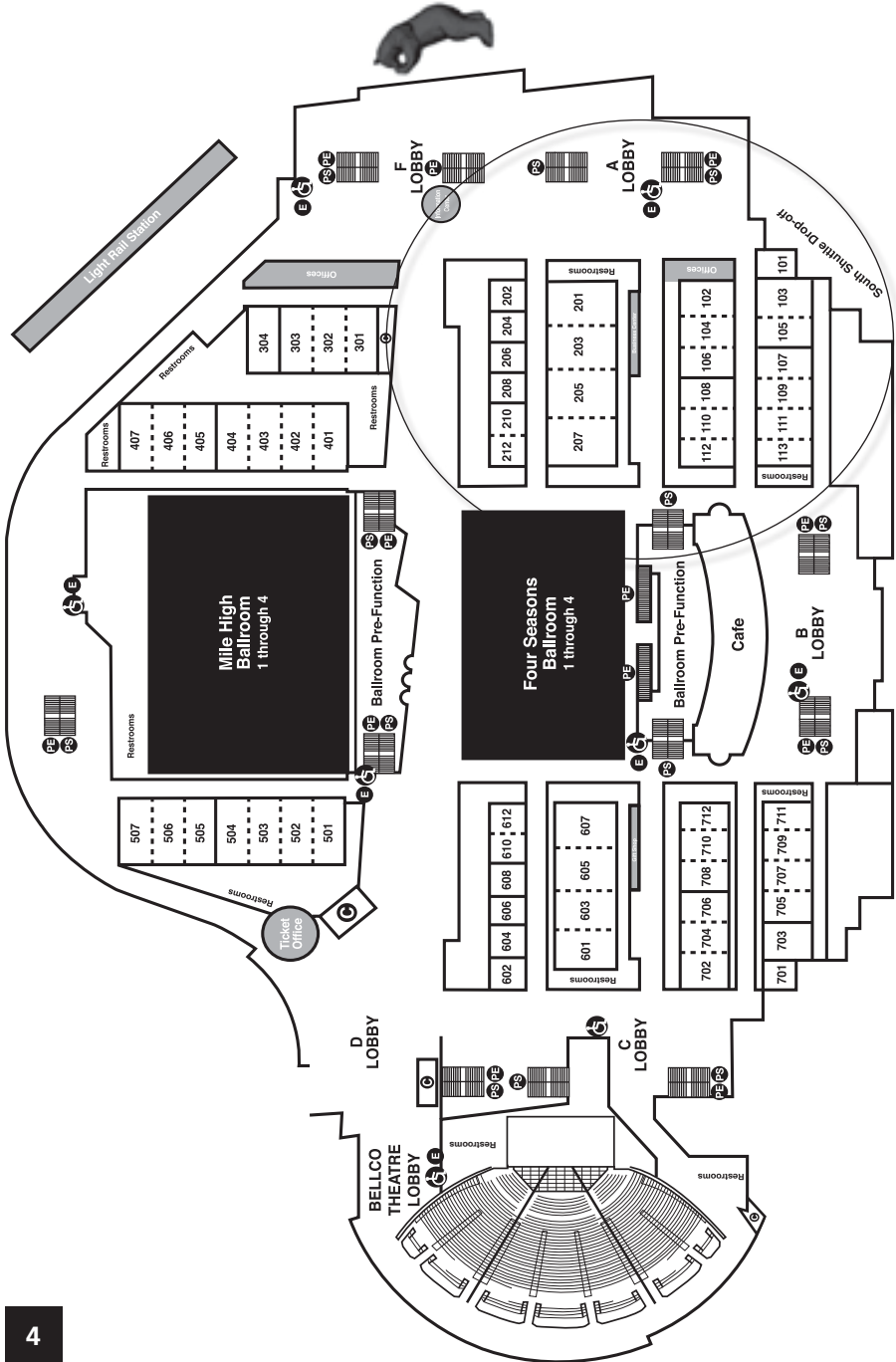
Room 105

Colorado Convention Center, 3rd Floor

Floor Plan

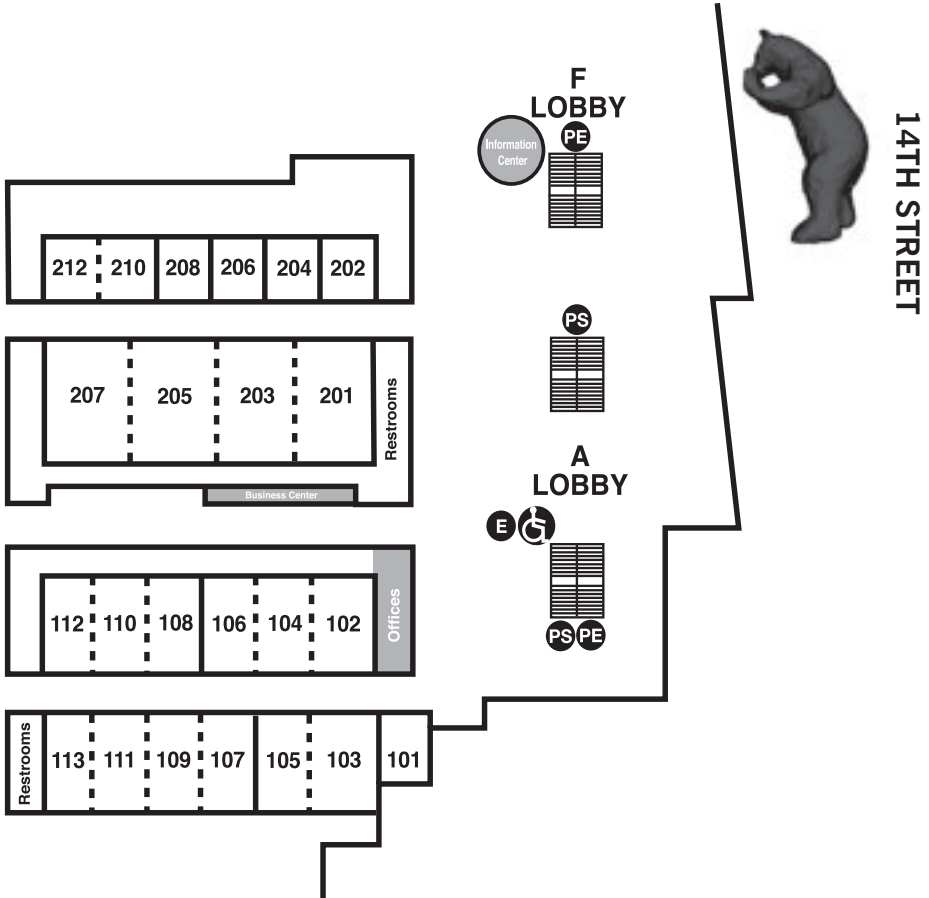
14TH STREET

WELTON STREET



Colorado Convention Center, 3rd Floor

Floor Plan—Close Up View



On behalf of Research Committee of the National Council of Teachers of Mathematics (NCTM) and the Special Interest Group/Research in Mathematics Education of the American Educational Research Association, we welcome you to NCTM's Research Pre-session. The Research Pre-session serves multiple purposes. First, it brings researchers together annually to examine and discuss current issues in mathematics education. Second, it is an opportunity for researchers to receive feedback on their work and to benefit from exposure to alternative points of view. Third, it affords beginning scholars opportunities to interact and network with veteran researchers in the field. Finally, it is an opportunity to capitalize on the collective wisdom available when researchers and practitioners come together to discuss mathematics education and research.

We thank the members of NCTM's Research Committee, members of the executive board for the SIG/RME, and other members of the research community who served as reviewers. Your work is greatly valued and appreciated. Moreover, we thank the staff at NCTM for helping us with the logistics of the conference, registration, printing the program, and so on. Also, we thank all the presenters for agreeing to participate. Finally, we thank everyone in attendance and hope that you will find the conference helpful to you in several ways.

Sincerely,

James E. Tarr
NCTM Research Committee, Chair

Eric Knuth
AERA SIG/RME Cochair

Maria Blanton
AERA SIG/RME Cochair

David Barnes
NCTM Research Committee, Staff Liaison

Opening Session—Monday, 7:00 p.m.

Educational Entrepreneurship, Disruptive Innovation, and the Struggle for the Soul of Teaching and Teacher Education

Kenneth Zeichner

University of Washington Seattle, Seattle, Washington

Rooms 205/207

See Session #35 for full details.

1

Adding Induction to Proof Writing: Examining Effects of Professional Development

Poster Session

Students might struggle with proofs because teachers focus too much on the final product and not enough on inductive practices that lead to proof. This research project studies the effects of a professional development program that focuses on inductive methods in teachers' beliefs, attitudes, and practices.

Matthew Chedister

Boston University, Boston, Massachusetts

Lobby A

2

Advancing Knowledge and Use of Mathematics: Reconceptualizing Engagement

Poster Session

Engagement is ill-defined: time and space are necessary, differences complicate use of behavioral indicators, and affective dimensions need to be considered. Presenting portraits problematizing conceptual limits of engagement, our research is informed by sociocultural constructivism. Synthesis suggests “knowing” and “knowledge” insufficiency.

Pamela A. Hagen

SD#43 Coquitlam, Vancouver, Canada

Alayne C. Armstrong

University of British Columbia, Vancouver, Canada

Sylvia McLellan

Vancouver, Canada

Natalie Poirier

Eaton Arrowsmith School, Vancouver, Canada

Lobby A

For your safety and because of fire regulations, only those with seats will be allowed in meeting rooms. To comply with fire codes, we will have to ask any persons sitting on the floor or standing to leave the room.

Please remember:

- All meeting rooms will be cleared between presentations.
- All seats are available on a first-come, first-served basis.
- Reserving spaces in line or saving seats is not permitted.
- As a courtesy to the speaker and your colleagues, please turn off your cell phone during all presentations.

3

A Linguistically Grounded Coding Scheme for Open-Ended Responses

Poster Session

We analyzed open-ended responses by using explicit knowledge of systemic functional linguistics in the context of a research project on teachers' decision making. This method of coding is developed with an eye toward advancing theory and research.

Wendy Aaron

Oregon State University, Corvallis, Oregon

Ander W. Erickson

University of Michigan, Ann Arbor, Michigan

Justin Dimmel

University of Michigan, Ann Arbor, Michigan

Pat Herbst

University of Michigan, Ann Arbor, Michigan

Lobby A

4

Autonomy-Supportive Instruction: Influences on Fourth Graders' Skill Comparing Fractions

Poster Session

We measured students' accuracy at comparing fractions to gauge whether autonomy-supportive instruction (ASI) influences flexible reasoning about fraction magnitude. Representation format and problem type were both significant: numerical notation > circle area model; SD > SN = DND; and performance was more consistent in a high-ASI classroom.

Tiera Willis

Chicago, Illinois

Lobby A

5

Beginning Teachers' Instructional Practices and Views about Math Success

Poster Session

Using achievement goal theory, I examined the instructional practices and views about success and failure in mathematics for 10 early-career upper-elementary teachers. These teachers graduated from the same teacher preparation program but were teaching in different contexts and geographical areas.

Shannon P. Sweeny

Michigan State University, East Lansing, Michigan

Lobby A

6

Body-Based Examples When Exploring Conjectures: Embodied Resources and Mathematical Proof

Poster Session

We use theories of embodied cognition to extend typical conceptions of example-based reasoning. Students can generate and test examples by using their bodies, and these powerful “embodied” examples are especially well positioned to support the development of general proofs that go beyond particular instances.

Muhammed Fatih Dogan

University of Wisconsin–Madison, Madison, Wisconsin

Caroline Williams

University of Wisconsin–Madison, Madison, Wisconsin

Candace Walkington

Southern Methodist University, Dallas, Texas

Lobby A

7

Brain Activity and Students’ Reading and Mathematics Fluency

Poster Session

Functional near-infrared imaging, which measures changes in blood flow, can investigate brain activity during reading and mathematics fluency tasks. Twelve university students participated in scanning sessions and interviews. Different activation levels were related to fluency levels, and fluency levels in mathematics and reading were comparable. We will discuss implications for learning.

Enrique Ortiz

University of Central Florida, Oviedo, Florida

Lobby A

8

Bringing Variable Notation to the Forefront of Early Mathematics Education

Poster Session

We present preliminary analyses to show that young children can and do comfortably use mathematical symbols to express relationships between quantities. Using variable notation is clearly within the reach of young children, and we challenge the lack of explicit attention to variable notation in early algebra research.

Barbara M. Brizuela

Tufts University, Medford, Massachusetts

Maria Blanton

TERC, Cambridge, Massachusetts

Katie Sawrey

Tufts University, Medford, Massachusetts

Angela Murphy Gardiner

TERC, Cambridge, Massachusetts

Brian Gravel

Tufts University, Medford, Massachusetts

Ashley Newman-Owens

Tufts University, Medford, Massachusetts

Lobby A

9

Coordinating Multiple Representations Skills in Reform Calculus

Poster Session

Both reform approaches to teaching calculus and the NCTM Standards call for coordinating multiple representations (CMR) skills. We coded CMR types in one reform textbook by using Janvier's 4×4 grid. Different CMR types were represented in different chapters, as well as between explanation portions and student exercises.

Jennifer Cromley

Temple University, Philadelphia, Pennsylvania

Briana Chang

Temple University, Philadelphia, Pennsylvania

Theodore W. Wills

Temple University, Philadelphia, Pennsylvania

Lobby A

10

Designing a Professional Development Series for K–8 Teachers**Poster Session**

Using transformational theory and a learner “hats” framework, we interpret and share findings from analysis of teacher-produced mathematics work over the session series, teacher focus group interviews, and teacher critical reflections. K–8 teachers’ thinking about what it means to do, learn, and teach mathematics has shifted.

Jeff D. Farmer

University of Denver, Denver, Colorado

Nicole M. Russell

University of Denver, Denver, Colorado

Allegra B. Reiber

University of Denver, Denver, Colorado

Mindy Adair

Kent Denver High School, Denver, Colorado

Catherine A. Martin

Denver Public Schools, Denver, Colorado

Jodi Holzman

Denver Public Schools, Denver, Colorado

Lobby A

11

Differentiation’s Effect on Standardized Assessment Performance**Poster Session**

Differentiated instruction affected seventh-grade student performance on standardized tests. Analysis of student data yielded inconclusive results, but classroom observations revealed deficiencies in instructional delivery, possibly correlated to preferred teaching styles. We will discuss data, standardized assessment, and challenges of differentiated instruction.

Kimberly G. Williams

Clint Independent School District, El Paso, Texas

Julia Truax

Clint Independent School District, El Paso, Texas

Norma Estrada-Keith

Clint Independent School District, El Paso, Texas

Lobby A

12

Discussion Orchestration's Effect on Students' Social Comparisons

Poster Session

This study describes discussion orchestration in one third-grade teacher's classroom from the perspective of social comparison theory. The teacher's positioning of student strategies contributed to ranking strategies depending on their relative sophistication, which sometimes triggered students' social comparison behaviors.

Yukari Yamakawa

Univeristy of Pittsburgh, Pittsburgh, Pennsylvania

Ellen Ansell

University of Pittsburgh, Pittsburgh, Pennsylvania

Lobby A

13

Enculturation of Teachers into Mathematical Inquiry

Poster Session

This research investigates the enculturation process that occurred for one teacher in a six-week intensive mathematics immersion professional development program. The analysis of language and verbal interaction was used to document increased participation in the cultural practices of a mathematical community.

Mary Elizabeth R. Matthews

Boston University, Boston, Massachusetts

Lobby A

14

Focus on Diversity in Preservice Mathematics Teachers' Development

Poster Session

We present results of a project employing strategies in a problem-solving course to enhance middle-grades preservice teachers' knowledge for teaching algebra for equity. Course activities include mathematics problem and equity challenges, discussions and reading on diversity, Second Life tutoring, and Second Life teaching.

Gerald Kulm

Texas A&M University, College Station, Texas

Trina Davis

Texas A&M University, College Station, Texas

LaToya C. Anderson

Texas A&M University, College Station, Texas

Tingting Ma

Texas A&M University, College Station, Texas

Chance R. Lewis

University of North Carolina–Charlotte, Charlotte, North Carolina

Lobby A

15

Group Theory's Effect on Mathematical Knowledge for Teaching

Poster Session

We studied how knowledge of group theory affected teaching of K–12 mathematics. Engage in dialogue about the potential role that advanced mathematical horizon knowledge plays in teachers' mathematical practice and ways to research its contribution to teaching.

Nicholas H. Wasserman

Southern Methodist University, Dallas, Texas

Julianna Connelly Stockton

Sacred Heart University, Fairfield, Connecticut

Lobby A

16

Hypothetical Learning Trajectories for Mathematically Gifted Students: K–5

Poster Session

Using a nationally representative ECLS-K data set, this study examines how the learning trajectories (LT) differ for grades K–5 students who received gifted services in mathematics and those who did not. Findings may help researchers and teachers understand differences between gifted and nongifted LT in mathematics.

Jennifer Oloff-Lewis

California State University, Chico, Chico, California

Finbarr Sloane

Arizona State University, Tempe, Arizona

Lobby A

17

Identifying Key Changes in Preservice Teachers' Thinking around Number Theory

Poster Session

Explore recent research describing preservice elementary teachers' developing understanding of number theory topics such as primes and divisibility. Using a constructivist theoretical framework, discussion will focus on key changes observed as participants achieved deeper levels of understanding after relevant instruction.

Ziv Feldman

Boston University, Boston, Massachusetts

Lobby A

17.1

Rural School Math Coaching: Lessons from a Yearlong Case Study

Poster Session

Explore findings of a yearlong case study about the relationship between math coaching and collaboration in a rural Appalachian school. Learn more about the work of a math coach, as well as the benefits and challenges of math coaching in a rural setting.

Sara Lohrman Hartman

Ohio University, Athens, Ohio

Lobby A

19

Improving Student Mathematical Thinking through Classroom Discourse and Instructional Tasks

Poster Session

Change in performance of four low-achieving, fourth-grade mathematics students with regard to taking responsibility for learning and thinking mathematically was analyzed. Students had the opportunity to solve and discuss high-level mathematical tasks. Analysis suggests positive changes in student performance.

Maryellen Williams

University of Pittsburgh, Pittsburgh, Pennsylvania

Lobby A

20

In-Service Secondary Teachers' Conceptualization of Complex Numbers

Poster Session

We will share in-service secondary mathematics teachers' reasoning of complex numbers with different representations. Participants did not have a dual conceptualization of each representation of complex numbers and thus did not have a dual conceptualization of complex numbers.

Stephenie Anderson-Dyben

University of Northern Colorado, Greeley, Colorado

Hortensia Soto-Johnson

University of Northern Colorado, Greeley, Colorado

Gulden Karakok

University of Northern Colorado, Greeley, Colorado

Lobby A

21

Investigating Trigonometry in the Modern Sciences

Poster Session

This poster reports results from a study aimed at developing a holistic, research-based perspective on the purpose of trigonometry in the modern sciences. Data come from a survey, interviews, and textbooks. Results clarify the degree of alignment and cohesion of trigonometry education in the modern sciences.

Joshua Hertel

Illinois State University, Normal, Illinois

Lobby A

22

Lesson Plan Evaluation Instrument: Assessing Math Lesson Plans

Poster Session

Lesson plans are a gateway into teachers' math understanding in relation to pedagogy. Investigating how teachers plan offers insight into how they perceive mathematical concepts developing during a lesson. The Lesson Plan Evaluation Instrument helps teacher educators and schools examine how teachers develop math concepts and has potential implications for instruction.

Jacqueline G. Van Schooneveld

University of Pennsylvania, Philadelphia, Pennsylvania

Lobby A

23

Mathematics Knowledge and Beliefs and Their Relationships in Preservice Teachers

Poster Session

Teachers develop their knowledge through teacher-preparation programs. Program developers should know the characteristics that preservice teachers hold upon entering programs. We characterize preservice teachers' mathematical knowledge for teaching and beliefs while analyzing relationships among these characteristics.

Janet Mercado

University of California, Irvine, Irvine, California

Rossella Santagata

University of California, Irvine, Irvine, California

Sonja Mohr

Berlin Institute of Technology Institute of Education, Berlin, Germany

Lobby A

24

Mathematics Pedagogical Beliefs and Early Childhood Student Teaching

Poster Session

This study used a mixed-methods explanatory design to examine changes in preservice teacher beliefs related to early childhood mathematics during their student-teaching experience. Positive shifts in pedagogical beliefs occurred after student teaching; however, follow-up interviews identified barriers impeding increased shifts across participants.

Sandra M. Linder

Clemson University, Clemson, South Carolina

Amber Simpson

Clemson University, Clemson, South Carolina

Lobby A

25

Mathematics Vocabulary's Effect on Mathematics Achievement

Poster Session

This study incorporates correctly and incorrectly worked examples and self-explanation prompts with typical problems to promote algebra learning. The purpose is to examine the correlation between the number of precise mathematical terms used correctly when answering self-explanation prompts and conceptual and procedural posttest performance.

Kelly M. McGinn

Temple University, Philadelphia, Pennsylvania

Lobby A

26

Math Teachers' Circle: Initial Findings of Impact on Teacher Leadership

Poster Session

A first-year Math Teachers' Circle offered teachers a professional development experience that not only allowed them to become mathematical learners and problem solvers again but also presented opportunities to become teacher leaders. This study uses a research-based communities-of-practice framework to present the findings.

Diana White

University of Colorado Denver, Denver, Colorado

Jan A. Yow

University of South Carolina, Columbia, South Carolina

Debra Geddings

University of South Carolina, Columbia, South Carolina

Lobby A

27

Preservice Chinese Teachers' Understanding of Ratio, Rate, and Proportional Reasoning

Poster Session

Chinese preservice mathematics teachers' subject-matter knowledge (SMK) on ratio, rate, and proportional reasoning focuses more on problem solving, reasoning, and making connections but less on understanding basic concepts such as ratio. The study indicates another way to categorize SMK by focusing on these aspects.

Jia He

Michigan State University, East Lansing, Michigan

Lin Ding

University of Hong Kong, China

Lobby A

28

Reciprocal Noticing: Constructing Common Resources with English Language Learners

Poster Session

Reciprocal noticing is the interpersonal process that allows two people to notice each other's ideas. A conversation with an English language learner (ELL) working on a volume problem shows how reciprocal noticing can support teachers and students—particularly ELLs—to create common resources for teaching and learning mathematics.

Higinio Dominguez

Michigan State University, East Lansing, Michigan

Lobby A

29

Special Education Teachers' Participation in a Mathematics–Science Partnership

Poster Session

This study explores the participation of eight special education teachers in a middle school mathematics–focused mathematics–science partnership, with attention to how the experience affects perceived math competence and instructional practice. We consider implications of including special education teachers in a program focused on deepening math content.

Hanin Rashid

Rutgers University, Piscataway, New Jersey

Lynda B. Ginsburg

Rutgers University, Piscataway, New Jersey

Lobby A

30

Student–Teacher Interactions in Calculus Classrooms and during Office Hours

Poster Session

I applied conversation analysis to video of teacher–student interactions in college calculus classrooms and during office hours. Whereas the teachers mainly controlled the discussion in classrooms, students took an active role during office hours, especially in starting a new topic of discussion and in verifying their thinking.

Jun-Ichi Yamaguchi

University of Georgia, Athens, Georgia

Lobby A

31

Teacher–Student Mathematical Interactions in Urban Middle Schools**Poster Session**

This study examines mathematical interactions between two urban middle school teachers and their students. The language and actions of these two teachers fostered student engagement in the context of conceptually challenging mathematics.

Pamela C. Brett

Rutgers University, Piscataway, New Jersey

Lobby A

32

Teachers' Support for Developing Students' Mathematical Argumentation**Poster Session**

Using Boaler and Brodie's framework for categorizing teachers' questions along with Toulmin's model of argumentation, we examine the role of teachers' questions in supporting students as they justify and explain their mathematical reasoning. We discuss findings from five algebra 1 classrooms and implications for future research.

Tracey Howell

University of North Carolina at Greensboro, Greensboro, North Carolina

P. Holt Wilson

University of North Carolina at Greensboro, Greensboro, North Carolina

Lobby A

33

Testing Psychometric Properties of the Modeling Self-Efficacy Scale**Poster Session**

We share the psychometric properties of the modeling self-efficacy scale. We examined the reliability and validity of a scale by engaging high school students, who rated their confidence for solving modeling tasks adapted from the Program for International Student Assessment 2003 problem-solving assessment.

Anu Sharma

University of Florida, Gainesville, Florida

Stephen J. Pape

Johns Hopkins University, Baltimore, Maryland

Lobby A

5:30 p.m.–6:45 p.m.

34

Which Mathematical Standards, Processes, and Content Draw Most Online Users?

Poster Session

MathTennessee.org offers resources for teachers, families, and out-of-school programs. This study analyzes frequency/duration of access of toolkit pages (1) explaining or providing resources for each Common Core State Standard, (2) devoted to specific math content areas or practices, and (3) offering general resources for each audience.

Olga Ebert

University of Tennessee, Knoxville, Tennessee

Lobby A

7:00 p.m.–8:30 p.m.

35

Educational Entrepreneurship, Disruptive Innovation, and the Struggle for the Soul of Teaching and Teacher Education

Opening Session

Debates in the U.S. in the arenas of policy and practice about the future of public schooling, teaching, and teacher education are in full swing. After describing the arguments and visions for the future of the different perspectives in this vigorous national debate, we will offer and analyze specific proposals that seek to transcend the various “camps” in the debate. These proposals will look to bridge the differences between giving everyone’s children access to well-prepared and competent teachers and to the “deeper” forms of learning that all policy makers want for their own children.

Kenneth Zeichner

University of Washington Seattle, Seattle, Washington

Rooms 205/207

36

A Lexicon for “Seeing” Viable Arguments in K–8 Classrooms

Discussion Session

Differences in how we refer to reasoning, proof, and argumentation can limit our ability to document viable reasoning and argumentation and slow research progress. Explore a lexicon that allows researchers to distinguish between types of reasoning and argumentation that occur in classrooms.

David A. Yopp

University of Idaho, Moscow, Idaho

Room 111/113

37

Approaches to Improving Mathematics Teaching in China

Research Symposium

We describe methods to improve mathematics teaching in China—one of the highest-achieving countries in international mathematics comparisons—and discuss how such approaches may affect U.S. professional development efforts, especially for adopting the Common Core State Standards.

Rongjin Huang

Middle Tennessee State University, Murfreesboro, Tennessee

Yeping Li

Texas A&M University, College Station, Texas

Meixia Ding

Temple University, Philadelphia, Pennsylvania

Xue Han

Dominican University, River Forest, Illinois

Thomas E. Ricks

Louisiana State University, Baton Rouge, Louisiana

Discussant: Ron Tzur

University of Colorado Denver, Denver, Colorado

Room 102

38

Assessing Secondary Teachers' Mathematical Habits of Mind**Discussion Session**

Explore instruments that assess secondary teachers' mathematical habits of mind. Work on assessment items designed to measure teachers' knowledge and classroom use of mathematical structure and language. We will also discuss how classroom observations informed the development of these assessment items.

Ryota Matsuura

St. Olaf College, Northfield, Minnesota

Sarah Sword

Education Development Center, Waltham, Massachusetts

Mary Beth Piecham

Education Development Center, Waltham, Massachusetts

Glenn Stevens

Boston University, Boston, Massachusetts

Al Cuoco

Education Development Center, Waltham, Massachusetts

Room 108

39

A Theory-Based Approach to Comparing Direct and Dialogic Mathematics Instruction**Research Symposium**

We will present two models for mathematics instruction, direct and dialogic, which have been specified and refined during a year of conversations with mathematicians and educators representing different sides of an ongoing debate. Three of these people will give their reactions after the presentation.

Charles Munter

University of Pittsburgh, Pittsburgh, Pennsylvania

Mary Kay Stein

University of Pittsburgh, Pittsburgh, Pennsylvania

Margaret Schwan Smith

University of Pittsburgh, Pittsburgh, Pennsylvania

Discussants:**James Hiebert**

University of Delaware, Newark, Delaware

William G. McCallum

University of Arizona, Tucson, Arizona

Marcy Stein

University of Washington–Tacoma, Tacoma, Washington

Rooms 205/207

40

Building Progress Monitoring Measures for Algebra: Exploring Items and Scores

Discussion Session

We share results from year 1 of a federally funded project, including item-level and total-score data from procedural and conceptual progress-monitoring measures. We will discuss characteristics of the items and their implications for use in progress monitoring.

Anne Foegen

Iowa State University, Ames, Iowa

Barbara J. Dougherty

University of Missouri, Columbia, Missouri

Vickie L. Spain

University of Missouri, Columbia, Missouri

Jeannette R. Olson

Iowa State University, Ames, Iowa

Subha Singamaneni

Iowa State University, Ames, Iowa

Room 107/109

41

Conceptualizing Mathematics as Discourse in Different Educational Contexts

Research Symposium

We bring together three studies using a communicational approach to cognition. This lens can be applied in different contexts to conceptualize mathematics as discourse and highlight the importance of communication in teaching and learning mathematics.

Beste Gucler

University of Massachusetts Dartmouth, Fairhaven, Massachusetts

Dong-Joong Kim

Korea University, Seoul, South Korea

Sasha Wang

Boise State University, Boise, Idaho

Discussant: Nathalie Sinclair

Simon Fraser University, Burnaby, Canada

Room 105

42

Implementation of a High School Curriculum: Research on Practice

Research Symposium

Explore research results from studying the implementation of a fourth-year high school mathematics curriculum based on operations research and industrial engineering, from student and teacher perspectives.

Karen Allen Keene

North Carolina State University, Raleigh, North Carolina

Karen S. Norwood

North Carolina State University, Raleigh, North Carolina

Krista Holstein

North Carolina State University, Raleigh, North Carolina

Richelle Dietz

North Carolina State University, Raleigh, North Carolina

Zeynep Yurtseven

North Carolina State University, Raleigh, North Carolina

Discussant: Thomas G. Edwards

Wayne State University, Detroit, Michigan

Room 103

43

Interactive Paper Session

Variations in Mathematics Teaching Cycles: A Framework for Teacher Growth

Results from the first year of a multi year qualitative case study investigating the practice of two practicing teachers' and one preservice teacher in a site-based secondary mathematics preparation program will be presented. Analysis of multiple data sources illuminated differences in participants' mathematics teaching cycles related to their beliefs and knowledge.

Alyson Lischka

Kennesaw State University, Kennesaw, Georgia

Learning Mathematics through Teaching: Preparation for Secondary Teaching

This paper describes research findings on the nature of the preservice secondary teachers' mathematical knowledge for teaching and how it changed during the implementation of a project that included teaching practicum and class experiences. We also describe their self-awareness of their preparation and the relationship between these components.

May Char

University of New Hampshire, Durham, New Hampshire

Timothy Fukawa-Connelly

University of New Hampshire, Durham, New Hampshire

Hyung Kim

University of New Hampshire, Durham, New Hampshire

Additional Authors: Sharon McCrone

University of New Hampshire, Durham, New Hampshire

Neil Portnoy

University of New Hampshire, Durham, New Hampshire

Brian Gleason

University of New Hampshire, Durham, New Hampshire

Karen Graham

University of New Hampshire, Durham, New Hampshire

Creating, Implementing, and Researching a Practice-Based Math Methods Course

This session will share how we created and implemented a practice-based secondary math methods course over the course of three years. It will include what we learned while researching its effects in math classrooms and how we used that knowledge to redesign the course to be more closely tied to teacher practice.

Mollie Appelgate

Vanderbilt University, Nashville, Tennessee

Jaime Park

University of California, Los Angeles, Los Angeles, California

Presenter: Chris Rasmussen

San Diego State University, San Diego, California

Room 110/112

44

Interactive Paper Session

English Learners: Academic English Language Proficiency and Mathematics

Empirical evidence of structural linear relationships across academic English language proficiency of English learners and performance on state mathematics tests, and the stability of these relationships across two U.S. states will be discussed. Strategies for embedding critical features of the academic language of mathematics into lessons will be highlighted.

Rosalie Grant

University of Wisconsin–Madison, Madison, Wisconsin

Rita MacDonald

University of Wisconsin–Madison, Madison, Wisconsin

Additional Authors: H. Cook

University of Wisconsin–Madison, Madison, Wisconsin

Aek Phakiti

University of Sydney, Sydney, Australia

Professional Development Intervention to Enhance Latinos' Math Learning

This session focuses on a three-year longitudinal study of a professional development (PD) intervention on teachers' practices used to teach mathematics to Latino third graders. The study explores characteristics of the PD facilitation moves as well as how these moves led to changes in the participating teachers' practices.

Kathryn Chval

University of Missouri, Columbia, Missouri

Luz Valoyes

University of Missouri, Columbia, Missouri

Didem Taylan

University of Missouri, Columbia, Missouri

Appraising What Teachers' Notice about Curriculum for Bilingual Learners

This study builds on the authors' curriculum work where they fundamentally altered commercial mathematics lessons in an effort to increase bilingual Latina/o students' engagement, participation, discourse, and opportunities to make mathematical meaning. This paper explores what teachers notice about the curricular modifications and the importance they attribute to these changes.

Craig Willey

Indiana University, Indianapolis, Indianapolis, Indiana

Kathleen Pitvorec

University of Illinois at Chicago, Chicago, Illinois

Presenter: Kathryn B. Chval

University of Missouri, Columbia, Missouri

Room 201

45

Interactive Paper Session

Student Teachers' In-the-Moment Noticing during Mathematics Instruction

We describe a study focused on understanding what student teachers who have had coursework focused on anticipating, analyzing, and using student thinking notice as important in the moment while teaching a lesson. We also analyze barriers that prevent them from noticing important mathematical moments that occur during instruction.

Shari Stockero

Michigan Technological University, Houghton, Michigan

Additional Author: Erin Thomas

Michigan Technological University, Houghton, Michigan

Developing Equitable Math Teaching Practices in Middle School Classrooms

This study explores what constitutes equitable mathematics instruction and describes efforts to design a graduate course that enables mathematics teachers to identify, and later design and enact, equitable teaching practices. The goal of this study extends current work on defining equitable instructional practices in middle school mathematics classrooms and helps to further refine a theory for mathematical knowledge for equitable teaching.

Imani Masters-Goffney

University of Houston, Houston, Texas

Unpacking Aspects of Task Implementation That Maintain Cognitive Demand in Classrooms with English Language Learners

With the number of English language learners (ELLs) in American schools growing at unprecedented rates, it is important to examine which strategies for maintaining cognitive demand of tasks are effective for ELLs. In this study I identified characteristics of classroom practice that helped maintain cognitive demand of tasks implemented with ELLs.

Zandra de Araujo

University of Missouri, Columbia, Missouri

President: Erica Walker

Teachers College, New York, New York

Room 203

46

Opportunities to Learn Length Measurement in Elementary Curricula

Research Symposium

Poor learning and teaching of length measurement is well documented, but the causes have not been systematically explored. We present results from a curriculum analysis that explored the content and expression of length-measurement opportunities in three U.S. curricular series and a widely used Singapore text.

Lorraine M. Males

University of Nebraska–Lincoln, Lincoln, Nebraska

Jack Smith

Michigan State University, East Lansing, Michigan

Kosze Lee

North Carolina State University, Raleigh, North Carolina

Discussant: Michael Battista

Ohio State University, Columbus, Ohio

Room 104

47

The Bodily Basis of Knowing and Mathematics Teaching/Learning

Discussion Session

Mathematics education research shows a growing interest in the biology of cognition, specifically how tactile–kinesthetic bodily experiences contribute to understanding of mathematics. Explore how this enhanced theoretical perspective might be useful for and taken up by the classroom mathematics teacher.

Barbara Graves

University of Ottawa, Ottawa, Canada

Room 106

48

Are We Reaching Equity in Mathematics Education?**Research Symposium**

The 2012 National Survey of Science and Mathematics Education provides nationally representative data for K–12 U.S. schools. We will share findings regarding equity by examining distributions of teaching and curriculum resources, as well as pedagogies and technologies for giving all students learning opportunities.

Daniel J. Heck

Horizon Research, Chapel Hill, North Carolina

Evelyn M. Gordon

Horizon Research, Chapel Hill, North Carolina

Kristen Malzahn

Horizon Research, Chapel Hill, North Carolina

Courtney Layne Nelson

Horizon Research, Chapel Hill, North Carolina

Discussant: Kathryn B. Chval

University of Missouri, Columbia, Missouri

Room 102

49

Developing a Valid, Reliable Observational Measure of Formative Assessment**Discussion Session**

Although formative assessment is often claimed to be an effective strategy to improve student learning, little extant research tests these claims. Learn about an instrument developed for large-scale evaluation of formative assessment, use the instrument, and discuss strategies to increase interrater reliability.

Robert C. Schoen

Florida State University, Tallahassee, Florida

Mark Lavenia

Florida State University, Tallahassee, Florida

Laura B. Lang

Florida State University, Tallahassee, Florida

Maureen F. Oberlin

Florida State University, Tallahassee, Florida

Room 106

50

Embodied Cognition: What It Means to Know and Do Mathematics**Research Symposium**

Explore recent advances in embodied cognition, focusing on theoretical and pragmatic issues. We discuss the roles of bodily actions in learning mathematics and how classroom experiences, as constituted by the body in interaction with others, tools, and technologies, open up spaces for mathematics learning.

Laurie Edwards

St. Mary's College, Moraga, California

Mitchell Nathan

University of Wisconsin–Madison, Madison, Wisconsin

Ricardo Nemirovsky

San Diego State University, San Diego, California

Discussant: Hortensia Soto-Johnson

University of Northern Colorado, Greeley, Colorado

Room 105

51

How Do Middle-Grades Teachers Recognize Proportional Relationships?**Research Symposium**

We bring together a new mathematical analysis of proportional relationships and three empirical studies. The analysis highlights two definitions of ratio. The empirical studies, each from a different project, examine when middle-grades teachers are more and less successful in making appropriate determinations about proportionality.

Andrew Izsak

University of Georgia, Athens, Georgia

Sybilla Beckmann

University of Georgia, Athens, Georgia

Erik Jacobson

University of Georgia, Athens, Georgia

Chandra Orrill

University of Massachusetts Dartmouth, Dartmouth, Massachusetts

James Burke

University of Massachusetts Dartmouth, Fairhaven, Massachusetts

Discussant: Patrick Thompson

Arizona State University, Phoenix, Arizona

Rooms 205/207

52

Interactive Paper Session

Teachers' Understandings of Proof and Reasoning in Middle School

We investigate teachers' perspectives on the role that proof and mathematical reasoning can play in middle school (grades 6–9) through semistructured interviews. Results suggest that teachers think narrowly about the nature and purpose of proof. They believe that reasoning skills, including making conjectures and generalizations, are critical, although barriers exist to including them in instruction.

Caroline Hagen

Tufts University, Medford, Massachusetts

Yi-Yin Ko

Indiana State University, Terre Haute, Indiana

Proof-Task Potential: Developing MKT for Proof in Professional Development

This paper draws on a framework of mathematical knowledge for teaching proof to detail the proof potential of two tasks implemented in PD settings. Findings presented provide a context for participants to discuss the design of proof tasks in PD and explore the MKT for proof framework as a tool to evaluate productive proof activity for teachers.

Kristin Lesseig

Washington State University Vancouver, Vancouver, Washington

Making Meaning: Teachers' Knowledge of Proofs and Their Classroom Practices

Using ethnographic fieldwork and discourse analysis, this study examined the interplay between teachers' knowledge of proofs and classroom practices. Using data from six middle school teachers, the findings from this study show the teachers hold a dual understanding of proofs: one related to their education and one to their students' education.

Megan Paddack

Southern New Hampshire University, Manchester, New Hampshire

Presenter: Ruthmae Sears

University of South Florida, Tampa, Florida

Room 110/112

53

Interactive Paper Session

Supporting Mathematics Teachers and Learners: A Curricular Activity System

This paper discusses a curricular activity system used with middle school learners as a theory of change and an impetus for educational reform. Findings document a statistically significant increase in understanding for students who were taught using a textbook replacement unit that integrates dynamic technology and is supported by focused teacher professional development.

George Roy

University of South Florida St. Petersburg, St. Petersburg, Florida

Vivian Fueyo

University of South Florida St. Petersburg, St. Petersburg, Florida

Phillip Vahey

SRI International, Menlo Park, California

A Comparison of Presentation Format in Algebra Curricula

The popular belief that, in algebra, solving symbolic equations should be taught prior to solving story problems has been called the symbol precedence view (SPV) and has been shown to be at odds with research on student performance and learning. This study investigates how standards-based curricula and traditional algebra curricula differ with respect to SPV.

Milan Sherman

Portland State University, Portland, Oregon

Additional Author: Candace Walkington

Southern Methodist University, Dallas, Texas

Students' Interactions and Mathematical Thinking while Using CPMP-Tools

A study of the nature of high school students' interactions and discourse in an environment that includes the use of the curriculum-embedded mathematical software CPMP-Tools, developed with the second edition of the Core-Plus Mathematics curriculum.

Karen Fonkert

Charleston Southern University, Charleston, South Carolina

Presenter: Karen Hollebrands

North Carolina State University, Raleigh, North Carolina

Room 201

54

Interactive Paper Session

Difference in Treatment Dosage of a Mathematics Intervention on Student Learning

Research studies often compare the impact of treatment and control groups as dichotomous. However, because implementation varies, a richer picture of how the intervention affects student learning takes that variation into account. This paper discusses how students' implementation of a mathematics program compares with their performance on external measures.

Pamela Paek

Center for Assessment, Austin, Texas

Andrew Coulson

MIND Research Institute, Santa Ana, California

Additional Authors: Xiaochuan Zhang

MIND Research Institute, Santa Ana, California

Sepehr Akhavan

MIND Research Institute, Santa Ana, California

Psychometric Analysis of a Survey Measuring Standards-Based Practices

The purpose of this study is to use item response theory (IRT) as well as exploratory and confirmatory factor analyses (EFA and CFA) to investigate the survey from Ross et. al.'s (2003) "A Survey Measuring Elementary Teachers' Implementation of Standards-Based Mathematics Teaching." IRT clarifies how the items and response categories function, whereas EFA and CFA reveal the factor structure measured.

Joseph Rino

Brigham Young University, Provo, Utah

Damon Bahr

Brigham Young University, Provo, Utah

Using Measures of MKT to Study and Evaluate Professional Development

This session describes the characteristics and knowledge for more than 16,000 teachers who have been assessed using the Learning Mathematics for Teaching (LMT) measures and the program effect sizes for more than 500 professional development programs using LMT outcomes. The session will include discussion of implications for PD study designs.

Geoffrey Phelps

Educational Testing Service, Princeton, New Jersey

Nathan Jones

Educational Testing Service, Princeton, New Jersey

Zahid Kisa

University of Pittsburgh, Pittsburgh, Pennsylvania

Additional Author: Shuangshuang Liu

Educational Testing Service, Princeton, New Jersey

Presenter: Robert Q. Berry

University of Virginia, Charlottesville, Virginia

Room 203

55

Interactive Paper Session

Classroom Practices of High School Math Teachers: A Longitudinal Analysis

This study examines the effects of content-based, sustained professional development on changes in instructional practices of high school mathematics teachers. Analysis of 5 years of classroom observation data collected from 49 teachers shed light on how changes in several aspects of their instructional practices followed different patterns.

Yasemin Copur-Gencturk

Rice University, Houston, Texas

Anne Papakonstantinou

Rice University, Houston, Texas

Additional Authors: Richard Parr

Rice University, Houston, Texas

Differences in Curricular Implementation Based on Various Professional Development

This study provides an account of the impact different components of a PD have on teachers' implementation of the Core-Plus curricular materials. The PD included four distinct components. Data indicated that teachers' beliefs about how students learn mathematics, their trust for the curriculum, and systemic factors influenced decisions teachers made about textbook implementation.

Erin Krupa

Montclair State University, Montclair, New Jersey

Transitioning from a Partnership to a Professional Learning Community

We share lessons learned from an ongoing three-year partnership among five rural school districts and one university to improve secondary mathematics teaching and learning. We share challenges and successes associated with creating and sustaining a professional learning and inquiry community.

Jean Lee

University of Indianapolis, Indianapolis, Indiana

Enrique Galindo

Indiana University, Bloomington, Indiana

Gina Borgioli-Yoder

Indiana University School of Education at Indianapolis, Indianapolis, Indiana

Presenter: James Tarr

University of Missouri–Columbia, Columbia, Missouri

Room 111/113

56

Recruiting and Retaining K–16 Students in STEM**Research Symposium**

Increasing the number of students interested in science, technology, engineering, and mathematics (STEM) is of particular educational and economic concern. Explore factors affecting the recruitment and retention of students in STEM, from elementary school to college.

Chris Rasmussen

San Diego State University, San Diego, California

James Moore II

Ohio State University, Columbus, Ohio

Noah Finkelstein

University of Colorado Boulder, Boulder, Colorado

Discussant: Sandra Laursen

University of Colorado Boulder, Boulder, Colorado

Room 104

57

Teachers' Stereotypes of Students' Mathematical Work**Research Symposium**

Teachers' participation in professional development (PD) discourse reveals stereotypes used to position students as mathematics learners. Extending our research on teacher learning of learning trajectories, we share findings about changes in teachers' stereotypes about students in PD settings, offering three critiques of the work.

Cyndi Edgington

North Carolina State University, Raleigh, North Carolina

P. Holt Wilson

University of North Carolina at Greensboro, Greensboro, North Carolina

Paola Sztajn

North Carolina State University, Raleigh, North Carolina

Marrielle Myers

North Carolina State University, Raleigh, North Carolina

Discussants:**Beth A. Herbel-Eisenmann**

Michigan State University, East Lansing, Michigan

Vicki Jacobs

University of North Carolina at Greensboro, Greensboro, North Carolina

David W. Stinson

Georgia State University, Atlanta, Georgia

Room 103

58

“There’s an App for That,” but How Good Is It?**Discussion Session**

Learn to assess math apps’ value in developing student mathematical proficiency. We evaluated more than 30 apps. Explore two math game apps and use our evaluation system to examine the app and to offer feedback on the evaluation system.

Usha M. Kotelawala

Fordham University, New York, New York

Laura M. Gellert

City University of New York, New York, New York

Kathleen Offenholley

Borough of Manhattan Community College, City University of New York, New York, New York

Robert J. Graham

Fordham University, New York, New York

Room 108

59

Using Learning Trajectories to Interpret the Common Core Math Standards**Discussion Session**

The Common Core State Standards for Mathematics (CCSSM) represents major challenges for instructional planning. Explore Web-based resources that use a learning trajectories lens to interpret CCSSM. Discussion elaborates on learning trajectories within CCSSM to support instruction through linking research to practice.

Jere Confrey

North Carolina State University, Raleigh, North Carolina

Alan Maloney

North Carolina State University, Raleigh, North Carolina

Nicole Panorkou

North Carolina State University, Raleigh, North Carolina

Kosze Lee

North Carolina State University, Raleigh, North Carolina

Andrew Corley

North Carolina State University, Raleigh, North Carolina

William McGowan

North Carolina State University, Raleigh, North Carolina

Tamar Avineri

North Carolina State University, Raleigh, North Carolina

Room 107/109

60

Early-Years Spatial Reasoning: Learning, Teaching, and Research Implications

Research Symposium

Spatial reasoning is essential in mathematics. This conclusion is drawn from developmental, psychological, educational, and neuroscience perspectives. Discuss and analyze video segments through diverse lenses, and learn about theoretical frameworks to explore how young children reason spatially.

Catherine D. Bruce

Trent University, Peterborough, Canada

Joan Moss

University of Toronto, Toronto, Canada

Nathalie Sinclair

Simon Fraser University, Burnaby, Canada

Walter Whitely

York University, Toronto, Canada

Yukari Okamoto

University of California, Santa Barbara, Santa Barbara, California

Lynn McGarvey

University of Alberta, Edmonton, Canada

Michelle A. Drefs

University of Calgary, Calgary, Canada

Krista Francis-Poscente

University of Calgary, Calgary, Canada

Discussant: Brent Davis

University of Calgary, Calgary, Canada

Room 105

61

Interactive Paper Session

Modeling Algebra Preparedness: Implications from a Measure Up Study

This study analyzes relationships among algebra preparedness, Measure Up experience, logical reasoning, and prior achievement of 9- to 12-year-olds. Findings suggest that algebra preparedness is strongly mediated by logical reasoning capabilities. This has implications for elementary curricula and determining readiness for studying advanced math.

Linda Venenciano

University of Hawaii, Manoa, Honolulu, Hawaii

Grades 4–6 Student Number Substitutions for Informal and Formal Variables

Despite knowledge of algebra students' difficulties with variable, research offers little insights into elementary students' meaning for variable. This research addresses the hypothesis that students' concepts of number and operation, as revealed in the numbers they substituted for variables, are influenced in fundamental ways by their experiences in early arithmetic.

John Switzer

Texas Christian University, Fort Worth, Texas

Attitudes and Beliefs of Third Graders Using Singapore and Everyday Math

Our study examines third-grade students' attitudes toward and beliefs about mathematics. We discuss findings regarding their attitudes and beliefs in general, in comparison to Schoenfeld's (1989) high school students, as well as how these attitudes and beliefs differ between Everyday Mathematics and Singapore Mathematics students.

Keely Machmer-Wessels

University of New Hampshire, Durham, New Hampshire

May Chaar

University of New Hampshire, Durham, New Hampshire

Presenter: Robert Q. Berry

University of Virginia, Charlottesville, Virginia

Room 111/113

62

Interactive Paper Session

Hidden Achievement Predictors: Equalizing Effects of Virtual Manipulatives

This study used a rigorous design to examine effects of virtual manipulatives (VMs) on achievement: (1) $N = 350$ students, (2) within-class random assignment, (3) retention effects measured by delayed posttests, (4) treatment fidelity measured by observations, and (5) psychometric properties of instruments. Results reveal predictors of achievement when VMs are used in mathematics instruction.

Patricia Moyer-Packenham

Utah State University, Logan, Utah

Kerry Jordan

Utah State University, Logan, Utah

Arla Westenskow

Utah State University, Logan, Utah

Additional Authors: Joe Baker

Utah State University, Logan, Utah

Kati Rodzon

Utah State University, Logan, Utah

Katie Anderson

Utah State University, Logan, Utah

Jessica Shumway

Utah State University, Logan, Utah

Comparing Students' Movement through a Learning Trajectory: A Design Study

This study reports on what it means for students to move through the levels of a learning trajectory (LT) for equipartitioning and to develop an understanding of the necessity of preceding levels—how they serve as precursory knowledge for later levels, particularly the upper-level concepts of co-splitting and equipartitioning multiple wholes, as related to forms of composition and distribution.

Andrew Corley

North Carolina State University, Raleigh, North Carolina

Additional Authors: Jere Confrey

North Carolina State University, Raleigh, North Carolina

Alan Maloney

North Carolina State University, Raleigh, North Carolina

(continued on next page)

(Session 62 continued)

Variations in Students' Use of Representations during Fraction Intervention

This study reports learning variations of Tier II students participating in three equivalent fraction instructional intervention groups (physical manipulatives, virtual manipulatives, and a combined group). Results revealed learning variations related to the type of manipulatives and representations used.

Arla Westenskow

Utah State University, Logan, Utah

Patricia Moyer-Packenham

Utah State University, Logan, Utah

Presenter: Chris Rasmussen

San Diego State University, San Diego, California

Room 201

63

Interactive Paper Session

Cultural Context and Sociomathematical Norms: A Case Study

Teacher's ability to create sociomathematical norms to successfully support student learning may depend on teacher's appropriate alignment to students' cultural context. We broaden the construct to include the effect of cultural context in advancing mathematical learning, and we unpack an example of a teacher who engaged students in the oral tradition of Aó, a teaching method extended from Hawaiian culture.

Michael Gilbert

University of Massachusetts, Boston, Massachusetts

Barbara Gilbert

Harvard University, Cambridge, Massachusetts

Proportional Reasoning with GIS Tools in the Study of the Great Migration

This study examines the proportional reasoning of four African American dyads who are using geographic information systems (GIS) maps to develop sociohistorical narratives of the Great Migration.

Maisie Gholson

University of Illinois at Chicago, Chicago, Illinois

Lori Butler

University of Illinois at Chicago, Chicago, Illinois

Additional Author: Josh Radinsky

University of Illinois at Chicago, Chicago, Illinois

Depicting Dynamics of Teacher Interventions and Student Mathematical Engagement

Student engagement is believed to be critical in the development of students' mathematical knowledge. We present findings from an investigation of how teachers' language and actions interact with student engagement. We suggest that context affects teachers' interventions and discuss ways teacher interventions may affect students' engagement.

Cathleen Rossman

Cuyahoga Community College, Cleveland, Ohio

Roberta Schorr

Rutgers University–Newark, Newark, New Jersey

Lina Sanchez Leal

Rutgers University, North Bergen, New Jersey

Additional Authors: Evelyn Seeve

Rutgers, The State University of New Jersey, New Brunswick, New Jersey

Pamela Brett

Rutgers University, Piscataway, New Jersey

Presenter: Clifford Konold

University of Massachusetts Amherst, Amherst, Massachusetts

Room 203

64

Knowledge and Practices of Professional Development Leaders**Research Symposium**

Little attention has been given to what professional development (PD) leaders need to know and be able to do. Drawing from multiple research studies, we explore the knowledge and practices PD leaders use to support preservice and in-service teachers in reorganizing their practices.

Lynsey Gibbons

Vanderbilt University, Nashville, Tennessee

Britnie Kane

Vanderbilt University, Nashville, Tennessee

Erin Pfaff

Vanderbilt University, Nashville, Tennessee

Megan Webster

McGill University, Montreal, Canada

Room 104

65

Learning from Teaching: Findings from Two NSF Career Projects**Research Symposium**

Explore findings from two National Science Foundation Career projects that engage preservice math teachers in structured analysis of practice. We compare the projects to highlight common design principles for activities that support development of preservice teachers' analysis skills. We discuss common learning outcomes and next steps.

Rossella Santagata

University of California, Irvine, Irvine, California

Shari L. Stockero

Michigan Technological University, Houghton, Michigan

Discussants:**Hilda Borko**

Stanford University, Stanford, California

Margaret Schwan Smith

University of Pittsburgh, Pittsburgh, Pennsylvania

Room 102

66

Looking at Teacher Understanding across Data Sources**Discussion Session**

Discuss how to examine the effects of a professional development program on teachers' understanding of mathematics. Data sources include teacher assessments, student assessments, teachers' coursework, and classroom video. Explore how to connect information across sources to see a richer picture.

Mary C. Caddle

Tufts University, Medford, Massachusetts

Alfredo Bautista

Tufts University, Medford, Massachusetts

Barbara M. Brizuela

Tufts University, Medford, Massachusetts

Sheree Sharpe

Tufts University, Medford, Massachusetts

Room 106

67

Mathematics Curriculum Design and Development in the East and West**Research Symposium**

We present and discuss overall curriculum design and development in school mathematics in four selected education systems from the East and West (Australia, China, the Netherlands, and Singapore) together with case studies of textbooks designed and used in these education systems.

Yeping Li

Texas A&M University, College Station, Texas

Marja van den Heuvel-Panhuizen

Utrecht University, Utrecht, Netherlands

Marc van Zanten

Utrecht University, Utrecht, Netherlands

Judy Anderson

University of Sydney, Sydney, Australia

Ngan Hoe Lee

Nanyang Technological University, Singapore, Singapore

Discussant: Sharon L. Senk

Michigan State University, East Lansing, Michigan

Room 103

68

Supporting Underprepared Algebra Students: Results from a Design-Based Research Program

Research Symposium

We analyze central issues regarding improving underprepared students' algebra learning in double-period classes. We present findings from a design-based research project regarding curriculum design; implementation; and students' learning of linear functions, equations, and other core algebra content.

Alison Castro Superfine

Learning Sciences Research Institute, University of Illinois at Chicago, Chicago, Illinois

James Lynn

Learning Sciences Research Institute, University of Illinois at Chicago, Chicago, Illinois

Timothy M. Stoelinga

Learning Sciences Research Institute, University of Illinois at Chicago, Chicago, Illinois

Mara V. Martinez

Learning Sciences Research Institute, University of Illinois at Chicago, Chicago, Illinois

Cynthia L. Schneider

Charles A. Dana Center, University of Texas at Austin, Austin, Texas

Diane J. Briars

Pittsburgh, Pennsylvania

Discussant: Phil Daro

Public Forum on School Accountability, San Francisco, California

Rooms 205/207

69

The Knowledge Quartet Researcher Coding Manual: An International Project

Discussion Session

Explore the work of an international research team using the Knowledge Quartet (Rowland, Turner, Thwaites, and Huckstep 2009). The team has written a Knowledge Quartet coding manual for K–12 research that involves classroom observation of mathematics instruction and is freely available on the Web.

Tracy L. Weston

University of Alabama, Tuscaloosa, Alabama

Room 108

70

Using Learning Trajectories to Create Cognitively Diagnostic Adaptive Assessments

Discussion Session

Advancing our understanding of how learning progresses requires comprehensive diagnostic measures. We apply the Q-Matrix Theory, the Rule Space Method, poset models, and computer-adaptive testing methods to create and evaluate an efficient and cognitively diagnostic adaptive mathematics assessment.

Douglas H. Clements

University of Denver, Denver, Colorado

Julie Sarama

University of Denver, Denver, Colorado

Curtis Tatsuoka

Case Western Reserve University, Cleveland, Ohio

Kikumi Tatsuoka

Columbia University, Chagrin Falls, Ohio

Elvira Khasanova

University of Buffalo, SUNY, Amherst, New York

Room 107/109

71

Assessing Enacted Mathematics Teaching Practice

Research Symposium

As teacher education focuses more directly on the actual work of teaching, a need emerges to assess preservice teachers' enacted practice. We will feature studies focused on a new approach to assessing novice teachers' mathematics teaching practice.

Timothy A. Boerst

University of Michigan, Ann Arbor, Michigan

Meghan Shaughnessy

University of Michigan, Ann Arbor, Michigan

Deborah Loewenberg Ball

University of Michigan, Ann Arbor, Michigan

Discussant: Megan Franke

University of California, Los Angeles, Los Angeles, California

Rooms 205/207

72

Effects of Mathematics Teacher Preparation on Teacher Knowledge and Practice**Research Symposium**

We describe the goals, methods, and initial findings from a five-year longitudinal study, currently in its third year, investigating how mathematics teacher preparation affects teacher knowledge and practice. The project follows two cohorts of K–8 teachers as they transition from their teacher-preparation program into classroom teaching.

Dawn Berk

University of Delaware, Newark, Delaware

James Hiebert

University of Delaware, Newark, Delaware

Amanda Jansen

University of Delaware, Newark, Delaware

Anne Morris

University of Delaware, Newark, Delaware

Laura Cline

University of Delaware, Newark, Delaware

Heather Gallivan

University of Delaware, Newark, Delaware

Erin Meikle

University of Delaware, Newark, Delaware

Emily Miller

University of Delaware, Newark, Delaware

Room 102

73

Equivalent Expressions and Solving Linear Equations: New Research Findings

Research Symposium

Core topics in school algebra are equivalence of expressions and solving linear equations. Explore findings from three research studies that focus on these concepts. These projects involve analyzing textbooks, developing and testing a learning progression, and studying the relationship between assigned homework and student achievement.

Denisse R. Thompson

University of South Florida, Tampa, Florida

Maria S. Terrell

Cornell University, Ithaca, New York

Nicole L. Fonger

Western Michigan University, Kalamazoo, Michigan

Yiting Yu

University of South Florida, Tampa, Florida

Discussant: Daniel J. Heck

Horizon Research, Chapel Hill, North Carolina

Room 105

74

Implementing Classroom-Based Formative Assessment Based on Learning Progressions

Discussion Session

Review and make recommendations for how best to support teachers' use of two assessment activities that are part of a formative assessment system for algebra instruction. The project explores ways to leverage learning progressions to support formative assessment.

Caroline Wylie

Educational Testing Service, Princeton, New Jersey

Malcolm Bauer

Educational Testing Service, Princeton, New Jersey

Room 107/109

75

Interactive Paper Session

Teacher Interview Predicts Preschool Children's Mathematics Achievement

This study describes PM-PCK, a new teacher interview assessing teachers' pedagogical content knowledge (PCK) for preschool mathematics. Analysis by hierarchical linear modeling (HLM) finds significant positive relationships between PM-PCK scores and children's math achievement, suggesting the interview adequately represents knowledge needed for teaching preschool mathematics.

Jennifer McCray

Erikson Institute, Chicago, Illinois

Jie-Qi Chen

Erikson Institute, Chicago, Illinois

Quantitative Measurement Approach to Prekindergarten Early Algebra

This paper reports the final results and recommendations of a two-year-long exploratory DR K–12 project addressing a measurement approach to prekindergarten students' development of quantitative reasoning. This approach is based on measurement concepts and algebraic design of the prenumeric stage of instruction found in the successful Elkonin–Davydov elementary mathematics curriculum from Russia.

Zaur Berkaliyev

California State University, Chico, California

Barbara Dougherty

University of Missouri, Columbia, Missouri

Teachers' Perspectives on Early Mathematics Teaching

The results of Early Mathematics Attitudes and Belief Survey indicate that preschool teachers believed that early math is important and they expressed confidence in their ability to teach math, but they were unsure about their own math skills and knowledge. The results have important implications for the design of professional development in early math.

Jie-Qi Chen

Erikson Institute, Chicago, Illinois

Jennifer McCray

Erikson Institute, Chicago, Illinois

President: James Tarr

University of Missouri–Columbia, Columbia, Missouri

Room 203

76

Interactive Paper Session

Supporting Teachers' Understandings of Function through Online PD

In this presentation, we will explore one segment of an extended research and development project that was conducted to better understand the ways online teacher professional development can support teachers' development of deep and connected understandings of the concept of function.

Jason Silverman

Drexel University, Philadelphia, Pennsylvania

Quantitative Reasoning and Rate of Change in Space

This session presents the results of a teaching experiment that developed models of student thinking about two-variable functions and directional derivatives. I provide excerpts and animations that allow the audience to characterize ways of thinking of students about both surfaces in space and rate of change.

Eric Weber

Oregon State University, Corvallis, Oregon

Teachers' Reasoning On Mathematical Knowledge for Teaching Geometry Items

Experienced geometry teachers were presented with nine Mathematical Knowledge for Teaching Geometry problems in an interview setting. The teachers were asked to talk through their reasoning in solving each problem. Responses were analyzed based on the teachers' thought processes and the types of knowledge they used in solving the problems.

Rachel Snider

University of Michigan, Ann Arbor, Michigan

Presenter: Clifford Konold

University of Massachusetts Amherst, Amherst, Massachusetts

Room 110/112

77

Interactive Paper Session

How Can the Classroom Flip Support Standards-Based Mathematics Learning?

This session reports research conducted in a flipped classroom. The challenges of managing the out-of-class learning environment and the in-class learning environment in order to provide students with a coherent, standards-based learning experience are identified. Recommendations for implementing a standards-based classroom flip will be presented.

Jeremy Strayer

Middle Tennessee State University, Murfreesboro, Tennessee

High School Students' Thinking About Technology-Based Geometric Functions

Geometric transformations are good examples of functions but are rarely presented to students as such. An analysis of high school students' understandings of function as revealed through their interactions with technology-based geometric function activities will be described.

Karen Hollebrands

North Carolina State University, Raleigh, North Carolina

Scott Steketee

KCP Technologies, Emeryville, California

Allison McCulloch

North Carolina State University, Raleigh, North Carolina

Additional Authors: Hollylynne Lee

North Carolina State University, Raleigh, North Carolina

Blake Whitley

North Carolina State University, Raleigh, North Carolina

Implementation of Preconstructed Dynamic Tasks in 1-1 Algebra 1 Classrooms

This study examined teachers' use of preconstructed dynamic sketches in three 1-1 laptop, algebra 1 classrooms. The mathematical task framework and five practices for orchestrating productive mathematical discussions served as conceptual frameworks for analysis. Patterns emerged between discourse, technology use, and high/low implemented level of cognitive demand.

Charity Cayton

North Carolina State University, Raleigh, North Carolina

President: Karen Hollebrands

North Carolina State University, Raleigh, North Carolina

Room 111/113

78

Interactive Paper Session

Student Achievement and Formative Assessment in Networked Classrooms

Multilevel analysis was conducted to determine the effects of the two different PD models for formative assessment (FA) in a networked classroom. Students made significant achievement gains, and teachers' efficacy in using FA, content knowledge, and use of features of networked classroom technology were predictors of student achievement. Student data were collected and analyzed to examine the effects of teacher variables on student achievement.

Judith Olson

University of Hawaii, Honolulu, Hawaii

Melfried Olson

University of Hawaii, Honolulu, Hawaii

Hannah Slovin

University of Hawaii, Honolulu, Hawaii

Middle-Grades Math Standards, Past and Present: How Different is the CCSSM?

To describe differences between typical middle-grades state standards documents and CCSSM, an analysis of pre-CCSSM state standards in six large states was conducted. This presentation will report findings, emphasizing areas of new content emphasis in CCSSM. The methodology will be contrasted with typical “crosswalk” reviews that may miss important differences and mislead teachers and other constituents.

Dung Tran

University of Missouri–Columbia, Columbia, Missouri

Barbara Reys

University of Missouri–Columbia, Columbia, Missouri

Dawn Teuscher

Brigham Young University, Provo, Utah

Improving Fraction Understanding with Perceptual Learning Software

This session presents a study that provides compelling evidence that using adaptive software based on principles of perceptual learning significantly improves sixth graders' mastery of challenging fraction concepts. Students made robust, long-lasting gains in their ability to extract the relational structure needed to understand fraction quantities.

Christine Massey

University of Pennsylvania, Philadelphia, Pennsylvania

Presenter: Erica Walker

Teachers College, New York, New York

79

Methods to Study Decisions in Mathematics Teaching**Research Symposium**

We discuss theory and show instruments developed to study decisions, recognition of norms and obligations, mathematical knowledge for teaching, and beliefs among geometry and algebra teachers. We use pilot data to illustrate analytic techniques and validate instruments, offering insights to explain mathematics teaching decisions.

Pat Herbst

University of Michigan, Ann Arbor, Michigan

Daniel Chazan

University of Maryland, College Park, Maryland

Karl W. Kosko

Kent State University, Kent, Ohio

Wendy Aaron

Oregon State University, Corvallis, Oregon

Justin Dimmel

University of Michigan, Ann Arbor, Michigan

Orly Buchbinder

University of Maryland, College Park, Maryland

Ander W. Erickson

University of Michigan, Ann Arbor, Michigan

Room 104

80

Perspectives and Strategies to Support Algebra Success for All Students

Research Symposium

Learn about findings from two studies investigating how districts perceive and respond to demands to ensure that all students complete algebra 1. Explore data from two nationwide surveys and district leader interviews on policies and practices to increase access to algebra and to support struggling students.

Lindsay M. Keazer

Michigan State University, East Lansing, Michigan

June Mark

Education Development Center, Waltham, Massachusetts

Michael D. Steele

Michigan State University, East Lansing, Michigan

Josephine Louie

Education Development Center, Waltham, Massachusetts

Beth A. Herbel-Eisenmann

Michigan State University, East Lansing, Michigan

Nina Hoe

University of Pennsylvania, Philadelphia, Pennsylvania

Discussant: Catherine Martin

Denver Public Schools, Denver, Colorado

Room 103

81

Understanding Facilitator Moves during Common Mathematics Planning Meetings

Discussion Session

We describe grade 7 mathematics teachers' conversations during a common planning meeting. We seek to understand the nature of these conversations and the influence of our facilitator moves. Examine and give feedback on whether our facilitator moves helped to foster teachers' conversations about students' thinking.

Dorothy Y. White

University of Georgia, Athens, Georgia

Eileen Murray

Harvard Graduate School of Education, Boston, Massachusetts

Angel M. Carreras-Jusino

University of Georgia, Athens, Georgia

Dario Gonzalez

University of Georgia, Athens, Georgia

Room 108

82

Writing and Reviewing for *Mathematics Teacher Educator*

Discussion Session

Members of the editorial board for *Mathematics Teacher Educator* will share information about the scope and purpose of the journal, criteria for manuscripts, and statistics on the journal to date (such as manuscripts received, acceptance rate, turnaround time).

Denise A. Spangler

University of Georgia, Athens, Georgia

Margaret Schwan Smith

University of Pittsburgh, Pittsburgh, Pennsylvania

Melissa D. Boston

Duquesne University, Pittsburgh, Pennsylvania

Gladis Kersaint

University of South Florida, Tampa, Florida

Diana V. Lambdin

Indiana University, Bloomington, Indiana

Room 106

83

Changing Preservice Teachers' Beliefs through a Mathematics Content Course

Poster Session

This case study describes the change in beliefs of two preservice elementary teachers who initially showed little evidence of a belief in teaching mathematics in a standards-based learning environment.

Micah S. Stohlmann

University of Nevada, Las Vegas, Nevada

Kathleen Cramer

University of Minnesota, Twin Cities, Minnesota

Tamara J. Moore

University of Minnesota, Twin Cities, Minnesota

Lobby A

84

Characterizing Preservice Teachers' Multicultural Mathematics Dispositions

Poster Session

Multicultural mathematics dispositions (MCMD) are important in preparing teachers of culturally diverse students. We will discuss how a cultural-awareness unit taught in a mathematics methods course allowed us to characterize preservice teachers' MCMD. We will share implications for teacher education and research.

Victor L. Brunaud-Vega

University of Georgia, Athens, Georgia

Dorothy Y. White

University of Georgia, Athens, Georgia

Jun-Ichi Yamaguchi

University of Georgia, Athens, Georgia

Lobby A

85

Children's Understanding of the Addition–Subtraction Complement Principle

Poster Session

We investigated the relation between children's understanding of the addition–subtraction complement principle and their use of the related subtraction-by-addition strategy when mentally solving two-digit subtraction problems.

Greet Peters

University of Leuven, Leuven, Belgium

Lobby A

86

Common Core State Standards and College Readiness in Quantitative Majors

Poster Session

We explore the mathematics needed to succeed in quantitative first-year college courses. We asked college instructors to examine 50 math problems and rate the importance of the skill each represents for success in entry-level courses. Students need fewer, more useful skills.

Juliet A. Baxter

University of Oregon, Eugene, Oregon

Karen Sprague

University of Oregon, Eugene, Oregon

Ronald Beghetto

University of Oregon, Eugene, Oregon

Lobby A

87

Creating Online Learning Modules for Linguistically Responsive Teaching

Poster Session

An interdisciplinary faculty group created online professional development opportunities for in-service teachers to support effective instruction. We examine these collaborations, which aimed to improve multilingual learners' acquisition of language, literacy, and content knowledge. Math and science were a special focus.

Kara Mitchell

University of Colorado Denver, Denver, Colorado

Nicole M. Russell

University of Denver, Denver, Colorado

Lobby A

88

Data-Driven Instruction: What Can Assessment Data Offer Urban Educators?

Poster Session

An extensive campaign around data-driven education has emerged over the last decade, but what is being done with the data and how they are being used is unclear. We explore how to best address the needs of elementary teachers related to assessment data, including how to take the results apart, how to make meaning of the data, and how to use the data to address students' conceptual understandings.

Ellen Meier

Teachers College, Columbia University, New York, New York

Rita Sanchez

Teachers College, Columbia University, New York, New York

Lobby A

89

Developing Discourse That Promotes Reasoning and Proof**Poster Session**

As part of a larger study investigating education reform in China, this study investigated a high-quality model lesson that represented the recommended instructional practices in current Chinese mathematics education. We focused on the design of the lesson, the unfolding of discourse, and the development of students' mathematical reasoning and proof.

Lianfang Lu

University of Arkansas at Little Rock, Little Rock, Arkansas

Thomas E. Ricks

Louisiana State University, Baton Rouge, Louisiana

Lobby A

90

Developing Mathematics Process Understanding through Music Activities**Poster Session**

This study used a quasi-experiment time-series design with multiple tests to investigate 28 third-grade students' mathematics process abilities. Between pretests and posttests, students showed statistically significant improvement on scores in the mathematics process abilities.

Song An

University of Texas at El Paso, El Paso, Texas

Lobby A

91

Developing Preservice Teachers' Analysis Skills to Learn from Teaching**Poster Session**

Research advocates the design of programs that support teachers in developing knowledge, skills, and habits of mind to learn from practice. This study investigates the effects of two mathematics methods courses on preservice teachers' analysis skills to learn from teaching.

Cathery Yeh

University of California, Irvine, Irvine, California

Lobby A

92

Do Charter Schools Produce Better Math Learners?**Poster Session**

We used two years of school-level data to examine students' Texas Assessment of Knowledge and Skills mathematics test scores over time. Academic performance is not univocal, and charter schools may provide as much educational benefit for mathematics as traditional public schools.

Alpaslan Sahin

Texas A&M University, College Station, Texas

Victor Willson

Texas A&M University, College Station, Texas

Robert M Capraro

Texas A&M University, College Station, Texas

Lobby A

93

Evolution of Educational Objects in Lesson Study**Poster Session**

We analyzed evolution of educational objects in lesson study. We report on two emergent categories and shifts in the evolution of lesson plans and discussion notes from teams of mathematics teachers participating in a three-year professional development grant that used lesson study.

Mike Fredenberg

San Diego State Research Foundation, San Diego, California

Bridget K. Druken

San Diego State Research Foundation, San Diego, California

Lobby A

94

Examining College Instructors' Perceptions of Technology Professional Development**Poster Session**

We will share college instructors' perceptions of a three-year professional development program focused on implementing classroom connectivity technology (CCT) and discourse. The instructors used CCT to develop mathematics discourse processes and increase mathematics achievement.

Stephen J. Pape

Johns Hopkins University, Baltimore, Maryland

Valerie Griffin

University of Florida, Gainesville, Florida

Lobby A

95

Examining How Teachers Support Collective Argumentation**Poster Session**

Collective argumentation and the teacher's role therein are important parts of classroom discourse, highlighting disciplinary practices of mathematics. We will use the teacher support for argumentation framework to examine how teachers influence the development of mathematics and support students' reasoning.

Laura Singletary

Lee University, Cleveland, Tennessee

AnnaMarie Conner

University of Georgia, Athens, Georgia

Ryan C. Smith

University of Georgia, Athens, Georgia

Lobby A

96

Examining Teachers' Error-Handling Practices in Mathematics Discussions**Poster Session**

This poster will introduce a tool for teacher learning focused on promoting productive error handling. The tool consists of rubrics that detail multiple dimensions of error-focused teaching and measure how much mathematical errors are leveraged during public discussion to support conceptual understanding.

Wendy S. Bray

University of Central Florida, Orlando, Florida

Lobby A

97

Exploring Congruency Tasks in Three Middle School Textbooks**Poster Session**

This study analyzed tasks related to congruency in three middle school textbooks. Two textbooks promoted using diagrams in combination with congruence theorems to deduce whether figures would be congruent. The third textbook used diagrams and construction tools for students to construct congruent figures.

Anna F. DeJarnette

University of Illinois, Champaign, Illinois

Lobby A

98

Exploring One New Preservice Teacher's Mathematical Content Knowledge

Poster Session

This poster presents the results of one participant's work in a study of the mathematical content knowledge of preservice elementary teachers early in the teacher-preparation program. As the student progresses through several stages while answering word problems, implications for teacher preparation will be discussed.

Ryan D. Fox

Penn State Abington, Abington, Pennsylvania

Lobby A

99

Fourth-Grade Students' Abilities to Write Algebraic Expressions and Equations

Poster Session

We focus on grade 4 students' use of variables in writing expressions, modeling linear problem situations, and analyzing an equation to determine the value of a variable. Data are students' responses to an assessment item given as part of a larger assessment administered to 51 grade 4 students.

Isil Isler

University of Wisconsin–Madison, Madison, Wisconsin

Timothy Marum

TERC, Cambridge, Massachusetts

Ana Stephens

University of Wisconsin–Madison, Madison, Wisconsin

Lobby A

100

How Do Students Reinvent Their Mathematics? A Study Involving Slope

Poster Session

To investigate how students develop a robust understanding of slope, we conducted a design experiment in a high school algebra 1 classroom. We will explore one activity from this design experiment to understand how students individually and collectively reinvented their mathematical realities.

Frederick A. Peck

Freudenthal Institute US and School of Education, University of Colorado at Boulder, Boulder, Colorado

Lobby A

101

Middle School Students' Engagement in a Technology-Rich Mathematics Class

Poster Session

The engagement that students experience can be important for their mathematical learning. This study investigates the momentary fluctuations and patterns of engagement that occur and how they relate to the mathematical learning of students from a large urban district while working on SimCalc MathWorlds activities.

Lina Sanchez Leal

Rutgers University, North Bergen, New Jersey

Lobby A

102

Preservice Teachers' Identity Development during Student Teaching

Poster Session

We explore how preservice elementary teachers develop as teachers of mathematics from the time of their teacher education courses to their field experiences. This study also researches the crucial experiences that helped build their identities and their roles as student teachers in their identity development.

Hyun Jung Kang

University of Northern Colorado, Greeley, Colorado

James A. Middleton

Arizona State University, Tempe, Arizona

Lobby A

103

Religious Engagement and Context in Mathematical Problem Solving**Poster Session**

This study examines problem solving of 30 children from a tithing (giving 10% of earnings to the church) religious community. When children were given mathematical tasks in a school-like context versus a church context, they used different mathematical strategies as a function of context, problem type, and their own tithing history.

Edd V. Taylor

Northwestern University, Evanston, Illinois

Tracy E. Dobie

Northwestern University, Evanston, Illinois

Lobby A

104

Retention and Teaching Practices of Noyce Program Alumni**Poster Session**

Using survey data and collections of artifacts of practice, this study examines (a) the characteristics of Noyce Program alumni who remain in high-need schools beyond their required service commitment and (b) whether the teaching practices of Noyce Program alumni differ from those of colleagues in their high-need schools.

William C. Zahner

Boston University, Boston, Massachusetts

Lobby A

106

Secondary Mathematics Teachers Negotiating Obligations and Goals: Two Case Studies**Poster Session**

Two teachers express a desire to change their teaching practices and yet struggle to make desired changes. We interpret and explain this struggle, drawing on the practical rationality framework to identify conflicting obligations inherent in the teachers' practice.

Corey Webel

Montclair State University, Montclair, New Jersey

Lobby A

107

Strengths and Weaknesses of Preservice Secondary Teachers' Proof Validation

Poster Session

Our study investigated the strengths and weaknesses of prospective secondary teachers' validation of mathematical arguments. Read and reflect on samples of prospective teachers' written feedback addressed to high school students who tried to construct mathematical proof.

Sarah K. Bleiler

Middle Tennessee State University, Murfreesboro, Tennessee

Denisse R. Thompson

University of South Florida, Tampa, Florida

Mile Krajcevski

University of South Florida, Tampa, Florida

Lobby A

108

Structural and Conceptual Interweaving of Mathematics Methods Coursework

Poster Session

We examine interweaving methods coursework and pedagogical instruction with classroom practice.

Damon L. Bahr

Brigham Young University, Provo, Utah

Eula E. Monroe

Brigham Young University, Provo, Utah

Lobby A

109

Supporting English Language Learners' Inclusion in Mathematics Discourse Communities

Poster Session

English language learners (ELLs) need supports in mathematics that go beyond vocabulary development. Teachers can engage students in discourse communities. Explore how four middle-grades mathematics teachers conceptualized supporting ELLs' engagement in their classroom discourse communities.

Sarah A. Roberts

Iowa State University, Ames, Iowa

Lobby A

110

Talking about Change: Students' Understandings of Negative Rates of Change

Poster Session

We report on the development of students' abilities to represent and interpret negative average rates of change. Students confused function values and rate values and often focused on the magnitude of the change rather than its signed value. Everyday language conflicted with formal mathematical language for describing negative rates of change.

AnnMarie H. O'Neil

Syracuse University, Syracuse, New York

Jonas B. Arleback

Syracuse University, Syracuse, New York

Lobby A

111

Teacher Adaptations of Homework: A Window into Curriculum Enactment

Poster Session

Factors beyond what is written in curriculum materials influence enacting homework. We examine how teachers construe and reconstruct reform-oriented elementary mathematics homework tasks. Our findings offer insight into the nature of students' learning opportunities across home and school settings.

Janine T. Remillard

University of Pennsylvania, Philadelphia, Pennsylvania

Jacqueline G. Van Schooneveld

University of Pennsylvania, Philadelphia, Pennsylvania

Enakshi Bose

University of Pennsylvania, Philadelphia, Pennsylvania

Lobby A

112

Using Feedback to Enhance Teaching of Preservice Mathematics Teachers

Poster Session

Feedback is a powerful tool to enhance the practice of beginning mathematics teachers. Practice-focused approaches to teacher education offer opportunities—and challenges—to giving generative feedback. Explore tools that support mathematics teacher educators in giving practice-focused feedback to beginning teachers.

Timothy A. Boerst

University of Michigan, Ann Arbor, Michigan

Lobby A

113

What Counts as Models for Middle School Mathematics Teachers**Poster Session**

We explore what middle school mathematics teachers consider the key features and purposes of mathematical models and modeling. We interviewed 10 in-service teachers as they constructed and evaluated models of liquid cooling. We report and compare patterns in teachers' criteria for constructing and evaluating models.

Michelle Hoda Wilkerson-Jerde

Tufts University, Medford, Massachusetts

Alfredo Bautista

Tufts University, Medford, Massachusetts

Barbara M. Brizuela

Tufts University, Medford, Massachusetts

Roger Tobin

Tufts University, Medford, Massachusetts

Lobby A

114

What Successful Young Latinas Say and Do in Problem Solving**Poster Session**

We examine the views of mathematics and problem solving held by successful middle-grades Latinas and compare those with the mathematics they showed during the study. These Latinas vouched for problem solving they claimed to do, but their work did not reflect that assessment.

Paula Patricia Guerra

Kennesaw State University, Kennesaw, Georgia

Woong Lim

Kennesaw State University, Kennesaw, Georgia

Lobby A

115

Engagement in Mathematical Discussion: Linking Practices and Outcomes

Research Symposium

Students can build mathematical insight through discussions in which they resolve disagreements by appeals to mathematical definitions. Explore findings from a curriculum design project on integers, fractions, and the number line that privilege mathematical definitions in argumentation and problem solving.

Geoffrey B. Saxe

University of California, Berkeley, Berkeley, California

Maryl Gearhart

University of California, Berkeley, Berkeley, California

Ronli Diakow

University of California, Berkeley, Berkeley, California

Nicole Leveille Buchanan

University of California, Berkeley, Berkeley, California

Jennifer Collett

University of California, Berkeley, Berkeley, California

Bona Kang

University of California, Berkeley, Berkeley, California

Kenton De Kirby

University of California, Berkeley, Berkeley, California

Marie Le

University of California, Berkeley, Berkeley, California

Discussant: Deborah Loewenberg Ball

University of Michigan, Ann Arbor, Michigan

Rooms 205/207

116**Fourth- and Eighth-Grade NAEP: Mathematics Trends in the 21st Century****Research Symposium**

Using grades 4 and 8 data from the National Assessment of Educational Progress, we explore trends in mathematics performance on items and groups of items administered between 2000 and 2011. We will discuss possible explanations for trends in the data and the extent to which NAEP items represent skills identified in the Common Core State Standards.

Peter Kloosterman

Indiana University, Bloomington, Indiana

Crystal Walcott

Indiana University Purdue University, Columbus, Indiana

Doris Mohr

University of Southern Indiana, Evansville, Indiana

Michael Roach

Indiana University, Bloomington, Indiana

Arnulfo Perez

Indiana University, Bloomington, Indiana

Discussant: Glen Blume

Pennsylvania State University, University Park, Pennsylvania

Room 104

117

Framing and Revising a Hypothetical Learning Trajectory for Area Measurement**Research Symposium**

We present data from connected studies arising from a longitudinal, National Science Foundation–funded project. Researchers in two states explored children’s thinking and learning of spatial measurement concepts. Hear results from mixed-method analyses and see our revised hypothetical learning trajectory for area measurement.

Jeffrey E. Barrett

Illinois State University, Normal, Illinois

Craig Cullen

Illinois State University, Normal, Illinois

Amanda L. Miller

Illinois State University, Normal, Illinois

Douglas W. Van Dine

University at Buffalo, Buffalo, New York

Cheryl L. Eames

Illinois State University, Normal, Illinois

Melike Kara

Illinois State University, Normal, Illinois

Julie Sarama

University of Denver, Denver, Colorado

Douglas H. Clements

University of Denver, Denver, Colorado

Room 102

118

Interactive Paper Session

Enactments of Care: Case Studies of African American Mathematics Teachers

Through the lens of care theory, this study analyzes three African American high school algebra teachers' enactments of care in attending to students' mathematical and personal identities and experiences. A critical analysis also reveals tensions regarding different care ethics and teaching mathematics for understanding.

Nancy Tseng

University of Maryland, College Park, Maryland

Ann Edwards

University of Maryland, College Park, Maryland

Additional Author: Hollie Young

University of Maryland, College Park, Maryland

Real-World Contexts in Urban High School Mathematics Lessons

This study describes real-world contexts in urban high school mathematics lessons. We investigate the role of real-world contexts and how they are elaborated by teacher and students. We relate role and elaboration to cognitive demand, instructional environment, and participation structures. Findings suggest practices that support students' participation and conceptual development.

Haiwen Chu

Graduate Center of the City University of New York, New York, New York

Haiwen Chu

WestEd, San Francisco, California

Laurie Rubel

CUNY Brooklyn College, Brooklyn, New York

STEM+M: Mathematics and Motivation in Inclusive STEM-Focused High Schools

This cross-case analysis compares how three STEM-focused high schools motivate and support students in learning college-preparatory mathematics. The schools have records of success in improving the educational outcomes of minority students, many of them first generation college-goers. It is part of a larger NSF-funded study of 12 such high schools.

Kathleen Ross

George Washington University, Washington, D.C.

President: Erin Elizabeth Krupa

Montclair State University, Montclair, New Jersey

Room 110/112

119

Interactive Paper Session

Supporting Preservice Teachers' Mathematical Learning through Argumentation

This study examines the argumentation that occurred within an elementary mathematics content course for preservice teachers (PSTs) and shares how argumentation helped PSTs make sense of important mathematical concepts. Moreover, it demonstrates the experiences that these PSTs had as they worked on learning through mathematical argumentation.

Alejandra Salinas

Boston University, Boston, Massachusetts

Facilitating Productive Discussions in Professional Development Settings

Drawing from a mixed-method experimental research study of a professional development initiative in elementary school mathematics, we present a framework for the facilitation of instructionally productive discussions in professional learning settings. We define and explain key practices facilitators can use to focus discussions around mathematics content, student learning, and instructional practices that build on and extend student thinking.

Caroline Ebbly

Consortium for Policy Research in Education, University of Pennsylvania, Philadelphia, Pennsylvania

Andrea Oettinger

Consortium for Policy Research in Education, University of Pennsylvania, Philadelphia, Pennsylvania

Chinese and U.S. Teachers: Knowledge for Facilitating Disagreements

Mathematical disagreements arise as students challenge classmates' ideas and defend their own. We examined what elementary teachers value about mathematical disagreements as well as the requisite knowledge base for facilitating the resolution of these disagreements. Implications for teacher development will be shared.

Angela Barlow

Middle Tennessee State University, Murfreesboro, Tennessee

Rongjin Huang

Middle Tennessee State University, Murfreesboro, Tennessee

Huk-Yuen Law

Chinese University of Hong Kong, Shatin, Hong Kong

Additional Authors: Yip Cheunk Chan

Chinese University of Hong Kong, Shatin, Hong Kong

Qiaoping Zhang

Chinese University of Hong Kong, China

Wesley Baxter

Middle Tennessee State University, Murfreesboro, Tennessee

Angeline Gaddy

Middle Tennessee State University, Murfreesboro, Tennessee

Presider: Samuel Otten

University of Missouri, Columbia, Missouri

Room 201

120

Interactive Paper Session

A Teacher Leadership Study in an Inquiry Professional Development Program

This professional development program based on inquiry teaching in mathematics and science middle school classrooms found that teachers progressed through stages one and two of a teacher leadership framework. By improving content knowledge and inquiry teaching practices, they were better prepared to influence colleagues.

Jan Yow

University of South Carolina, Columbia, South Carolina

Christine Lotter

University of South Carolina, Columbia, South Carolina

**Findings from a Math Teachers' Circle:
Past, Present, and Future Directions**

Initiated by the American Institute of Mathematics, more than 80 Math Teachers' Circles (MTCs) have been established throughout the United States and its territories. The current session explores one such regional MTC, its curriculum, and findings from 4 yearlong cohorts, including teacher interviews and observations and pre/post measures of change.

David Khaliqi

University of Colorado Colorado Springs, Colorado Springs, Colorado

Peter Marle

University of Colorado Colorado Springs, Colorado Springs, Colorado

Lisa Decker

University of Colorado Colorado Springs, Colorado Springs, Colorado

Math Leadership Academy: Enhancing Content, Pedagogy, and Leadership

This session shares details of the Math Leadership Academy, a program designed to build teacher capacity in math content, pedagogy, and leadership. Project goals, means of achieving these goals, and evidence of impact will be shared. Participants will discuss ideas for building mathematics teachers' capacity for emerging leadership goals.

Fabiana Cardetti

University of Connecticut, Storrs, Connecticut

Mary Truxaw

University of Connecticut, Storrs, Connecticut

Sharon Heyman

University of Connecticut, Storrs, Connecticut

Additional Author: Megan Staples

University of Connecticut, Storrs, Connecticut

Presenter: Daniel J. Heck

Horizon Research, Chapel Hill, North Carolina

Room 203

121

Mathematics Education Research Using Systemic Functional Linguistics

Research Symposium

We explore mathematics education research using theoretical and methodological elements from systemic functional linguistics. The papers examine the interplay between research questions and theoretical and methodological perspectives that validate examining mathematics education issues.

Gloriana Gonzalez

University of Illinois, Champaign, Illinois

Anna F. DeJarnette

University of Illinois, Champaign, Illinois

Juan Gerardo

University of Illinois, Champaign, Illinois

Rochelle Gutiérrez

University of Illinois, Champaign, Illinois

Beth A. Herbel-Eisenmann

Michigan State University, East Lansing, Michigan

Kate R. Johnson

Michigan State University, East Lansing, Michigan

Elaine M. Lande

University of Michigan, Ann Arbor, Michigan

Vilma Mesa

University of Michigan, Ann Arbor, Michigan

Discussant: David Pimm

University of Alberta, Vancouver, Canada

Room 103

122

Moving Mathematics Identity Forward: New Developments in Theory and Research**Discussion Session**

Explore the interaction among identity and mathematical thinking and learning—and as that relationship also intersects with issues of race, socialization, and equity. These papers share content analyses and reviews of related research, findings from new studies, or extant and emerging theoretical developments.

Lateefah Id-Deen

Michigan State University, East Lansing, Michigan

Gregory V. Larnell

University of Illinois at Chicago, Chicago, Illinois

Niral Shah

University of California, Berkeley, Berkeley, California

Maisie Gholson

University of Illinois at Chicago, Chicago, Illinois

Room 111/113

123

Purposeful Play: Design and Selection of Video Games for Learning**Discussion Session**

Discuss the development and selection of educational video games. Explore using an evidence-centered design (ECD) approach to design educational video games with purpose, and learn about using ECD to select educational games to fulfill desired learning objectives.

Terry P. Vendlinski

SRI International, Menlo Park, California

Room 106

124

Student and Teacher Assessment of Problem Difficulty**Discussion Session**

We assessed secondary school students' understanding of linear functions and their teachers' understanding of student difficulties. Teachers could not identify the most difficult problems for students or the nature of the difficulties. Students were better at identifying their difficulties than were their teachers.

Valentina Postelnicu

Arizona State University, Mesa, Arizona

Carole E. Greenes

Arizona State University, Mesa, Arizona

Room 107/109

125

The Life of a *JRME* Manuscript, through Three Lenses**Discussion Session**

See how journal reviewers and the editor generate feedback for a manuscript—and how to best use the feedback in a resubmission. Members of the editorial staff and editorial panel of the *Journal for Research in Mathematics Education* will show the stages in the life of a manuscript.

Natasha Speer

University of Maine, Orono, Maine

Cynthia Langrall

Illinois State University, Normal, Illinois

Andrew Izsak

University of Georgia, Athens, Georgia

Anderson Norton

Virginia Tech, Blacksburg, Virginia

David Stinson

Georgia State University, Atlanta, Georgia

Karen Graham

University of New Hampshire, Durham, New Hampshire

David Barnes

National Council of Teachers of Mathematics, Reston, Virginia

Room 108

126

Using Research to Make a Difference**Plenary Session**

In recent years I have come to realize that producing research knowledge is not enough to make changes in math classrooms. In this presentation I will describe a journey I have been on over recent years that has involved working with politicians, journalists, film makers, and others.

Jo Boaler

Stanford University, Stanford, California

Rooms 205/207

127

Brilliance of Black Children in Mathematics: Toward New Discourse**Research Symposium**

Move beyond the numbers of aggregated “achievement gap” data and toward new discourse about black children and mathematics. We bring together a collection of mathematics educators who begin with the brilliance of black children in mathematics as the starting point in their analysis.

David W. Stinson

Georgia State University, Atlanta, Georgia

Robert Q. Berry

University of Virginia, Charlottesville, Virginia

Oren L. McClain

University of Virginia, Charlottesville, Virginia

Nicole M. Russell

University of Denver, Denver, Colorado

Lou Matthews

Bermuda Ministry of Education, St. David's, Bermuda

Yolanda Parker

University of Texas at Arlington, Arlington, Texas

Shelly M. Jones

Central Connecticut State University, New Britain, Connecticut

Christopher Jett

University of West Georgia, Carrollton, Georgia

Discussants:

Jacqueline Leonard

University of Wyoming, Laramie, Wyoming

Brian Williams

Georgia State University, Atlanta, Georgia

Room 102

128

Elementary Teacher and Student Learning about Generalization and Proof**Research Symposium**

We describe professional development to help teachers integrate a focus on the behavior of the operations into their instruction. We report on teacher and student learning that resulted from this approach and raise the question, What are the elements, content, and structures of the professional development that might account for such learning?

Susan Jo Russell

TERC, Cambridge, Massachusetts

Megan Franke

University of California, Los Angeles, Los Angeles, California

Deborah Schifter

Education Development Center, Waltham, Massachusetts

Virginia Bastable

Mount Holyoke College, South Hadley, Massachusetts

Discussants:**Linda Davenport**

Boston Public Schools, Boston, Massachusetts

Vicki Jacobs

University of North Carolina at Greensboro, Greensboro, North Carolina

Rooms 205/207

129

Interactive Paper Session**How Do K–8 Teachers Change Their Practices after Learning More Mathematics?**

This study investigates the complex relationships among teachers' knowledge, beliefs, and instruction based on data collected from 21 in-service teachers for 4 years. The results shed light on which aspects of instructional practices are most closely related to teacher knowledge and which are related to teachers' beliefs, as opposed to (or in addition to) their mathematical knowledge.

Yasemin Copur-Gencturk

Rice University, Houston, Texas

Ritual: A Category for Understanding Persistent Practices in Math Education

This session describes a theoretical study concerning the persistence of practices in math classrooms while also contributing to a theory of rituals in math education. Considering math classrooms as cultural spaces, I propose the analytic category of ritual for gaining insights about the persistence of some common practices.

Andrea McCloskey

Penn State University, University Park, Pennsylvania

Young Latinas and Their Construction of Successful Mathematical Identities

This study examines the mathematical identity construction by successful Latina middle graders and connects it with their schooling experiences. We found a constant negotiation between contrasting narratives and argue this negotiation could be a reason to opt out of science, technology, engineering, and mathematics careers.

Paula Guerra

Kennesaw State University, Kennesaw, Georgia

Presider: Zandra de Araujo

University of Missouri, Columbia, Missouri

Room 110/112

130

Interactive Paper Session

Supporting Students' Early Development of Multiplicative Structures

We reported students' early development of multiplicative structures through instructional support on fair-sharing tasks. A teaching experiment was conducted in a regular classroom before introducing multiplication. Some students were competent in comparing a fairly shared whole or collection to one share multiplicatively. Implications concerning Common Core State Standards implementation and research will be discussed.

Kosze Lee

North Carolina State University, Raleigh, North Carolina

Nicole Panorkou

North Carolina State University, Raleigh, North Carolina

Additional Authors: Nicole Panorkou

North Carolina State University, Raleigh, North Carolina

Jere Confrey

North Carolina State University, Raleigh, North Carolina

Andrew Corley

North Carolina State University, Raleigh, North Carolina

Kenny Nguyen

Catlin Gabel School, Portland, Oregon

Alan Maloney

North Carolina State University, Raleigh, North Carolina

Paths to Becoming Teacher Leaders in Elementary Mathematics

Few elementary teachers choose mathematics as their subject of interest, so what is different about elementary teachers who do become mathematics teacher leaders? By gaining insight into their paths towards leadership positions, we might find ways to identify, empower, and support new leaders for the benefit of all teachers.

Lynn McGarvey

University of Alberta, Edmonton, Canada

Gladys Sterenberg

University of Alberta, Edmonton, Canada

A Transition from Additive to Multiplicative Thinking: Unit Confusion

A cross-sectional study embedded within classroom instruction investigated transitions in multiplicative thinking. Reported here is one of four themes: unit confusion, what is conjectured to be a natural yet messy transition in the coordination of units. Results are from the teaching experiment pre and post interviews.

James Brickwedde

Hamline University, St. Paul, Minnesota

President: Dorothy Y. White

University of Georgia, Athens, Georgia

Room 201

131

Interactive Paper Session

Modeling Change in In-Service Teachers' Mathematical Knowledge for Teaching

This longitudinal study used measures of mathematical knowledge for teaching targeting multiplicative reasoning topics to investigate how middle-grades in-service teachers' knowledge growth is affected by grade-level experience, collegial activity focused on student thinking (e.g., discussing student work examples), and certification route.

Erik Jacobson

University of Georgia, Athens, Georgia

Novice Middle School Teachers' Development of Discussion

The study discusses findings and implications of a study of novice middle school mathematics teachers placed in historically low-performing schools serving low-income students. The teachers engaged in a reflective teaching cycle focused on developing student discussion. Teachers discussed strategies to promote student discussion and the dilemmas associated with implementing these strategies.

Emily Yanisko

University of Maryland, College Park, Maryland

(Session 131 continued)

Negotiating Authority: An Analysis of Teacher Discourse Moves

In this analysis, I examine teachers' discourse moves to understand the ways teachers negotiate authority, particularly mathematical authority, during instruction. I present three case studies of beginning middle school mathematics teachers and their instructional practices to underscore ways the classroom communication system mediates learning.

Enakshi Bose

University of Pennsylvania, Philadelphia, Pennsylvania

President: Corey M. Webel

Montclair State University, Montclair, New Jersey

Room 203

132

Reasoning with Discrete and Continuous Images of Quantity

Discussion Session

Explore theoretical and practical considerations in supporting students' quantitative reasoning (QR), focusing on students' discrete and continuous images of quantity. Learn of distinctions between conceptions of change in quantities, roles of students' images in coming to understand function, and task design supporting students' QR.

Heather Lynn Johnson

University of Colorado Denver, Denver, Colorado

Carlos Castillo-Garsow

Kansas State University, Manhattan, Kansas

Kevin C. Moore

University of Georgia, Athens, Georgia

Erik Tillema

IU School of Education at Indianapolis, Indianapolis, Indiana

Amy Ellis

University of Wisconsin–Madison, Madison, Wisconsin

Room 106

133

Reflecting Ability and Noticing Students' Thinking: What Does It Take?

Research Symposium

We discuss an innovative approach to an elementary field experience and report on the nature of preservice teachers' abilities to reflect on practice and notice student thinking. Explore the effect of this approach on preservice teachers' reflective abilities and their ability to pursue student thinking.

Enrique Galindo

Indiana University, Bloomington, Indiana

Julie Amador

University of Idaho, Coeur d'Alene, Idaho

Rick A. Hudson

University of Southern Indiana, Evansville, Indiana

Ingrid Weiland

University of Louisville, Louisville, Kentucky

Mi Yeon Lee

Indiana University, Bloomington, Indiana

Samuel K. Tsegai

Winona State University, Winona, Minnesota

Kai-Ju Yang

Indiana University, Bloomington, Indiana

Discussant: Anderson Norton

Virginia Tech, Blacksburg, Virginia

Room 104

134

Student Mathematical Problem-Solving Conversation at an Informal Site

Discussion Session

The LiveScribe Pen is a technology tool that, while writing on a dot paper, links everything heard to everything written. See how we used the LiveScribe Pen to collect data in an informal setting. We also suggest approaches to collect and analyze data.

Gorjana Popovic

Illinois Institute of Technology, Chicago, Illinois

Joy Kubarek-Sandor

John G. Shedd Aquarium, Chicago, Illinois

Room 111/113

135

Supporting Math Leaders Learning Facilitation: Developing a Research Agenda

Discussion Session

We share insights emerging from two professional development (PD) leader projects on the demands that advancing teachers' core math ideas raises for PD facilitators. By examining features and findings of the projects, you will consider designs for leader development and synthesize ideas to refine a PD leader research agenda.

Rebekah Elliott

Oregon State University, Corvallis, Oregon

Kristin Lesseig

Washington State University Vancouver, Vancouver, Washington

Nanette Seago

WestEd, San Francisco, California

Elham Kazemi

University of Washington, Seattle, Washington

Cathy Carroll

WestEd, Redwood City, California

Matthew Campbell

Oregon State University, Corvallis, Oregon

Megan Kelley-Petersen

University of Washington, Seattle, Washington

Room 107/109

136

Teacher Mathematics as Floor and Ceiling for Classroom Opportunities

Research Symposium

The empirical papers augment research on teacher knowledge with an approach that privileges mathematical activity with implications for professional development. Teacher understanding might be a ceiling that constrains classroom opportunities or a floor that supports classroom mathematics given pedagogical foci and school setting.

Rose Mary Zbiek

Pennsylvania State University, University Park, Pennsylvania

M. Kathleen Heid

Pennsylvania State University, University Park, Pennsylvania

Glen Blume

Pennsylvania State University, University Park, Pennsylvania

Discussant: Margaret Schwan Smith

University of Pittsburgh, Pittsburgh, Pennsylvania

Room 103

137

Turning Your Research into an Article for Teachers

Discussion Session

Explore ways to publish your research in one of the NCTM practitioner journals, to be read and used by teachers. Work with this year's award-winning authors and journal editors to develop your ideas for articles.

Members of the Editorial Panels of *Teaching Children Mathematics*, *Mathematics Teaching in the Middle School*, and *Mathematics Teacher*.

Room 108

138

Using Curriculum Materials to Design and Enact instruction

Research Symposium

Explore research findings aimed at using mathematics curriculum resources effectively to design and enact instruction. We focus on the design demands of curriculum use and the capacities needed to meet these demands from four different angles.

Janine T. Remillard

University of Pennsylvania, Philadelphia, Pennsylvania

Ok-Kyeong Kim

Western Michigan University, Kalamazoo, Michigan

Luke Reinke

University of Pennsylvania, Philadelphia, Pennsylvania

Naphtalin A. Atanga

Western Michigan University, Kalamazoo, Michigan

Joshua Taton

University of Pennsylvania, Philadelphia, Pennsylvania

Dustin O. Smith

Western Michigan University, Kalamazoo, Michigan

Hendrik Van Steenbrugge

Gent University, Gent, Belgium

Shari Lewis

Aquinas College, Grand Rapids, Michigan

Room 105

139

Analyzing Learning Trajectories in Grades K–2 Children’s Understanding of Functions

Discussion Session

Examine learning trajectories in grades K–2 children’s thinking about functions. Compare sequences of video and written data for consistency with trajectories we developed, focusing on children’s understanding of covariation and use of representations.

Maria Blanton

TERC, Cambridge, Massachusetts

Barbara M. Brizuela

Tufts University, Medford, Massachusetts

Angela Murphy Gardiner

TERC, Cambridge, Massachusetts

Katie Sawrey

Tufts University, Medford, Massachusetts

Brian Gravel

Tufts University, Medford, Massachusetts

Room 107/109

140

Building Scholarly Inquiry and Practices for Mathematics Methods Courses

Research Symposium

We focus on syntheses of research exploring activities mathematics teacher educators (MTEs) use with prospective teachers in mathematics methods courses. Reports share descriptions of activities, implementation, and teacher development. We will discuss research underpinnings for MTEs’ practices and inquiry into such practices.

Signe Kastberg

Purdue University, West Lafayette, Indiana

Wendy B. Sanchez

Kennesaw State University, Kennesaw, Georgia

Andrew Tyminski

Clemson University, Clemson, South Carolina

Discussant: Denise A. Spangler

University of Georgia, Athens, Georgia

Room 102

141

How Does Example Use Influence Conjecturing and Proving?

Research Symposium

While students struggle with proof, research on mathematicians' reasoning shows the value of strategic example use to support proof development. Thus, example exploration could potentially foster students' proving. We share four projects studying example use to support proof across grade bands and expertise levels.

Amy Ellis

University of Wisconsin–Madison, Madison, Wisconsin

Elise Lockwood

University of Wisconsin–Madison, Madison, Wisconsin

Orit Zaslavsky

New York University, New York, New York

Orly Buchbinder

University of Maryland, College Park, Maryland

Pooneh Sabouri

New York University, New York, Wisconsin

Caroline Williams

University of Wisconsin–Madison, Madison, Wisconsin

Muhammed Fatih Dogan

University of Wisconsin–Madison, Madison, Wisconsin

Eric Knuth

University of Wisconsin–Madison, Madison, Wisconsin

Discussant: Hymann Bass

University of Michigan, Ann Arbor, Wisconsin

Room 103

142

Interactive Paper Session

Developing Mathematical Knowledge for Teaching in Practice

Our study aims to investigate what teacher educators can do to support novice teachers in acquiring and using mathematical knowledge for teaching in their work with children. We investigate this question in the context rehearsal, which involves novices in publicly and purposefully practicing the work of teaching using particular instructional activities with guided feedback from the teacher educator.

Hala Ghouseini

University of Wisconsin, Madison, Wisconsin

Sarah Lord

University of Wisconsin, Madison, Wisconsin

Actions a Math Teacher Educator Employs during Whole-Group Instruction

We know very little about the practices of mathematics teacher educators because these practices are not widely researched or disseminated. The identified actions one educator employed in her elementary math content/methods course that provided the opportunity for prospective teachers to improve their knowledge of student understanding will be reported.

Cynthia Taylor

Millersville University of Pennsylvania, Millersville, Pennsylvania

Teaching to Teach without Having Taught: New Mathematics Teacher Educators

Data from surveys and focus-group interviews was used to study new mathematics teacher educators' beliefs about their preparation for a career in academe. This work explores the experiences of respondents who are responsible for preparing elementary teachers yet who have not themselves had much (or any) experience teaching elementary-aged children.

Rachael Welder

Hunter College, New York, New York

Andrea McCloskey

Penn State University, University Park, Pennsylvania

Presenter: Kevin C. Moore

University of Georgia, Athens, Georgia

Room 203

143

Interactive Paper Session

Connecting Teacher Understanding of Mathematics and Classroom Opportunities

A case study of a beginning secondary mathematics teacher illustrates how the teacher's understanding of mathematics supports her augmenting representations, symbolic sense, and potential justifications and enhances students' mathematical opportunities in lessons required to focus on procedures.

Kim Johnson

Pennsylvania State University, University Park, Pennsylvania

Additional Authors: Rose Zbiek

Pennsylvania State University, University Park, Pennsylvania

Fernanda Bonafini

Pennsylvania State University, University Park, Pennsylvania

Donna Kinol

Pennsylvania State University, University Park, Pennsylvania

Tenille Cannon

Pennsylvania State University, University Park, Pennsylvania

Conceptual Metaphors of Problem Solving: Listening for Experiences

By introducing the linguistic tool of conceptual metaphor, students and teachers articulated a system of shared experiences for problem solving. Instead of defining problem solving globally, this study shows how conceptual metaphor theory locally defines problem solving to give students a voice, help teachers actively listen, and offer researchers a novel hermeneutic methodology.

Sean Yee

California State University, Fullerton, Fullerton, California

Piloting Online Professional Development for Facilitating the Common Core

This presentation describes an initial pilot of an online professional development experience for secondary math teachers in facilitating the Common Core practice standards. Results suggested some promise for using interactive media for professional development, as well as lessons for improvement.

Karl Kosko

Kent State University, Kent, Ohio

Vu Minh Chieu

University of Michigan, Ann Arbor, Michigan

Presenter: Dawn Teuscher

Brigham Young University, Provo, Utah

Room 110/112

144

Interactive Paper Session

Preservice Teachers Leverage Children's Multiple Math Knowledge Bases

Effective mathematics instruction requires attention not only to children's mathematical thinking but also to their cultural, linguistic, and home- and community-based knowledge and experiences. In this session, we describe how case study methods supported 76 preservice teachers in leveraging knowledge of students' multiple mathematical knowledge bases in suggestions for future instruction.

Erin Turner

University of Arizona, Tucson, Arizona

Mary Foote

Queens College, CUNY, Flushing, New York

Kathy Stoehr

University of Arizona, Tucson, Arizona

Amy Roth McDuffie

Washington State University Tri-Cities, Richland, Washington

Additional Authors: Julia Aguirre

University of Washington–Tacoma, Tacoma, Washington

Tonya Bartell

Michigan State University, East Lansing, Michigan

Corey Drake

Michigan State University, East Lansing, Michigan

(continued on next page)

(Session 144 continued)

Investigating Teacher Discourse Following Students' Mathematics Difficulty

This research analyzes responses middle school mathematics teachers offer when their students encounter difficulty during collaborative mathematical problem solving. Teachers' retrospective reflections add insight regarding factors contributing to their response decisions, including ways in which their interventions address particular student and contextual variables.

Evelyn Seeve

Rutgers, The State University of New Jersey, New Brunswick, New Jersey

Making the Most of Methodological Decisions

Methodological decisions can maximize what can be investigated and learned in a research effort. Benefits of three methodological decisions will be shared from a study examining effects on teachers, teaching, and students following middle-grades teachers' participation in a 40-hour professional development program on geometric thinking.

Daniel Heck

Horizon Research, Chapel Hill, North Carolina

Mark Driscoll

Education Development Center, Waltham, Massachusetts

Kristen Malzahn

Horizon Research, Chapel Hill, North Carolina

Additional Authors: Johannah Nikula

Education Development Center, Waltham, Massachusetts

Rachel DiMateo

Education Development Center, Waltham, Massachusetts

Evelyn Gordon

Horizon Research, Chapel Hill, North Carolina

President: Erin Elizabeth Krupa

Montclair State University, Montclair, New Jersey

Room 201

145**Measuring Mathematical Knowledge for Teaching****Discussion Session**

Explore results from three validity studies of MKT measures developed for the Measures of Effective Teaching project. We share an insider's view by sharing sample items for work and discussion, and we facilitate discussion of strengths and weaknesses of item design, the validity evidence, and proposed uses of the measures.

Heather Howell

Educational Testing Service, Princeton, New Jersey

Barbara Weren

Educational Testing Service, Princeton, New Jersey

Geoffrey Phelps

Educational Testing Service, Princeton, New Jersey

Room 111/113

146**Pushing Symbols: An Intervention to Increase Understanding of Algebraic Notation****Discussion Session**

Meet Pushing Symbols, a middle-grades algebra intervention that engages students with the visual structure of notation by physically and dynamically interacting with algebraic expressions. See video clips and explore components of the intervention, including manipulatives and an iPad application.

Taylyn Hulse

University of Richmond, Richmond, Virginia

Jaclyn Pierce

University of Richmond, Richmond, Virginia

David Landy

University of Richmond, Richmond, Virginia

Room 106

147

Research Insights from the 12th International Congress on Mathematical Education

Research Symposium

The session will highlight results from ICME-12 Survey Teams with focus on research related to curriculum content, goals, and implementation, gaps between research and practice, and professional development models for strengthening teacher knowledge. Discussion will consider implications of international practices for our work as educators in the U.S.

Gail Burrill

Michigan State University, East Lansing, Michigan

Shannon M. Larsen

University of Maine at Farmington, Farmington, Maine

Janet Stramel

Fort Hays State University, Fort Hays, Kansas

Discussant: J. Michael Shaughnessy

Portland State University, Portland, Oregon

Room 105

148

Synthesizing Assessment Research from the International Congress on Mathematic Education

Research Symposium

We synthesize research findings from ICME-12 around how we can improve the way teachers develop and use tasks and corresponding data to more closely connect instructional and assessment practices. Each paper frames the international context and research, offering ways that these can guide future U.S. research and practice.

David C. Webb

Center for Assessment, Austin, Texas

Pamela L. Paek

Center for Assessment, Austin, Texas

Anne M. Collins

Lesley University, Cambridge, Massachusetts

Discussant: Guillermo Solano-Flores

University of Colorado at Boulder, Boulder, Colorado

Room 104

149

Teaching and Learning Mathematics in Virtual Environments

Research Symposium

Two projects discuss the quality of instructional materials for teaching and learning mathematics in three computer-mediated environments (virtual schools, curriculum supplements, and Web-based educational programs). We will share revisions to the tasks and instructional materials to increase cognitive demand.

Melissa D. Boston

Duquesne University, Pittsburgh, Pennsylvania

Mary Kay Stein

University of Pittsburgh, Pittsburgh, Pennsylvania

Aaron Kessler

University of Pittsburgh, Pittsburgh, Pennsylvania

Theresa Henderson

Duquesne University, Pittsburgh, Pennsylvania

Ahmet Akcay

Duquesne University, Pittsburgh, Pennsylvania

Rooms 205/207

Index of Speakers

Aaron, Wendy	79, 3	Borko, Hilda	65
Adair, Mindy	10	Bose, Enakshi	111, 131
Adrefs, Michelle	60	Boston, Melissa	82, 149
Aguirre, Julia	144	Bray, Wendy	96
Akcay, Ahmet	149	Brett, Pamela	31, 63
Akhavan, Sepehr	54	Briars, Diane	68
Amador, Julie	133	Brickwedde, James	130
An, Song	90	Brizuela, Barbara	139, 113, 8, 66
Anderson, Ann	2	Bruce, Catherine	60
Anderson, Judy	67	Brunaud-Vega, Victor	84
Anderson, Katie	62	Buchbinder, Orly	79, 141
Anderson, LaToya	14	Burke, James	51
Anderson-Dyben, Stephenie	20	Burrill, Gail	147
Ansell, Ellen	12	Butler, Lori	63
Appelgate, Mollie	43	Caddle, Mary	66
Arleback, Jonas	110	Campbell, Matthew	135
Armstrong, Alayne	2	Cannon, Tenille	143
Atanga, Naphtalin	138	Capraro, Robert	92
Avineri, Tamar	59	Cardetti, Fabiana	120
Bahr, Damon	108, 54	Carreras-Jusino, Angel	81
Baker, Joe	62	Carroll, Cathy	135
Ball, Deborah	71, 115	Castillo-Garsow, Carlos	132
Barlow, Angela	119	Castro Superfine, Alison	68
Barnes, David	125	Cayton, Charity	77
Barrett, Jeffrey	117	Chaar, May	61
Bartell, Tonya	144	Chan, Yip Cheunk	119
Bass, Hymann	141	Chang, Briana	9
Bastable, Virginia	128	Chazan, Daniel	79
Battista, Michael	46	Chedister, Matthew	1
Bauer, Malcolm	74	Chen, Jie-Qi	75
Bautista, Alfredo	66, 113	Chieu, Vu Minh	143
Baxter, Juliet	86	Chu, Haiwen	118
Baxter, Wesley	119	Chval, Kathryn	44, 48, 44
Beckmann, Sybilla	51	Clements, Douglas	70, 117
Beghetto, Ronald	86	Cline, Laura	72
Berk, Dawn	72	Collett, Jennifer	115
Berkaliev, Zaur	75	Collins, Anne	148
Berry, Robert	61, 54, 127	Confrey, Jere	59, 130
Blanton, Maria	8, 139	Conner, AnnaMarie	95
Bleiler, Sarah	107	Cook, H.	44
Blume, Glen	116, 136	Copur-Gencturk, Yasemin	55, 129
Boaler, Jo	126	Corley, Andrew	59, 130
Boerst, Timothy	112, 71	Coulson, Andrew	54
Bonafini, Fernanda	143	Cramer, Kathleen	83
Borgioli-Yoder, Gina	55	Cromley, Jennifer	9

Index of Session Participants *(continued)*

Name	Presentation Number	Name	Presentation Number
Cullen, Craig	117	Fukawa-Connelly, Timothy	43
Cuoco, Al	38	Gaddy, Angeline	119
Daro, Phil	68	Galindo, Enrique	133, 55
Davenport, Linda	128	Gallivan, Heather	72
Davis, Brent	60	Gardiner, Angela	8, 139
Davis, Trina	14	Gearhart, Maryl	115
de Araujo, Zandra	129, 45	Geddings, Debra	26
De Kirby, Kenton	115	Gellert, Laura	58
Decker, Lisa	120	Gerardo, Juan	121
DeJarnette, Anna	121, 97	Gholson, Maisie	122, 63
Diakow, Ronli	115	Ghousseini, Hala	142
Dietz, Richelle	42	Gibbons, Lynsey	64
DiMateo, Rachel	144	Gilbert, Barbara	63
Dimmel, Justin	3, 79	Gilbert, Michael	63
Ding, Lin	27	Ginsburg, Lynda	29
Ding, Meixia	37	Gleason, Brian	43
Dobie, Tracy	103	Gonzalez, Dario	81
Dogan, Muhammed	6, 141	Gonzalez, Gloriana	121
Dominguez, Higinio	28	Gordon, Evelyn	48, 144
Dougherty, Barbara	40, 75	Graham, Karen	43
Drake, Corey	144	Graham, Robert	58
Driscoll, Mark	144	Grant, Rosalie	44
Druken, Bridget	93	Gravel, Brian	139, 8
Eames, Cheryl	117	Graves, Barbara	47
Ebby, Caroline	119	Greenes, Carole	124
Ebert, Olga	34	Griffin, Valerie	94
Edgington, Cyndi	57	Gucler, Beste	41
Edwards, Ann	118	Guerra, Paula	114, 129
Edwards, Laurie	50	Gutiérrez, Rochelle	121
Edwards, Thomas	42	Hagen, Caroline	52
Elliott, Rebekah	135	Hagen, Pamela	2
Ellis, Amy	132, 141	Han, Xue	37
Ely, Robert	137	Hartman, Sara	17.1
Erickson, Ander	79, 3	He, Jia	27
Estrada-Keith, Norma	11	Heck, Daniel	73, 48, 120, 144
Farmer, Jeff	10	Heid, M. Kathleen	136
Feldman, Ziv	17	Henderson, Theresa	149
Finkelstein, Noah	56	Herbel-Eisenmann, Beth	57, 80, 121
Foegen, Anne	40	Herbst, Pat	79, 3
Fonger, Nicole	73	Hertel, Joshua	21
Fonkert, Karen	53	Heuvel-Panhuizen, Marja	67
Foote, Mary	144	Heyman, Sharon	120
Fox, Ryan	98	Hiebert, James	39, 72
Francis, Krista	60	Hoe, Nina	80
Franke, Megan	71, 128	Hollebrands, Karen	77, 53, 77
Fredenberg, Mike	93	Holstein, Krista	42
Fueyo, Vivian	53		

Index of Session Participants (*continued*)

Name	Presentation Number	Name	Presentation Number
Holzman, Jodi	10	Kulm, Gerald	37, 14
Howell, Heather	145	Lambdin, Diana	82
Howell, Tracey	32	Lande, Elaine	121
Huang, Rongjin	37, 119	Landy, David	146
Hudson, Rick	133	Lang, Laura	49
Hulse, Taylyn	146	Langrall, Cynthia	125
Id-Deen, Lateefah	122	Larnell, Gregory	122
Isler, Isil	99	Larsen, Shannon	147
Izsak, Andrew	51	Laursen, Sandra	56
Jacobs, Vicki	128, 57	Lavenia, Mark	49
Jacobson, Erik	51, 131	Law, Huk-Yuen	119
Jansen, Amanda	72	Le, Marie	115
Jett, Christopher	127	Lee, Hollylynn	77
Johnson, Heather	132	Lee, Jean	55
Johnson, Kate	121	Lee, Kosze	46, 59, 130
Johnson, Kim	143	Lee, Mi Yeon	133
Jones, Nathan	54	Lee, Ngan Hoe	67
Jones, Shelly	127	Leonard, Jacqueline	127
Jordan, Kerry	62	Lesseig, Kristin	135, 52
Joy Kubarek-Sandor, Joy	134	Leveille Buchanan, Nicole	115
Kane, Britnie	64	Lewis, Chance	14
Kang, Bona	115	Lewis, Shari	138
Kang, Hyun Jung	102	Li, Yeping	37, 67
Kara, Melike	117	Lim, Woong	114
Karakok, Gulden	20	Linder, Sandra	24
Kastberg, Signe	140	Lischka, Alyson	43
Kazemi, Elham	135	Liu, Shuangshuang	54
Keazer, Lindsay	80	Lockwood, Elise	141
Keene, Karen	42	Lord, Sarah	142
Kelley-Petersen, Megan	135	Lotter, Christine	120
Kersaint, Gladis	82	Louie, Josephine	80
Kessler, Aaron	149	Lu, Lianfang	89
Khaliqi, David	120	Lynn, James	68
Khasanova, Elvira	70	Ma, Tingting	14
Kim, Dong-Joong	41	MacDonald, Rita	44
Kim, Hyung	43	Machmer-Wessels, Keely	61
Kim, Ok-Kyeong	138	Males, Lorraine	46
Kinol, Donna	143	Maloney, Alan	59, 130
Kisa, Zahid	54	Malzahn, Kristen	48, 144
Kloosterman, Peter	116	Mark, June	80
Knuth, Eric	141	Marle, Peter	120
Ko, Yi-Yin	52	Martin, Catherine	10, 80
Konold, Clifford	76, 63	Martinez, Mara	68
Kosko, Karl	79, 143	Marum, Timothy	99
Kotlawala, Usha	58	Massey, Christine	78
Krajcevski, Mile	107	Masters-Goffney, Imani	45
Krupa, Erin	144, 118, 55	Matsuura, Ryota	38

Index of Session Participants *(continued)*

Name	Presentation Number	Name	Presentation Number
Matthews, Lou	127	Olson, Melfried	78
Matthews, Mary Elizabeth	13	O’Neil, AnnMarie	110
McCallum, William	39	Orrill, Chandra	51
McClain, Oren	127	Ortiz, Enrique	7
McCloskey, Andrea	129	Otten, Samuel	119
McCray, Jennifer	75	Ottmar, Erin	146
McCrone, Sharon	43	Paddack, Megan	52
McCulloch, Allison	77	Paek, Pamela	148, 54
McGarvey, Lynn	130	Panorkou, Nicole	59, 130
McGinn, Kelly	25	Papakonstantinou, Anne	55
McGowan, William	59	Pape, Stephen	33, 94
McLellan, Sylvia	2	Park, Jaime	43
Meier, Ellen	88	Parker, Yolanda	127
Meikle, Erin	72	Parr, Richard	55
Mercado, Janet	23	Peck, Frederick	100
Mesa, Vilma	121	Perez, Arnulfo	116
Middleton, James	102	Peters, Greet	85
Miller, Amanda	117	Pfaff, Erin	64
Miller, Emily	72	Phakiti, Aek	44
Mitchell, Kara	87	Phelps, Geoffrey	145, 54
Mohr, Doris	116	Piecham, Mary Beth	38
Mohr, Sonja	23	Pierce, Jaclyn	146
Monroe, Eula	108	Pimm, David	121
Moore, Kevin	142, 132	Pitvorec, Kathleen	44
Moore, Tamara	83	Poirier, Natalie	2
Moore II, James	56	Popovic, Gorjana	134
Morris, Anne	72	Portnoy, Neil	43
Moss, Joan	60	Postelnicu, Valentina	124
Moyer-Packenham, Patricia	62	Radinsky, Josh	63
Munter, Charles	39	Rashid, Hanin	29
Murray, Eileen	81	Rasmussen, Chris	43, 62, 56
Myers, Marrielle	57	Reiber, Allegra	10
Nathan, Mitchell	50	Reinke, Luke	138
Nelson, Courtney	48	Remillard, Janine	138, 111
Nemirovsky, Ricardo	50	Reys, Barbara	78
Newman-Owens, Ashley	8	Ricks, Thomas	89, 37
Nguyen, Kenny	130	Rino, Joseph	54
Nikula, Johannah	144	Roach, Michael	116
Norton, Anderson	133	Roberts, Sarah	109
Norwood, Karen	42	Rodzon, Kati	62
Oberlin, Maureen	49	Ross, Kathleen	118
Oettinger, Andrea	119	Rossman, Cathleen	63
Offenholley, Kathleen	58	Roth McDuffie, Amy	144
Okamoto, Yukari	60	Roy, George	53
Oloff-Lewis, Jennifer	16	Rubel, Laurie	118
Olson, Jeannette	40	Russell, Nicole	87, 10, 127
Olson, Judith	78	Russell, Susan Jo	128

Index of Session Participants (*continued*)

Name	Presentation Number	Name	Presentation Number
Sabouri, Pooneh	141	Stephens, Ana	99
Sahin, Alpaslan	92	Stenberg, Gladys	130
Salinas, Alejandra	119	Stevens, Glenn	38
Sanchez Leal, Lina	101, 63	Stinson, David	127, 57
Sanchez, Rita	88	Stockero, Shari	65, 45
Sanchez, Wendy	140	Stockton, Julianna	15
Santagata, Rossella	23, 65	Stoehr, Kathy	144
Sarama, Julie	117, 70	Stoelinga, Timothy	68
Sawrey, Katie	8, 139	Stohlmann, Micah	83
Saxe, Geoffrey	115	Stramel, Janet	147
Schifter, Deborah	128	Strayer, Jeremy	77
Schneider, Cynthia	68	Sweeny, Shannon	5
Schoen, Robert	49	Switzer, John	61
Schorr, Roberta	63	Sword, Sarah	38
Seago, Nanette	135	Sztajn, Paola	57
Sears, Ruthmae	52	Tarr, James	75, 55
Seeve, Evelyn	144	Taton, Joshua	138
Senk, Sharon	67	Tatsuoka, Curtis	70
Shah, Niral	122	Tatsuoka, Kikumi	70
Sharma, Anu	33	Taylan, Didem	44
Sharpe, Sheree	66	Taylor, Cynthia	142
Shaughnessy, J. Michael	147	Taylor, Edd	103
Shaughnessy, Meghan	71	Terrell, Maria	73
Sherman, Milan	53	Teuscher, Dawn	143, 78
Shumway, Jessica	62	Thomas, Erin	45
Silverman, Jason	76	Thompson, Denisse	107, 73
Simpson, Amber	24	Thompson, Patrick	51
Sinclair, Nathalie	60, 41	Tillema, Erik	132
Singamaneni, Subha	40	Tobin, Roger	113
Singletary, Laura	95	Towers, Jo	60
Sloane, Finbarr	16	Tran, Dung	78
Slovin, Hannah	78	Truax, Julia	11
Smith, Dustin	138	Truxaw, Mary	120
Smith, Jack	46	Tsegai, Samuel	133
Smith, Margaret	136, 39, 82, 65	Tseng, Nancy	118
Smith, Ryan	95	Turner, Erin	144
Snider, Rachel	76	Tyminski, Andrew	140
Solano-Flores, Guillermo	148	Vahey, Phillip	53
Soto-Johnson, Hortensia	20, 50	Valoyes, Luz	44
Spain, Vickie	40	Van Dine, Douglas	117
Spangler, Denise	140, 82	Van Schooneveld, Jacqueline	111, 22
Sprague, Karen	86	Van Steenbrugge, Hendrik	138
Staples, Megan	120	Vendlinski, Terry	123
Steele, Michael	80	Venenciano, Linda	61
Stein, Marcy	39	Walcott, Crystal	116
Stein, Mary Kay	149, 39	Walker, Erica	45, 78
Steketee, Scott	77		

Index of Session Participants *(continued)*

Name	Presentation Number	Name	Presentation Number
Walkington, Candace	6, 53	Wills, Theodore	9
Wang, Sasha	41	Willson, Victor	92
Wasserman, Nicholas	15	Wilson, P. Holt	32, 57
Webb, David	148	Wylie, Caroline	74
Webel, Corey	106, 131	Yamakuchi, Jun-Ichi	84, 30
Weber, Eric	76	Yamakawa, Yukari	12
Webster, Megan	64	Yang, Kai-Ju	133
Weiland, Ingrid	133	Yanisko, Emily	131
Welder, Rachael	142	Yee, Sean	143
Weren, Barbara	145	Yeh, Cathery	91
Westenskow, Arla	62	Yopp, David	36
Weston, Tracy	69	Young, Hollie	118
White, Diana	26	Yow, Jan	26, 120
White, Dorothy	130, 84, 81	Yu, Yiting	73
Whitely, Walter	60	Yurtseven, Zeynep	42
Whitley, Blake	77	Zahner, William	104
Wilkerson-Jerde, Michelle	113	Zanten, Marc	67
Willey, Craig	44	Zaslavsky, Orit	141
Williams, Brian	127	Zbiek, Rose	136, 143
Williams, Caroline	141, 6	Zeichner, Kenneth	35
Williams, Kimberly	11	Zhang, Qiaoping	119
Williams, Maryellen	19	Zhang, Xiaochuan	54
Willis, Tiera	4		



© VISIT DENVER

Notes