PROGRAM FOR THE
Research Presession
April 11–13, 2011
Research Preseession Planning Committee

NCTM Research Committee

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Announcements

• The Research Presession will be held at the Indiana Convention Center.
• Registration will be held in the 2nd Floor Serpentine Lobby. The times are Monday, 4:30 p.m. to 7:00 p.m., and Tuesday, 7:00 a.m. to 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 at 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 the Sagamore Ballroom Lobby from 8:30 p.m. to 10:00 p.m., following the opening session at 7:00 p.m. in Sagamore 4.
• Research posters will be available for viewing and discussing with the presenters in the 2nd Floor Serpentine Lobby on Monday from 5:15 p.m. to 6:30 p.m. and Tuesday from 4:45 p.m. to 6:00 p.m.
• This year, NCTM partnered with NCSM to allow NCSM attendees to attend NCTM’s opening session Monday night. NCTM Research Presession attendees can attend NCSM’s session, titled “Understanding the Influence of the Common Core Standards in Mathematics: What Do We Need to Know and When Do We Need to Know It?” on Wednesday from 2:45 p.m. to 4:15 p.m., Indianapolis Marriott Downtown, Grand Ballroom 6.
• Be sure to visit the NCTM Bookstore, which has a special table on research, in the Exhibit Hall on Wednesday.
• The Call for Papers for the next Research Presession, to be held in Philadelphia, Pennsylvania in 2012, will be available online in June 2011.

Interactive Paper Sessions

Interactive paper sessions replace individual and roundtable sessions as the format for findings presentations from completed work. Each session will involve individual papers, grouped by the program planning committee around a common theme. For each paper, the speaker(s) will give a 10-minute overview presentation of the study to the entire audience then engage in two roundtable breakouts to stimulate discussion with small groups of participants. The session will conclude with remarks from a discussant selected by the program planning committee.
### Invited Sessions

#### Opening Session
28. Maintaining Ambitious Teaching: Constraints, Affordances of Schools, Professional Education, Policy  
   Monday, April 11, 7:00 p.m.–8:30 p.m.  
   Sagamore 4

29. Differentiating Instruction to Meet All Students’ Needs: Bringing Research and Practice Together  
   Tuesday, April 12, 8:30 a.m.–10:00 a.m.  
   201

62. National Science Foundation (NSF) and Mathematics Education: Past, Present, and Future  
   Tuesday, April 12, 3:00 p.m. – 4:30 p.m.  
   201

#### Plenary Session
102. Toward an Empirically Grounded Theory of Action for Improving Mathematics Teaching Quality at Scale  
   Wednesday, April 13, 8:30 a.m.–10:00 a.m.  
   Sagamore 4

105. Research in Statistics Education: Current Efforts and Future Directions  
   Wednesday, April 13, 10:30 a.m.–12:00 noon  
   203

110. The High-School-to-College Mathematics Transition: Challenges and Prospects  
   Wednesday, April 13, 10:30 a.m.–12:00 noon  
   Sagamore 4

121. Research Opportunities Arising from the Standards for Mathematical Practice  
   Wednesday, April 13, 1:00 p.m. –2:30 p.m.  
   Sagamore 4

132. Research on Technology in Mathematics Education: Current Efforts and Future Directions  
   Wednesday, April 13, 3:00 p.m. –4:30 p.m.  
   Sagamore 4

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All sessions in Indiana Convention Center.
On behalf of the Research Committee of the National Council of Teachers of Mathematics (NCTM) and the Special Interest Group/Research in Mathematics Education (SIG/RME) of the American Educational Research Association (AERA), 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 would like to 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 would like to thank the staff at NCTM for helping us with the logistics of the conference, registration, printing the program, and so on. Also, we would like to thank all the presenters for agreeing to participate. Finally, we would like to thank everyone in attendance, and we hope that you will find the conference helpful to you in a number of ways.

Sincerely,

Dorothy Y. White,
NCTM Research Committee, Chair

Jinfa Cai,
AERA SIG/RME Cochair

David E. Barnes,
NCTM Research Committee, Staff Liaison

Karen King,
NCTM Director of Research
For your safety and due to fire regulations, only those with seats will be allowed in meeting rooms. To comply with fire codes, it may be necessary to ask any person 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.

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**1**

**Abstracting Mathematics Principles from Korea and Singapore for Professional Development**

**Poster Session**

Two groups of elementary school teachers abstracted principles from Singapore Mathematics and the Korean national curriculum’s Gecko Mathematics. This session will describe a study that investigated those abstractions’ effects. Highlighted strategies will include modeling and using number lines and number bonds across the curriculum.

**Janice Grow-Maienza**  
*Truman State University, Kirksville, Missouri*

**Daniel Kitashima**  
*Ka Waihona o ka Na‘auao Public Charter School, Waianae, Hawaii*

**K. Scott Alberts**  
*Truman State University, Kirksville, Missouri*

2nd Floor Serpentine Lobby, Table 1

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**2**

**Collaborating to Develop FUSION, a First-Grade Mathematics Intervention**

**Poster Session**

FUSION, a first-grade intervention program for at-risk students, targets whole-number understanding with number sense, base ten and place value, and number operations. The speakers will present their curriculum development process, which uses teacher-researchers and FUSION’s design features, observation systems, and early field-test data.

**Christian Doabler**  
*Center on Teaching and Learning, University of Oregon, Eugene, Oregon*

**Mari Strand Cary**  
*Center on Teaching and Learning, University of Oregon, Eugene, Oregon*

2nd Floor Serpentine Lobby, Table 2
3

Concreteness Fading in Supporting the Learning and Transfer of the Distributive Property

Poster Session

This study explored concreteness fading used by a dominant Chinese elementary textbook series to support the learning and transfer of the distributive property. Findings revealed three main features—(1) being principled with multifaceted uses, (2) being progressive with visible connections, and (3) being purposeful with explicit supports.

Meixia Ding
University of Nebraska—Lincoln, Lincoln, Nebraska

Xiaobao Li
University of Houston, Houston, Texas

2nd Floor Serpentine Lobby, Table 3

4

Content Analysis of the Bahamian National Examination in Middle-School Mathematics

Poster Session

Since achieving independence from England in 1973, the Bahamian government has developed educational policy requiring all its citizens to take national examinations at the end of grades 9 and 12. This study qualitatively describes the ninth-grade examination’s content for 2002–06 and 2008–09.

Yolanda A. Rolle
Boston University, Boston, Massachusetts

2nd Floor Serpentine Lobby, Table 4

5

Creativity as Intercontextuality in Math Education

Poster Session

Little room for imagination or creativity seems to exist in mathematics classrooms. However, describing creativity as seeing problems in new ways and adaptively escaping the bounds of conventional thinking fits the concept of intercontextuality, one method shown to increase transfer. The speaker will discuss two cases.

Jacqueline L. Barnes
Indiana University Bloomington, Bloomington, Indiana

2nd Floor Serpentine Lobby, Table 5
6

Deer in the Headlights: Designing Professional Development for Math PBL

Poster Session

This session will discuss (1) the professional development given to teachers prior to implementing project-based learning (PBL) and (2) its effects on teachers’ content knowledge, practices, and attitudes toward PBL. The speakers will describe elements of a productive mathematical teaching disposition and its impact on the project’s success.

Rick A. Hudson
University of Southern Indiana, Evansville, Indiana

Dionne I. Cross
Indiana University Bloomington, Bloomington, Indiana

Catherine Brown
Indiana University Bloomington, Bloomington, Indiana

2nd Floor Serpentine Lobby, Table 6

7

Supporting Preservice Teachers in Designing Project-Based Learning Units

Poster Session

The speakers will examine how preservice secondary school teachers design and implement project-based learning units, giving specific examples that demonstrate how a project’s mathematical rigor can fluctuate during implementation and the related, influencing factors. They will suggest ways to improve novice teachers’ confidence and expertise.

Jean S. Lee
University of Indianapolis, Indianapolis, Indiana

Howard Fischer
University of Indianapolis, Indianapolis, Indiana

Katherine Castro
University of Indianapolis, Indianapolis, Indiana

Melvin Bridges
University of Indianapolis, Indianapolis, Indiana

2nd Floor Serpentine Lobby, Table 7
8
Enacting New Curriculum: A Teacher’s First Attempt with Data Modeling
Poster Session
Curriculum design aims to develop strategies and tools that create opportunities for learning. Curriculum, however, does not interact with students in a sterile environment. This session will analyze a teacher’s first attempt at using an innovative statistics curriculum and suggest additional features to support teachers during implementation.

Ryan Seth Jones
Vanderbilt University, Nashville, Tennessee

Min-Joung Kim
Vanderbilt University, Nashville, Tennessee

2nd Floor Serpentine Lobby, Table 8

9
Examining Students’ Engagement through the Lens of Imaginative Education
Poster Session
This session will present results from a qualitative study that investigated six students’ perspectives of learning geometry, using the theory of imaginative education to examine students’ engagement. Combining affective responses and imagination created stepping stones to increased engagement and to developing cognitive understanding.

Pamela A. Hagen
University of British Columbia; School District 43, Coquitlam, Vancouver, Canada

2nd Floor Serpentine Lobby, Table 9

10
Expanding Models of Students’ Combinatorial Reasoning
Poster Session
This presentation will report on data from an eight-month, constructivist teaching experiment with three eighth-grade students. It will extend a previously developed framework for studying students’ two-dimensional, combinatorial reasoning by examining students’ reasoning on arrangement and combination problems.

Erik Tillema
Indiana University Purdue University Indianapolis, Indianapolis, Indiana

2nd Floor Serpentine Lobby, Table 10
11 Exploring How Accurately Grades K–3 Children Assess Their Mathematical Competencies
Poster Session
The speakers will report findings from TEMA-3 and a Child Belief Survey that examine association strength between mathematics ability and high-versus-low math-competency beliefs among students in a midwestern state. Several differences were significant, with the differences greater in grades 2–3 than in grades K–1.

Traci S. Kutaka  
*University of Nebraska—Lincoln, Lincoln, Nebraska*

Wendy Smith  
*University of Nebraska—Lincoln, Lincoln, Nebraska*

Carolyn Pope-Edwards  
*University of Nebraska—Lincoln, Lincoln, Nebraska*

2nd Floor Serpentine Lobby, Table 11

12 Factors Influencing College Success in Mathematics (FICSMath) Project
Poster Session
The FICSMath project focused on finding evidence for effective strategies that prepare students across the nation for college calculus. A model created from data on more than 3,000 secondary school students reveals significant, positive pedagogies that predict college calculus success.

Carol Wade  
*Clemson University, Clemson, South Carolina*

Charity Watson  
*Clemson University, Clemson, South Carolina*

Jennifer Cribbs  
*Clemson University, Clemson, South Carolina*

2nd Floor Serpentine Lobby, Table 12
How Does Professional Development in Professional Noticing Lead to High Mathematics Achievement?

Poster Session

Why can some schools help their mathematics teachers adopt new practices to make their instruction more effective? This research study will examine how small professional learning communities affect teachers’ professional noticing—teachers’ conceptualizations and descriptions of, and responses to, their students’ mathematical thinking.

Marcia DeJesus-Rueff
Expeditionary Learning, New York, New York

Instructional Provocations for Inquiry-Based Learning in College Mathematics

Poster Session

The speakers will propose some forms of instructional provocations that may help college teachers encourage inquiry-based learning, focusing on contrasting prompts, potentially pivotal bridging examples, and stimulating questions. Their study’s data, collected from a design experiment with two students, report that these discursive moves encouraged students to develop their reasoning and understanding.

Kyeong Hah Roh
Arizona State University, Tempe, Arizona

Aviva Halani
Arizona State University, Tempe, Arizona

Mathematics Course Taking in Rural High Schools

Poster Session

This session will use 2005 NAEP High School Transcript Study data (number of mathematics credits earned, highest mathematics course taken, and enrollment and access to advanced or AP mathematics courses) to compare rural and nonrural high school students’ mathematics course-taking patterns.

Rick Anderson
Eastern Illinois University, Charleston, Illinois
16
On Curricular Effectiveness: Professional Development (PD) Activities, Emphasis, and Impact
Poster Session
This session will present findings related to PD of teachers participating in an NSF-funded, three-year, quasiexperimental longitudinal study. It will examine differences regarding the PD’s duration, emphasis, and impact across teachers of different curriculum types and discuss why the PD did not correlate to students’ higher achievement.

R. Didem Taylan
University of Missouri—Columbia, Columbia, Missouri

James Tarr
University of Missouri—Columbia, Columbia, Missouri

2nd Floor Serpentine Lobby, Table 16

17
Preservice Elementary School Teachers’ Conceptions of Mathematical Reasoning
Poster Session
This session will report on a study of four preservice elementary school teachers, examining how their mathematical arguments—and their evaluations of others’—changed over the course of a semester in which public, collective mathematical reasoning was an integral feature.

Michael H. Perkowski
University of Missouri—Columbia, Columbia, Missouri

2nd Floor Serpentine Lobby, Table 17

18
Preservice Mathematics Teachers’ Attitudes in Instruction: Comparing the United States and China
Poster Session
This session will compare the perspectives of 48 preservice teachers at Beijing Normal University, China, to those of 56 preservice teachers at Saint Cloud State University, Minnesota. The speaker will analyze quantitative results and follow-up interview data and discuss specific differences between the teacher preparation programs.

Hsuehi (Martin) Lo
Saint Cloud State University, St. Cloud, Minnesota

2nd Floor Serpentine Lobby, Table 18
19
Prospective Teachers’ Levels of Geometric Thinking through the Discursive Lens
Poster Session
This study investigated the changes in prospective elementary school teachers’ geometric discourse on classifying quadrilaterals, resulting from their participation in a university geometry course. The study produced a translation of van Hiele levels into a detailed model that describes students’ levels of thinking discursively.

Sasha Wang
Michigan State University, East Lansing, Michigan

20
Secondary School Students’ Covariational Reasoning on Rate of Change
Poster Session
This session will offer the results of a study examining secondary school students’ reasoning in tasks with multiple representations of constant and varying rate of change. The speaker will discuss differences in sophistication of students’ reasoning and implications for students’ making sense of covarying quantities in rates of change.

Heather Lynn Johnson
University of Colorado Denver, Denver, Colorado

21
Textual Expression of Knowledge in Curricula: Illuminating Opportunities to Learn
Poster Session
This presentation will discuss how textual analysis of written curriculum materials illuminates issues regarding students’ opportunities to learn area measurement. Discussion will focus on how textual elements express mathematical knowledge in three elementary school curricula and their implications are for students’ opportunities to learn.

Lorraine Males
Michigan State University, East Lansing, Michigan

Funda Gonulates
Michigan State University, East Lansing, Michigan
22
The Mathematics Expanded Curriculum: Critical Thinking and Creativity
Poster Session
Contemporary conceptions of schooling’s purpose prioritize higher-order thinking skills, such as problem solving and critical thinking, as goals that transcend conventional mathematical facts and procedures. The speaker will report on Israeli research into instructional interventions designed to achieve this expanded curriculum.

Einav Aizikovitsh-Udi
Harvard University Graduate School of Education, Cambridge, Massachusetts
2nd Floor Serpentine Lobby, Table 22

23
The Relationships among Teachers’ Mathematical Knowledge, Teaching, and Students’ Learning
Poster Session
Using data from 21 teachers, the speaker investigated relationships among teachers’ mathematical knowledge, their teaching, and students’ learning and how each one affects instruction and students’ achievement.

Yasemin Copur
University of Illinois at Urbana-Champaign, Urbana-Champaign, Illinois
2nd Floor Serpentine Lobby, Table 23

24
Thinking about Definitions: What Students Say, and What Students Do
Poster Session
Do your students struggle with mathematical definitions? The speakers will share their analysis of interview data focused on what students say and do as they work on statements about prime numbers. Their analysis has lead to an emerging framework for thinking about students’ understanding of mathematical definitions.

Margaret T. Kinzel
Boise State University, Boise, Idaho
Laurie O. Cavey
Boise State University, Boise, Idaho
2nd Floor Serpentine Lobby, Table 24
Turkish Student Teachers’ Attitudes toward Mathematics and Science Integration

This study investigated how student teachers’ attitudes toward mathematics and science integration relate to their universities’ teacher preparation curricula. The research showed university A, focusing on curriculum knowledge, produced students with a more negative attitude for mathematics and science integration than university B, focusing pedagogical content knowledge.

Sencer Corlu
Texas A&M University, College Station, Texas

Robert M. Capraro
Texas A&M University, College Station, Texas

Mary Margaret Capraro
Texas A&M University, College Station, Texas

When Students with Resources Fail: How Beliefs Affect Problem Solving

This poster session will report trends from a study that examined causes of urban students’ challenges in solving nonroutine mathematics problems when formal resources were not lacking. Data reveals three categorical trends in students’ beliefs paralleling three trends in students’ effective use of control and subsequent problem-solving success.

Sarah E. Nix
University of California at Berkeley, Berkeley, California
Who Teaches Mathematics Content Courses for Preservice Elementary School Teachers?

Poster Session

This poster session will present and discuss results of a nationwide survey of all higher education institutions on mathematics content courses for preservice elementary school teachers, what mathematics content these courses include, who teaches these courses, and on the instructors’ academic and teaching backgrounds.

Joanna O. Masingila  
Syracuse University, Syracuse, New York

Dana Olanoff  
Syracuse University, Syracuse, New York

Dennis K. Kwaka  
Syracuse University, Syracuse, New York

2nd Floor Serpentine Lobby, Table 27
Opening Session

28
Maintaining Ambitious Teaching: Constraints, Affordances of Schools, Professional Education, Policy

This talk will report on research investigating what resources might make ambitious mathematics teaching the norm in U.S. schools, and what stands in the way. The speaker will examine intellectual, social, and material resources that could be common tools and language for a teaching practice, and illustrate the roles that these can play.

Magdalene Lampert
University of Michigan, Ann Arbor, Michigan

Sagamore 4, Capacity: 546
Differentiating Instruction to Meet All Students’ Needs: Bringing Research and Practice Together

Research Symposium

This session will describe collaborative work to develop mutual visions for teaching mathematics to English language learners and special-needs students. The speakers will also address tensions and opportunities inherent in providing equitable, optimal learning opportunities for all students.

Jennifer M. Bay-Williams  
University of Louisville, Louisville, Kentucky

Socorro Herrera  
Kansas State University, Manhattan, Kansas

Barbara J. Dougherty  
Iowa State University, Ames, Iowa

Anne Foegen  
Iowa State University, Ames, Iowa

Discussant: Karen Karp  
University of Louisville, Louisville, Kentucky

Discussant: Rochelle Gutierrez  
University of Illinois at Urbana-Champaign, Champaign, Illinois

201, Capacity: 84
Knowledge and Characteristics of Teachers and Their Students’ Achievement

Research Symposium

This session will (1) present findings from a program of research addressing teachers’ characteristics (background, knowledge, beliefs, and professional experiences) and students’ achievement and (2) engage participants in a discussion of implications for teacher preparation, evaluation policies, and next steps.

Patricia F. Campbell  
*University of Maryland, College Park, Maryland*

Toni M. Smith  
*George Mason University, Fairfax, Virginia*

Lawrence M. Clark  
*University of Maryland, College Park, Maryland*

Amber Rust  
*University of Maryland, College Park, Maryland*

Masako Nishio  
*University of Maryland, College Park, Maryland*

Darcy Conant  
*University of Maryland, College Park, Maryland*

Discussant: Robert Ronau  
*University of Louisville, Louisville, Kentucky*

Discussant: Diane J. Briars  
*National Council of Supervisors of Mathematics, Pittsburgh, Pennsylvania*
31
From Dissertation to Publication in Journal for Research in Mathematics Education (JRME)

Research Symposium

Two researchers who recently turned their dissertations into accepted articles for JRME will share their experiences regarding how to restructure a dissertation into manuscript form. Participants will learn JRME’s submission and review process and the characteristics of a strong manuscript and then discuss topics in small groups.

M. Kathleen Heid
Editor, Journal for Research in Mathematics Education; Pennsylvania State University, University Park, Pennsylvania

Michael Oehrtman
Arizona State University, Phoenix, Arizona

Kristen Bieda
Michigan State University, East Lansing, Michigan

Maria Blanton
Editorial Panel Chair, Journal for Research in Mathematics Education; University of Massachusetts, Dartmouth, Fairhaven, Massachusetts

Members of JRME Editorial Panel

32
Research in Grades K–8 Mathematics Instructional Coaching

Work Session

Participants will consider results from a study investigating knowledge that contributes to successful mathematics instructional coaching. The session will focus on defining and assessing coaching knowledge. It will investigate methods used to create definitions of coaching knowledge and findings from an instrument that measures that knowledge.

Elizabeth A. Burroughs
Montana State University, Bozeman, Montana

David Yopp
Montana State University, Bozeman, Montana

John T. Sutton
RMC Research Corporation, Denver, Colorado
33  
Examining Learning Progressions, Trajectories, and Levels: Beyond Scope and Sequence

Research Symposium

Is a learning trajectory distinct from scope and sequence? How do progressions, trajectories, and levels differ? Are learning trajectories idiosyncratic by curricula? The speakers will define the construct and then compare two trajectory-based accounts on the same topic for coherence. What implications exist for theory, research, and practice?

Jeffrey E. Barrett  
Illinois State University, Normal, Illinois

Douglas Clements  
University at Buffalo, State University of New York, Buffalo, New York

Michael T. Battista  
Ohio State University, Columbus, Ohio

Julie Sarama  
University at Buffalo, State University of New York, Buffalo, New York

Discussant: Jack Smith  
Michigan State University, East Lansing, Michigan

34  
Articulated Learning Trajectories: A Method for Examining the Textbook Curriculum

Work Session

The speaker will present findings comparing articulated learning trajectories in developing algebraic thinking constructs from pattern concepts in four middle grades textbook series. He will describe efforts to extend textbook examination to include different content and grade levels. He will discuss theoretical considerations and content.

Travis Olson  
University of Nevada, Las Vegas, Las Vegas, Nevada
Assessing Teachers’ Mathematical Knowledge

This study will investigate the relationship between two measures widely used to assess teachers’ mathematics knowledge for teaching. It compares 25 teachers’ scores on those measures and sought to identify which assessment could better detect gains teachers made during a mathematics content/pedagogy hybrid course and a mathematics course.

Yasemin Copur  
*University of Illinois at Urbana-Champaign, Champaign, Illinois*

Sarah Lubienski  
*University of Illinois at Urbana-Champaign, Champaign, Illinois*

High School Teachers’ Mathematical Knowledge for Teaching Discrete Mathematics

A large professional development institute studied urban high school teachers’ discrete mathematics learning. The professional development emphasized essential concepts of discrete mathematics by modeling scientific phenomena. Repeated analysis of variance measures showed significant learning and improved pedagogy over the course of the program.

James A. Middleton  
*Arizona State University, Tempe, Arizona*

Mona Toncheff  
*Phoenix Union High School District, Phoenix, Arizona*

Investing in Teachers: A Metaanalysis on Professional Development’s Focus

This session will present the results of a metaanalysis intended to clarify the relationship between the substantive-content focus of in-service mathematics teachers’ professional development and their students’ achievement.

Alejandra Salinas  
*Boston University, Boston, Massachusetts*

Discussant: Catherine Brown  
*Indiana University Bloomington, Bloomington, Indiana*
Improving Teachers or Teaching: Alternatives for Improving Classroom Instruction

Research Symposium

Improving classroom instruction is usually addressed by recruiting or training better teachers. An alternative, not tried seriously in the United States, is improving teaching by building instructional products that all teachers can use and to which all teachers can contribute. The speakers will propose and critique this alternative.

James Hiebert  
University of Delaware, Newark, Delaware

Anne Morris  
University of Delaware, Newark, Delaware

Discussant: Deborah Loewenberg Ball  
University of Michigan, Ann Arbor, Michigan

Discussant: Magdalene Lampert  
University of Michigan, Ann Arbor, Michigan
Changing Teaching Practices and Students’ Outcomes through Collaborative Evaluation

Professional development that encourages teachers to reflect on mathematics instruction, observe classroom practices, and engage in investigating students’ learning facilitates more effective instruction and improved outcomes. A longitudinal study will examine a collaborative evaluation’s effects on an elementary school’s instruction and outcomes.

Kelli Thomas
University of Kansas, Lawrence, Kansas

Developing Teachers’ Algebraic Connections and Representational Fluency

The speakers will examine teachers’ development of algebraic connections and representational fluency, describe a content-focused summer institute and a lesson study during the academic year, and identify experiences that catalyzed change in teachers’ pedagogical strategies and dispositions toward teaching with problem solving.

Jennifer M. Suh
George Mason University, Fairfax, Virginia

Spencer Jamieson
Fairfax County Public Schools, Fairfax, Virginia

Patricia Freeman
Fairfax County Public Schools, Fairfax, Virginia

Mathematics: Understanding, Learning, and Teaching (MULT)

A longitudinal study combined cognitively guided instruction and Japanese lesson study models, analyzing changes among participants. Results include the program’s impact on teachers’ mathematics knowledge, beliefs about teaching and learning mathematics, and changes in instruction to support students’ conceptual understanding of mathematics.

Naomi S. Kent
San Joaquin Valley Mathematics Project; California State University, Fresno, Fresno, California

Melanie R. Wenrick
California State University, Fresno, Fresno, California

Rajee Amarsinghe
California State University, Fresno, Fresno, California

Discussant: June Mark
Education Development Center, Newton, Massachusetts
Observation of Learning Environments (OLE) in Mathematics Classrooms

This research session will focus on an instrument for the observing and assessing mathematics classroom instruction. OLE, developed as part of a Discovery K–12 NSF research grant, will enable the assessment of a mathematics learning environment in a classroom. The results of a validation study will also be discussed.

Cathy J. Kinzer  
*New Mexico State University, Las Cruces, New Mexico*

Lisa Virag  
*New Mexico State University, Las Cruces, New Mexico*

Ken Korn  
*New Mexico State University, Las Cruces, New Mexico*

Alfred Valdez  
*New Mexico State University, Las Cruces, New Mexico*

Accessing Mathematical Understanding through the Hermeneutic Circle

This presentation will share a description of the research study designed to use the hermeneutic circle to access mathematical understanding. The speaker will pay particular attention to data collection and analysis methods. She will present a summary of results concerning prospective elementary school teachers’ understanding of function.

Valerie V. Sharon  
*Sam Houston State University, Huntsville, Texas*

Collaborative, Metacognitive Interactions in Small-Group Mathematical Problem Solving

This session will describe a study examining problem-solvers’ metacognitive activity in collaborative group interactions. It will chronicle social aspects of metacognitive activity in small-group problem solving and characterize situations associated with identified metacognitive activity. Participants will analyze transcripts.

Marta T. Magiera  
*Marquette University, Milwaukee, Wisconsin*

Sagamore 6, Capacity: 150

*(Session continued)*
The M-Scan Measure of Mathematics Instructional Quality

This paper describes research using M-Scan, an observational assessment system for mathematics instruction quality. M-Scan measures cognitive depth, problem solving, connections and applications, explanation and justification, mathematical discourse, multiple representations, lesson structure, students’ use of mathematical tools, and accuracy.

Sara Rimm-Kaufman  
*University of Virginia, Charlottesville, Virginia*

Erin Ottmar  
*University of Virginia, Charlottesville, Virginia*

Eileen Merritt  
*University of Virginia, Charlottesville, Virginia*

**Discussant: Daniel Heck**  
*Horizon Research, Inc., Chapel Hill, North Carolina*
Professional Development: Leading Mathematical Tasks versus Discussions of Classroom Practice

Work Session

This working session will feature two leader-preparation, research-and-development projects that study what professional developers need to know and be able to do. Participants will explore two aspects of leaders’ work: leading mathematical tasks with teachers and facilitating discussions of classroom practice.

Elham Kazemi  
*University of Washington, Seattle, Washington*

Cathy Carroll  
*West Ed, Redwood City, California*

Megan Kelley-Petersen  
*University of Washington, Seattle, Washington*

Hilda Borko  
*Stanford University, Stanford, California*

Karen Koellner  
*Hunter College, City University of New York, New York*

Jennifer Jacobs  
*University of Colorado at Boulder, Boulder, Colorado*

Sarah Kate Selling  
*Stanford University, Stanford, California*

Rebekah Elliott  
*Oregon State University, Corvallis, Colorado*
Analyzing Teachers’ Discussions about Representations of Teaching

Research Symposium

Using representations of mathematics teaching in videos, animations, and written cases is a ubiquitous practice in teacher education and in research. The session includes a collection of papers with different methodological approaches to examining teachers’ discussions around representations of mathematics teaching.

Gloriana González
University of Illinois at Urbana-Champaign, Urbana-Champaign, Illinois

Patricio G. Herbst
University of Michigan, Ann Arbor, Michigan

Hagit Sela
University of Maryland, College Park, Maryland

Kristen Bieda
Michigan State University, East Lansing, Michigan

Deborah Moore-Russo
University at Buffalo, State University of New York, Buffalo, New York

Janine M. Viglietti
University at Buffalo, State University of New York, Buffalo, New York

Discussant: Ellice Forman
University of Pittsburgh, Pittsburgh, Pennsylvania
41
Teachers’ Knowledge Relevant to Using Standards-Based Curriculum Materials

Research Symposium

This symposium will explore the relationships between teachers’ knowledge and teachers’ use of curriculum materials. The speakers will focus on how knowledge developed from using Standards-based materials, professional development workshops, and other district-provided resources, affects teachers’ use of the materials.

Jeffrey M. Choppin
University of Rochester, Rochester, New York

Corey Drake
Iowa State University, Ames, Iowa

Tonia J. Land
Iowa State University, Ames, Iowa

Discussant: Amy Roth McDuffie
Washington State University Tri-Cities, Richland, Washington

42
Writing a Successful Grant Proposal for NSF’s Division for Research on Learning

Research Symposium

This session will acquaint participants with current funding opportunities at NSF. The speakers will describe program priorities; the processes for development, submission, and review of proposals; and crucial considerations in preparing strong proposals.

Jinfa Cai
National Science Foundation, Arlington, Virginia

Patricia Wilson
National Science Foundation, Arlington, Virginia

Work Session

This working session will discuss and critique a conceptual framework and research agenda, related to research on the enacted mathematics curriculum, that were generated at a conference in November 2010.

Denisse R. Thompson  
*University of South Florida, Tampa, Florida*

Mary Ann Huntley  
*Cornell University, Ithaca, New York*

Sharon L. Senk  
*Michigan State University, East Lansing, Michigan*

Kathryn Chval  
*University of Missouri—Columbia, Columbia, Missouri*

Steven Ziebarth  
*Western Michigan University, Kalamazoo, Michigan*

Iris Weiss  
*Horizon Research, Chapel Hill, North Carolina*
Assessing and Measuring Change in Reflective Practices of Preservice Teachers

Research Symposium

The speakers will discuss the implementing an innovative approach to field experiences for elementary mathematics methods. They will share results from efforts to develop assessments for important aspects of reflective teaching and to identify indicators of change in the quality of preservice teachers’ practices and predictors of teaching quality.

Enrique Galindo  
*Indiana University Bloomington, Bloomington, Indiana*

Anderson Norton  
*Virginia Polytechnic and State University, Blacksburg, Virginia*

Kathryn Essex  
*Indiana University Purdue University Columbus, Columbus, Indiana*

Rick A. Hudson  
*University of Southern Indiana, Evansville, Indiana*

Julie Amador  
*Indiana University Bloomington, Bloomington, Indiana*

Discussant: Barbara Reys  
*University of Missouri—Columbia, Columbia, Missouri*

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Supporting Secondary School Mathematics Teachers’ Purposeful and Powerful Discourse

Work Session

This symposium will share concepts and activities from professional development materials designed to help facilitators collaborate with secondary school teachers to develop purposeful, powerful classroom discourse. Participants will engage in, analyze, and discuss the activities, using the theories to consider work with mathematics teachers.

Beth Herbel-Eisenmann  
*Michigan State University, East Lansing, Michigan*

Michael Steele  
*Michigan State University, East Lansing, Michigan*

Michelle Cirillo  
*University of Delaware, Newark, Delaware*
Mathematics Teacher Self-Efficacy, Knowledge, and Mathematics Instructional Quality

This study examines how mathematics teacher self-efficacy beliefs, in addition to mathematical knowledge for teaching contribute to mathematics instructional quality. In addition, this study investigates whether being trained in a social emotional learning intervention (the Responsive Classroom® (RC) approach) impacts teacher practices and the quality of mathematics instruction.

Erin Ottmar  
*University of Virginia, Charlottesville, Virginia*

Sara Rimm-Kaufman  
*University of Virginia, Charlottesville, Virginia*

Temple Walkowiak  
*North Carolina State University, Raleigh, North Carolina*

Body and Mind: About Which Aspects Do Primary School Teachers Care?

Pursuing an interest in extralinguistic communication and collaborative learning, the speakers will analyze outcomes of a questionnaire administered to primary school teachers, investigating what they say they care about in teaching. Addressing teachers’ beliefs, they will inquire to what extent teachers focus on embodied aspects of learning.

Chiara Andrà  
*Dipartimento di Matematica, Università di Torino, Torino, Italy*

Luciana Bazzini  
*Dipartimento di Matematica, Università di Torino, Torino, Italy*

Integrated versus Discrete Perspectives on Equity in Mathematics Learning

This paper explores preservice teachers’ perspectives on relations among culture, power, and mathematics learning. Programs separating equity from inquiry tend to produce candidates who see the relations as discrete. Teachers with integrated perspectives often reject deficit viewpoints, noticing and intervening when unequal power hierarchies occur.

Victoria Hand  
*University of Colorado at Boulder, Boulder, Colorado*

Discussant: Randolph Philipp  
*San Diego State University, San Diego, California*
Crucial, Culturally Relevant Mathematics Pedagogies and Curriculum in Urban Schools

Research Symposium

This session will explore crucial mathematics and culturally relevant mathematics teaching and curriculum design, focusing on teachers’ development, curriculum creation, and classroom enactment. The speakers will showcase four research and development projects, from three large cities, that are developing models for this work in urban classrooms.

Janine Remillard
University of Pennsylvania, Philadelphia, Pennsylvania

Luke Reinke
University of Pennsylvania, Philadelphia, Pennsylvania

Nina D. Hoe
University of Pennsylvania, Philadelphia, Pennsylvania

Patricia Buenrostro
University of Illinois at Chicago, Chicago, Illinois

Eric (Rico) Gutstein
University of Illinois at Chicago, Chicago, Illinois

Laurie Rubel
Brooklyn College, Brooklyn, New York

Vivian Lim
University of Pennsylvania, Philadelphia, Pennsylvania

Andrew H. Chu
Graduate Center of the City University of New York, New York, New York
Developing an Equity Pedagogy for School Mathematics

Preservice teachers’ thinking about equity affects the instructional practices they will implement and teachers’ education that prepares them to address inequities. This study examined preservice teachers’ conceptions of equity, specifically how they addressed race. Implications for teacher education will be discussed.

Delayne Y. Johnson
Clemson University, Clemson, South Carolina

Identifying and Defining Equitable Mathematics Instruction

This study will probe what constitutes equitable mathematics instruction. Building on the Mathematical Knowledge for Teaching theory, the speaker will evaluate specific instructional practices, determine how particular teaching practices provide leverage, and create access to mathematics content for diverse learners.

Imani Goffney
University of Houston, Houston, Texas

Understanding a Beginning Teacher’s Sensitivity to Students and Mathematics

The speakers will follow a beginning teacher to his classroom, to determine how his mathematics relates to that of his classroom. Jaworski’s teaching triad and focus on mathematical processes illuminate how affective sensitivity to students without cognitive sensitivity increases student’s engagement but offers only modest mathematical challenge.

Rose Mary Zbiek
Pennsylvania State University—University Park, University Park, Pennsylvania

Tenille Cannon
Pennsylvania State University—University Park, University Park, Pennsylvania

Kim Johnson
Pennsylvania State University—University Park, University Park, Pennsylvania

Discussant: Carol E. Malloy
University of North Carolina at Chapel Hill; McGraw-Hill K–12 Mathematics, Chapel Hill, North Carolina
Analyzing Preservice Teachers’ Pedagogical Content Knowledge of Fractions

The study assessed whether elementary school preservice teachers at a southwestern public university had appropriate profound knowledge of teaching fractions and could illustrate them with pictorial representations.

Roslinda Rosli  
Texas A&M University, College Station, Texas  
Sunyoung Han  
Texas A&M University, College Station, Texas  
Mary Margaret Capraro  
Texas A&M University, College Station, Texas

Bridging: Assimilation and Zone-of-Proximal-Development (ZPD)-Enhancing Practice in Chinese Pedagogy

Using a constructivist framework, the speakers will explain how Chinese pedagogical bridging (xian jie) practice promotes every student’s assimilation of new ideas into available conceptions and thus empowers learning through one’s ZPD. They will examine Year-7 teachers’ views on bridging and examples of fractions leading to algebraic ideas.

Xianyan Jin  
Monash University, Victoria, Australia  
Ron Tzur  
University of Colorado Denver, Denver, Colorado

How Does Students’ Fractional Knowledge Influence Equation Writing?

An interview study of 17 seventh and eighth graders determined relationships between their fraction knowledge and equation writing. Conceiving of improper fractions as numbers correlated writing multiplicative equations and facilitated reciprocal reasoning with unknowns. The speakers will explain the results.

Amy J. Hackenberg  
Indiana University Bloomington, Bloomington, Indiana  
Mi Yeon Lee  
Indiana University Bloomington, Bloomington, Indiana

(Session continued)
Understanding Perceptions Using Children’s Thinking Activities

Research shows that children’s thinking activities help prospective teachers learn about children’s mathematical thinking. Using these activities in a mathematics for teaching course suggests that prospective teachers with negative mathematics associations can experience mathematics in positive ways, allowing them to reevaluate their own thinking.

Laura K. McLeman
University of Michigan—Flint, Flint, Michigan

Discussant: Kenny Nguyen
North Carolina State University, Raleigh, North Carolina

Graduate Student, Junior Faculty, and Researcher Mentoring Session

Work Session

Experienced faculty and researchers will provide mentoring on topics such as publishing dissertation-based manuscripts, finding faculty positions in higher education, transitioning from doctoral student to faculty member, grant writing, and navigating the tenure process. Attendees will rotate among topic-focused tables.

Patricia Baltzley  Baltimore County Public Schools
David Barker  Illinois State University
Maria Blanton  University of Massachusetts-Dartmouth
Dana Cox  Miami University
Barbara Dougherty  Iowa State University
Randall E. Groth  Salisbury University
Karen Hollebrands  North Carolina State University
Karen King  New York University; NCTM
Eric Knuth  University of Wisconsin-Madison
Rebecca McGraw  University of Arizona
Jill Newton  Purdue University
Robert E. Reys  University of Missouri
Lynn Stallings  Kennesaw State University
James Tarr  University of Missouri
Dorothy Y. White  University of Georgia
Laura Van Zoest  Western Michigan University
51
Learning about Mathematical Justification and Its Role in the Classroom

Research Symposium

Three studies carefully examine teachers’ conceptions of mathematical justification and argumentation and how enhancing them influences the teachers’ practice. The three studies also examine how these conceptions transform in practice, further affecting the development of teachers’ conceptions of justification and their practice.

Karen Marrongelle
Portland State University, Portland, Oregon

Sean Larsen
Portland State University, Portland, Oregon

Eva Thanheiser
Portland State University, Portland, Oregon

Megan Staples
University of Connecticut, Storrs, Connecticut

Tutita Casa
University of Connecticut, Storrs, Connecticut

Melissa Gresalfi
Indiana University Bloomington, Bloomington, Indiana

Discussant: Margaret Smith
University of Pittsburgh, Pittsburgh, Pennsylvania

Discussant: Despina Stylianou
City University of New York, New York, New York
Examining Mathematics Curriculum Materials from the Perspective of Teachers’ Use

This session will present analyses of five elementary school mathematics curricula concerning what teachers require to use them. The aim is to make visible the mathematical and pedagogical features teachers encounter when reading curriculum resources in order to guide research on teaching and curriculum materials and improved materials design.

Ok-Kyeong Kim  
*Western Michigan University, Kalamazoo, Michigan*

Napthalin A. Achubang  
*Western Michigan University, Kalamazoo, Michigan*

Shari Ann Lewis  
*Aquinas College, Grand Rapids, Michigan*

Nina D. Hoe  
*University of Pennsylvania, Philadelphia, Pennsylvania*

Luke Reinke  
*University of Pennsylvania, Philadelphia, Pennsylvania*

Janine Remillard  
*University of Pennsylvania, Philadelphia, Pennsylvania*

Putting Policy into Practice: How Is Eighth-Grade Algebra Working?

Eighth-grade algebra is a heated topic among policymakers and educational practitioners, but little information exists on how it affects students. This session will discuss state and district studies of eighth-grade algebra and show how this practice has affected students’ later mathematics course taking and achievement.

Pamela Paek  
*Center for Assessment, Austin, Texas*

Terry Vendlinski  
*National Center for Research on Evaluation, Standards, and Student Testing, Los Angeles, California*

Steve Waterman  
*San Mateo County Office of Education, Daly City, California*
54  Tapping and Mining Your Research for an Article for Teachers

Work Session

The Editorial Panels of the NCTM’s teacher journals, Teaching Children Mathematics, Mathematics Teaching in the Middle School, and Mathematics Teacher, will offer writing tips and suggestions for potential and current authors. The session will focus on techniques for turning research articles into feature or department articles for the journals.

Christine D. Thomas  
Georgia State University, Atlanta, Georgia

Judith Zawojewski  
Illinois Institute of Technology, Chicago, Illinois

Debra Johanning  
University of Toledo, Toledo, Ohio

Robert Berry  
University of Virginia, Charlottesville, Virginia

Laurie O. Cavey  
Boise State University, Boise, Idaho

Margaret T. Kinzel  
Boise State University, Boise, Idaho

204, Capacity: 100

55  International Comparisons in Mathematics Teacher Education: Research and Practice

Research Symposium

This session will describe challenges faced by cross-national comparative studies of mathematics teacher preparation, important findings from a recent study of 24,000 future primary and secondary schoolteachers in 17 countries, and implications for research and practice in teacher preparation.

Sharon L. Senk  
Michigan State University, East Lansing, Michigan

Maria Teresa Tatto  
Michigan State University, East Lansing, Michigan

Discussant: Barbara Reys  
University of Missouri—Columbia, Columbia, Missouri

Discussant: Jeremy Kilpatrick  
University of Georgia, Athens, Georgia

Sagamore 1, Capacity: 280
1:00 p.m.–2:30 p.m.

56
Analyzing Video from an Urban “Math for Social Justice” Classroom

Work Session
Participants will view 15 minutes of video from a Mathematics for Social Justice class, taught by an experienced teacher in a public high school of all low-income students of color. After an overview, participants will analyze, critique, and discuss the video, first in small groups, then as a whole.

Patricia Buenrostro
University of Illinois—Chicago, Chicago, Illinois

Anita Balasubramanian
University of Illinois—Chicago, Chicago, Illinois

Eric (Rico) Gutstein
University of Illinois at Chicago, Chicago, Illinois

Sagamore 2, Capacity: 190
An Instructional Intervention for Positively Affecting Students’ Problem-Solving Beliefs

This presentation will report findings from a four-year design experiment in an undergraduate mathematics course. The findings show that achieving a notable positive effect is possible on four common and counterproductive beliefs students have about problem solving, with a 75-minute instructional intervention.

Gabriel Stylianides  
University of Oxford, Oxford, England

Andreas Stylianides  
University of Cambridge, Cambridge, England

Content Alignment between University Mathematics Placement Tests and High School Curriculum

This study investigated the curricular validity of the university mathematics placement exam by analyzing content alignment between university placement exam and three high school mathematics curricula. The speaker will correlate results on content alignment with students’ performance on the exam.

Ke W. Norman  
University of Montana, Missoula, Montana

Investigating Teaching and Learning Infinite Series

Instructors struggle to teach infinite series, and students have difficulty learning it. Several strategies used during the calculus reform movement were implemented during a unit on series. Students’ responses gave insight into their misconceptions about the topic. Comparisons among classes documented the teaching strategies’ effectiveness.

Brian J. Lindaman  
Montana State University, Bozeman, Montana

Discussant: Yvonne Lai  
University of Michigan, Ann Arbor, Michigan
Algebra: A Challenge at the Crossroads of Policy and Practice

Research Symposium

Despite the urgent call for more students to complete algebra, research offers little clear information about the efficacy of universal and early algebra policies. This NSF-funded work addresses what is known and needs to be known about algebra policy in order to guide future policy and research.

Mary Kay Stein
University of Pittsburgh, Pittsburgh, Pennsylvania

Milan Sherman
University of Pittsburgh, Pittsburgh, Pennsylvania

Julia Kaufman
University of Pittsburgh, Pittsburgh, Pennsylvania

Discussant: Bradford Findell
Ohio Department of Education, Columbus, Ohio

Discussant: Steven J. Leinwand
American Institutes for Research, Washington, District of Columbia

Discussant: William McCallum
University of Arizona, Tucson, Arizona
Grades 4–6 Students’ Meanings for Informal and Formal Variable Representations

This presentation reports on research on students’ meanings for variables across representations, tasks with equivalent mathematical structures, and task types. These students demonstrated similar and different meanings as those established by research as contributory to algebra students’ misconceptions and difficulties with variables.

J. Matt Switzer
University of Missouri—Columbia, Columbia, Missouri

Representational Fluency of Rational Number Models in Third Grade

A promising instructional approach to teaching rational number is a model grounded in embodied linear measure concepts. This research explores how, and in what circumstances, third-grade students transition between mental models of rational number. Results show that certain proficiencies allow easier access for some students than others.

Erin Pfaff
Vanderbilt University, Nashville, Tennessee

Discussant: Jeffrey E. Barrett
Illinois State University, Normal, Illinois
60
Researching Preservice Teachers’ Representations of Mathematics Teaching: Challenges and Possibilities
Work Session
The presenters will share research contexts, methodologies, and insights from work with preservice teachers’ representations of mathematics teaching. The audience will analyze and discuss sample representations using different frameworks. The session will then synthesize challenges, possibilities, and future directions for this line of research.

Chia-Ling Chen
University of Michigan, Ann Arbor, Michigan

Sandra Crespo
Michigan State University, East Lansing, Michigan

Joy A. Oslund
Alma College, Alma, Michigan

Michael Weiss
Oakland University, Rochester, Michigan

Patricio G. Herbst
University of Michigan, Ann Arbor, Michigan

61
Taking Student-Centered Instruction Online
Work Session
This working session will focus on the design of an online graduate program for middle school mathematics teachers. Committed to constructivist tenets, program developers will center discussions on challenges and some solutions to the paradox of teaching about student-centered, face-to-face mathematics instruction in a virtual environment.

Shea Culpepper
University of Houston, Houston, Texas

Jennifer Chaumont
University of Houston, Houston, Texas

Whitney Grese Hannah
University of Houston, Houston, Texas

Anita Vyas
University of Houston, Houston, Texas

Sagamore 6, Capacity: 150

Sagamore 7, Capacity: 190
62 National Science Foundation (NSF) and Mathematics Education: Past, Present, and Future
Research Symposium
This session will first present a historical analysis of NSF’s role in mathematics education research and development. The speakers will then focus on how the mathematics education research community and NSF will work together to generate new knowledge.

Jinfa Cai
National Science Foundation, Arlington, Virginia

John S. Bradley
National Science Foundation, Arlington, Virginia

Joan Ferrini-Mundy
National Science Foundation, Arlington, Virginia

Jeremy Kilpatrick
University of Georgia, Athens, Georgia

Glenda Lappan
Past President, NCTM; Michigan State University, East Lansing, Michigan

James A. Middleton
Arizona State University, Tempe, Arizona

63 Teachers’ Professional Competence in Mathematics: Expert-Novice Comparison
Research Symposium
Understanding teachers’ professional competence (TPC) is the key to developing high-quality teachers. This session will describe three research studies, each focusing on a component of TPC by comparing Chinese novice and expert teachers. Participants will discuss each study and the implications for teachers’ professional development.

Rongjin Huang
University of Colorado Denver, Denver, Colorado

Yeping Li
Texas A&M University, College Station, Texas

Tingting Ma
Texas A&M University, College Station, Texas

Discussant: Anne Morris
University of Delaware, Newark, Delaware
Launching Tasks and Equity in Opportunities to Learn: Research and Practice

Research Symposium

This symposium will focus on launching cognitively demanding tasks in middle-grades mathematics. Presentations will describe theoretical considerations and empirical findings on the relationship among task launch methods, equity in learning opportunities, and the education design that teaches teachers to launch tasks equitably and accessibly.

Melissa Boston  
Duquesne University, Pittsburgh, Pennsylvania

Emily Shahan  
Vanderbilt University, Nashville, Tennessee

Anne Garrison  
Vanderbilt University, Nashville, Tennessee

Jonee Wilson  
Vanderbilt University, Nashville, Tennessee

Lynsey Kay Gibbons  
Vanderbilt University, Nashville, Tennessee

Kara Jackson  
McGill University, Montreal, Quebec, Canada

Discussant: Megan Franke  
University of California at Los Angeles, Los Angeles, California
Exploring and Heightening Teachers’ Awareness of their Students’ Mathematics Dispositions

Work Session

This working session will explore issues concerning designing, facilitating, and studying two cases of mathematics teaching focused on heightening teachers’ awareness of their students’ mathematics dispositions. Teachers will consider, among other items, the influence of race and class on their students’ mathematics dispositions development.

Lawrence M. Clark  
*University of Maryland, College Park, Maryland*

Ann Ryu Edwards  
*University of Maryland, College Park, Maryland*

Nancy Tseng  
*University of Maryland, College Park, Maryland*

Toya Jones  
*University of Maryland, College Park, Maryland*

Mathematics Teacher Noticing: Seeing through Teachers’ Eyes

Research Symposium

This symposium examines the nature of mathematics teacher noticing, addressing some of the primal questions of teaching: Where do teachers look, what do they see, and what sense do they make of what they see? The presentations will draw from a recent book on mathematics teacher noticing comprising a diverse array of studies.

Miriam Sherin  
*Northwestern University, Evanston, Illinois*

Randolph Philipp  
*San Diego State University, San Diego, California*
67
Mathematical Habits of Mind for Teaching

Work Session

This session will focus on using mathematicians’ mathematical habits of mind as an organizing framework for mathematical knowledge for teaching in secondary school, engage in assessment items designed to measure mathematical habits of mind in teachers, and review and discuss video clips illustrating these approaches in practice.

Ryota Matsuura
Saint Olaf College, Northfield, Minnesota

Sarah Sword
Center for Mathematics Education, Education Development Center, Newton, Massachusetts

Al Cuoco
Center for Mathematics Education, Education Development Center, Newton, Massachusetts

Glenn Stevens
Boston University, Boston, Massachusetts

Russell Faux
Davis Square Research Associates, Somerville, Massachusetts

Sagamore 2, Capacity: 190
Assessment Reform in Mathematics Classrooms: Practices and Dilemmas

This presentation will draw on two studies to consider the experiences of mathematics teachers in the context of calls from both assessment and mathematics education literature to shift assessment practices. It will offer robust descriptions of teachers’ assessment to support students’ learning, the dilemmas they face, and how they are supported.

Christine Suurtamm
University of Ottawa, Ottawa, Canada

National Evaluation of Elementary School Math Curricula

This session will present results from a large-scale U.S. Department of Education study of the effectiveness of four elementary math curricula. The speakers will present results for first- and second-grade students and discuss whether instructional practices may account for any differences in curriculums’ effects.

Barbara Harris
Mathematica Policy Research, Washington, District of Columbia

Roberto Agodini
Mathematica Policy Research, Princeton, New Jersey

When the Experience Is Not Ideal: Implementing Integrated Mathematics Curriculum

After statewide implementation of an integrated mathematics curriculum, the speakers studied teachers’ resulting conceptions of integrated mathematics. They will explore emergent themes in teachers’ distinctions between experienced curriculum and ideally integrated mathematics curriculum and corresponding implications for future curriculum reform.

Laura Marie Singletary
University of Georgia, Athens, Georgia

Zandra de Araujo
University of Georgia, Athens, Georgia

Patricia Wilson
National Science Foundation, Arlington, Virginia

Discussant: James Tarr
University of Missouri—Columbia, Columbia, Missouri
Who Decides What Counts as Mathematics Education?

Research Symposium

Members of the editorial panel and authors whose work is featured in the special Journal for Research in Mathematics Education issue on equity will present their perspectives on the power dynamics that arise in defining mathematics education as a field.

Rochelle Gutierrez  
University of Illinois at Urbana-Champaign, Champaign, Illinois

Danny B. Martin  
University of Illinois at Chicago, Chicago, Illinois

David Wayne Stinson  
Georgia State University, Atlanta, Georgia

Beatriz D’Ambrosio  
Miami University, Oxford, Ohio

Signe Kastberg  
Purdue University, West Lafayette, Indiana
Helping At-Risk Kindergartners Develop Number Sense

An eight-week, targeted number sense intervention boosted high-risk kindergartners’ number sense relative to that of their peers in a control group. The intervention was based on the premises that weaknesses in essential competencies underlie mathematics difficulties and that explicit instruction can develop these competencies early.

Nancy Dyson  
University of Delaware, Newark, Delaware

Nancy C. Jordan  
University of Delaware, Newark, Delaware

Prekindergarten Early Algebra through Measurement and Quantitative Reasoning

This paper addresses an innovative approach to Pre-K students’ development of quantitative and algebraic reasoning through measurement. The study adapts and refocuses the measurement-based algebraic design of the successful Elkonin-Davydov elementary school mathematics curriculum from Russia for use in teaching experiments with U.S. Pre-K students.

Zaur Berkaliev  
Illinois Institute of Technology, Chicago, Illinois

Barbara J. Dougherty  
Iowa State University, Ames, Iowa

The Magnitude Learning Trajectory of Struggling First-Grade Students

This session will compare the learning trajectory in magnitude for first-grade students demonstrating typical development with that of students struggling with mathematics. It will share the cognitive obstacles that struggling students encountered.

John Lannin  
University of Missouri—Columbia, Columbia, Missouri

J. Matt Switzer  
University of Missouri—Columbia, Columbia, Missouri

Delinda van Garderen  
University of Missouri—Columbia, Columbia, Missouri

Discussant: Diana V. Lambdin  
Indiana University Bloomington, Bloomington, Indiana
Using Discourse to Develop Prospective Teachers’ Mathematical Justifications

Work Session
This session will focus on discourse’s role in advancing preservice elementary school teachers’ knowledge of mathematics for teaching. Explore how using discourse in small-group and whole-class discussions can help preservice teachers represent, generalize, and justify mathematical ideas.

Matthew Chedister
Boston University, Boston, Massachusetts

Suzanne H. Chapin
Boston University, Boston, Massachusetts

Ziv Feldman
Boston University, Boston, Massachusetts

Johanna Bunn
Boston University, Boston, Massachusetts

Diana Cheng
Middle Tennessee State University, Murfreesboro, Tennessee

Examining Content Knowledge for Teaching by Comparing Assessment Items

Work Session
The speakers will discuss improving the capacity to produce high-quality measures of content knowledge for teaching by working backwards, examining similarities and differences among items to produce language for and write features of items that express content knowledge for teaching.

Erik D. Jacobson
University of Georgia, Athens, Georgia

Mark Thames
University of Michigan, Ann Arbor, Michigan

Deborah Loewenberg Ball
University of Michigan, Ann Arbor, Michigan

Yvonne Lai
University of Michigan, Ann Arbor, Michigan
73
A Study of Stages in Teachers’ Leadership Development (TLD)

Poster Session
The speakers will present a study of 31 certified mathematics teachers’ TLD as they begin a leadership training program. Statistical analyses show differences in practices between high-, medium-, and limited-stage teachers across defined types of leadership activities along, with an emerging TLD pattern.

Serigne Mbaye Gningue
City University of New York—Lehman College, New York City, New York

Roger Peach
City University of New York—Lehman College, New York City, New York

2nd Floor Serpentine Lobby, Table 1

74
Approaches to Developing Function Sense in Three Middle School Curricula

Poster Session
This poster session will make a detailed comparison of approaches a Standards-based curriculum (Connected Mathematics Project) and two traditional middle school mathematics curricula (Glencoe, Saxon) take to developing function sense. The speakers will present 10 features of each curriculum’s treatment of functions.

John Moyer
Marquette University, Milwaukee, Wisconsin

Bikai Nie
University of Delaware, Newark, Delaware

Jinfa Cai
National Science Foundation, Arlington, Virginia

2nd Floor Serpentine Lobby, Table 2
**75**

**Assessment for Learning and Formative Assessment: Establishing a Universal Definition**

**Poster Session**

Lack of common language when doing research in assessment for learning and formative assessment can cause confusion among researchers and educators. This session reports on an extensive literature review conducted to synthesize important concepts of both terms to establish a universal definition.

**Jonathan A. Engelman**  
*Western Michigan University, Kalamazoo, Michigan*

**Lindsay A. Noakes**  
*Western Michigan University, Kalamazoo, Michigan*

**Diane R. Rogers**  
*Western Michigan University, Kalamazoo, Michigan*

2nd Floor Serpentine Lobby, Table 3

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**76**

**College Professors’ and Secondary School Teachers’ Views on Preparation for College Calculus**

**Poster Session**

This presentation will offer two perspectives on preparing students for college calculus. College professors tell what secondary school teachers need to do to prepare students for success, and secondary school teachers tell what they do that they think makes a positive difference in their students’ preparation.

**Carol Wade**  
*Clemson University, Clemson, South Carolina*

**Charity Watson**  
*Clemson University, Clemson, South Carolina*

**Jennifer Cribbs**  
*Clemson University, Clemson, South Carolina*

2nd Floor Serpentine Lobby, Table 4
Conceptions of Reform-Based Mathematics Teaching among Conference Presenters

Poster Session

A phenomenographic approach investigated variations in conceptions of reform-based mathematics among presenters at a state conference. The study used the presenters’ conceptions, mode of delivering the presentation, and intended impact on the audience to determine how the presentation aligned with mathematics education reform literature.

Kimberly Gardner  
*Kennesaw State University, Kennesaw, Georgia*

Kelly W. Edenfield  
*Kennesaw State University, Kennesaw, Georgia*

2nd Floor Serpentine Lobby, Table 5

Defining Knowledge for Grades K–8 Mathematics Instructional Coaching

Poster Session

This poster session will present results from a research study investigating knowledge that contributes to successful mathematics instructional coaching. The speakers will focus on defining and assessing coaching knowledge, highlighting study’s methods and its measurement instrument.

Elizabeth A. Burroughs  
*Montana State University, Bozeman, Montana*

David Yopp  
*Montana State University, Bozeman, Montana*

John T. Sutton  
*RMC Research Corporation, Denver, Colorado*

2nd Floor Serpentine Lobby, Table 6
79

Developing of a Self-Efficacy Instrument for Algebra Teachers
Poster Session
To address the need for an effective method to assess teacher confidence in reaching all students in algebra, a team of mathematics educators is currently working on the development of an instrument to measure teachers’ self-efficacy in teaching algebra. In this session, participants will engage in the evaluation of instrument items.

Trena Wilkerson
Baylor University, Waco, Texas

William A. Jasper
Sam Houston State University, Huntsville, Texas

Judy Taylor
LeTourneau University, Longview, Texas

Winifred Mallam
Texas Woman’s University, Denton, Texas

Sarah E. Quebec Fuentes
Texas Christian University, Fort Worth, Texas

Colleen M. Eddy
University of North Texas, Denton, Texas

Sandi Cooper
Baylor University, Waco, Texas

2nd Floor Serpentine Lobby, Table 7

80

Functions Perspectives in Algebra: A Framework for Assessing Students’ Knowledge
Poster Session
This study analyzes grade 8–9 students’ interviews in order to create an empirical basis for a framework for understanding mathematical functions in beginning algebra. The speakers will offer hypotheses about students’ behavior in problem solving that may help identify a particular conception of mathematical function.

Milan Sherman
University of Pittsburgh, Pittsburgh, Pennsylvania

Candace Walkington
University of Wisconsin—Madison, Madison, Wisconsin

2nd Floor Serpentine Lobby, Table 8
81 How Students of Diverse Abilities Use Diagrams to Solve Problems
Poster Session
This session will present results from a study that examined how students of diverse abilities used diagrams to solve mathematics word problems, identify difficulties students encountered when using diagrams to solve the problems, and discuss implications for instruction.

Delinda van Garderen
University of Missouri—Columbia, Columbia, Missouri
Amy Scheuermann
Minnesota State University, Mankato, Mankato, Canada
Christa Jackson
University of Kentucky, Lexington, Kentucky

2nd Floor Serpentine Lobby, Table 9

82 Integrating Reasoning and Proof in Secondary School Mathematics Classrooms
Poster Session
Practicing secondary school teachers took a six-week, summer course on reasoning and proof. The course’s curriculum aimed to develop the teachers’ understanding and ability to reason and prove, as well as prepare them to promote similar understandings in their students. The speaker will share preliminary data on the teachers’ learning.

Justin D. Boyle
University of Pittsburgh, Pittsburgh, Pennsylvania

2nd Floor Serpentine Lobby, Table 10

83 Mapping Discourse and Interventions for Proof Tasks
Poster Session
Research indicates that novel tasks, studying discourse, and relating students’ work to a framework can help students develop reasoning and proving skills. Directed graphs and interactivity flowcharts reveal the effectiveness of teachers’ interventions in moving students from nonproof arguments to proofs.

Michelle S. Switala
Pine-Richland School District, Gibsonia, Pennsylvania

2nd Floor Serpentine Lobby, Table 11
84 Mathematics Reform and English Language Learners: Challenges and Interventions
Poster Session
This study conducted interviews to examine teachers’ experiences implementing a reform-oriented mathematics curriculum with English language learners. Teachers discussed both the challenges encountered implementing the curriculum and the instructional interventions used to overcome them. The speaker will share implications for future research.

Zandra de Araujo
University of Georgia, Athens, Georgia

2nd Floor Serpentine Lobby, Table 12

85 Model-Centered Learning’s Impact on Teachers’ Attitudes toward Mathematics Teaching
Poster Session
A professional development course for in-service teachers implemented mathematical modeling using dynamic learning technology. Participants took an online course on problem solving. Data collected from precourse and postcourse surveys showed significant improvement in teachers’ confidence and attitudes toward doing and teaching mathematics.

Lingguo Bu
Southern Illinois University Carbondale, Carbondale, Illinois

Frackson Mumba
Southern Illinois University Carbondale, Carbondale, Illinois

Mary Wright
Southern Illinois University Carbondale, Carbondale, Illinois

2nd Floor Serpentine Lobby, Table 13
86  
Ordinary Teacher: A Case Study of a Middle-School Mathematics Teacher  
Poster Session  
Compared to studies in other genres of mathematics education research, a disproportionately small number exists that describe the mathematics teacher and her students. To complement existing literature on mathematics teaching, this session will tell the story of one middle school mathematics teacher.  
Yolanda A. Rolle  
*Boston University, Boston, Massachusetts*  

87  
Preservice Elementary School Teachers’ Perceptions of Teaching Mathematics through Problem-Solving  
Poster Session  
The speakers will present research findings on beginning preservice teachers’ perceptions of a problem-solving approach to teaching and learning mathematics. Presentations will focus on preservice teachers experiences prior to joining the teacher education program that lead to those perceptions.  
Dennis K. Kwaka  
*Syracuse University, Syracuse, New York*  
Joanna O. Masingila  
*Syracuse University, Syracuse, New York*  

88  
Preservice Teachers Understanding English Language Learners (ELLs) through Task-Based Interviews  
Poster Session  
This talk will outline a study that engaged preservice, middle school mathematics teachers in task-based interviews with ELL students. The speaker will touch on preservice teachers’ learning in the interview process and discuss developing best practices for training all mathematics teachers to work with ELL students.  
Anthony Fernandes  
*University of North Carolina at Charlotte, Charlotte, North Carolina*
89
Preservice Teachers’ Place-Value Knowledge in and out of Base Ten
Poster Session
The speaker will present preliminary results of a study that examined preservice teachers’ understandings of place value and how that understanding connects across several contexts. He will contrast students’ thinking in base ten, in alternative bases, and in the context of arithmetic algorithms.

Peter S. Wiles
Eastern Illinois University, Charleston, Illinois

2nd Floor Serpentine Lobby, Table 17

90
Professional Learning: Grades K–3 Teachers as Staff Developers
Poster Session
Five elementary school teachers had access to research-based pedagogy. As they conducted staff development sessions for colleagues, on what did they focus and why? The speakers analyzed levels of intellectual development, videotapes of teaching practice in their own classrooms, instructional practice during their staff development sessions, and responses from interviews on teaching and learning.

Cheryl A. Lubinski
Illinois State University, Normal, Illinois

Jo Ann Cady
University of Tennessee, Knoxville, Tennessee

Patricia A. Guinee
Peoria School District, Peoria, Illinois

2nd Floor Serpentine Lobby, Table 18
91
Promoting Functional Thinking with Geometric Growing Patterns

Poster Session

A study used design research to develop an instruction theory on students’ development of functional thinking about geometric growing patterns. Four sixth-grade classrooms implemented pattern tasks that the theory helped create. The speaker will present findings about students’ functional thinking development and effective ways to support learning.

Kimberly Markworth
Western Washington University, Bellingham, Washington

2nd Floor Serpentine Lobby, Table 19

92
Sensitivity, Stability, Reliability: Testing the Teacher Attitude Variable on Early Mathematics

Poster Session

This study explores the sensitivity, stability, and reliability of a survey instrument that measures teachers’ attitudes and beliefs toward early mathematics learning and teaching. The speakers will describe the need for such study, the variable’s development, the testing procedures and results, and the work’s implications.

Yinna Zhang
Erikson Institute, Chicago, Illinois

Nikolaus Bezruczko
Measurement and Evaluation Consulting, Chicago, Illinois

Jie-Qi Chen
Erikson Institute, Chicago, Illinois

2nd Floor Serpentine Lobby, Table 20
93
Strategies and Invalid Reasoning Entailed in Examples for Comparing Fractions
Poster Session
This session will examine examples for comparing fractions with unlike numerators and denominators in Everyday Mathematics and HarCourt Math. The speakers will present findings about possible strategies and noted invalid reasoning and discuss some considerations for selecting and choosing examples in written, enacted, and assessed curriculum.

Dicky Ng
Utah State University, Logan, Utah

Minsung Kwon
University of Michigan, Ann Arbor, Michigan

2nd Floor Serpentine Lobby, Table 21

94
Students’ Conceptions, Teachers’ Actions: Exploring How Teachers Anticipate Students’ Work
Poster Session
This study analyzed data from study group discussions among high school geometry teachers. The paper will report on how teachers anticipated the different operations students could use to solve a problem about tangents. It will consider different combinations of operations in light of different conceptions of tangency students exhibit in their responses.

Justin Dimmel
University of Michigan, Ann Arbor, Michigan

2nd Floor Serpentine Lobby, Table 22
95
Success in the College Prep Mathematics: Policies’ Impact
Poster Session
This paper will examine the impact of policies employed by the Early College High School, Redesign, and High Schools That Work reform models on students’ progression through the college prep mathematics pipeline. The examined policies include course-taking requirements, rigorous instruction, academic support, personalization, and relevance.

Nina Arshavsky
SERVE Center, University of North Carolina at Greensboro, Greensboro, North Carolina

Luke Miller
The Urban Institute, Washington, District of Columbia

Julie Edmunds
SERVE Center, University of North Carolina at Greensboro, Greensboro, North Carolina

96
Teachers’ Understanding of Culture Bias in Mathematics Problems
Poster Session
This study introduces a hybrid multivocal analysis of six teachers’ cultural scripts as they grappled with what they considered as culturally biased mathematics word problems. The approach portrays mathematics teachers’ cultural constructions influencing their work with culturally and linguistically diverse students when teaching problem solving.

Jane Wilburne
Pennsylvania State Harrisburg, Middletown, Pennsylvania

Martha Strickland
Pennsylvania State Harrisburg, Middletown, Pennsylvania

Barbara Marinak
Pennsylvania State Harrisburg, Middletown, Pennsylvania
The Instructional Environment’s Influence on Students’ Part-Whole Understanding

Poster Session
The classroom environment has a significant impact on students’ interpretations of critical mathematical concepts. In dissertation research the speaker examined students’ perceptions of part-whole relationships and how various classroom factors, particularly how teachers use multiple representational forms, constrain or support students’ interpretations.

Kelley Buchheister
University of Missouri—Columbia, Columbia, Missouri

The Role of Similarity and Typicality in Students’ Inferential Reasoning

Poster Session
This poster session will display results from a study series designed to investigate middle school students’ selection and use of examples for reasoning inferentially in mathematical contexts. The studies also contrast students’ inferential reasoning in mathematical contexts with that in nonmathematical contexts.

Eric Knuth
University of Wisconsin—Madison, Madison, Wisconsin

Amy Ellis
University of Wisconsin—Madison, Madison, Wisconsin

Caroline Williams
University of Wisconsin—Madison, Madison, Wisconsin
99  
**Trajectories of Teachers’ Learning: Evolving Conceptions of High-Quality Mathematics Instruction**  
*Poster Session*  
This poster will model teachers’ learning about concepts of high-quality mathematics instruction. The study was part of an examination of the impact of aspects of institutional settings on district-wide efforts to improve mathematics teaching and learning opportunities. The models offer a method for indexing teachers’ related learning.  

Charles Munter  
*University of Pittsburgh, Pittsburgh, Pennsylvania*  

2nd Floor Serpentine Lobby, Table 27

100  
**Transitioning to Principled Knowledge: A Teachers’ Beliefs and Views**  
*Poster Session*  
The presentation will feature a unique professional learning opportunity, in which an elementary school teacher observed instruction for one academic year that focused on developing principled knowledge of mathematics. The speakers will describe the needed supports the teacher identified for transitioning into a mathematics teacher’s role.  

Angela T. Barlow  
*University of Mississippi, University, Mississippi*  
Shannon Harmon  
*University of Mississippi, University, Mississippi*  

2nd Floor Serpentine Lobby, Table 28

101  
**Wrestling with Math: From a Practice-Based Methods Course to Classrooms**  
*Poster Session*  
This study of eight teachers examined the connection between practice-based preservice teacher education and classroom practice. It found a relationship between how preservice school teachers are pressed to wrestle with content in a mathematics methods course and how they engage students around mathematical content as first-year teachers.  

Angela Chan Turrou  
*University of California at Los Angeles, Los Angeles, California*  

2nd Floor Serpentine Lobby, Table 29
Plenary Session

102
Toward an Empirically Grounded Theory of Action for Improving Mathematics Teaching Quality at Scale

This presentation will summarize current research findings capable of guiding large-scale mathematics instruction improvement and identify pressing, unresolved questions. The speakers will consider curriculum materials and frameworks, pull-out and job-embedded professional development, networks, coaching, and schools’ and districts’ leadership.

Paul Anthony Cobb
Vanderbilt University, Nashville, Tennessee

Kara Jackson
McGill University, Montreal, Canada

Sagamore 4, Capacity: 546
This session will bring together three projects, all involving teaching geometry to secondary school students, that analyzed collective argumentation to answer different questions, giving evidence argumentation’s usefulness in addressing different kinds of research questions.

AnnaMarie Conner  
University of Georgia, Athens, Georgia

Patty Anne Wagner  
University of Georgia, Athens, Georgia

Laura Marie Singletary  
University of Georgia, Athens, Georgia

Brian W. Gleason  
University of Georgia, Athens, Georgia

Kelly W. Edenfield  
Kennesaw State University, Kennesaw, Georgia

Ryan Smith  
University of Georgia, Athens, Georgia

Discussant: Karen F. Hollebrands  
North Carolina State University, Raleigh, North Carolina
104
Studying Higher-Order Thinking during State Curriculum Reform Implementation

Research Symposium

This symposium presents three research studies within a statewide, integrated, process standards-based mathematics curriculum implementation. Each study focused how teachers attended to higher-order thinking during implementation and the challenges encountered during the first years of standards reform.

Kelly W. Edenfield  
*Kennesaw State University, Kennesaw, Georgia*

Kyle T. Schultz  
*James Madison University, Harrisonburg, Virginia*

Eileen Murray  
*University of Georgia, Athens, Georgia*

Discussant: Jeremy Kilpatrick  
*University of Georgia, Athens, Georgia*

105
Research in Statistics Education: Current Efforts and Future Directions

Research Symposium

This session will explore recent research on developing teachers’ and other adult learners’ statistical knowledge and reasoning. The speakers will discuss to existing statistical education theory, the design of productive learning environments, and the use of assessment instruments to guide statistics education research.

Randall E. Groth  
*Salisbury University, Salisbury, Maryland*

Tim Jacobbe  
*University of Florida, Gainesville, Florida*

Sandra Madden  
*University of Massachusetts Amherst, Amherst, Michigan*

Andrew Zieffler  
*University of Minnesota, Minneapolis, Minnesota*

Discussant: Rich Lehrer  
*Vanderbilt University, Nashville, Tennessee*

Discussant: Hollylynne Lee  
*North Carolina State University, Raleigh, North Carolina*
106
Perspectives on Formative Assessment: Approaches in General and Special Education

Work Session

The speaker will describe secondary school applications of formative assessment; present divergent perspectives from general and special education, including research on assessments to monitor progress in algebra; and discuss strengths and limitations in conceptual frameworks, research methodology and results, and implications for instruction.

Anne Foegen
Iowa State University, Ames, Iowa

107
Studying Effective Mathematics Instruction: Assessment Systems, Professional Learning, Interventions

Research Symposium

This symposium will comparatively analyze four different studies that identify high-quality teaching practices in mathematics: two use assessment systems to identify high-quality instruction, one examines what mentor teachers convey about high-quality instruction to novice teachers, and one analyzes an expert teachers’ teaching in a lab setting.

Jennifer M. Lewis
Wayne State University, Detroit, Michigan

Deborah Loewenberg Ball
University of Michigan, Ann Arbor, Michigan

Douglas Corey
Brigham Young University, Provo, Utah

Jack A. Dieckmann
Stanford University, Stanford, California

Discussant: Kristin L. Umland
University of New Mexico, Albuquerque, New Mexico
Using Cell Phones for Social Mediated Mathematics Diagnostic Assessment

Work Session

The speakers will present a diagnostic assessment system for equipartitioning using cell phones that addresses three challenges: opportunity to learn, self-directed learning, and students’ growth documentation. They will describe the system along with research results. Participants will then use the instrument and discuss the system’s validity.

Kenny Nguyen  
North Carolina State University, Raleigh, North Carolina

Jere Confrey  
North Carolina State University, Raleigh, North Carolina

Alan Maloney  
North Carolina State University, Raleigh, North Carolina
**English Learners’ Mathematical Thinking When Taught Mathematics Vocabulary**

This study examined English learners’ mathematical thinking during a fractions unit that included mathematics vocabulary. Students engaged in mathematical discourse using mathematics vocabulary and everyday language, gained both procedural and conceptual knowledge of fractions, and expressed greater confidence in their mathematics abilities.

Eula Ewing Monroe  
*Brigham Young University, Provo, Utah*

Hilary H. Webb  
*Brigham Young University, Provo, Utah*

Damon L. Bahr  
*Brigham Young University, Provo, Utah*

**Middle School Experiences as a Foundation to Success in Algebra**

This study draws from a longitudinal sample of ethnically diverse middle school students to examine the development of conceptual understanding in algebra and the impact of reform-based instruction. The results showed that gains in conceptual understanding in middle school predicted higher levels of algebraic achievement across all students.

Carol E. Malloy  
*University of North Carolina at Chapel Hill; McGraw-Hill K–12 Mathematics; Chapel Hill, North Carolina*

Beverly Glienke  
*University of North Carolina at Chapel Hill, Chapel Hill, North Carolina*

**Success Made Probable: African-American Girls’ Statistics Explorations Using Problem-Based Learning**

The speakers will present findings from a study that examined changes in elementary-school-aged, African-American girls’ mathematical understanding and academic identity following engagement in a project-based statistics unit.

Olufunke Adefope  
*Indiana University Bloomington, Bloomington, Indiana*

Mi Yeon Lee  
*Indiana University Bloomington, Bloomington, Indiana*

Lauren Rapacki  
*Indiana University Bloomington, Bloomington, Indiana*

**Discussant: Dorothy Y. White**  
*University of Georgia, Athens, Georgia*
The High-School-to-College Mathematics Transition: Challenges and Prospects

Research Symposium

This session will discuss issues and trends regarding the transition from high school to college. Topics will include national data on students’ course taking, curricular efforts to support STEM- and non-STEM-intending students, the nature and effect of high school calculus, and the implications of the new common core standards.

Cathy Seeley
Past President, NCTM; Charles A. Dana Center, University of Texas at Austin, Austin, Texas

Karen Marrongelle
Portland State University, Portland, Oregon

Christian R. Hirsch
Western Michigan University, Kalamazoo, Michigan

Discussant: William McCallum
University of Arizona, Tucson, Arizona
How Mathematics Challenges and Opportunities Can Change Beginning Teachers’ Beliefs

This talk will examine early-career elementary school teachers’ mathematics challenges and opportunities enacting standards-based curricula. It will probe roles that the challenges and opportunities played in changing the teachers’ mathematics beliefs and discuss implications for elementary school teacher education and professional development.

Joan Gujarati
Manhattanville College, Purchase, New York

Preventing the Achievement Gap: Professional Development in Foundational Mathematics

Efforts to train early childhood teachers in mathematics are rare and often of limited effectiveness. This presentation will describe foundational mathematics, an important conceptual framework for mathematics professional development for teachers of young children. The speakers will present results of a successful intervention based on this idea.

Jennifer S. McCray
Erikson Institute, Chicago, Illinois

Yinna Zhang
Erikson Institute, Chicago, Illinois

Jie-Qi Chen
Erikson Institute, Chicago, Illinois

Third-Grade Teachers’ Instructional Quality, Knowledge, and Efficacy in Mathematics

This study determined profiles among third-grade teachers regarding their mathematics instructional quality, knowledge, and efficacy; and described each profile’s mathematics instructional practices. Quantitative results revealed three profiles; qualitative findings showed how their differences affected students’ opportunities to learn.

Temple Walkowiak
North Carolina State University, Raleigh, North Carolina

Robert Berry
University of Virginia, Charlottesville, Virginia

Sara Rimm-Kaufman
University of Virginia, Charlottesville, Virginia

Discussant: Julie Sarama
University at Buffalo, State University of New York, Buffalo, New York
Investigating Early Algebra Learning Progressions for Grades 3–8

This working session will critique conjectured Early Algebra Learning Progressions (EALPs) for grades 3–8. EALPs that bridge research and practice in algebra learning between elementary and middle grades are crucial first steps in developing elementary grades interventions that examine effects of current reforms’ longitudinal approach to algebra.

Maria Blanton  
University of Massachusetts Dartmouth, Fairhaven, Massachusetts

Ana Stephens  
University of Wisconsin—Madison, Madison, Wisconsin

Timothy Marum  
University of Massachusetts Dartmouth, Fairhaven, Massachusetts

Angela Murphy Gardiner  
University of Massachusetts Dartmouth, Fairhaven, Massachusetts

Eric Knuth  
University of Wisconsin—Madison, Madison, Wisconsin
This working session will examine the use of rehearsals as a pedagogical tool for supporting novice teachers’ ability to teach ambitiously. The speakers will discuss the coding used to investigate how rehearsals support novice teachers’ learning and data on the teacher educators’ role in leading rehearsals and tuning novice teachers’ performance.

Megan Franke  
*University of California at Los Angeles, Los Angeles, California*

Elham Kazemi  
*University of Washington, Seattle, Washington*

Magdalene Lampert  
*University of Michigan, Ann Arbor, Michigan*

Hala Ghousseini  
*University of Wisconsin—Madison, Madison, Wisconsin*

Angela Chan Turrou  
*University of California at Los Angeles, Los Angeles, California*

Heather Beasley  
*University of Michigan, Ann Arbor, Michigan*

Adrian Cunard  
*University of Washington, Seattle, Washington*
114

Strategic Judgment: The Missing Paradigm in Mathematics Teacher Preparation

Research Symposium

This symposium will argue for an approach to teacher preparation in which preservice teachers strengthen their strategic pedagogical judgment through reflective work with what we call “knowledge-practice heuristics,” or “what if” scenarios that pair particular mathematical topics with specific pedagogical moves.

Sandra Crespo  
*Michigan State University, East Lansing, Michigan*

Ann Lawrence  
*Michigan State University, East Lansing, Michigan*

Aaron Brakoniecki  
*Michigan State University, East Lansing, Michigan*

Justin N. Thorpe  
*Michigan State University, East Lansing, Michigan*

Curtis Lewis  
*Michigan State University, East Lansing, Michigan*

Leslie Dietiker  
*Michigan State University, East Lansing, Michigan*

Discussant: Deborah Schifter  
*Center for the Development of Teaching, Newton, Massachusetts*
115

A Lens for Analyzing Coaches’ and Teachers’ Equity Pedagogy

Research Symposium

This symposium will present results of three studies using an equity pedagogy code book to analyze mathematics coaches’ and teachers’ application of equity pedagogy elements in narrative responses and teachers’ application of them in practice.

Diana B. Erchick  
*Ohio State University at Newark, Newark, Ohio*

Michael D. Dornoo  
*Ohio State University at Newark, Newark, Ohio*

Manjula P. Joseph  
*Ohio State University, Columbus, Ohio*

**Discussant: Cynthia A. Tyson**  
*Ohio State University, Columbus, Ohio*
Measurement Research and Practice

116

Research Symposium

This symposium will present different perspectives on research on measurement and share that research’s latest results. The speakers will describe four programs—on learning trajectories, concepts of unit, and relationships among different attributes and number—and follow with a structured audience participation.

Douglas Clements
University at Buffalo, State University of New York, Buffalo, New York

Jennifer McDonel
University at Buffalo, State University of New York, Buffalo, New York

Doug van Dine
University at Buffalo, State University of New York, Buffalo, New York

Barbara J. Dougherty
Iowa State University, Ames, Iowa

Jack Smith
Michigan State University, East Lansing, Michigan

Craig J. Cullen
Illinois State University, Normal, Illinois

Jeffrey E. Barrett
Illinois State University, Normal, Illinois

Julie Sarama
University at Buffalo, State University of New York, Buffalo, New York

203, Capacity: 90
Examining Preservice Teachers’ Metacognition of Place-Value Concepts

Work Session

This session will highlight an approach that creates disequilibrium in grades K–2 teachers regarding their place-value understanding and encourages metacognition. The audience will engage in the theoretical and conceptual underpinnings of developing the mathematical knowledge needed for teaching place-value concepts.

Jo Ann Cady  
*University of Tennessee, Knoxville, Tennessee*

Jamie Price  
*East Tennessee State University, Johnson City, Tennessee*

Cheryl A. Lubinski  
*Illinois State University, Normal, Illinois*

Karen Lucas  
*University of Tennessee, Knoxville, Tennessee*
118 Interactive Paper Session

Lead Teachers’ Competence, Confidence, and Credentials, and Their Students’ Academic Achievement

Rice University’s Mathematics Leadership Institute, developed with two Houston-area school districts, addresses effective, campus-based, high school mathematics leadership by developing lead teachers. The speakers will present statistics showing enhanced content knowledge, preparedness to teach, self-efficacy, credentials, and students’ achievement.

Ngozi Kamau
Rice University, Houston, Texas

Cynthia Knowles
Rice University Mathematics Leadership Institute, Noyce Scholar, Houston, Texas

Middle and High School Mathematics Teachers’ Differences in Alternative Certification

This study examined the differences in content knowledge, attitudes toward mathematics, and concepts of teacher self-efficacy among several different types of teachers in the New York City Teaching Fellows program. The results guide teacher education in mathematics alternative certification.

Brian R. Evans
Pace University, New York, New York

Discussant: Kathryn Chval
University of Missouri—Columbia, Columbia, Missouri

119 Listening to Children’s Mathematical Reasoning

Work Session

Teachers often speak of teaching as listening, but seldom encounter it in practice. This work session will listen to children’s reasoning as evidenced in their language, discursive practices, and mathematical representations as they share solutions to a geometry problem.

Barbara Graves
University of Ottawa, Ottawa, Canada
A Modified Framework for Analyzing Teachers’ Learning Online

The speakers will discuss an aspect of a project that extends existing research on professional teaching communities to an online environment. They will investigate what aspects of an existing analytical framework that investigates professional teaching communities’ learning are transferable to online environments.

Chrystal Dean
Appalachian State University, Boone, North Carolina

Jason Silverman
Drexel University, Philadelphia, Pennsylvania

Developing and Enhancing Teachers’ TPACK

The speakers will report findings of their synthesis of what they currently know about preparing future teachers to integrate technology into their teaching. They will also make recommendations on areas that need additional research and engage participants will be engaged in a discussion of TPACK for mathematics educators.

Shannon Driskell
University of Dayton, Dayton, Ohio

Christine A. Browning
Western Michigan University, Kalamazoo, Michigan

Margaret L. Niess
Oregon State University, Corvallis, Oregon

Christopher Johnston
George Mason University, Fairfax, Virginia

Rachel A. Harrington
Western Oregon University, Monmouth, Oregon

Supporting Teachers’ Developing Instrumental Genesis with Dynamic Mathematical Software

This research is the product of a two-year study of technologically rich learning environments designed for graduate students studying mathematics education. The main research question of interest asked what characteristics of a learning environment might support students’ progress toward instrumental genesis using dynamic cognitive learning tools.

Sandra Madden
University of Massachusetts Amherst, Amherst, Michigan

Discussant: Karen F. Hollebrands
North Carolina State University, Raleigh, North Carolina
121
Research Opportunities Arising from the Standards for Mathematical Practice

Research Symposium

The standards for mathematical practice in the Common Core State Standards for Mathematics provide guidance and convey expectations about the “varieties of expertise that mathematics educators at all levels should seek to develop in their students.” This session will address related research opportunities in curriculum, teaching, and assessment.

Fran Arbaugh
Pennsylvania State University, University Park, Pennsylvania

Harold Asturias
University of California, Berkeley, Berkeley, California

Al Cuoco
Center for Mathematics Education, Education Development Center, Newton, Massachusetts

Discussant: Valerie Mills
National Council of Supervisors of Mathematics; Oakland Schools Regional Resource Center, Waterford, Michigan

Sagamore 4, Capacity: 546
Comparing Effects of Two Formative-Assessment Professional Development Models

The presentation will describe different models of professional development that use formative assessment with networked technology, along with effects on teachers’ confidence, self-efficacy, value and interest in technology, and knowledge about assessment. The speakers will share comparisons of changes after each model’s first and second year.

Melfried Olson  
University of Hawaii, Honolulu, Hawaii

Yue Yin  
University of Illinois at Chicago, Chicago, Illinois

Hannah Slovin  
University of Hawaii, Honolulu, Hawaii

Connecting Professional Development to Teachers’ Learning and Instructional Change

This session will present research on secondary school mathematics teachers’ learning and instructional change following professional development that focused on selecting and implementing cognitively challenging tasks. The speaker will explore how changes in teachers’ knowledge and practices connected to their professional learning.

Melissa Boston  
Duquesne University, Pittsburgh, Pennsylvania

Hard Evidence: High School Mathematics Teachers Engaging in Inquiry

Teachers have heard widespread calls to engage in evidence-based inquiry into their own teaching in an effort to improve it. This study examines what five high school mathematics teachers did when consistently asked for evidence of improvement in teaching for conceptual understanding in mathematics.

Robert Wieman  
University of Delaware, Newark, Delaware

Discussant: Michelle Cirillo  
University of Delaware, Newark, Delaware

Sagamore 5, Capacity: 210
Learning to Build on Children’s Thinking through Curriculum Materials

Work Session

The speaker’s team has developed a series of activities and video-based materials for elementary methods courses grounded in the idea that educative features in Standards-based curricula can help teachers learn about and support children’s mathematical thinking. They will share activities and evidence of preservice teachers’ learning.

Corey Drake  
*Iowa State University, Ames, Iowa*

Molly Sweeney  
*Des Moines Public Schools, Des Moines, Iowa*

Jennifer Johnson  
*Des Moines Public Schools, Des Moines, Iowa*

Natalie Franke  
*Des Moines Public Schools, Des Moines, Iowa*

Andrew M. Tyminski  
*Clemson University, Clemson, South Carolina*

Alejandro Andreotti  
*Iowa State University, Ames, Iowa*

Tonia J. Land  
*Iowa State University, Ames, Iowa*
Teachers’ Specialized Knowledge: Task Use in Classrooms and Professional Education

Work Session

This session will describe four research projects taking up teachers’ specialized content knowledge development by studying the function of mathematical tasks in classroom practice and professional education. The speakers will consider improved designs for professional education that meet teaching’s subject matter demands.

Rebekah Elliott  
Oregon State University, Corvallis, Colorado

Judith Mumme  
WestEd, San Francisco, California

Karen Marrongelle  
Portland State University, Portland, Oregon

Erin Baldinger  
Stanford University, Stanford, California

Hilda Borko  
Stanford University, Stanford, California

Karen Koellner  
Hunter College, City University of New York, New York

Suzanne H. Chapin  
Boston University, Boston, Massachusetts

Nancy Anderson  
Boston University, Boston, Massachusetts

Sagamore 7, Capacity: 190
125
Helping Teachers Adapt Instruction to Promote Mathematical Thinking

Research Symposium

This session will explore ways to adapt teaching and consider professional development’s role in the adaptation process. The speakers will address how practicing teachers learn to adapt mathematical curricula for instruction and discuss effects of prospective teachers’ learning, beliefs, and teaching contexts on their instructional adaptations.

Aki Murata  
Stanford University, Stanford, California

Benjamin Hedrick  
Stanford University, Stanford, California

Sarah Kate Selling  
Stanford University, Stanford, California

Erin Baldinger  
Stanford University, Stanford, California

Laura Bofferding  
Stanford University, Stanford, California

Megan W. Taylor  
Harvard University, Cambridge, Massachusetts
126
Longitudinal Changes in Teachers’ Knowledge and Students’ Achievement

Research Symposium

This symposium will examine what systemic change in teachers’ knowledge, classroom practice, and students’ achievement looks like when multilevel effects are explicitly modeled. Presentations will focus on issues of estimating individual students’ and teachers’ growth when participants are part of coherent cultural groups in social institutions.

James A. Middleton
Arizona State University, Tempe, Arizona

Finbarr Sloane
University of Colorado at Boulder, Boulder, Colorado

Seong Hee Kim
Arizona State University, Tempe, Arizona

Hyun Jung Kang
Arizona State University, Tempe, Arizona

Paula Guerra-Lombardi
Arizona State University, Tempe, Arizona

Jennifer Oloff-Lewis
Arizona State University, Tempe, Arizona

202, Capacity: 87

127
Sequences and Transitions in Grades K–12 Geometry Textbooks

Research Symposium

This symposium will challenge unexplored assumptions about sequences in which U.S. geometry textbooks present mathematical ideas and activities. The speakers will describe these sequences as curricular storylines, analyze verbal and visual storylines offered by textbooks, and explore how sequences promote and limit geometry construction.

Aaron Brakoniecki
Michigan State University, East Lansing, Michigan

Leslie Dietiker
Michigan State University, East Lansing, Michigan

Discussant: Kristen Bieda
Michigan State University, East Lansing, Michigan

203, Capacity: 90
Creating a Framework to Examine Mathematics Teachers’ Exploratory Data Analysis

Work Session

Several U.S. institutions implemented an NSF-funded curriculum for mathematics teachers, focusing on data analysis and probability. The presenters will share a self-developed coding tool to analyze teachers’ reports of their exploratory data analysis. Participants will analyze, use, and critique the coding tool.

Hollylynne Lee
North Carolina State University, Raleigh, North Carolina

Shannon Driskell
University of Dayton, Dayton, Ohio

Suzanne Harper
Miami University, Oxford, Ohio

Dustin L. Jones
Sam Houston State University, Huntsville, Texas

Gladis Kersaint
University of South Florida, Tampa, Florida
Developing Young Children’s Qualitative Geometric Reasoning

Children’s geometry experiences are mostly Euclidean, but they also have nonmetric ideas. Supported by a specially designed, interactive geometry environment, the speaker conducted a teaching experiment with two children. He found that the children developed significant, authentic forms of what he called qualitative geometric reasoning.

Steven Greenstein  
*University of the Virgin Islands, Saint Thomas, Virgin Islands*

The Impact of Advanced Primary School Geometry and Measurement Curriculum

This session will present research findings, activities, and students’ work from Project M2, funded by an NSF grant to nurture talent in all young students. The project presented advanced content in depth and encouraged students to think like mathematicians. Results show that these students significantly outperformed their peers.

M. Katherine Gavin  
*University of Connecticut, Storrs, Connecticut*

Tutita Casa  
*University of Connecticut, Storrs, Connecticut*

Jill Adelson  
*University of Louisville, Louisville, Kentucky*

Discussant: Rich Lehrer  
*Vanderbilt University, Nashville, Tennessee*
130
Supporting and Studying Teachers’ Learning about Reasoning and Proving

Work Session
This session will analyze and discuss a set of teacher education materials that develop teachers’ capacity to reason, prove, and engage their students productively in such practices. The speakers will present data from a pilot study of teachers’ learning from the materials.

Margaret Smith
University of Pittsburgh, Pittsburgh, Pennsylvania

James Greeno
University of Pittsburgh, Pittsburgh, Pennsylvania

Justin D. Boyle
University of Pittsburgh, Pittsburgh, Pennsylvania

Evelyn Gordon
Horizon Reserach Inc., Chapel Hill, North Carolina

Sagamore 2, Capacity: 190
Modeling Variation in Students’ Mathematics Achievement in a Reform Curricula

Using hierarchical linear modeling to account for variation in students’ achievement, the speakers will give an overview of the impact of the reform-based Core-Plus Mathematics curricular materials on students’ test scores. They will examine how teachers’ participation in a state-funded professional development affected students’ achievement.

Erin Elizabeth Krupa  
*North Carolina State University, Raleigh, North Carolina*

Jere Confrey  
*North Carolina State University, Raleigh, North Carolina*

Reasoning and Proof in Reform and Conventional Mathematics Textbooks

This session describes the results of an analysis of the written curriculum for reasoning and proof elements using an adapted framework. The analysis compared chapters on polynomial functions from a reform-oriented high school mathematics textbook and a conventional high school textbook.

Jon D. Davis  
*Western Michigan University, Kalamazoo, Michigan*

Textbook Analysis: The Case of High School Algebra

Curriculum materials strongly determine what students have an opportunity to learn, yet vast differences exist in the algebra strands of commercially available secondary school textbooks. The speakers will present data from a textbook analysis project that characterized these differences coherently, comprehensively, and commensurably.

Mary Ann Huntley  
*Cornell University, Ithaca, New York*

Maria Terrell  
*Cornell University, Ithaca, New York*

Discussant: Sharon L. Senk  
*Michigan State University, East Lansing, Michigan*
Research on Technology in Mathematics Education: Current Efforts and Future Directions

Research Symposium

This session focuses on current research efforts regarding technology in mathematics education, including research related to digital technologies, dynamic software, and video gaming. The session participants will also discuss future directions regarding research on technology in mathematics education.

Eric Knuth
University of Wisconsin—Madison, Madison, Wisconsin

Stephen Hegedus
University of Massachusetts-Dartmouth, North Dartmouth, Massachusetts

Nathalie Sinclair
Simon Fraser University, Burnaby, British Columbia, Canada

John Olive
University of Georgia, Athens, Georgia

Melissa Gresalfi
Indiana University Bloomington, Bloomington, Indiana

Discussant: Janet Bowers
San Diego State University, San Diego, California

Discussant: Walter Stroup
University of Texas, Austin, Texas

Sagamore 4, Capacity: 546
**Exploring the Mathematics Resocialization Processes of Three Latino Students**

Using the notion of the zone of mathematical practice, we analyzed three Latino students’ trajectories (grades 3–6) in an after-school mathematics program. Results demonstrate that students took on new roles participating in mathematical meaning-making through mathematical talk, new use of tools, social networking, and playful interactions.

Carlos Lopez Leiva  
*University of Illinois at Chicago, Chicago, Illinois*

Gabriel Viego  
*University of Illinois at Chicago, Chicago, Illinois*

Zayoni Torres  
*University of Illinois at Chicago, Chicago, Illinois*

**Identities and Gatekeepers: Postsecondary Transitions for African American Students**

What mathematics identities are students constructing, rejecting, and repairing throughout the transition to postsecondary remedial math courses? This presentation will feature the structure and findings of case-study research centered on mathematics engagement and identity work among African American students.

Gregory Larnell  
*Michigan State University, East Lansing, Michigan*

**What Makes Me Smart? Students’ Positioning in High School Mathematics**

This session will present results of a qualitative case study of students’ group interactions in a high school mathematics class. The study investigated (1) how five students negotiated their own and peers’ academic status and (2) how they viewed themselves and their peers as smart in mathematics.

Teresa K. Dunleavy  
*University of Washington, Seattle, Washington*

**Discussant: Victoria Hand**  
*University of Colorado at Boulder, Boulder, Colorado*
Algebraically Rich Tasks: Linking Instructional Practices and Students’ Understanding

Work Session

This session will present findings linking classroom practices and students’ learning in algebra. The speakers will highlight challenges of building an observation scheme to capture classroom practices and developing assessments to measure students’ understanding. They will discuss the coding scheme, sample tasks, and classroom video.

Jamie L. W. Wernet  
Michigan State University, East Lansing, Michigan

Kimberly Seashore  
University of California-Berkeley, Berkeley, California

Jerilynn Lepak  
Michigan State University, East Lansing, Michigan

Learning to Do Mathematics as a Teacher

Work Session

What are the mathematical demands of teaching? How can teachers learn to do the specialized work of mathematics teaching? Explore these questions by focusing on a selection of cases and considering how mathematical knowledge for teaching is used to manage recurrent problems of practice.

Meghan M. Shaughnessy  
University of Michigan, Ann Arbor, Michigan

Deborah Loewenberg Ball  
University of Michigan, Ann Arbor, Michigan

Hyman Bass  
University of Michigan, Ann Arbor, Michigan

Yeon Kim  
University of Michigan, Ann Arbor, Michigan

Yvonne Lai  
University of Michigan, Ann Arbor, Michigan

Laurie Sleep  
University of Michigan, Ann Arbor, Michigan

Minsung Kwon  
University of Michigan, Ann Arbor, Michigan

Mark Thames  
University of Michigan, Ann Arbor, Michigan
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Solving $4x + 2 = 3x + 9$

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