Research Council for Diagnostic and Prescriptive Mathematics

24th Annual Conference Program February 6-8, 1997

> Radisson Inn Oklahoma City, Oklahoma

Jointly Sponsored By The University of Oklahoma and The University of Central Oklahoma

Research Council for Diagnostic and Prescriptive Mathematics

RCDPM

24th Annual Conference Program February 6 - 8, 1997 Radisson Inn Oklahoma City, Oklahoma

Mission Statement

RCDPM seeks to stimulate, generate, coordinate, and disseminate research efforts designed to understand and/or overcome factors that inhibit maximal mathematics learning.

Executive Board

George Bright
William Speer
Virginia Usnick
Jane Schielak
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UNC-Greensboro Bowling Green State Univ. UNLV Texas A & M University of Maryland Univ. of Houston-Clear Lake

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Program Chair	Jayne Fleener

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University of Central Okla. University of Oklahoma

RCDPM PROGRAM

Thursday, February 6, 1997

9:00 -	12:00	Executive B	oard Meeting		President's Suite
	Pre-Conference Special Interest Gro Investigations of Mathematics Learning Inhibitors/ Clinical Methods, Coordinated by Clyde Greeno, MALEI Institu		atics cal		
12:00 -	- 5:00	Registration			Lobby
1:00 -	1:50	Opening Ses	sion		Cumberland
2:00 -	3:30	Birds-of-a-fe	eather Sessions		
IA	Metho	ds Classes Facilitators:	Bill Speer Dan Brahier Kathy Litz	Bowli	Cumberland rsity of Las Vegas ng Green State University nis (Las Vegas) School
IB	Assess	ment Facilitator:	Alan Zollman	Northe	Allegheny ern Illinois University
IC	Under	standing Lea Facilitator:	rning Anne Reynolds	Unive	Blue Ridge

3:45 - 4:45 Thursday Sessions

IIA Mathematical Thinking

Room 101

Title: Exploring Children's Geometric Thinking

Geok Lian NG University of Oklahoma

Description: The research presented will explore children's problem solving processes while engaged in geometric tasks. Specifically, fourth and fifth grade students' responses to a variety of tasks will be used to provide insight on children's strategies for approaching these tasks.

3:45 - 4:45 Thursday Sessions (continued)

IIB Attitudes

Allegheny

Title: Teacher Candidates Attitudes and Beliefs Toward the Nature and the Teaching of Mathematics and Science

Gilli Shama	University of Maryland at College Park
Tad Watanabe	Towson State University
J. Randy McGinnis	University of Maryland at College Park

Description: The Maryland Collaborative for Teacher Preparation (MCTP) project includes the development and implementation of an upper elementary and middle school level interdisciplinary mathematics and science teacher preparation program. The research report will discuss teacher candidates' beliefs and attitudes concerning the nature of mathematics and science and their teaching.

IIC Technology

Blue Ridge

Title: Calculated Responses: Identifying Teachers' Misconceptions through Calculator-Based Activities

Virginia Usnick	University of Nevada - Las Vegas
Juli K. Dixon	University of Nevada - Las Vegas
Marilyn Sue Ford	University of Nevada - Las Vegas

Description: This session will present findings from a recently completed series of inservice workshops which focused on integrating calculators into the elementary classroom. During this session, participants will experience selected activities from the workshops and discuss potential misconceptions which will then be compared to those identified during the workshops.

IID Learning

Cumberland

Title: Use of Concept Maps to Assess Learning of Geometric Concepts

Marguerite M. Mason	University of Virginia
Sara Delano Moore	University of Kentucky

Description: Differences between the concept images and concept definitions for similarity and congruence will be discussed. This session will also report on the difficulties experienced with angles when they are contained in a closed figure as compared to standing along or being part of an open figure.

Thursday Sessions (continued) 3:45 - 4:45

IIE Attitudes

Room 102

Title: Metaphors and Attitudes About Mathematics

Gloria Dupree Oklahoma School of Science and Mathematics

Description: This paper will look at the metaphors students use to express their attitudes about mathematics and the kinds of activities that effect positive changes in their metaphors. Examples of specific activities and metaphor prompts will be provided.

5:00 - 6:00 Reception - Brandywine Restaurant

7:00 - 9:00 **Dinner and Shenandoah Lecture**

Featured Speaker: Frosty Troy - Publisher and Political Commentator

Friday, February 7, 1997

8:30 - 4:00 Reg	gistration
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8:00 - 9:00 Continental Breakfast

9:00 - 10:00 Friday Sessions

IIIA Understanding

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Title: Teachers' Understanding of How Children Solve Problems

George Bright	UNC - Greensboro
Nancy Nesbitt Vacc	UNC - Greensboro
Anita H. Bowman	UNC - Greensboro

Description: Prior to the start of a five year project designed to help primarygrade teachers improve their mathematics instruction, 29 teacher participants responded in writing to questions related to children's thinking. Teachers responses were grouped into several categories. Results and implications of this research will be discussed.

Shenandoah

Lobby

Allegheny

9:00 - 10:00 Friday Sessions (continued)

IIIB Learning

Blue Ridge

Title: Something Old/Something New: Nontraditional Students and the Learning of Mathematics

Xuan Le University of Oklahoma

Description: This study is an attempt to understand how nontraditional college students approach the learning of mathematics. The main difficulty that most of the participants encountered was a mismatch between expectations they had coming into the course and the new learning experience they had in their College Algebra class. Results and implications of this research will be discussed.

IIIC Reasoning

Room 101

Title: The Impact of Modalities of Inference on Empowerment

Janice M. Green Hiram College - Ohio

Description: This presentation will be a discussion of student reasoning skills as they relate to ability to solve problems. There are differing ways in which students draw conclusions from given information. We will discuss some of those ways, giving examples of student work, or non-work, as related to them. Reactions to knowledge and use of different modes will be shared by some students through responses to a questionnaire about attitude and empowerment at the conclusion of the class.

IIID Assessment

Room 201

Title: Assessing Pre-Service Teachers' Knowledge of the Concept of Variable

Enrique Ortiz

University of Central Florida at Daytona Beach

Description: This research is an effort to understand factors involved in prospective teachers' knowledge of the concept of variable and how these factors might inhibit their maximal effectiveness in teaching mathematics. Prospective teachers will be diagnosed for their understanding of four different uses of the concept of variable and possible instructional implications for the elementary mathematics methods courses will be discussed.

9:00 - 10:00 Friday Sessions (continued)

IIIE Attitudes

Room 102

Title: Results of the Quantitative Literacy Attitude Survey

Victoria LaBerge Northern Illinois University

Description: This session will provide an overview of students' mathematics related beliefs. Incoming freshmen and graduating seniors responded to a Quantitative Literacy Attitude Survey. Responses from these students indicate some changes in attitudes (both positive and negative) may have occurred as a result of their participation in the problem solving courses. Possible explanations for these changes will be discussed.

10:00 - 10:15 Break

10:15 - 11:15 Friday Sessions

IVA Methods Courses

Allegheny

Title: First Things First: A Philosophical Approach to the Demands of the Elementary Mathematics Methods Course

Alan Zollman

Northern Illinois University

Description: We traditionally begin elementary methods classes with undergraduates who believe mathematics is a collection of facts and algorithms. We hope to turn them into reflective practitioners and agents of educational change. How? This session will be a discussion and an examination of our priorities and "best" approaches to this dilemma.

IVB Algebra

Room 101

Title: Remediation within a Problem Solving Approach to Algebra: Meeting the Algebra for Everyone Goal

Ann Crawford UNC - Wilmington

Description: To realize a goal of "Algebra for Everyone," diverse needs of students with learning difficulties in mathematics will need to be accommodated. This study takes an exploratory approach employing a teaching experiment to investigate adjustments that may need to be made within the Hawaii Algebra Process Approach to meet the needs of students with learning difficulties.

10:15 - 11:15 Friday Sessions (continued)

IVC Understanding

Blue Ridge

Title: Self Esteem, Constructivism, and Creativity: A Proposition for the Convocation of Mathematics Education

Noel Geoghegan University of Oklahoma and University of Western Sydney

Description: This presentation will draw upon Austrailian research which has sought to explore the relationship between the learning of mathematics and music in early childhood education. Discussion in this session will seek to present conceptual accommodation as being reflexive in nature and dependent, as well as resultant, upon the process of change within the learner's frame of understanding.

IVD Assessment

Room 102

Title: What You Ask For Is What You Get: Using Assessments that Promote Mathematical Thinking

Daniel Brahier Bowling Green State University

Description: The purpose of this presentation is to focus the participants on what it means to develop assessment tasks and strategies that promote and measure mathematical process skills. Results of research with teachers participating in project ASPECT to change assessment practices will be shared.

IVE Teaching

Room 201

Title: A Fourth-Grade Teacher's Interpretation of Constructivist Learning Theory

Diana F. Steele

Northern Illinois University

Description: Utilizing video of a teacher presenting a mathematics lesson, this session will examine how one fourth-grade teacher interprets and implements constructivist learning principles within her mathematics teaching. This teacher's approach to teaching is complex and rich and provides an example that will increase understanding of constructivist learning principles in elementary mathematics.

Shenandoah

1:30 - 2:20 Friday Sessions

VA	Mathematical Literacy	Allegheny
	Title: Mathematical Literacy - Wha	t it Really Means
	William S. Dalman I.D.C.	Chan al II'll

William S. Palmer	UNC - Chapel Hill
David K. Pugalee	Saginaw Valley State University, Michigan

Description: One factor that seems to lack attention in the research literature on problem solving is the ability for students engaged in problem solving to integrate literacy, interpretive, and computation skills. Selected case studies will be presented to illustrate differences in student ability and response in an informal literacy-based scheme developed by the researchers.

VB Methods

Room 101

Title: Empower Elementary Education Educators

Barbara Irvin	Texas Woman's University
Winifred Mallam	Texas Woman's University

Description: Before teachers can empower students, they must possess necessary knowledge, methodology, sense-making and confidence of mathematics and mathematics pedagogy. This "reflection-on-practice" session will present activities that help preservice teachers in university mathematics methods courses feel empowered.

VC Reform

Room 201

Title: A Twist of the Tetrahedron: Reflection, Metaphors and Change

Sheryl A. Maxwell The University of Memphis

Description: This presentation will highlight the results of the qualitative research efforts that investigated through the lenses of fourteen teacher participants and two facilitators, the aspect of growth and change that occurred as a result of the Geometry Enhancement Models Institute. The session will highlight recent qualitative research that investigates how change aspects, promoted by reflective prompts, is revealed through participants' creation of metaphor.

1:30 - 2:20 Friday Sessions (continued)

VD Learning

Blue Ridge

Title: Elementary Students' Proportional Reasoning

Anne Reynolds	University of Oklahoma
Grayson H. Wheatley	Florida State University

Description: This session will present the results of research into elementary students' proportional reasoning in a problem solving setting. It will explore the ways, both successful and unsuccessful, in which students approached these tasks and indicate how teachers in classrooms might provide opportunities for students to develop proportional thought.

IVE Teacher Education

Room 102

Title: Preservice Teacher Perceptions of Mathematics Teaching

Anna Graeber University of Maryland

Description: Preservice undergraduate and graduate elementary teachers were asked to complete a concept map of their vision of "teaching mathematics" at the beginning and end of the semester. Samples of maps and student reflections will be presented.

2:30 - 3:20 Friday Sessions

VIA Reform

Room 201

Title: Reforming Applied Calculus: A Report from the Field

Nancy Matthews

University of Oklahoma

Description: Much work has been done in reform calculus in the past decade, but virtually all of it has been in calculus courses designed for mathematics, engineering, and hard science majors. Only recently has attention begun to shift to applied calculus courses. An experiment in teaching applied calculus with reform principles will be described. In particular, the use of group projects to introduce non-trivial, non-routine applications will be examined.

2:30 - 3:20 Friday Sessions (continued)

VIB Teacher Preparation

Blue Ridge

Title: Empowering Pre-Service Elementary Teachers in Mathematics

Dixie Metheny	Montana State University - Billings
David Davison	Montana State University - Billings

Description: The presenters have been revising the two mathematics content courses for elementary education majors for the past three years modeling their approach after the Learning Cycle approach in science. The structure of the courses as well as sample activities will be shared.

VIC Reform

Room 101

Title: Empowering Teachers/Empowering Students: Effects of a Teacher Dialogic Community

Roland Pourdavood Cleveland State University

Description: This presentation concentrates on the dialectical relationship between four elemantary teachers' dialogue and their instructional practices. The interactive nature of the dialogic community provided the teachers opportunities to reflect on who they are as teachers and how they can facilitate the creation of learning opportunities for their students.

VID Assessment

Room 102

Title: The Impact of Clinical Mathematical Experiences on Clinicians and Students

Sue Brown

University of Houston - Clear Lake

Description: The University of Houston-Clear Lake Diagnostic Mathematics Clinic administers and evaluates diagnostic tests, conducts parent, student, and teacher interviews, analyzes measurement and screening data provided by the school, and develops an achievement plan for each student. This session will describe and present results of a study of the long-term impact of clinical experiences on the children.

2:30 - 3:20 Friday Sessions (continued)

VIE Beliefs

Allegheny

Title: Do You Believe Like I Believe?

William Speer	University of Nevada at Las Vegas
Kathy Litz	Lummis (Las Vegas) School

Description: This session will present research examining 4th and 5th graders' beliefs about mathematics, teaching and learning. These beliefs are compared to beliefs held by prospective elementary teachers in methods classes. We will also report on findings comparing what each group identifies as the other group's beliefs with the actual statements of beliefs.

NOTE: Buses for the Cowboy Hall of Fame will leave at 4:00

Saturday, February 8, 1997

8:00 - 11:00 Registration

8:00 - 9:00 Breakfast

Shenandoah

Lobby

9:00 - 10:00 Keynote Speaker: Curtis McKnight University of Oklahoma Blue Ridge/Cumberland

TIMMS: Implications for the U.S. Mathematics Curriculum

10:15 - 11:15 Saturday Sessions

IIA Attitudes

Allegheny

Title: A Comparison of Chinese Students' and American Students' Attitudes Toward Mathematics

Patricia Lamphere Texas A & M

Description: Ninth grade students in Suzhow, China were surveyed on their attitudes about mathematics. These results were compared to a similar population of students in the United States. The questions on the survey originally appeared on the SIMS. Results of the study and sample items will be shared.

VIIB	Teaching	and	Learni	ino
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Blue Ridge/Cumberland

Title: It's All in The Cards

Charles Lamb Texas A & M

Description: This session will be a series of card tricks for use in the mathematics classroom. Anecdotes relative to the success of these activities will be shared. The session will be hands-on.

VIIC Assessment

Room 101

Title: Concept Development and Concept Mapping

Vicki Schell

Lenoir-Rhyne College

Description: This session will discuss the results of the use of concept maps by students throughout a geometry course. The approaches will include both teacher use of the maps as a means of diagnosis and assessment and as a "window" into students' thinking, and student use of maps as a means of communication and conjecturing.

VIID Technology

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Room 102

Title: Technology Tools Expose the 'Simplify Ceremony' and Other Impediments to Communicating Mathematical Meaning Clearly

George Wyer West Hartford (CT) Public Schools

Description: This presentation will explore the impact of graphing utility technology [TI82] on : 1) visualizing complex mathematical objects, 2) using traditional simplify ceremonies, 3) reliance on 'bench mark' triangles, 4) crunching indicated computations, and 5) generalizing mathematics through familes of functions. This is a rich ground for research into identifying and overcoming blocks to learning mathematics.

10:15 - 11:15 Saturday Sessions (Continued)

VIIE Technology

Room 201

Title: A Cognitive/Geometric Understanding of Arithmetic of Real Numbers

John Edgell

Southwest Texas State

Description: Most people in their daily lives apply numbers in conjunction with various types of measurement activities. Several historical and pedagogic techniques for using measurement to demonstrate number concepts will be demonstrated and discussed with the participants.

11:30 - 12:30 Saturday Sessions

VIIIA Mathematical Understanding

Allegheny

Title: Filling in the Gaps: Three Middle School Students Become "Empowered"

William B. Weber University of Toledo

Description: This session will discuss research on the effects of experimental instruction designed to 'fill in the gaps' in students' knowledge of rational numbers. This session will discuss changes in three middle grade students' conceptual knowledge of rational numbers, computation achievement, thought processes, and self-confidence in mathematics as a result of the instruction designed to help students make sense of mathematics.

VIIIB Technology

Room 201

Title: A Formula for the Size of Constructs that Reflects Cognitive Concerns

John Edgell Southwest Texas State University

Description: Using programmable, graphing calculators, participants will explore properties of polygonal and polyhedronal regions.

11:30 - 12:30 Saturday Sessions (continued)

VIIIC Mathematical Understanding

Room 101

Title: Using Dynamic Physical Models to Understand Functions

Ellen Hines Northern Illinois University

Description: Understanding functions as dynamic processes can be especially challenging for students who have experienced functions only through static representations such as equations and graphs. This session will report on the initial findings of a teaching experiment aimed at uncovering the processes used by middle school students to interpret dynamic models of functions, and to relate those interpretations to equations and graphs.

VIIID Standards

Blue Ridge/Cumberland

Title: Do We Agree? A Brief Look at How Teachers and the Public View National Standards

Melfried Olson	Western Illinois University
Judith Olson	Western Illinois University
Kay Wohlhuter	Western Illinois University

Description: The educational community continues to address the issue of standards. This session will provide a look at how the public responded to a set of 10 questions related to standards in general. These same items were given to several groups of teachers to see whether the teachers responded differently. Results of this study will be used to open discussion of the standards debate.

VIIE Teacher Education Room 102

Title: Teacher Beliefs vs. Student Understanding of the Limit Concept

Elizabeth Francis University of Central Oklahoma

Description: Teacher beliefs drive teaching behaviors and expectations. Student understanding of the limit concept was measured as well as techer perceptions of student understanding. Incongruences are considered.

Conference Ends 12:30 - Have a safe trip home!

1:00 - 4:00 Executive Board Meeting

President's Suite

11:30 - 12:30 Saturday Sessions (continued)

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1:00 - 4:00 Executive Board Meeting

President's Suite

List of Speakers

NAME

INSTITUTION

SESSION(S)

Anita H. Bowman **Dan Brahier George Bright** Sue Brown Ann Crawford **David Davison** Juli K. Dixon **Gloria Dupree** John Edgell Marilyn Sue Ford **Elizabeth Francis** Noel Geoghegan Anna Graeber Janice M. Green **Ellen Hines Barbara** Irvin Victoria LaBerge **Charles Lamb Patricia Lamphere** Xuan Le Geok Lian NG Kathy Litz Winifred Mallam **Marguerite Mason Nancy Matthews** Sheryl A. Maxwell J. Randy McGinnis **Curtis McKnight Dixie Metheny** Sara Delano Moore **Judith Olson Melfried Olson Enrique Ortiz** William S. Palmer **Roland Pourdavood** David K. Pugalee **Anne Reynolds** Vicki Schell **Gilli Shama Bill Speer** Diana F. Steele Virginia Usnick Nancy Nesbitt Vacc Tad Watanabe William B. Weber **Grayson Wheatley** Kay Wohlhuter George Wyer Alan Zollman

UNC - Greensboro IIIA Bowling Green State University IA, IVD UNC - Greensboro IIIA University of Houston - Clear Lake VID **UNC** - Wilmington **IVB** Montana State University - Billings VIB University of Nevada - Las Vegas IIC Oklahoma School of Sci and Math IIE Southwest Texas State VIIE, VIIIB University of Nevada - Las Vegas IIC University of Central Oklahoma VIIIE OU & University of Western Sydney IVC University of Maryland VE Hiram College - Ohio IIIC Northern Illinois University VIIIC Texas Woman's University VB Northern Illinois University IIID Texas A & M VIIB Texas A & M VIIA University of Oklahoma IIIB University of Oklahoma IIA Lummis (Las Vegas) School IA, VIE Texas Woman's University VB University of Virginia IID University of Oklahoma VIA The University of Memphis VC University of Maryland at College Park IIB University of Oklahoma Keynote Montana State University - Billings VIB University of Kentucky IID Western Illinois University VIIID Western Illinois University VIIID Univ. of Central Florida-Daytona Beach IIID UNC - Chapel Hill VA Cleveland State University VIC Saginaw Valley State University, Michigan VA University of Oklahoma IC, VD Lenoir-Rhyne College VIIC University of Maryland at College Park IIB University of Las Vegas IA, VIE Northern Illinois University IVE University of Nevada - Las Vegas IIC UNC - Greensboro IIIA Towson State University IIB University of Toledo VIIIA Florida State University VD Western Illinois University VIIID West Hartford (CT) Public Schools VIID Northern Illinois University IB, IVA



courts, putting green, jogging track/fitness trail, volleyball court, gift and sundry shop, barber shop.

Room service is available from 6:00 am until 10:30pm. Check-out time is 12:00 (Noon).







Chisholm's Club

An authentic old-time saloon and dance hall featuring: shuffleboard, pool tables, big screen TV, and country western disc jockey.

Hours:

Monday - Friday: 5:00pm until 2:00am Saturday - Sunday: 6:00pm until 2:00am



Bombay Oyster Bar

The perfect place for quiet relaxation or conversation, serving oysters on the half shell and peel-n-eat shrimp.

Hours:

Monday - Friday: 11:30am until 1:00am Saturday: 3:00pm until 1:00am Sunday: 4:00pm until Midnight



The Brandywine Dining Room & Piano Bar

Fine dining featuring selected specials offered nightly; lunch buffet served 11:00am until 2:00pm weekdays. Sunday Brunch served 11:00am until 2:00pm.

Hours:

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INN OKLAHOMA

Monday - Saturday: 6:00am until 2:00pm & 6:00pm until 11:00pm

Sunday Brunch: 11:00am until 2:00pm

Live Entertainment:

Friday & Saturday: 7:00pm until 11:00pm Sunday Brunch: 11:00am until 2:00pm

Coffee Shop

Nightly family dining specials. Lunch buffet served daily 11:00am until 2:00pm. Hours: 6:00am until 11:00pm



Sports Page Club Cocktails, dancing, and live entertainment. Hours: Weekdays: 4:00pm until 2:00am Saturday: 6:00pm until 2:00am

Gazebo

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LEGEND

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EXITS

STAIRWELLS

GUEST ROOMS