

RESEARCH PRESESSION

**The 74th Annual Meeting of the
National Council of Teachers of Mathematics**

April 23-24, 1996

**Marriott Hotel & Marina
San Diego, CA**

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**

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Announcements

The Tuesday evening session and all Wednesday sessions will be held in the San Diego Marriott Hotel and Marina. Consult the final NCTM program for location of the Thursday sessions.

Informal meetings may be held on Wednesday in the Newport Beach Room (Level 4).

Thanks to Beverly McLain, University of Delaware, for her help in publishing this program.

Tuesday, April 23, 1996

7:30 - 9:00 p.m.

Marina G

Welcome

Organizers: **Patrick W. Thompson**, San Diego State University
Chair, NCTM Research Advisory Committee

James Hiebert, University of Delaware
Co-Chair, SIG/RME of AERA

Justifying Claims in Mathematics Education Research *Opening Plenary Address*

Presenter: **Frank K. Lester**, Indiana University
Editor, Journal for Research in Mathematics Education

There are two very different ways of discussing issues related to justifying the claims we make in mathematics education research. One traditional way--or at least a familiar way--is to discuss justification in terms of scientific rationalism. A second way is to frame the issue of justification claims through the lens of dialogic, communicative rationalism. I will sketch both of these ways of thinking about justifying claims and will suggest that the latter may offer mathematics education a more useful way of thinking about our research activities.

Responders: **Thomas P. Carpenter**, University of Wisconsin-Madison
Past Editor, Journal for Research in Mathematics Education

Judith T. Sowder, San Diego State University
Editor-Elect, Journal for Research in Mathematics Education

A reception will be held in Marina F following this session

Wednesday, April 24, 1996

(See center of program for Wednesday's Schedule)

8:30 - 12:00 noon

Delmar (Level 3)

***Models for Mathematics Instruction:
Everyday Mathematics and Mathematicians' Mathematics***

Organizers/Presenters: **Marta Civil**, University of Arizona
Steven Guberman, University of Colorado
Joanna Masingila, Syracuse University
Presenters: **Mary Brenner**, University of California, Santa Barbara
Rogers Hall, University of California, Berkeley
Andee Rubin, TERC, Cambridge, MA
Discussant: **Judit Moschkovich**, IRL, Palo Alto, CA

The participants and audience will discuss two models for reforming mathematics instruction--everyday mathematics and mathematicians' practices. How different are these models? Should (can) they be integrated? How are they reflected in (real) schools?

8:30 - 12:00 noon

Warner Center (Level 4)

***Principles for Middle Grades Teacher Enhancement:
A Participatory Session for Teacher Educators***

Organizer/Presenter: **Thomas R. Post**, University of Minnesota
Presenters: **Kathleen Cramer**, University of Wisconsin-River Falls
Robert Reys, University of Missouri
Mary Pat Roberts, Pri Math Project, Minneapolis
Thomas A. Romberg, University of Wisconsin-Madison
Discussants: **Rick Billstein**, University of Montana
William Fitzgerald, Michigan State University
Susan Friel, University of North Carolina
Richard Lesh, University of Massachusetts, N. Dartmouth

The need for expanded forms of continuing professional development for teachers will be especially apparent as new NSF curricula become available, each with different assumptions about the nature of mathematics, problem solving and learning. This session will consider how we can maximize the effectiveness of these efforts.

8:30-10:00 am

Board Room (Level 3)

Examining a Framework and Item Bank for Exploring Number Sense

Organizer/Presider: **Alistair McIntosh**, Edith Cowan University, Australia
Organizer/Presenter: **Barbara Reys**, University of Missouri
Presenters: **Goran Emanuelsson**, University of Gothenborg, Sweden
Bengt Johansson, University of Gothenborg, Sweden
Der-Ching Yang, St. John's & St. Mary's, Taiwan
Discussant: **Judy Sowder**, San Diego State University

A framework for characterizing and examining number sense will be presented and discussed. Items developed to assess various components of the framework will be shared along with data collected in Australia, Sweden, United States, and Taiwan.

8:30 - 10:00 am

Green Room (Level 3)

***"Reflecting On Practice" Session:
Facing Challenges of Uncovering and Understanding Students' Thinking***

Organizer: **Research Advisory Committee of NCTM**
Presenter: **Deborah Loewenberg Ball**, Michigan State University
Discussant: **Mary M. Lindquist**, Columbus College

Figuring out how students are thinking is at the heart of teaching and of doing research. Participants will investigate three children's mathematical thinking, using the sorts of material with which both teachers and researchers must work (e.g., talk, nonverbal actions). The discussion will explore the challenges of seeing, hearing, and interpreting students.

8:30 - 10:00 am

Torrance (Level 4)

***Combining Large-Scale Evaluation with Focused Research
in Reformed Mathematics Classrooms***

Organizer/Presider: **Hal Schoen**, University of Iowa
Presenters: **Diane Bean**, University of Iowa
Judy Flowers, University of Michigan
Gwen Lloyd, University of Michigan
Melvin R. (Skip) Wilson, University of Michigan
Steve Ziebarth, University of Iowa
Discussant: **Diana Lambdin**, Indiana University

This session will use the experience of one reformed curriculum project's evaluation/focused research program as a point of departure for discussion of the issues and opportunities that reformed curricula provide for mathematics education researchers.

8:30 - 10:00 am

Rancho Las Palmas (Level 4)

Perspectives on Algebra and Reform in K-12 Mathematics

Organizer/Presider: **Al Cuoco**, EDC, Newton, MA
Presenters: **Daniel Goroff**, Harvard University
Carole Lacampagne, Department of Education
James Kaput, University of Massachusetts, N.
Dartmouth
Hung-Hsi Wu, University of California, Berkeley

We will discuss various perspectives on the changes underway in K-12 mathematics, with a focus on algebra. Especially important is the perspective of pure mathematics and the significant aspects of mathematical practice that may be underemphasized in current attempts to improve mathematics education.

10:30 - 12:00 noon

Board Room (Level 3)

***Recognizing Children's Conceptual Frameworks:
Implications for School Mathematics***

Organizer/Presider: **Anne Teppo**, University of Montana
Presenters: **Jere Confrey**, Cornell University
Nerida Ellerton, Edith Cowan University,
Australia
Carolyn Maher, Rutgers University
Joy Whitenack, University of Missouri
Erna Yackel, Purdue University, Calumet

Short presentations from research in elementary and middle schools will examine how attending to children's constructions of powerful mathematics necessitates a critical examination of our own beliefs about the nature of mathematics and its pedagogical presentation.

10:30 - 12:00 noon

Green Room (Level 3)

Building a Pedagogy for Understanding

Organizer/Presenter: **Diana Wearne**, University of Delaware
Presenters: **Thomas P. Carpenter**, University of Wisconsin-
Madison
James Hiebert, University of Delaware
Discussants: **Patricia Campbell**, University of Maryland
Joan Ferrini-Mundy, MSEB, Washington, DC
Ana Serrano, UCLA

Based on the emerging consensus from four research projects on the teaching and learning of whole number arithmetic, we will identify features of classroom instruction that are essential for promoting students' understanding. Illustrative videos will be shown and discussed.

10:30-12:00 noon

Torrance (Level 4)

Research Issues in Large Scale Mathematics Reform

Organizer/Presenter: **Judy Mumme**, Mathematics Renaissance Project, CA
Presenters: **Kris Acquarelli**, Mathematics Renaissance Project, CA
Nanette Seago, Mathematics Renaissance Project, CA
Susan Loucks-Horsley, Far West Laboratory, AZ
Discussants: **Victoria Martinez**, Mathematics Renaissance Project, CA
Stephanie Smith, Brigham Young University

As demands for "scaled up" reform increase, research is needed to understand these efforts. Using California's Middle Grade Mathematics Renaissance, a case of large scale reform, participants will engage in a discussion on key research questions that emerge from large scale reform.

10:30 - 12:00 noon

Rancho Las Palmas (Level 4)

Research Perspectives: Nontraditional Means of Achieving Equity in Mathematics Education

Organizer/Presider: **Martin L. Johnson**, University of Maryland
Organizers/Presenters: **Marilyn E. Strutchens**, University of Maryland
Kirsten C. Lollis, University of Maryland
Presenters: **Duane A. Cooper**, University of Maryland
Dorothy Y. White, University of Georgia

This session will focus on achieving equity in mathematics education through a variety of means, including students' writings, classroom discourse, culture inclusive mathematics and resource allocation. Theoretical perspectives and relevant research will be presented and discussed.

10:30 - 12:00 noon

Coronado (Level 4)

Reform in Mathematics Teaching-- Its Many Aspects and Difficulties

Organizer: **Research Advisory Committee of NCTM**
Presider: **Pat Thompson**, San Diego State University
Presenters: **Randy Philipp**, San Diego State University
Alba Thompson, San Diego State University
Lisa Clement, San Diego State University
Jamal Bernhard, San Diego State University

If important reform is in students' engagement and not in their activity, then are we setting the stage for "trivialized reform" by not providing teachers appropriate opportunities to internalize this distinction? This session will draw from case studies to generate discussion of ways we underestimate the consequences of our rhetoric.

12:00 noon - 1:30 pm

Lunch

Summary of Wednesday Sessions**8:30 - 10:00****10:30 - Noon****1:30 - 3:00****3:30 - 5:00****Board Room (Level 3)**

McIntosh, B. Reys, Emanuelsson,
Johansson, Yang, J. Sowder
*Examining a Framework and Item
Bank for Exploring Number Sense*

Teppo, Confrey, Ellerton, Maher,
Whitenack, Yackel
*Recognizing Children's Conceptual
Frameworks: Implications for School
Mathematics*

Saenz-Ludlow, Walgamuth, Ball,
Hunting
Children's Generated Word Problems

Tierney, Hunting, Doig, L. Sowder
*Interview Techniques for Classroom
Researchers and Practitioners*

Green Room (Level 3)

Ball, Lindquist
*"Reflecting on Practice" Session:
Facing Challenges of Uncovering and
Understanding Students' Thinking*

Wearne, Carpenter, Hiebert,
Campbell, Ferrini-Mundy, Serrano
*Building a Pedagogy for
Understanding*

Clarke, Kessel, Lesh, Steffe,
Romberg
*Change the Lens, Change the Image:
The Problematics of Researching
Learning*

Clements, Sarama, Henry,
Swaminathan, Steffe
*A Year in the Life of TurtleMath:
Multiple Perspectives*

Delmar (Level 3)

Civil, Guberman, Masingila, Brenner, Hall, Rubin, Moschkovich
*Models for Mathematics Instruction: Everyday Mathematics and
Mathematicians' Mathematics*

Rachlin, Eron, Prichard,
Brown, Lappan
*Reshaping the Preparation of
Teachers of Middle Grade
Mathematics*

Tyson, Barnett, Gordon, Heller,
Clarke
*Issues in Establishing the Impact of
Teachers' Professional Development
Experiences: An Example from the
Mathematics Case Methods Project*

Warner Center (Level 4)

Post, Cramer, R. Reys, Roberts, Romberg, Billstein, Fitzgerald, Friel, Lesh
*Principles for Middle Grades Teacher Enhancement: A Participatory
Session for Teacher Educators*

Becker, Morrow, Buerk, Cossey, D'Ambrosio, Jacobs, Koch, Taylor
New Research Designs for Addressing Gender Issues in Mathematics Education

Torrance (Level 4)

Schoen, Bean, Flowers, Lloyd,
Wilson, Ziebarth, Lambdin
*Combining Large-Scale Evaluation
With Focused Research in Reformed
Mathematics Classrooms*

Mumme, Acquarelli, Seago,
Loucks-Horsley, Martinez, S. Smith
*Research Issues in Large Scale
Mathematics Reform*

Stigler, Knoll, Kawanaka, Serrano
The TIMSS Videotape Classroom Study: An Exploration of Methods

Rancho Las Palmas (Level 4)

Cuoco, Goroff, Lacampagne, Kaput,
Wu
*Perspectives on Algebra and Reform
in K-12 Mathematics*

Johnson, Strutchens, Lollis, Cooper,
White
*Research Perspectives:
Nontraditional Means of Achieving
Equity in Mathematics Education*

Curcio, Bright, Friel, Shaughnessy, E.
Smith
*Building a Theory of Graphicacy:
Where Are We Now?*

Ivey, Whalen, Burke, Franke,
Williams
*Pedagogical Social Knowledge:
Issues in Teachers Reforming the
Social Structure of Mathematics
Classrooms*

Coronado (Level 4)

P. Thompson, Philipp, A. Thompson,
Clement, Bernhard
*Reform in Mathematics Teaching--Its
Many Aspects and Difficulties*

Lobato, Confrey, Wheeler, Mack
*Examining Students' Intuitions in
Mathematics Classrooms*

Newport Beach (Level 4)

OPEN FOR INFORMAL MEETINGS

OPEN FOR INFORMAL MEETINGS

1:30 - 5:00 pm

Warner Center (Level 4)

New Research Designs for Addressing Gender Issues in Mathematics Education

Organizers/Facilitators: **Joanne Rossi Becker**, San Jose State University
Char Morrow, SummerMath, South Hadley, MA

Presenters/Facilitators: **Dorothy Buerk**, Ithaca College
Ruth Cossey, Mills College
Beatriz S. D'Ambrosio, Indiana University, Indianapolis
Judith Jacobs, California State Polytechnic U., Pomona
Laura Koch, University of Minnesota
Lyn Taylor, University of Colorado, Denver

Recent sessions have begun to set a new agenda for gender research in mathematics education. This worksession will present various frameworks for such research and then have small groups generate specific research issues and appropriate methods to study them. Participants will form research partnerships.

1:30 - 5:00 pm

Torrance (Level 4)

***The TIMSS Videotape Classroom Study:
An Exploration of Methods***

Organizer/Presenter: **Jim Stigler**, UCLA
Presenters: **Steffan Knoll**, UCLA (and Germany)
Takako Kawanaka, UCLA (and Japan)
Ana Serrano, UCLA (and U.S.)

The Third International Mathematics and Science Study includes a video study of eighth-grade mathematics instruction in Germany, Japan, and the United States. We will watch and discuss video from each country and then introduce the coding system and innovative software developed and used in the project.

1:30 - 3:00 pm

Board Room (Level 3)

Children's Generated Word Problems

Organizer/Presenter: **Adalira Saenz-Ludlow**, UNC, Charlotte
Presenter: **Cathy Wálgamuth**, Washington Elementary, W. Lafayette
Discussants: **Deborah Ball**, Michigan State University
Robert P. Hunting, La Trobe University, Australia

This session focuses on arithmetical word problems generated by third graders. We will analyze the classroom environment that facilitates this mathematical activity, the word problems and children's solutions, and the interactional and intersignificational aspects of the student-student and teacher-student dialogues.

1:30 - 3:00 pm

Green Room (Level 3)

***Change the Lens, Change the Image:
The Problematics of Researching Learning***

Organizer/Presenter: **David Clarke**, University of Melbourne, Australia
Presenters: **Cathy Kessel**, University of California, Berkeley
Richard Lesh, University of Massachusetts, N. Dartmouth
Les Steffe, University of Georgia
Discussant: **Thomas A. Romberg**, University of Wisconsin-Madison

This session seeks to compare three distinct approaches to the researching of learning: the Teaching Experiment, Naturalistic Classroom Research, and Large-Scale Studies. By using the lens as metaphor, we can consider questions of detail, clarity, resolution, field of view, and the interaction of figure and setting.

1:30 - 3:00 pm

Delmar (Level 3)

Reshaping the Preparation of Teachers of Middle Grade Mathematics

Organizer/Presenter: **Sid Rachlin**, East Carolina University
Presenters: **Mary Eron**, East Carolina University
Mary Kim Prichard, University of North Carolina,
Charlotte
Catherine Brown, LRDC, University of Pittsburgh
Glenda Lappan, Michigan State University

In a time of reform in the teaching and learning of middle grades mathematics, this session examines the theoretical and empirical issues related to the preparation of middle grades mathematics teachers.

1:30 - 3:00 pm

Rancho Las Palmas (Level 4)

Building a Theory of Graphicacy: Where Are We Now?

Organizer/Presenter: **Frances R. Curcio**, New York University
Presenters: **George W. Bright**, UNC, Greensboro
Susan N. Friel, UNC, Chapel Hill
Discussants: **J. Michael Shaughnessy**, Portland State
University
Erick Smith, University of Illinois, Chicago

Based on various perspectives for studying graph comprehension, an evolving, cohesive theory will be proposed and discussed. Participants will be involved in analyzing selected examples of students' graphicacy skills, discussing the coherence of the theory, and raising critical questions.

1:30 - 3:00 pm

Coronado (Level 4)

Examining Students' Intuitions in Mathematics Classrooms

Organizer/Presenter: **Joanne Lobato**, University of California, Berkeley
Discussants: **Jere Confrey**, Cornell University
Robert F. Wheeler, Northern Illinois University
Nancy K. Mack, University of Pittsburgh

We will examine fundamental research issues related to intuitive, informal, and everyday knowledge: How do students relate their informal or everyday knowledge to formal mathematical knowledge? In what ways do intuitions change during instruction? How can mathematics instruction build on students' informal knowledge?

3:30 - 5:00 pm

Board Room (Level 3)

Interview Techniques for Classroom Researchers and Practitioners

Presenter: **Cornelia Tierney**, TERC
Organizer/Presenter: **Robert P. Hunting**, La Trobe University, Australia
Presenter: **Brian A. Doig**, Australian Council for Educational
Research
Discussant: **Larry Sowder**, San Diego State University

This session focuses on the use of interviews in elementary school classrooms, although the methodology is more generally applicable. We will consider first the theory and practice of task-based clinical interviews and then discuss specifically focused psuedo-interviews.

3:30 - 5:00 pm

Green Room (Level 3)

A Year in the Life of TurtleMath: Multiple Perspectives

Organizer/Presenter: **Douglas H. Clements**, SUNY Buffalo
Presenters: **Julie Sarama**, SUNY Buffalo
Julie Jacobs Henry, SUNY Fredonia
Sudha Swaminathan, University of Nevada, Las
Vegas
Discussant: **Les Steffe**, University of Georgia

Teachers are challenged to transform and reorganize their instruction and curriculum using technology. We will present four interrelated studies, each striving to understand--from a different perspective--a year-long implementation of one technology-based mathematics innovation by all fourth-grade teachers in an elementary school.

3:30 - 5:00 pm

Delmar (Level 3)

Issues in Establishing the Impact of Teachers' Professional Development Experiences: An Example from the Mathematics Case Methods Project

Organizer/Presenter: **Pamela A. Tyson**, Far West Laboratory, CA
Presenters: **Carne Barnett**, Far West Laboratory, CA
Ann Gordon, San Francisco State University
Joan I. Heller, Educational Testing Service, CA
Discussant: **David Clarke**, University of Melbourne, Australia

This session, based on extensive evaluation data collected on the mathematics case method, raises questions and identifies issues about measuring the impact of professional development experiences on mathematics teachers' pedagogical content knowledge, classroom practices, and student performance.

3:30 - 5:00 pm

Rancho Las Palmas (Level 4)

Pedagogical Social Knowledge: Issues in Teachers Reforming the Social Structure of Mathematics Classrooms

Organizer/Presenter: **Kathy M. C. Ivey**, Western Carolina University
Presenter: **Sharon B. Whalen**, Montana State University
Discussants: **Maurice Burke**, Montana State University
Megan Loef Franke, UCLA
Steven R. Williams, Brigham Young University

This session explores the construct of pedagogical social knowledge. The purpose is to stimulate within the research community a discussion of how teachers can influence the creation of a classroom social structure that supports reform recommendations.

9:00 - 10:00 am

TBA

Lessons from Calculus: Intended and Unintended

Presenter: **Wayne Roberts**, Macalester College, Saint Paul, MN

This is session #76 in the NCTM Program. It was arranged by the Research Advisory Committee, the Special Interest Group for Research in Mathematics Education, the National Council of Supervisors of Mathematics, and the Association of State Supervisors of Mathematics.

10:30 - 11:30 am

TBA

***JRME Outstanding Article for 1994
Capitalizing on Errors as "Springboards for Inquiry":
A Teaching Experiment
Raffaella Borasi***

This is session #109 in the NCTM Program. It was arranged by the Research Advisory Committee.

Notes

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