Research Presession Planning Committee

NCTM Research Committee

James E. Tarr (2010–2013), Chair
University of Missouri

Chris L. Rasmussen (2010–2013)
San Diego State University

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

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

AERA–SIG/RME Executive Board

Dan Battey (2011–2013), Electronics
Rutgers University

Denise Spangler (2012–2014), Awards
University of Georgia

University of Maryland
• The Research Presession 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 Presession 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 Presession 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.
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
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 Presession. The Research Presession 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.
Monday, April 15

5:30 p.m.–6:45 p.m.

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

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

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
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*

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*
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 $4 \times 4$ 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
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*

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*
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
University of Pittsburgh, Pittsburgh, Pennsylvania

Ellen Ansell
University of Pittsburgh, Pittsburgh, Pennsylvania

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
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

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
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*

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*

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*
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


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
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*

---

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*

---

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*
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
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

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
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
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 Chaar  
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*

**Presider: Chris Rasmussen**
*San Diego State University, San Diego, California*
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*

**Presider: Kathryn B. Chval**  
*University of Missouri, Columbia, Missouri*

Room 201
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*

Presider: Erica Walker  
*Teachers College, New York, New York*
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*

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*
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

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
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
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

Presider: 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

Presider: Karen Hollebrands
North Carolina State University, Raleigh, North Carolina

Room 201
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*

**Presider: Robert Q. Berry**  
*University of Virginia, Charlottesville, Virginia*
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

Presider: 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
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*

**Presider: Robert Q. Berry**  
*University of Virginia, Charlottesville, Virginia*
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)
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

Presider: 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*

Presider: Clifford Konold  
*University of Massachusetts Amherst, Amherst, Massachusetts*
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

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
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
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

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
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
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 Berkaliev  
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

Presider: James Tarr  
University of Missouri–Columbia, Columbia, Missouri
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

Presider: 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

Presider: Karen Hollebrands
North Carolina State University, Raleigh, North Carolina

Room 111/113
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*

Presider: Erica Walker  
*Teachers College, New York, New York*
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*
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

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
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

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
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

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
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*  

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*  

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*
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

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

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
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

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
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

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

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
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

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

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
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

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
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*

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*
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
Wednesday, April 17

8:30 a.m.–10:00 a.m.

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
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.*

Presider: Erin Elizabeth Krupa  
*Montclair State University, Montclair, New Jersey*
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 Ebby

Andrea Oettinger
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*
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*

Presider: Daniel J. Heck  
*Horizon Research, Chapel Hill, North Carolina*

Room 203
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
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

Presider: Dorothy Y. White
University of Georgia, Athens, Georgia

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

(continued on next page)
(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

Presider: 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
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*
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

Napthalin 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
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*
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 of 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 Ghousseini  
*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*

Presider: 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*

Presider: Dawn Teuscher  
*Brigham Young University, Provo, Utah*

Room 110/112

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*

**Presider: Erin Elizabeth Krupa**
*Montclair State University, Montclair, New Jersey*
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 Mathematical 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
Adair, Mindy .........................................10
Adrefs, Michelle ......................................60
Aguirre, Julia .........................................144
Akcay, Ahmet .........................................149
Akhavan, Sepehr ......................................54
Amador, Katie .........................................62
Anderson, LaToya ....................................14
Anderson-Dyben, Stephenie .......................20
Ansell, Ellen ..........................................12
Appelgate, Mollie ....................................43
Arleback, Jonas .......................................110
Armstrong, Alayne ....................................2
Atanga, Naphatlin .....................................138
Avineri, Tamar ........................................59
Bahr, Damon ...........................................108, 54
Baker, Joe .............................................62
Ball, Deborah .........................................71, 115
Barlow, Angela .........................................119
Barnes, David .........................................125
Barrett, Jeffrey ........................................117
Bartell, Tonya ..........................................144
Bass, Hymann .........................................141
Bastable, Virginia ....................................128
Battista, Michael ......................................46
Bauer, Malcolm .......................................74
Bautista, Alfredo .....................................66, 113
Baxter, Juliet ..........................................86
Baxter, Wesley .........................................119
Beckmann, Sybilla ....................................51
Beghetto, Ronald ......................................86
Berk, Dawn ............................................72
Berkaliev, Zaur .......................................75
Berry, Robert .........................................61, 54, 127
Blanton, Maria .........................................8, 139
Bleiler, Sarah .........................................107
Blume, Glen ...........................................116, 136
Boaler, Jo ...............................................126
Boerst, Timothy ......................................112, 71
Bonafini, Fernanda ...................................143
Borgioli-Yoder, Gina .................................55
Borko, Hilda ...........................................65
Bose, Enakshi .........................................111, 131
Boston, Melissa .......................................82, 149
Bray, Wendy ...........................................96
Brett, Pamela ..........................................31, 63
Briars, Diane ..........................................68
Brickwedge, James ..................................130
Bruzuela, Barbara .....................................139, 113, 8, 66
Bruce, Catherine ......................................60
Brunaud-Vega, Victor .................................84
Buchbinder, Orly ......................................79, 141
Burke, James ..........................................51
Burrill, Gail ...........................................147
Butler, Lori ............................................63
Cadle, Mary ...........................................66
Campbell, Matthew ..................................135
Cannon, Tenille .......................................143
Capraro, Robert .......................................92
Cardetti, Fabiana .....................................120
Carreras-Jusino, Angel ...............................81
Carroll, Cathy .........................................135
Castillo-Garsow, Carlos ..............................132
Castro Superfine, Alison ..............................68
Cayton, Charity .......................................77
Chara, May .............................................61
Chan, Yip Cheunk .....................................119
Chang, Briana .........................................9
Chazan, Daniel ........................................79
Chedister, Matthew ...................................1
Chen, Jie-Qi ...........................................75
Chieu, Vu Minh .......................................143
Chu, Haiwen ..........................................118
Chval, Kathryn .........................................44, 48, 44
Clements, Douglas ....................................70, 117
Cline, Laura ...........................................72
Collett, Jennifer .......................................115
Collins, Anne .........................................148
Confrey, Jere ..........................................59, 130
Conner, AnnaMarie ...................................95
Cook, H ..................................................44
Copur-Genceturk, Yasemin ..........................55, 129
Corley, Andrew .......................................59, 130
Coulson, Andrew ......................................54
Cramer, Kathleen .....................................83
Cromley, Jennifer .....................................9
<table>
<thead>
<tr>
<th>Name</th>
<th>Presentation Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cullen, Craig</td>
<td>117</td>
</tr>
<tr>
<td>Cuoco, Al</td>
<td>38</td>
</tr>
<tr>
<td>Daro, Phil</td>
<td>68</td>
</tr>
<tr>
<td>Davenport, Linda</td>
<td>128</td>
</tr>
<tr>
<td>Davis, Brent</td>
<td>60</td>
</tr>
<tr>
<td>Davis, Trina</td>
<td>14</td>
</tr>
<tr>
<td>de Araujo, Zandra</td>
<td>129, 45</td>
</tr>
<tr>
<td>De Kirby, Kenton</td>
<td>115</td>
</tr>
<tr>
<td>Decker, Lisa</td>
<td>120</td>
</tr>
<tr>
<td>DeJarnette, Anna</td>
<td>121, 97</td>
</tr>
<tr>
<td>Diakow, Ronli</td>
<td>115</td>
</tr>
<tr>
<td>Dietz, Richelle</td>
<td>42</td>
</tr>
<tr>
<td>DiMateo, Rachel</td>
<td>144</td>
</tr>
<tr>
<td>Dimmel, Justin</td>
<td>3, 79</td>
</tr>
<tr>
<td>Ding, Lin</td>
<td>27</td>
</tr>
<tr>
<td>Ding, Meixia</td>
<td>37</td>
</tr>
<tr>
<td>Dobie, Tracy</td>
<td>103</td>
</tr>
<tr>
<td>Dogan, Muhammed</td>
<td>6, 141</td>
</tr>
<tr>
<td>Dominguez, Higinio</td>
<td>28</td>
</tr>
<tr>
<td>Dougherty, Barbara</td>
<td>40, 75</td>
</tr>
<tr>
<td>Drake, Corey</td>
<td>144</td>
</tr>
<tr>
<td>Driscoll, Mark</td>
<td>144</td>
</tr>
<tr>
<td>Drucken, Bridget</td>
<td>93</td>
</tr>
<tr>
<td>Eames, Cheryl</td>
<td>117</td>
</tr>
<tr>
<td>Ebby, Caroline</td>
<td>119</td>
</tr>
<tr>
<td>Ebert, Olga</td>
<td>34</td>
</tr>
<tr>
<td>Edgington, Cyndi</td>
<td>57</td>
</tr>
<tr>
<td>Edwards, Ann</td>
<td>118</td>
</tr>
<tr>
<td>Edwards, Laurie</td>
<td>50</td>
</tr>
<tr>
<td>Edwards, Thomas</td>
<td>42</td>
</tr>
<tr>
<td>Elliott, Rebekah</td>
<td>135</td>
</tr>
<tr>
<td>Ellis, Amy</td>
<td>132, 141</td>
</tr>
<tr>
<td>Ely, Robert</td>
<td>137</td>
</tr>
<tr>
<td>Erickson, Ander</td>
<td>79, 3</td>
</tr>
<tr>
<td>Estrada-Keith, Norma</td>
<td>11</td>
</tr>
<tr>
<td>Farmer, Jeff</td>
<td>10</td>
</tr>
<tr>
<td>Feldman, Ziv</td>
<td>17</td>
</tr>
<tr>
<td>Finkelstein, Noah</td>
<td>56</td>
</tr>
<tr>
<td>Foejen, Anne</td>
<td>40</td>
</tr>
<tr>
<td>Fonger, Nicole</td>
<td>73</td>
</tr>
<tr>
<td>Fonkert, Karen</td>
<td>53</td>
</tr>
<tr>
<td>Foote, Mary</td>
<td>144</td>
</tr>
<tr>
<td>Fox, Ryan</td>
<td>98</td>
</tr>
<tr>
<td>Francis, Krista</td>
<td>60</td>
</tr>
<tr>
<td>Franke, Megan</td>
<td>71, 128</td>
</tr>
<tr>
<td>Fredenberg, Mike</td>
<td>93</td>
</tr>
<tr>
<td>Fueyo, Vivian</td>
<td>53</td>
</tr>
<tr>
<td>Fukawa-Connelly, Timothy</td>
<td>43</td>
</tr>
<tr>
<td>Gaddy, Angeline</td>
<td>119</td>
</tr>
<tr>
<td>Galindo, Enrique</td>
<td>133, 55</td>
</tr>
<tr>
<td>Gallivan, Heather</td>
<td>72</td>
</tr>
<tr>
<td>Gardiner, Angela</td>
<td>8, 139</td>
</tr>
<tr>
<td>Gearhart, Mary</td>
<td>115</td>
</tr>
<tr>
<td>Geddings, Debra</td>
<td>26</td>
</tr>
<tr>
<td>Gellert, Laura</td>
<td>58</td>
</tr>
<tr>
<td>Gerardo, Juan</td>
<td>121</td>
</tr>
<tr>
<td>Gholson, Maisie</td>
<td>122, 63</td>
</tr>
<tr>
<td>Ghousseini, Hala</td>
<td>142</td>
</tr>
<tr>
<td>Gibbons, Lynsey</td>
<td>64</td>
</tr>
<tr>
<td>Gilbert, Barbara</td>
<td>63</td>
</tr>
<tr>
<td>Gilbert, Michael</td>
<td>63</td>
</tr>
<tr>
<td>Ginsburg, Lynda</td>
<td>29</td>
</tr>
<tr>
<td>Gleason, Brian</td>
<td>43</td>
</tr>
<tr>
<td>Gonzalez, Dario</td>
<td>81</td>
</tr>
<tr>
<td>Gonzalez, Gloriana</td>
<td>121</td>
</tr>
<tr>
<td>Gordon, Evelyn</td>
<td>48, 144</td>
</tr>
<tr>
<td>Graham, Karen</td>
<td>43</td>
</tr>
<tr>
<td>Graham, Robert</td>
<td>58</td>
</tr>
<tr>
<td>Grant, Rosalie</td>
<td>44</td>
</tr>
<tr>
<td>Gravel, Brian</td>
<td>139, 8</td>
</tr>
<tr>
<td>Graves, Barbara</td>
<td>47</td>
</tr>
<tr>
<td>Greenes, Carole</td>
<td>124</td>
</tr>
<tr>
<td>Griffin, Valerie</td>
<td>94</td>
</tr>
<tr>
<td>Gueler, Beste</td>
<td>41</td>
</tr>
<tr>
<td>Guerra, Paula</td>
<td>114, 129</td>
</tr>
<tr>
<td>Gutiérrez, Rochelle</td>
<td>121</td>
</tr>
<tr>
<td>Hagen, Caroline</td>
<td>52</td>
</tr>
<tr>
<td>Hagen, Pamela</td>
<td>2</td>
</tr>
<tr>
<td>Han, Xue</td>
<td>37</td>
</tr>
<tr>
<td>Hartman, Sara</td>
<td>17.1</td>
</tr>
<tr>
<td>He, Jia</td>
<td>27</td>
</tr>
<tr>
<td>Heck, Daniel</td>
<td>73, 48, 120, 144</td>
</tr>
<tr>
<td>Heid, M. Kathleen</td>
<td>136</td>
</tr>
<tr>
<td>Henderson, Theresa</td>
<td>149</td>
</tr>
<tr>
<td>Herbel-Eisenmann, Beth</td>
<td>57, 80, 121</td>
</tr>
<tr>
<td>Herbst, Pat</td>
<td>79, 3</td>
</tr>
<tr>
<td>Hertel, Joshua</td>
<td>21</td>
</tr>
<tr>
<td>Heyman-Panhuizen, Marja</td>
<td>67</td>
</tr>
<tr>
<td>Heyman, Sharon</td>
<td>120</td>
</tr>
<tr>
<td>Hiebert, James</td>
<td>39, 72</td>
</tr>
<tr>
<td>Hoe, Nina</td>
<td>80</td>
</tr>
<tr>
<td>Hollebrands, Karen</td>
<td>77, 53, 77</td>
</tr>
<tr>
<td>Holstein, Krista</td>
<td>42</td>
</tr>
<tr>
<td>Name</td>
<td>Presentation Number</td>
</tr>
<tr>
<td>--------------------------</td>
<td>---------------------</td>
</tr>
<tr>
<td>Holzman, Jodi</td>
<td>10</td>
</tr>
<tr>
<td>Howell, Heather</td>
<td>145</td>
</tr>
<tr>
<td>Howell, Tracey</td>
<td>32</td>
</tr>
<tr>
<td>Huang, Rongjin</td>
<td>37, 119</td>
</tr>
<tr>
<td>Hudson, Rick</td>
<td>133</td>
</tr>
<tr>
<td>Hulse, Taylyn</td>
<td>146</td>
</tr>
<tr>
<td>Id-Deen, Lateefah</td>
<td>122</td>
</tr>
<tr>
<td>Isler, Isil</td>
<td>99</td>
</tr>
<tr>
<td>Izsak, Andrew</td>
<td>51</td>
</tr>
<tr>
<td>Jacobs, Vicki</td>
<td>128, 57</td>
</tr>
<tr>
<td>Jacobson, Erik</td>
<td>51, 131</td>
</tr>
<tr>
<td>Jansen, Amanda</td>
<td>72</td>
</tr>
<tr>
<td>Jett, Christopher</td>
<td>127</td>
</tr>
<tr>
<td>Johnson, Heather</td>
<td>132</td>
</tr>
<tr>
<td>Johnson, Kate</td>
<td>121</td>
</tr>
<tr>
<td>Johnson, Kim</td>
<td>143</td>
</tr>
<tr>
<td>Jones, Nathan</td>
<td>54</td>
</tr>
<tr>
<td>Jones, Shelly</td>
<td>127</td>
</tr>
<tr>
<td>Jordan, Kerry</td>
<td>62</td>
</tr>
<tr>
<td>Kang, Bona</td>
<td>115</td>
</tr>
<tr>
<td>Kang, Hyun Jung</td>
<td>102</td>
</tr>
<tr>
<td>Kara, Melike</td>
<td>117</td>
</tr>
<tr>
<td>Karakok, Gulden</td>
<td>20</td>
</tr>
<tr>
<td>Kastberg, Signe</td>
<td>140</td>
</tr>
<tr>
<td>Kazemi, Elham</td>
<td>135</td>
</tr>
<tr>
<td>Keazer, Lindsay</td>
<td>80</td>
</tr>
<tr>
<td>Keene, Karen</td>
<td>42</td>
</tr>
<tr>
<td>Kelley-Petersen, Megan</td>
<td>135</td>
</tr>
<tr>
<td>Kersaint, Gladis</td>
<td>82</td>
</tr>
<tr>
<td>Kessler, Aaron</td>
<td>149</td>
</tr>
<tr>
<td>Khalqi, David</td>
<td>120</td>
</tr>
<tr>
<td>Khasanova, Elvira</td>
<td>70</td>
</tr>
<tr>
<td>Kim, Dong-Joong</td>
<td>41</td>
</tr>
<tr>
<td>Kim, Hyung</td>
<td>43</td>
</tr>
<tr>
<td>Kim, Ok-Kyeong</td>
<td>138</td>
</tr>
<tr>
<td>Kinol, Donna</td>
<td>143</td>
</tr>
<tr>
<td>Kisa, Zahid</td>
<td>54</td>
</tr>
<tr>
<td>Kloosterman, Peter</td>
<td>116</td>
</tr>
<tr>
<td>Knuth, Eric</td>
<td>141</td>
</tr>
<tr>
<td>Ko, Yi-Yin</td>
<td>52</td>
</tr>
<tr>
<td>Konold, Clifford</td>
<td>76, 63</td>
</tr>
<tr>
<td>Kosko, Karl</td>
<td>79, 143</td>
</tr>
<tr>
<td>Kotelawala, Usha</td>
<td>58</td>
</tr>
<tr>
<td>Krajecvski, Mile</td>
<td>107</td>
</tr>
<tr>
<td>Krupa, Erin</td>
<td>144, 118, 55</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Name</th>
<th>Presentation Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kulm, Gerald</td>
<td>37, 14</td>
</tr>
<tr>
<td>Lambdin, Diana</td>
<td>82</td>
</tr>
<tr>
<td>Lande, Elaine</td>
<td>121</td>
</tr>
<tr>
<td>Landy, David</td>
<td>146</td>
</tr>
<tr>
<td>Lang, Laura</td>
<td>49</td>
</tr>
<tr>
<td>Langrall, Cynthia</td>
<td>125</td>
</tr>
<tr>
<td>Larnell, Gregory</td>
<td>122</td>
</tr>
<tr>
<td>Larsen, Shannon</td>
<td>147</td>
</tr>
<tr>
<td>Laursen, Sandra</td>
<td>56</td>
</tr>
<tr>
<td>Lavenia, Mark</td>
<td>49</td>
</tr>
<tr>
<td>Law, Huk-Yuen</td>
<td>119</td>
</tr>
<tr>
<td>Le, Marie</td>
<td>115</td>
</tr>
<tr>
<td>Lee, Hollylyne</td>
<td>77</td>
</tr>
<tr>
<td>Lee, Jean</td>
<td>55</td>
</tr>
<tr>
<td>Lee, Kosze</td>
<td>46, 59, 130</td>
</tr>
<tr>
<td>Lee, Mi Yeon</td>
<td>133</td>
</tr>
<tr>
<td>Lee, Ngan Hoe</td>
<td>67</td>
</tr>
<tr>
<td>Leonard, Jacqueline</td>
<td>127</td>
</tr>
<tr>
<td>Lesseig, Kristin</td>
<td>135, 52</td>
</tr>
<tr>
<td>Leveille Buchanan, Nicole</td>
<td>115</td>
</tr>
<tr>
<td>Lewis, Chance</td>
<td>14</td>
</tr>
<tr>
<td>Lewis, Shari</td>
<td>138</td>
</tr>
<tr>
<td>Li, Yeping</td>
<td>37, 67</td>
</tr>
<tr>
<td>Lim, Woong</td>
<td>114</td>
</tr>
<tr>
<td>Linder, Sandra</td>
<td>24</td>
</tr>
<tr>
<td>Lischka, Alyson</td>
<td>43</td>
</tr>
<tr>
<td>Liu, Shuanghuang</td>
<td>54</td>
</tr>
<tr>
<td>Lockwood, Elise</td>
<td>141</td>
</tr>
<tr>
<td>Lord, Sarah</td>
<td>142</td>
</tr>
<tr>
<td>Lotter, Christine</td>
<td>120</td>
</tr>
<tr>
<td>Louie, Josephine</td>
<td>80</td>
</tr>
<tr>
<td>Lu, Lianfang</td>
<td>89</td>
</tr>
<tr>
<td>Lynn, James</td>
<td>68</td>
</tr>
<tr>
<td>Ma, Tingting</td>
<td>14</td>
</tr>
<tr>
<td>MacDonald, Rita</td>
<td>44</td>
</tr>
<tr>
<td>Machmer-Wessels, Keely</td>
<td>61</td>
</tr>
<tr>
<td>Males, Lorraine</td>
<td>46</td>
</tr>
<tr>
<td>Maloney, Alan</td>
<td>59, 130</td>
</tr>
<tr>
<td>Malzahn, Kristen</td>
<td>48, 144</td>
</tr>
<tr>
<td>Mark, June</td>
<td>80</td>
</tr>
<tr>
<td>Marle, Peter</td>
<td>120</td>
</tr>
<tr>
<td>Martin, Catherine</td>
<td>10, 80</td>
</tr>
<tr>
<td>Martinez, Mara</td>
<td>68</td>
</tr>
<tr>
<td>Marum, Timothy</td>
<td>99</td>
</tr>
<tr>
<td>Massey, Christine</td>
<td>78</td>
</tr>
<tr>
<td>Masters-Goffney, Imani</td>
<td>45</td>
</tr>
<tr>
<td>Matsuura, Ryota</td>
<td>38</td>
</tr>
<tr>
<td>Name</td>
<td>Presentation Number</td>
</tr>
<tr>
<td>-----------------------</td>
<td>----------------------</td>
</tr>
<tr>
<td>Matthews, Lou</td>
<td>127</td>
</tr>
<tr>
<td>Matthews, Mary Elizabeth</td>
<td>13</td>
</tr>
<tr>
<td>McCallum, William</td>
<td>39</td>
</tr>
<tr>
<td>McClain, Oren</td>
<td>127</td>
</tr>
<tr>
<td>McCloskey, Andrea</td>
<td>129</td>
</tr>
<tr>
<td>McCray, Jennifer</td>
<td>75</td>
</tr>
<tr>
<td>McCrane, Sharon</td>
<td>43</td>
</tr>
<tr>
<td>McCulloch, Allison</td>
<td>77</td>
</tr>
<tr>
<td>McGarvey, Lynn</td>
<td>130</td>
</tr>
<tr>
<td>McGinn, Kelly</td>
<td>25</td>
</tr>
<tr>
<td>McGowan, William</td>
<td>59</td>
</tr>
<tr>
<td>McLellan, Sylvia</td>
<td>2</td>
</tr>
<tr>
<td>Meier, Ellen</td>
<td>88</td>
</tr>
<tr>
<td>Meikle, Erin</td>
<td>72</td>
</tr>
<tr>
<td>Mercado, Janet</td>
<td>23</td>
</tr>
<tr>
<td>Mesa, Vilma</td>
<td>121</td>
</tr>
<tr>
<td>Middleton, James</td>
<td>102</td>
</tr>
<tr>
<td>Miller, Amanda</td>
<td>117</td>
</tr>
<tr>
<td>Miller, Emily</td>
<td>72</td>
</tr>
<tr>
<td>Mitchell, Kara</td>
<td>87</td>
</tr>
<tr>
<td>Mohr, Doris</td>
<td>116</td>
</tr>
<tr>
<td>Mohr, Sonja</td>
<td>23</td>
</tr>
<tr>
<td>Monroe, Eula</td>
<td>108</td>
</tr>
<tr>
<td>Moore, Kevin</td>
<td>142, 132</td>
</tr>
<tr>
<td>Moore, Tamara</td>
<td>83</td>
</tr>
<tr>
<td>Moore II, James</td>
<td>56</td>
</tr>
<tr>
<td>Morris, Anne</td>
<td>72</td>
</tr>
<tr>
<td>Moss, Joan</td>
<td>60</td>
</tr>
<tr>
<td>Moyer-Packenham, Patricia</td>
<td>62</td>
</tr>
<tr>
<td>Muter, Charles</td>
<td>39</td>
</tr>
<tr>
<td>Murray, Eileen</td>
<td>81</td>
</tr>
<tr>
<td>Myers, Marrielle</td>
<td>57</td>
</tr>
<tr>
<td>Nathan, Mitchell</td>
<td>50</td>
</tr>
<tr>
<td>Nelson, Courtney</td>
<td>48</td>
</tr>
<tr>
<td>Nemirovsky, Ricardo</td>
<td>50</td>
</tr>
<tr>
<td>Newman-Owens, Ashley</td>
<td>8</td>
</tr>
<tr>
<td>Nguyen, Kenny</td>
<td>130</td>
</tr>
<tr>
<td>Nikula, Johannah</td>
<td>144</td>
</tr>
<tr>
<td>Norton, Anderson</td>
<td>133</td>
</tr>
<tr>
<td>Norwood, Karen</td>
<td>42</td>
</tr>
<tr>
<td>Oberlin, Maureen</td>
<td>49</td>
</tr>
<tr>
<td>Oettinger, Andrea</td>
<td>119</td>
</tr>
<tr>
<td>Offenholley, Kathleen</td>
<td>58</td>
</tr>
<tr>
<td>Okamoto, Yukari</td>
<td>60</td>
</tr>
<tr>
<td>Oloff-Lewis, Jennifer</td>
<td>16</td>
</tr>
<tr>
<td>Olson, Jeannette</td>
<td>40</td>
</tr>
<tr>
<td>Olson, Judith</td>
<td>78</td>
</tr>
<tr>
<td>Olson, Melfried</td>
<td>78</td>
</tr>
<tr>
<td>O’Neil, AnnMarie</td>
<td>110</td>
</tr>
<tr>
<td>Orill, Chandra</td>
<td>51</td>
</tr>
<tr>
<td>Ortiz, Enrique</td>
<td>7</td>
</tr>
<tr>
<td>Otten, Samuel</td>
<td>119</td>
</tr>
<tr>
<td>Ottmar, Erin</td>
<td>146</td>
</tr>
<tr>
<td>Paddock, Megan</td>
<td>52</td>
</tr>
<tr>
<td>Paek, Pamela</td>
<td>148, 54</td>
</tr>
<tr>
<td>Panorkou, Nicole</td>
<td>59, 130</td>
</tr>
<tr>
<td>Papakonstantinou, Anne</td>
<td>55</td>
</tr>
<tr>
<td>Pape, Stephen</td>
<td>33, 94</td>
</tr>
<tr>
<td>Park, Jaime</td>
<td>43</td>
</tr>
<tr>
<td>Parker, Yolanda</td>
<td>127</td>
</tr>
<tr>
<td>Parr, Richard</td>
<td>55</td>
</tr>
<tr>
<td>Peck, Frederick</td>
<td>100</td>
</tr>
<tr>
<td>Perez, Arnulfo</td>
<td>116</td>
</tr>
<tr>
<td>Peters, Greet</td>
<td>85</td>
</tr>
<tr>
<td>Pfaff, Erin</td>
<td>64</td>
</tr>
<tr>
<td>Phakiti, Ack</td>
<td>44</td>
</tr>
<tr>
<td>Phelps, Geoffrey</td>
<td>145, 54</td>
</tr>
<tr>
<td>Picham, Mary Beth</td>
<td>38</td>
</tr>
<tr>
<td>Pierce, Jaclyn</td>
<td>146</td>
</tr>
<tr>
<td>Pimm, David</td>
<td>121</td>
</tr>
<tr>
<td>Pitvorec, Kathleen</td>
<td>44</td>
</tr>
<tr>
<td>Poirier, Natalie</td>
<td>2</td>
</tr>
<tr>
<td>Popovic, Gorjana</td>
<td>134</td>
</tr>
<tr>
<td>Portnoy, Neil</td>
<td>43</td>
</tr>
<tr>
<td>Postelniciu, Valentina</td>
<td>124</td>
</tr>
<tr>
<td>Radinsky, Josh</td>
<td>63</td>
</tr>
<tr>
<td>Rashid, Hanin</td>
<td>29</td>
</tr>
<tr>
<td>Rasmussen, Chris</td>
<td>43, 62, 56</td>
</tr>
<tr>
<td>Reiber, Allegra</td>
<td>10</td>
</tr>
<tr>
<td>Reinke, Luke</td>
<td>138</td>
</tr>
<tr>
<td>Remillard, Janine</td>
<td>138, 111</td>
</tr>
<tr>
<td>Reys, Barbara</td>
<td>78</td>
</tr>
<tr>
<td>Ricks, Thomas</td>
<td>89, 37</td>
</tr>
<tr>
<td>Rino, Joseph</td>
<td>54</td>
</tr>
<tr>
<td>Roach, Michael</td>
<td>116</td>
</tr>
<tr>
<td>Roberts, Sarah</td>
<td>109</td>
</tr>
<tr>
<td>Rodzon, Kati</td>
<td>62</td>
</tr>
<tr>
<td>Ross, Kathleen</td>
<td>118</td>
</tr>
<tr>
<td>Rossman, Cathleen</td>
<td>63</td>
</tr>
<tr>
<td>Roth McDuffie, Amy</td>
<td>144</td>
</tr>
<tr>
<td>Roy, George</td>
<td>53</td>
</tr>
<tr>
<td>Rubel, Laurie</td>
<td>118</td>
</tr>
<tr>
<td>Russell, Nicole</td>
<td>87, 10, 127</td>
</tr>
<tr>
<td>Russell, Susan Jo</td>
<td>128</td>
</tr>
</tbody>
</table>
Index of Session Participants (continued)

<table>
<thead>
<tr>
<th>Name</th>
<th>Presentation Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sabourj, Pooneh</td>
<td>141</td>
</tr>
<tr>
<td>Sahin, Alpaslan</td>
<td>92</td>
</tr>
<tr>
<td>Salinas, Alejandra</td>
<td>119</td>
</tr>
<tr>
<td>Sanchez Leal, Lina</td>
<td>101, 63</td>
</tr>
<tr>
<td>Sanchez, Rita</td>
<td>88</td>
</tr>
<tr>
<td>Sanchez, Wendy</td>
<td>140</td>
</tr>
<tr>
<td>Santagata, Rossella</td>
<td>23, 65</td>
</tr>
<tr>
<td>Sarama, Julie</td>
<td>117, 70</td>
</tr>
<tr>
<td>Sawrey, Katie</td>
<td>8, 139</td>
</tr>
<tr>
<td>Saxe, Geoffrey</td>
<td>115</td>
</tr>
<tr>
<td>Schiffer, Deborah</td>
<td>128</td>
</tr>
<tr>
<td>Schneider, Cynthia</td>
<td>68</td>
</tr>
<tr>
<td>Schoen, Robert</td>
<td>49</td>
</tr>
<tr>
<td>Schorr, Roberta</td>
<td>63</td>
</tr>
<tr>
<td>Seago, Nanette</td>
<td>135</td>
</tr>
<tr>
<td>Sears, Ruthmae</td>
<td>52</td>
</tr>
<tr>
<td>Seeve, Evelyn</td>
<td>144</td>
</tr>
<tr>
<td>Senk, Sharon</td>
<td>67</td>
</tr>
<tr>
<td>Shah, Niral</td>
<td>122</td>
</tr>
<tr>
<td>Sharma, Anu</td>
<td>33</td>
</tr>
<tr>
<td>Sharpe, Sheree</td>
<td>66</td>
</tr>
<tr>
<td>Shaughnessy, J. Michael</td>
<td>147</td>
</tr>
<tr>
<td>Shaughnessy, Meghan</td>
<td>71</td>
</tr>
<tr>
<td>Sherman, Milan</td>
<td>53</td>
</tr>
<tr>
<td>Shumway, Jessica</td>
<td>62</td>
</tr>
<tr>
<td>Silverman, Jason</td>
<td>76</td>
</tr>
<tr>
<td>Simpson, Amber</td>
<td>24</td>
</tr>
<tr>
<td>Sinclair, Nathalie</td>
<td>60, 41</td>
</tr>
<tr>
<td>Singamaneni, Subha</td>
<td>40</td>
</tr>
<tr>
<td>Singletary, Laura</td>
<td>95</td>
</tr>
<tr>
<td>Sloane, Finbarr</td>
<td>16</td>
</tr>
<tr>
<td>Slovin, Hannah</td>
<td>78</td>
</tr>
<tr>
<td>Smith, Dustin</td>
<td>138</td>
</tr>
<tr>
<td>Smith, Jack</td>
<td>46</td>
</tr>
<tr>
<td>Smith, Margaret</td>
<td>136, 39, 82, 65</td>
</tr>
<tr>
<td>Smith, Ryan</td>
<td>95</td>
</tr>
<tr>
<td>Snider, Rachel</td>
<td>76</td>
</tr>
<tr>
<td>Solano-Flores, Guillermo</td>
<td>148</td>
</tr>
<tr>
<td>Soto-Johnson, Hortensia</td>
<td>20, 50</td>
</tr>
<tr>
<td>Spain, Vickie</td>
<td>40</td>
</tr>
<tr>
<td>Spangler, Denise</td>
<td>140, 82</td>
</tr>
<tr>
<td>Sprague, Karen</td>
<td>86</td>
</tr>
<tr>
<td>Staples, Megan</td>
<td>120</td>
</tr>
<tr>
<td>Steele, Michael</td>
<td>80</td>
</tr>
<tr>
<td>Stein, Marcy</td>
<td>39</td>
</tr>
<tr>
<td>Stein, Mary Kay</td>
<td>149, 39</td>
</tr>
<tr>
<td>Steketee, Scott</td>
<td>77</td>
</tr>
<tr>
<td>Stephens, Ana</td>
<td>99</td>
</tr>
<tr>
<td>Stephenson, Gladys</td>
<td>130</td>
</tr>
<tr>
<td>Stevens, Glenn</td>
<td>38</td>
</tr>
<tr>
<td>Stinson, David</td>
<td>127, 57</td>
</tr>
<tr>
<td>Stockero, Shari</td>
<td>65, 45</td>
</tr>
<tr>
<td>Stockton, Julianna</td>
<td>15</td>
</tr>
<tr>
<td>Stoehr, Kathy</td>
<td>144</td>
</tr>
<tr>
<td>Stolenga, Timothy</td>
<td>68</td>
</tr>
<tr>
<td>Stohlman, Micah</td>
<td>83</td>
</tr>
<tr>
<td>Stramel, Janet</td>
<td>147</td>
</tr>
<tr>
<td>Strayer, Jeremy</td>
<td>77</td>
</tr>
<tr>
<td>Sweeney, Shannon</td>
<td>5</td>
</tr>
<tr>
<td>Switzer, John</td>
<td>61</td>
</tr>
<tr>
<td>Sword, Sarah</td>
<td>38</td>
</tr>
<tr>
<td>Sztajn, Paola</td>
<td>57</td>
</tr>
<tr>
<td>Tarr, James</td>
<td>75, 55</td>
</tr>
<tr>
<td>Taton, Joshua</td>
<td>138</td>
</tr>
<tr>
<td>Tatsuoka, Curtis</td>
<td>70</td>
</tr>
<tr>
<td>Tatsuoka, Kikumi</td>
<td>70</td>
</tr>
<tr>
<td>Taylor, Cynthia</td>
<td>142</td>
</tr>
<tr>
<td>Taylor, Edd</td>
<td>103</td>
</tr>
<tr>
<td>Terrell, Maria</td>
<td>73</td>
</tr>
<tr>
<td>Teuscher, Dawn</td>
<td>143, 78</td>
</tr>
<tr>
<td>Thomas, Erin</td>
<td>45</td>
</tr>
<tr>
<td>Thompson, Denisse</td>
<td>107, 73</td>
</tr>
<tr>
<td>Thompson, Patrick</td>
<td>51</td>
</tr>
<tr>
<td>Tillema, Erik</td>
<td>132</td>
</tr>
<tr>
<td>Tobin, Roger</td>
<td>113</td>
</tr>
<tr>
<td>Towers, Jo</td>
<td>60</td>
</tr>
<tr>
<td>Tran, Dung</td>
<td>78</td>
</tr>
<tr>
<td>Truax, Julia</td>
<td>11</td>
</tr>
<tr>
<td>Truxaw, Mary</td>
<td>120</td>
</tr>
<tr>
<td>Tsegai, Samuel</td>
<td>133</td>
</tr>
<tr>
<td>Tseng, Nancy</td>
<td>118</td>
</tr>
<tr>
<td>Turner, Erin</td>
<td>144</td>
</tr>
<tr>
<td>Tyminski, Andrew</td>
<td>140</td>
</tr>
<tr>
<td>Valhey, Phillip</td>
<td>53</td>
</tr>
<tr>
<td>Valoyes, Luz</td>
<td>44</td>
</tr>
<tr>
<td>Van Dine, Douglas</td>
<td>117</td>
</tr>
<tr>
<td>Van Schooneveld</td>
<td>111, 22</td>
</tr>
<tr>
<td>Jacqueline,</td>
<td>122</td>
</tr>
<tr>
<td>Van Steenbrugge, Hendrik</td>
<td>138</td>
</tr>
<tr>
<td>Vendlinski, Terry</td>
<td>123</td>
</tr>
<tr>
<td>Venenciano, Linda</td>
<td>61</td>
</tr>
<tr>
<td>Walcott, Crystal</td>
<td>116</td>
</tr>
<tr>
<td>Walker, Erica</td>
<td>45, 78</td>
</tr>
<tr>
<td>Name</td>
<td>Presentation Number</td>
</tr>
<tr>
<td>-----------------------</td>
<td>---------------------</td>
</tr>
<tr>
<td>Walkington, Candace</td>
<td>6, 53</td>
</tr>
<tr>
<td>Wang, Sasha</td>
<td>41</td>
</tr>
<tr>
<td>Wasserman, Nicholas</td>
<td>15</td>
</tr>
<tr>
<td>Webb, David</td>
<td>148</td>
</tr>
<tr>
<td>Webel, Corey</td>
<td>106, 131</td>
</tr>
<tr>
<td>Weber, Eric</td>
<td>76</td>
</tr>
<tr>
<td>Webster, Megan</td>
<td>64</td>
</tr>
<tr>
<td>Weiland, Ingrid</td>
<td>133</td>
</tr>
<tr>
<td>Welder, Rachael</td>
<td>142</td>
</tr>
<tr>
<td>Weren, Barbara</td>
<td>145</td>
</tr>
<tr>
<td>Westenskow, Arla</td>
<td>62</td>
</tr>
<tr>
<td>Weston, Tracy</td>
<td>69</td>
</tr>
<tr>
<td>White, Diana</td>
<td>26</td>
</tr>
<tr>
<td>White, Dorothy</td>
<td>130, 84, 81</td>
</tr>
<tr>
<td>Whitley, Walter</td>
<td>60</td>
</tr>
<tr>
<td>Whitley, Blake</td>
<td>77</td>
</tr>
<tr>
<td>Wilkerson-Jerde, Michelle</td>
<td>113</td>
</tr>
<tr>
<td>Willey, Craig</td>
<td>44</td>
</tr>
<tr>
<td>Williams, Craig</td>
<td>127</td>
</tr>
<tr>
<td>Williams, Caroline</td>
<td>141, 6</td>
</tr>
<tr>
<td>Williams, Kimberly</td>
<td>11</td>
</tr>
<tr>
<td>Williams, Maryellen</td>
<td>19</td>
</tr>
<tr>
<td>Willis, Tiera</td>
<td>4</td>
</tr>
<tr>
<td>Wills, Theodore</td>
<td>9</td>
</tr>
<tr>
<td>Willson, Victor</td>
<td>92</td>
</tr>
<tr>
<td>Wilson, P. Holt</td>
<td>32, 57</td>
</tr>
<tr>
<td>Wylie, Caroline</td>
<td>74</td>
</tr>
<tr>
<td>Yamaguchi, Jun-Ichi</td>
<td>84, 30</td>
</tr>
<tr>
<td>Yamakawa, Yukari</td>
<td>12</td>
</tr>
<tr>
<td>Yang, Kai-Ju</td>
<td>133</td>
</tr>
<tr>
<td>Yanisko, Emily</td>
<td>131</td>
</tr>
<tr>
<td>Yee, Sean</td>
<td>143</td>
</tr>
<tr>
<td>Yeh, Cathery</td>
<td>91</td>
</tr>
<tr>
<td>Yopp, David</td>
<td>36</td>
</tr>
<tr>
<td>Young, Hollie</td>
<td>118</td>
</tr>
<tr>
<td>Yow, Jan</td>
<td>26, 120</td>
</tr>
<tr>
<td>Yu, Yiting</td>
<td>73</td>
</tr>
<tr>
<td>Yurtseven, Zeynep</td>
<td>42</td>
</tr>
<tr>
<td>Zahner, William</td>
<td>104</td>
</tr>
<tr>
<td>Zanten, Marc</td>
<td>67</td>
</tr>
<tr>
<td>Zaslavsky, Orit</td>
<td>141</td>
</tr>
<tr>
<td>Zbiek, Rose</td>
<td>136, 143</td>
</tr>
<tr>
<td>Zeichner, Kenneth</td>
<td>35</td>
</tr>
<tr>
<td>Zhang, Qiaoping</td>
<td>119</td>
</tr>
<tr>
<td>Zhang, Xiaochuan</td>
<td>54</td>
</tr>
</tbody>
</table>