Program for the Research Presession

The 76th Annual Meeting of the
National Council of Teachers of Mathematics

31 March–1 April 1998

Grand Hyatt Hotel
Washington, D.C.

Sponsored by
Research Advisory Committee of the National Council of Teachers of Mathematics
Special Interest Group for Research in Mathematics Education of the American Educational Research Association
Informal meetings can be held on Wednesday, 8:00 a.m.–5:00 p.m., in the LaTrobe Room, Third Level, and in the Renwick and Bulfinch Rooms from 8:00 a.m. to 10:00 a.m. and 12:00 noon to 5:00 p.m.

The NCTM Research Advisory Committee is pleased to announce a “Research in Mathematics Education” Web site at www.nctm.org/committees/rac/. This Web site incorporates the information formerly found in the Research Highlights booklet.
Welcome

Organizers
Paul Cobb, Vanderbilt University  
Chair, NCTM Research Advisory Committee
Douglas Owens, Ohio State University  
Cochair, SIG/RME of AERA

7:30 p.m.–9:00 p.m.
Plenary Address
Critical and Social Dimensions in Equity for Mathematics Education

Presenter
Walter G. Secada, University of Wisconsin—Madison

This session will present historical evidence of how promising developments in mathematics education became barriers to the achievement of equity. It will develop the argument that without a critical stance toward reform and an understanding of the social forces that might interfere with our ability to achieve equity, the goal of “mathematics for all” will become just another slogan.

A reception will be held following the opening session.
8:30 a.m.–10:00 a.m.
Symposium
The Recognizing and Recording Reform in Mathematics Education Project: Insights for the Future of Standards
Organizer/Presenter
Joan Ferrini-Mundy, University of New Hampshire and National Research Council
Presenter
Karen Graham, University of New Hampshire
We will discuss the impact of standards-based reform at various sites studied in this project, including roles that standards documents played, teachers’ views of standards, and what teachers addressed in their practice. We will also examine implications for the standards movement in mathematics.

Constitution A

8:30 a.m.–10:00 a.m.
Symposium
Innovation in Mathematics Teacher Learning
Organizer/Presenter
Gwendolyn M. Lloyd, Virginia Polytechnic Institute and State University
Presenters
Jeffrey Frykholm, Virginia Polytechnic Institute and State University
Dominic Peressini, University of Colorado at Boulder
Rebekah Elliott, University of Colorado at Boulder
Skip Wilson, University of Michigan
Edward Wall, University of Michigan
Raven Wallace, University of Michigan
Discussant
Deborah Loewenberg Ball, University of Michigan
Participants will discuss research themes associated with the development and implementation of innovative ways to facilitate mathematics teacher learning. Primary areas of focus will be teacher learning with reform-oriented curriculum materials, collegial collaboration, and hypermedia creation and exploration.

Constitution B
8:30 a.m.–10:00 a.m.

Symposium

**Communication in Mathematics Classrooms: The Synergistic Nature of Teacher-Student and Student-Student Interaction**

Organizer/Presenter

Adalira Saenz-Ludlow, University of North Carolina at Charlotte

Presenters

Lena Licón Khisty, University of Illinois at Chicago
Verna Adams, Washington State University
Bey-Bey Li, Washington State University

Discussant

Erna Yackel, Purdue University/Calumet

These three papers, from three different research projects, explore the synergy between student-teacher and student-student interactions and its influence on elementary and middle school students’ understanding of mathematics.

**Constitution C**

8:30 a.m.–10:00 a.m.

Work Session

**Conducting Research within a Systemic Teacher-Enhancement Project**

Organizer/Presenter

Marilyn E. Strutchens, University of Maryland

Presenters

Patricia F. Campbell, University of Maryland
Duane A. Cooper, University of Maryland
Ann Wallace, University of Maryland

We will discuss research efforts and design issues related to the major components of a systemic teacher-enhancement project. Components include teachers’ content knowledge, curriculum revision, administrative support, parental and community involvement, and documenting teacher change.

**Constitution D/E**
Wednesday, 1 April 1998

8:30 a.m.–10:00 a.m.
Work Session

**Windows on Teaching**

Organizers/Presenters
- Nanette Seago, Mathematics Renaissance
- Judith Mumme, WESTED

Discussants
- Iris Weiss, Horizon Research, Inc.
- Jim Stigler, University of California at Los Angeles

An interactive session to examine two techniques for gathering information about teaching practices—classroom observation analysis and video analysis. Preliminary results will be shared from a comparative study of classroom observation protocols from Horizon Research (Local Systemic Change Initiatives) and TIMSS Video Analysis.

Arlington/Cabin John

8:30 a.m.–10:00 a.m.
Symposium

**Constructive Software: Developing Computer Environments Based on Theoretical Models**

Organizer/Presenter
- Douglas H. Clements, State University of New York at Buffalo

Presenters
- Julie Sarama, Wayne State University
- Les Steffe, University of Georgia
- John Olive, University of Georgia

We describe a model for the development of software based on theory and research and four constructivist software environments built from this model.

Roosevelt/Wilson
10:30 a.m.–12:00 noon
Symposium
Reflecting on the Math Wars: Perspectives on the Role of Research and Researchers in the Public Discourse about Mathematics Education Reform
Organizer/Presenter
Edward A. Silver, University of Pittsburgh
Presenters
Hyman Bass, Columbia University
Judith T. Sowder, San Diego State University
Three participant-observers in the public discourse about mathematics education reform will address the general theme suggested in the title of this session, respond to each other’s remarks, and engage those attending the session in a dialogue about key issues related to this theme.

Constitution A

10:30 a.m.–12:00 noon
Symposium
Standards-Oriented Elementary School Mathematics Curricula: What Does the Research Say about Student Outcomes?
Organizer/Presenter
Sharon L. Senk, Michigan State University
Presenters
Janet Beissinger, University of Illinois at Chicago
Andy Isaacs, University of Chicago School Mathematics Project
Jan Mokros, TERC
Discussants
Mary Kay Bouck, Battle Creek (Michigan) Public Schools
Denisse R. Thompson, University of South Florida
Representatives of three elementary school curriculum projects will present evidence of what students who study from standards-oriented mathematics materials know and are able to do. Common themes and implications for research and practice will be discussed by a school mathematics curriculum director and a university researcher/teacher educator.

Constitution B
Symposium

**Current Perspectives on Algebra**

Organizer/Presenter
Susan J. Lamon, Marquette University

Presenters
Bill Parker, Kansas State University
James Kaput, University of Massachusetts—Dartmouth
Randolph Philipp, San Diego State University
Cornelia Tierney, TERC

Discussant
M. Kathleen Heid, Pennsylvania State University

The current status of the national debate on algebra will be examined from multiple perspectives. Theoretical and empirical work will explore the nature of algebra, issues in teacher preparation, and children's thinking under the influence of curricular and pedagogical innovations.

**Constitution C**

Work Session

**Linking Research and Systemic Reform: A Working Group**

Organizer:
Jere Confrey, University of Texas at Austin

Presenters
Eric Hamilton, National Science Foundation
Celeste Pea, National Science Foundation
Maria Santos, San Francisco Unified School District
Walter M. Stroup, University of Texas at Austin

This work session will address the need to link research and systemic reform. It will provide information on existing programs and discuss theories of systemics, challenges, obstacles in conducting research, and potential research targets.

**Constitution D/E**
10:30 a.m.–12:00 noon
Work Session

**Math Recovery: An Intervention and Advancement Program for Low-Attaining First Graders and an Extensive Professional Development Program for Teachers**

Organizer/Presenter
- Bob Wright, Southern Cross University, Australia

Presenters
- Ann Stafford, SC Educational Associates, Walhalla, South Carolina
- Jim Martland, University of Liverpool, United Kingdom

This session will focus on (a) a brief overview of the Math Recovery program, (b) the application of research results and techniques in the design of the program, (c) associated research studies, (d) examples of research questions arising from the program, and (e) directions for future research.

_Arlington/Cabin John_

10:30 a.m.–12:00 noon
Symposium

**Classroom Research on Students’ Probabilistic Thinking**

Organizers/Presenters
- Sarah Berenson, North Carolina State University
- Carolyn A. Maher, Rutgers, The State University of New Jersey—New Brunswick

Presenters
- Robert Speiser, Brigham Young University
- Orit Zaslavsky, Technion—Israel Institute of Technology

Discussant
- Herbert P. Ginsberg, Teachers College, Columbia University

Findings from several classroom studies related to middle school students’ and preservice teachers’ probabilistic thinking will be shared and discussed in order to pose further questions for later work.

_Roosevelt/Wilson_
Program at a Glance

8:30 a.m.–10:00 a.m.

Constitution A

The Recognizing and Recording Reform in Mathematics Education Project: Insights for the Future of Standards
Joan Ferrini-Mundy

Constitution B

Innovation in Mathematics Teacher Learning
Gwendolyn M. Lloyd

Constitution C

Communication in Mathematics Classrooms: The Synergistic Nature of Teacher-Student and Student-Student Interaction
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Roosevelt/Wilson

Classroom Research on Students’ Probabilistic Thinking
Sarah Berenson
Carolyn A. Maher

Renwick/Bulfinch

A Search for Meaningful and Valid Practices in Performance Assessment in Mathematics
Max Stephens
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**NOTE:**
“Update on Federal Funding for Research in Mathematics Education” will be held from 5:15 p.m. to 6:30 p.m. in Constitution B.
Symposium  
**A Search for Meaningful and Valid Practices in Performance Assessment in Mathematics**

Organizer/Presenter  
Max Stephens, Victoria Board of Studies, Australia

Presenters  
Cathy Beesey, Australian Catholic University  
Norman Webb, University of Wisconsin—Madison  
Susan P. Lajoie, McGill University

Discussant  
Tom Romberg, University of Wisconsin—Madison

The symposium will report on studies of performance assessment in three countries. It will focus on the quality and consistency of teachers’ judgments and on theoretical and practical issues relating to the aggregation of information derived from performance assessments.

Thematic Presentation  
**Policy, Practice, and Performance—Revisiting the California Math Reforms**

Organizer/Presider  
Jim Stigler, University of California at Los Angeles

Presenter  
David K. Cohen, University of Michigan

This paper discusses the mathematics reforms in California on the basis of a 1994 survey of California teachers. Teachers who had the usual opportunities to learn about improved mathematics teaching reported conventional teaching. But a minority of teachers studied new curriculum designed for the reforms, or students’ work on revised assessments. Their practice was significantly closer to the aims of the policy, and their students had higher math scores.
1:30 p.m.–3:00 p.m.

Symposium **Perspectives on Classroom Research**

Organizer/Presenter
David Clarke, University of Melbourne, Australia

Presenters
Deborah Loewenberg Ball, University of Michigan
Koeno Gravemeijer, University of Utrecht, Netherlands
Alan Schoenfeld, University of California at Berkeley

Discussant
James Greeno, Institute for Research on Learning and Stanford University

A variety of methods are currently being employed internationally for the investigation of the practices and outcomes of mathematics classrooms and for the improvement of those practices and outcomes. This session will outline how four researchers have met the challenges of classroom research in addressing their distinct research agendas.

Constitution B

1:30 p.m.–3:00 p.m.

Symposium **Speaking and Writing the Wor(l)d: Two Teacher-Researchers Explore Mathematical Classroom Discourse**

Organizer/Presenter
Vicki Zack, Saint George’s School, Montreal, Quebec, and McGill University

Presenters
Roberta Schorr, Rutgers, The State University of New Jersey—Newark
Eileen Phillips, Kerrisdale Elementary School, Vancouver, British Columbia

Discussants
Carolyn Maher, Rutgers, The State University of New Jersey—New Brunswick
David Pimm, Michigan State University

Eileen Phillips and Vicki Zack, teacher-researchers, will report on ongoing research connected with written and spoken mathematical discourse, with a focus on the high-level similarities and differences between speech and writing in the teaching and learning of mathematics.

Constitution C
1:30 p.m.–3:00 p.m.
Work Session

Examining the Functional Dualism of Discourse in Mathematics Classrooms

Organizer/Presenter
   Dominic D. Peressini, University of Colorado at Boulder

Presenter
   Eric Knuth, University of Colorado at Boulder

A conceptual framework built around the functional dualism of discourse will be introduced, and participants—using this framework—will analyze the discourse that occurred in a yearlong professional development program for secondary school teachers and in a high school mathematics class.

Constitution D/E

1:30 p.m.–3:00 p.m.
Thematic Presentation

Examining Mathematics in Power Relationships and Power in Mathematical Relationships

Organizer/Presenter
   Sue Mau, Indiana University–Purdue University Indianapolis

Presenters
   Ann Leitze, Ball State University
   Anne M. Raymond, Keene State College
   Beatriz D’Ambrosio, Indiana University–Purdue University Indianapolis

This session examines the interaction of mathematical power and power relationships in mathematics classrooms from the perspective that power is both being able to participate competently and actually participating competently in mathematics.

Arlington/Cabin John
1:30 p.m.–3:00 p.m.

Symposium

**Multiplicative Thinking in Ratio, Rate, and Function Situations**

Organizer/Presenter
- Esther M. H. Billings, Northern Illinois University

Presenters
- Jason Thrun, Northern Illinois University
- Ellen Hines, Northern Illinois University
- David B. Klanderman, Trinity Christian College

Discussant
- Helen A. Khoury, Northern Illinois University

Four related studies will explore different aspects of students’ multiplicative thinking in ratio, rate, and function situations. Students’ constructions and coordination of units during problem solving will be analyzed, and implications related to students’ algebraic thinking will be discussed.

Roosevelt/Wilson

3:30 p.m.–5:00 p.m.

Symposium

**Toward a “Research Agenda” in Language and Mathematics in Relation to Classrooms**

Organizer/Presider
- Paul Cobb, Vanderbilt University

Presenter
- David Pimm, Michigan State University

For the past twenty years I have worked in and around an area loosely framed by the conjunction “language and mathematics.” I am beginning to develop a sense for some seemingly invariant issues and dilemmas about mathematical communication and other functions of language in the service of mathematics—its very expression as well as its teaching and learning—which I propose to offer for discussion.

Constitution A
Wednesday, 1 April 1998

3:30 p.m.–5:00 p.m.
Work Session

**Standards 2000: Continuing the Research Conversation**

Organizers
- Mary Lindquist, Columbus State University
- Joan Ferrini-Mundy, University of New Hampshire and National Research Council

Presenters
- Members of the Standards 2000 Writing Group and the Commission on the Future of the Standards

This session will provide an update on research-related initiatives in the Standards 2000 project and an opportunity for the research community to have a continuing voice and opportunity for input into the effort. Visit www.nctm.org/Standards2000 for discussion questions.

Constitution B

3:30 p.m.–5:00 p.m.
Symposium

**Classroom Implications of Research on Mental Computation: International Perspectives**

Organizer/Presenter
- Alistair McIntosh, Edith Cowan University, Australia

Presenters
- Eddie Gray, University of Warwick, United Kingdom
- Demetra Pitta, University of Warwick, United Kingdom
- Robert Reys, University of Missouri—Columbia
- Len Sparrow, Edith Cowan University, Australia

Discussant
- Paul R. Trafton, University of Northern Iowa

The session highlights three research studies from Australia, England, and the United States on the mental computation of elementary school children, which have differing, and sometimes conflicting, implications for the elementary school classroom.

Constitution C
3:30 p.m.–5:00 p.m.

Work Session

**Investigating the Teaching and Learning of Developmental Mathematics at the University Level**

Organizer/Presenter
- Erna Yackel, Purdue University/Calumet

Presenters
- Elena Steencken, Rutgers, The State University of New Jersey—New Brunswick
- Mercedes McGowen, William Rainey Harper College
- Diana Underwood Gregg, Purdue University/Calumet

The session will involve participants in identifying the role that mathematics education research can play in developmental mathematics at the university level. A panel of mathematics educators will open the session by discussing the issues that they are currently investigating.

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3:30 p.m.–5:00 p.m.

Symposium

**The Legacy of CGI: Moving the Philosophy beyond Primary School Mathematics**

Organizer/Presenter
- Diana B. Erchick, Ohio State University

Presenters
- Patti Brosnan, Ohio State University
- Sybil Brown, Ohio State University
- Richard P. Connelly, Ohio State University
- Ferdinand Rivera, Ohio State University

Discussant
- Suzanne K. Damarin, Ohio State University

Five presenters discuss implications and issues for mathematics content and pedagogy that emerged from their research on efforts to expand Cognitively Guided Instruction (CGI) into the teaching and learning of mathematics in grades 4–16.
3:30 p.m.–5:00 p.m.
Thematic Presentation

**A Structural Analysis of Learning Qualitative Calculus in Graphical Environments:**
An Overview and Synthesis of More than a Decade of Research

Organizer/Presenter
Walter M. Stroup, University of Texas at Austin

Discussants
Jere Confrey, University of Texas at Austin
Ricardo Nemirovsky, TERC
Patrick W. Thompson, Vanderbilt University

Updating Piaget's idea of qualitative rate, a notion of qualitative calculus will be introduced and used to synthesize more than a decade of calculus-related research and innovation in computer-based graphing and simulation environments.

Roosevelt/Wilson

5:15 p.m.–6:30 p.m.
Information Session

**Update on Federal Funding for Research in Mathematics Education**

Presider
Erna Yackel, Purdue University/Calumet

Presenters
Nora Sabelli, National Science Foundation
Pat O’Connell Ross, U.S. Department of Education,
    Dwight D. Eisenhower Professional Development Program
Carol Lyons, U.S. Department of Education,
    Office of Educational Research and Improvement

Constitution B