



Research Council
on
Mathematics Learning

Thirtieth Annual Conference

Tempe, AZ

6-8 March 2003

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Research Council on Mathematics Learning

Thirtieth Annual Conference

Tempe, AZ

6-8 March 2003

Thursday, March 6, 2003

12:30-3:30 p.m. Executive Board Meeting, Crown Boardroom, Old Main, ASU

4:00-5:00 p.m. Reception, Ballroom, Old Main, ASU

5:00-6:00 p.m. Ballroom, Old Main

1. KEYNOTE:

Mathematics and Landscape Design

Juan Brenes-Garcia <jchikin@hotmail.com>

The Valley of the Sun and Arizona State University's campus are noted for several buildings designed by Frank Lloyd Wright. Another form of architecture widely seen throughout the valley is that of landscape design, the focus of this presentation.

DINNER ON YOUR OWN

Friday, March 7, 2003

8:00-8:50 a.m.

2. Problem Solving Across the Grades

Apache

Robert Mann <RR-Mann@wiu.edu>

Kim Hartweg <KK-Hartweg@wiu.edu>

As part of a professional development experience, teachers from grades 5 through 12 administered the same problem-solving tasks and critical thinking activities to their respective students. Many of the problems used were variations of typical algebra exercises but were presented in an atypical environment and format. Student responses from all participating grade levels were documented, analyzed, and compared to determine if an increase in grade level correlated with an increase in problem-solving ability. Student strategies, approaches, misconceptions, and success rates will be shared and audience input will be encouraged.

3. Concept Development Activities: Experiencing, Creating, and Implementing in Classrooms

Cochise

Sheryl Maxwell <smaxwell@memphis.edu>

Teacher candidates learn about many types of mathematics activities that help students construct their understandings. This presentation focuses on results of activities that provide a framework that enhances mathematics learning and teaching. The aggregate case studies of three teacher candidates showing them experiencing, designing, and implementing these activities are shared.

4. Leave No Child Behind: The Challenge to Preservice Special Education Teachers Navajo
 Bea Babbitt <babbitt@unlv.edu>
This presentation will summarize four case studies of preservice special education teacher candidates as they seek to develop skills to leave no child behind in mathematics.
5. K-8 Preservice Teachers' Use of Representation and Task in Lesson Planning Pinal
 Robin Ward <raward@email.arizona.edu>
 Cynthia O. Anhalt <anhalt@u.arizona.edu>
A recent study was carried out involving a classroom of prospective K-8 teachers enrolled in an elementary mathematics methods course. Lesson plans were collected at three intervals throughout the semester to investigate and analyze how these teachers plan mathematical instruction through the use of mathematical representations. Additionally, the types of tasks articulated in the teachers' lesson plans were explored. A discussion will ensue on how to assist preservice teachers in developing effective mathematics tasks.
6. A Course for K-8 Preservice Educators Linking Math, Science, and Technology: A Discourse Yavapai
 Winifred Mallam <wmallam@twu.edu>
The session will present units that have been developed for use in a course where mathematics, science, and technology are linked. The target population for the course is K-8 preservice educators.
7. Literature's Influence on Mathematics Learning Yuma
 Carolyn Pinchback <carolinp@mail.uca.edu>
 Matthew D. Dalke <rxdeliverer@yahoo.com>
The speakers will share the results of the use of literature ("How much land does a man need," Gulliver's Travels, and Anno's Magic Seeds) in mathematics classes at the secondary level.
- 9:00-9:50 a.m.
8. Exploring Preservice Teachers' Understanding of Two-digit Multiplication Apache
 Rama Menon <rmemon@calstatela.edu>
About 70 preservice teachers were given a two-digit multiplication problem, solved in three different ways by using three separate algorithms. Questions were asked to ascertain their understanding of the fundamental mathematics on which these algorithms were based. Findings indicate that a profound understanding of mathematics needed to explain why the algorithms work is lacking among these preservice teachers. These finding and suggestions to redress this lack of understanding will be discussed.
9. GEAR UP with the OU Sooner Flight Academy Cochise
 Kerri Richardson <krichardson@ou.edu>
 Gabriel Matney <gmatney@ou.edu>
Sooner Flight Academy is a private-pilot ground school offered by the University of Oklahoma in which students actually fly a course they prepare in a small airplane. There is a three-day in-school preparation program culminating in Saturday flight activities. This presentation includes all of the activities these students participated in during Sooner Flight Academy and discusses other OU GEAR UP programs. Research on student (and teacher!) learning through Flight Academy participation also will be shared.

10. Mathematics Reform in Middle School Mathematics: Effects of a State-wide Initiative Navajo

Kate Popejoy <kate.popejoy@wwu.edu>

Chris Ohana <chris.ohana@wwu.edu>

Oddmund Myhre <Oddmund.myhre@wwu.edu>

NO LIMIT! is a state-wide project to improve middle-school mathematics education. It provides technological resources to schools, teacher training, and mentor support while establishing collaborative learning communities among middle-school mathematics teachers. We describe the effects on teaching behavior and learning of mathematics and the consequences of different implementation strategies.

11. Using Case Studies to Engage Learners Pinal

Lynae Sakshaug <lsakshau@brockport.edu>

During this session, participants will experience using a case study to address pedagogical issues related to learning mathematics. The presenter will then share the results of using case studies for three years in undergraduate and graduate mathematics methods classes.

12. A Beginning Teacher's Journey: Growing as a Professional Yavapai

Kay Wohlhuter <kwohlhut@d.umn.edu>

This session will describe a beginning secondary mathematics teacher's journey as a professional from the time of her mathematics methods course through her second year of teaching.

13. Reclaiming the History of Mathematics Education Yuma

for Current Application: Some First Steps

David E. Boliver <dboliver2@cox.net>

Mathematics education has finally become of a significant age so that some studies from the past are being ignored while still relevant. Three examples of this are the Texarkana experience with accountability, the National Longitudinal Study of Mathematical Abilities, and the discovery learning concept of ungeneralized awareness. Participants will be asked to contribute suggestions for a better archiving of such information.

9:50-10:00 BREAK

Hallway by Cochise

10:00-11:15

14. What Is Mathematics? Navajo

Jayne Fleener <fleener@ou.edu>

Anne Reynolds <areynolds@ou.edu>

~~Keith Clift <kcliftcsl@yahoo.com>~~

~~Vieky Fleurnoy <vickiflournoy@sbcglobal.net>~~

David Davison <ddavison@msubillings.edu>

This symposium will present papers on the following topics: Beliefs about mathematics: a language games approach; Goethe's critique of physics: Reflections on mathematics; Mathematics as patterns: Brain science and difference; and Postmodern logics and patterns that connect: Seeing with soft eyes. There will be lots of time for discussion.

15. Mathematics Reform-based Instruction: Hearing Teachers' Voices Pinal

Mary C. Enderson <mcenders@mtsu.edu>

Azita Manouchehri <Azita.M@cmich.edu>

This session will report on a pilot project's efforts in addressing the absence of the teacher's voice in the reform movement. Findings from the project on reform-based teaching and learning in the

secondary mathematics classroom will be shared as well as defining directions for future research on reform-based instruction.

16. Mathematics Preparation Initiative: A Unique Supplementary Authorization in Mathematics Program Yavapai
 Frances Kuwahara Lang Chinn <flang@calstatela.edu>
 Frederick Uy <fuy@calstatela.edu>

The Mathematics Preparation Initiative was collaboratively developed by the Mathematics Department and the Charter College of Education faculty to address underprepared middle-school mathematics teachers already in the classroom. The feedback from participants and the high completion rates are indications of the success and power of the program. The participants went through courses as a cohort creating a powerful support group.

11:20-12:50

Cochise

**LUNCH and ANNUAL MEETING
(All attendees welcome)**

1:00-1:50 p.m.

17. Mathematics Methods Courses - What Works? Apache
 Sue Brown <browns@cl.uh.edu>
 Virginia Usnick <vusnick@unlv.edu>

Panel members will share practices they have found to be successful in teaching mathematics methods courses to elementary and early childhood education students. Participants will then work in small groups to identify other successful practices they have implemented in teaching math methods classes and will share their report with the entire group.

18. Integrating Culture in the Mathematics Classroom Cochise
 Dixie Metheny <dmetheny@msubillings.edu>
 David Davison <ddavison@msubillings.edu>

One of the most important concerns in classrooms today is to help education majors deal with diversity issues. One aspect of this diversity is multiculturalism. This presentation will address how we are dealing with the issue of mathematics and culture in teacher preparation at Montana State University-Billings.

19. Development of a Mathematics Curriculum Designed for Preservice Elementary, Special Education, and Early Childhood Teachers Navajo
 Dana Craig <dcraig2@cox.net>

This presentation shares how one university has chosen to meet the challenge of preparing elementary, special education, and early childhood majors to teach mathematics with four courses of mathematics. Helping preservice elementary teachers fully understand and appreciate the mathematics they will be teaching is an ongoing challenge for teacher educators.

20. Dynamic Software: Effect on Understanding of Geometric Similarity Pinal
 Helen Gerretson <hpg@unco.edu>

This presentation reports research related to a study which explored the role of the learning environment upon the mathematical evolution of preservice K-8 teachers within the area of

transformational geometry. The basic goal of the study was to detect the extent to which a dynamic geometry learning environment effects problem solving.

21. Curriculum Matters: Teachers' Understanding of Curriculum and Content Yavapai
 Jean McGehee <jeanm@mail.uca.edu>
 Linda K. Griffith <LindaG@mail.uca.edu>

The Professional Development and Curriculum Alignment Project has studied changes in teacher practice and knowledge by analyzing teacher-made curriculum documents, observational and interview data from classroom visits, and student achievement data from criterion-referenced tests. Teacher combinations of content, curriculum, and textbook has emerged as an interesting aspect of the study.

22. Mathematics Learning in an Inquiry-enhanced Environment for Preservice Teachers Yuma
 Jennifer Wilhelm <jennifer.wilhelm@ttu.edu>
 Sandi Cooper <sandi.cooper@ttu.edu>

Putting theory into practice is the focus of this study, where preservice teachers will experience, as learners, an inquiry-enhanced environment in their methods classes. Most mathematics teachers have never had experience performing inquiry-based investigations. This training creates the opportunity for teachers to explore their own mathematical conjectures. The intention is to inspire teachers to enact this form of learning into their own future mathematics classrooms.

2:00-2:50

23. Mathematics of Morphing for What Level? Apache
 Paul Baker <pbaker@catawba.edu>

Traditionally, topology has only been taught at the graduate level of college. There are fascinating aspects of topology that are readily accessible to much, much younger students. The author has developed a new course, the Mathematics of Morphing, and written a book for teaching topology to mathematically naïve college, liberal arts students. This new audience has required a radical departure from the traditional teaching methodology of definition – theorem – proof. Instead, visualization and modeling are central pedagogies. Anecdotal experience with much younger students leads author to believe that many of the topics could be handled readily by middle school students, perhaps even those at the elementary school level.

24. Social and Cultural Aspects of Mathematics Learning among 5 Third-grade Students Cochise
 Roland Pourdavood <r.pourdavood@csuohio.edu>
 Nicole Carignan <carignan.nicole@uqam.ca>
 Belvia Martin <martin_b@shaker-heights.k12.oh.us>

The intention of this research presentation is to connect social and cultural aspects of mathematics learning among third grade students. In addition, students' attitudes and beliefs about mathematics are investigated as they engage themselves in problem solving, communication, and mathematical representations.

25. Revisiting Mathematics: Problem Solving, Argumentation, and Reflective Writing Navajo
 Elaine Young <eyoung@ou.edu>

Preservice teachers revisit "learned" concepts in college content mathematics courses for deeper understanding and connections.

26. Proof-eliciting Problems and Reasoning with Transformations

Pinal

Denise Nunley <denise.nunley@asu.edu>

This presentation reports on an undergraduate geometry class where students are given proof-eliciting problems which involve reasoning with transformations. The presentation will be framed in terms of how student thinking dynamically, how they figure out the underlying structure behind a pattern, and how they are justifying while using transformations.

27. Voices from the Field: How to Improve Mathematics Literacy in Urban Schools

Yavapai

Judith McVarish <judith.mcvarish@nyu.edu>

Barbara Signer <signerb@stjohns.edu>

Robert Tobias <rjt3@nyu.edu>

Survey results of NY City teachers and administrators about factors that influence productive mathematics teaching as well as suggestions for improving math literacy will be shared. A discussion will follow about mathematics learning from the perspective of those who face the challenge daily of improving mathematics literacy in our schools.

28. Assessment Through Portfolios in Mathematics Courses for Teachers

Yuma

Conrad VanVoorst <cvanvoor@brockport.edu>

Student course portfolios in a graduate mathematics course for teachers can be effective tools for encouraging participants to take responsibility for their own learning. Through products and reflections, students provide evidence of mathematical understanding, original thinking, effective use of technology, communication skills, transfer of learning, and active, independent learning. The presenter will discuss the assessment of these outcomes.

2:50-3:00 BREAK

Hallway outside Cochise

3:00-4:00

Cochise

29. JOHN WILSON MEMORIAL LECTURE:

Art and Physics: Parallel Visions in Space, Time, and Light

Leonard Shlain <Lshlain@aol.com>

Art interprets the visible world; physics charts its unseen workings. Dr. Shlain tracks their breakthroughs side by side throughout history to reveal an astonishing correlation of visions.

4:10-5:00

x 30. Elementary Teachers' Algebraic Reasoning in a Standards-based Content Course

Apache

Angela Krebs <askrebs@umd.umich.edu>

This paper reports preliminary findings of a research project studying preservice teachers' development of their algebraic and proportional reasoning in a standards-based content course. The presenter will describe the course, and engage participants in a discussion surrounding what these students know and what they need to know to teach mathematics.

31. Elementary Preservice Students' Conceptual Understanding of Fractions Navajo
 Patricia Lamphere Jordan <lampher@okstate.edu>
This presentation reflects the knowledge base from which students formulate their concepts of fractions, results of pretests, interventions that took place over the semester, reflections on tutoring experiences, and results of post-tests. Elementary preservice teachers often demonstrate a lack of conceptual understanding of fraction concepts as well as difficulties working problems and connecting those ideas to models. Student work samples will also provide insight into their understanding and how their level of expertise impacts their work with elementary-aged children through their tutoring experiences.
32. Online and Web-enhanced Courses in Mathematics and Math Education Pinal
 Sally Robison <srobison@fau.edu>
Online courses are popping up everywhere, but are they really working? What are the issues we should be concerned about when going online? Who is benefitting?
33. Using Number Sentences to Develop Teachers' Understanding of Relational Thinking Yavapai
 Jeffrey Shih <jshih@unlv.edu>
One aspect of developing algebraic thinking in elementary-school students is relational thinking. This presentation will examine number sentence sequences generated by pre- and in-service teachers' to help develop relational thinking. Audience participation and discussion is encouraged.
34. Assessing Learning in a Standards-based Geometry Course for Elementary Teachers Yuma
 Kathy Burgis <burgikat@aquinas.edu>
Two years ago, Aquinas College substantially redesigned its required mathematics content courses for elementary teachers. "Standards-based" K-8 curriculum materials are used extensively throughout the content and methods sequence. This presentation will focus on the geometry course and research now underway to assess growth in students' geometric reasoning and spatial visualization.
- 5:10-6:00
35. Preservice Elementary Teachers: Mathematics Methods...Contrasts and Conflicts Apache
 Donna Foss <donnafo@mail.uca.edu>
This presentation identifies the contrasting and conflicting conceptions of mathematics and mathematic teaching and learning held by preservice elementary teachers and their methods instructors. Conclusions include the idea that until conflicting conceptions are acknowledged, confronted, and intensely challenged, there is no reason to believe that preservice elementary teachers will adopt the mathematics methods and curriculum exemplified in standards-based teacher education programs. Teacher education programs can no longer delegate this goal to one isolated course, but must integrate this objective throughout the program and if necessary, expand or add methods course experiences.
36. Developing Algebraic Reasoning Through the Use of Generalization in Fifth Grade Navajo
 John Lannin <LanninJ@missouri.edu>
This discussion centers around the ability of elementary students to construct and understand algebraic generalizations. Emphasis is placed on students' ability to justify generalizations and students' understanding of recursive and explicit reasoning.

37. Technology Integration in Mathematics for Prospective Elementary Teachers

Pinal

Barbara Boschmans <B.Boshchmans@nau.edu>

A quantitative dissertation on the integration of technology into elementary mathematics content courses was conducted at Northern Arizona University during 2002. The prospective elementary teachers' self-efficacy in using technology as a mathematical problem-solving tool both as a student and as a future teacher was surveyed. Data, conclusions, and the technology projects used will be discussed.

38. Improving Teachers' Understanding of State Standards

Yavapai

John Telese <jtelese@utb.edu>

A case study was conducted with teachers as they went through an alignment of state standards with the state's high-stakes assessment, using a process developed by Project 2061. As a result, the teachers developed a better understanding of the standards and how to assess them.

39. Gross Motor Movement and Mathematical Achievement: Are They Connected?

Yuma

Virginia Usnick <vusnick@unlv.edu>

Marilyn Sue Ford <fordm@unlv.edu>

For years, possibly decades, early childhood specialists have considered fine-motor coordination as indicative of a child's readiness to learn. Recent medical research seems to indicate that gross-motor development is at least as important if not more important than fine-motor skills. We will present the results of a study investigating connections between motor development and mathematics achievement among first and second graders.

6:00-->

DINNER

Cochise

Saturday, March 8, 2003

8:30-9:45

40A. Strategies of Geometry Instruction with Low-achieving Secondary Students

Apache

(THESE SPEAKERS ARE SHARING THIS TIME SLOT)

Dang Phan <Dang@asu.edu>

Kathleen M. McCoy <wizard1@imap1.asu.edu>

This paper describes techniques used with low-achieving secondary students from a low-income and culturally-diverse population. Special emphasis is placed on the use of the newspaper as an instructional tool that provides relevant contexts for geometry.

40B. KITE: Student-centered Strategy for Solving Word Problems

Apache

(THESE SPEAKERS ARE SHARING THIS TIME SLOT)

Helen Atkins Kurtz <wolfzmom@hotmail.com>

Kathleen M. McCoy <wizard1@imap1.asu.edu>

Results of a seven-month word problem training program used with forty seventh-grade students from a population representing diversity and low income is presented. Findings are related to problem-solving achievement and comparisons are made for gender and ethnic groups.

41. Emergent Curriculum: Classroom Cultures, Argumentation, and Technology Cochise

M. Jayne Fleener <fleener@ou.edu>
 Anne Reynolds <areynolds@ou.edu>
 Stacy Reeder <stacyreeder@worldnet.att.net>
 Darlinda Cassel <darlinda.cassel@oc.edu>
 Keith Adolphson <adolphson@juno.com>

To offer a context for an emergent curriculum that follows the ebbs and flows of classroom discourse, we will hear how three separate studies explored the dynamics of problem-centered inquiry, teacher and student beliefs, argumentation, classroom cultures, worthwhile mathematics tasks, and discipline knowledge. The audience will be invited to discuss possibilities for an emergent curriculum, especially in these times of increased standardization and high stakes testing.

42. Geometry Standards: A Comparison Between the United States, China, and Taiwan Navajo

Mary Margaret Capraro <mmcapraro@coe.tamu.edu>
 Robert M. Capraro <rcapraro@coe.tamu.edu>
 Gerald Kulm <gkulm@coe.tamu.edu>

Participants will review relevant lessons from China, Taiwan, and the United States using the NCTM Principles and Standards for School Mathematics (2000) as a measure for comparison on selected geometry standards across various grade levels.

43. Integrating Mathematics and Science Methods -- We're in This Together Pinal

William Speer <speerw@unlv.edu>
 Jeffrey Shih <jshih@unlv.edu>
 Aimee Govett <govett@ccmail.nevada.edu>
 Kent Crippen <kcrippen@unlv.edu>
 Cynthia Hernon <thernon@intermind.net>

This panel presentation will report on efforts by math and science methods instructors to collaborate on the integration of their methods courses. Successes and failures will be presented.

10:00-10:50

44. Using Parent "Stories" to Help Educators Understand How Children Learn Mathematics Apache

Judith McVarish <judith.mcvarish@nyu.edu>
 Margot Ely <margot.ely@nyu.edu>
 Elizabeth Quintero <not available>
 X Brenda Strassfeld <not available>

This study will explore how young children learn mathematics by collecting parent "stories" from parents of children participating in an urban after-school mathematics program in an effort to identify factors that influence their mathematics learning in order to guide the development of curriculum for the after-school program.

45. Effectiveness of the Study Group as a Staff Development Strategy Cochise

Daniel J. Brahier <brahier@bgnet.bgsu.edu>

Three groups of elementary and middle-school mathematics teachers participated in Eisenhower-funded projects titled SUCCESS between 2000 and 2002. Results of research conducted on the effectiveness of this program and the value of using small study groups as a staff development tool will be explored.

46. Integrating Native American History and Culture with Mathematics Instruction

Navajo

✓ Laura Tsosie <LTsosie@pusdatsa.org>
 EmmaJean H-Begaye <maisis929@yahoo.com>
 Virginia Usnick <vusnick@unlv.edu>

Speakers in this session, teachers at Pinon Middle School located on the Navajo Reservation, will present a unit about the Navajo Long Walk they developed for their sixth graders. Focus will be on the mathematics content embedded within the unit.

47. Learning Through Argumentation: The Child's Perspective

Pinal

✓ *missy* Darlinda Cassel <darlinda.cassel@oc.edu>
 Anne Reynolds <areynolds@ou.edu>

Argumentation was investigated while engaging students in ways of working through "arguing." The students identified several positive aspects of argumentation that impacted learning as a result of explaining and justifying their mathematical solutions.

48. Rocks in a Jar: A Structure Approach for Understanding Elementary Education Mathematics Content

Yavapai

✓ Alan Zollman <zollman@math.niu.edu>

This presentation will disseminate a prototype mathematics content course for elementary education majors based on the structure of mathematics. The structure of the prototype is based on the work of the Mathematics Sciences Education Board in "On the Shoulders of Giants" (1990) and the Organisation (sic) for Economic Co-operation and Development in Measuring Student Knowledge and Skills (1999).

11:00 - 12:00

Cochise

49. KEYNOTE:

Issues and Challenges in Teacher Education

Jon Engelhardt <jon.engelhardt@wichita.edu>

This session will address the issue of why teacher education, extending from 1983's "A Nation at Risk," continues to lack credibility. Focus will be placed on specific issues and challenges and recommendations will be made.

12:00 CLOSING and BOX LUNCH

Cochise

12:30 Executive Board meeting

Apache

<u>Name</u>	<u>Session No.</u>	<u>email</u>	<u>Name</u>	<u>Session No.</u>	<u>email</u>
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Anhalt, Cynthia	5	<anhalt@u.arizona.edu>	Mann, Robert	2	<RR-Mann@wiu.edu>
Babbitt, Bea	4	<babbitt@univ.edu>	Manouchehri, Azita	15	<Azita.M@cmich.edu>
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Boliver, David	13	<dboliver2@cox.net>	Matney, Gabriel	9	<gmatney@ou.edu>
Boschmans, Barbara	37	<B.Boschmans@nau.edu>	Maxwell, Sheryl	3	<smaxwell@memphis.edu>
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Lannin, John	36	<LanninJ@missouri.edu>	Young, Elaine	25	<eyoung@ou.edu>
			Zollman, Alan	48	<zollman@math.niu.edu>

