



Research Council on Mathematics Learning

***Learning, Teaching, and Knowledge:
(Re)Constructing Mathematical
Ontologies and Epistemologies
in an Era of Transition***

**39th Annual Meeting of RCML
Charlotte, North Carolina
February 23 - 25, 2012**

Welcome

Welcome to Charlotte!

On behalf of the RCML board, the conference chair, and program chair, welcome to our 39th Annual Meeting. Be it your first RCML conference or your 39th, I know that stimulating conversations await you as you attend sessions and interact with other attendees. Thank you for joining us and enjoy the conference.

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Schedule of Events

All sessions will be held at the Hilton Charlotte University Place.

Thursday, February 23, 2012

Registration (Midway Room)	4:30 pm - 7:30 pm
Wilson Lecture (Lakeview Room)	5:30 pm - 6:30 pm
Reception (Lakeview Room)	6:45 pm - 8:30 pm

Friday, February 24, 2012

Registration (Midway Room)	7:30 am - 5:30 pm
Sessions 1 - 7	8:00 am - 8:45 am
Sessions 8 - 14	9:00 am - 9:45 am
Sessions 15 - 21	10:00 am - 10:45 am
Sessions 22 - 28	11:00 am - 11:45 am
Lunch & Business Meeting (Lakeview Room)	12:00 pm - 1:45 pm
Sessions 29 - 35	2:00 pm - 2:45 pm
Sessions 36 - 42	3:00 pm - 3:45 pm
Sessions 43 - 49	4:00 pm - 4:45 pm
Keynote Address (Lakeview Room)	5:00 pm - 5:45 pm

Saturday, February 25, 2012

Registration (Midway Room)	7:00 am - 9:00 am
Sessions 50 - 56	8:00 am - 8:45 am
Sessions 57 - 63	9:00 am - 9:45 am
Sessions 64 - 70	10:00 am - 10:45 am
Sessions 71 - 77	11:00 am - 11:45 am
Lunch	12:00 pm - 1:00pm
Keynote Address (Lakeview Room)	1:15 pm - 2:00 pm
Executive Board Meeting	2:30 pm - 5:00 pm

Keynote Speakers

Founder's Lecture:



M. Jayne Fleener, Ph.D., Dean of the College of Education at North Carolina State University, has over 25 years of professional experience in K-12 and higher education, including teaching high school mathematics and computer science in North Carolina. Dr. Fleener is currently the Dean of the College of Education at NC State University. Previously, she was the Dean of the College of Education at Louisiana State University, where she also held the E.B. (“Ted”) Robert professorship, and was the Associate Dean of the College of Education at the University of Oklahoma. In her capacity as Dean at LSU, she served on the Blue Ribbon Commission for Educational Excellence and was involved in teacher education accountability reforms in Louisiana.

Dr. Fleener has received several awards including the 2010 Educational Leadership award from AdvanEd. She has over 80 publications in the areas of learning and learning theory; curriculum and instruction; teacher preparation, development, and change; and educational research and theory, including two books which have been translated into Chinese. She serves on numerous governing and advisory boards for journals, professional organizations, and community non-profits, and has over 100 national and international presentations in the areas of mathematics education, curriculum and instruction, teacher education, service learning, and educational and research reform and paradigms.

Dr. Fleener’s keynote address is entitled *Why Mathematics?: Redefining Core Understandings for Gen-Zers and Beyond*. We expect our children to know more than us. Society in fact counts on it. We develop structures and mechanisms to ensure the cumulative knowledge of each generation is passed on, extended, and adapted. Yet knowledge and information are not the same thing. Over the past century, the proliferation of information has created an information-knowledge gap that makes it impossible to expect any individual or even group of individuals to know all there is to know about any particular field of inquiry. As a mathematics teacher, that means her goals are not to teach everything anyone could possibly need to know about and do with mathematics, but to help students develop their understandings, passions, and mathematical reasoning powers so they can solve any future problems or engage with any future educative or practical needs associated with mathematics with confidence and discernment. In the age of the Common Core, it is time to re-examine what mathematics is important for our students to know and be able to do, and to problematize what it even means to know mathematics. She will open the doors to what needs to be a much larger conversation about the future of our field.

Keynote Speakers

Keynote Address:



Paola Sztajn, Ph.D. is a professor of Mathematics Education in the Department of Elementary Education at North Carolina State University. She teaches mathematics methods courses for prospective and practicing teachers. Her research program focuses on practicing elementary teachers mathematics knowledge and professional development. The overarching question that guides Paola's research interests is: in which ways do practicing elementary mathematics teachers acquire and continue to develop the knowledge needed to teach all students high quality mathematics? She works with colleagues from different fields, in collaborative studies that allow multi-faceted, in-depth investigations of this complex question. Currently, she is the principal investigator in three grants from the National Science Foundation to investigate various aspects of the professional development of elementary mathematics teachers.

Dr. Sztajn's keynote address is entitled "**Teacher Learning and Innovation: Challenges for Professional Development.**"

In this presentation she will discuss what she sees as two important challenges for professional development: attending to the processes through which practicing teachers come to develop their professional knowledge and making sure innovations play a role in teachers professional lives. She approaches these challenges through the examination of her current work in three research projects that study different facets of professional development for practicing mathematics teachers: one examines the design of professional development; one focuses on teacher knowledge of students' mathematics; and one focuses on issues of classroom discourse. She will bring her experiences in these three projects together to set an agenda for future work in professional development.

Wilson Memorial Lecture:



Neil Calkin, Ph.D., was born in Connecticut and raised in England. He studied mathematics at Trinity College, Cambridge, and earned a Doctorate in Mathematics in Combinatorics and Optimization in 1988 from the University of Waterloo. He started doing origami before the age of ten. This decade he has discovered the joy of using origami and card tricks to sneak mathematics into his children's lives (as well as those of their schoolmates).

The title of Dr. Calkin's keynote address is "**Origami and Magic Tricks: Sneaking Mathematics Into Children's Lives.**" Most children love magic tricks and many love origami. We will illustrate some of the ways we can use these interests to sneak some mathematics into the lives of small --- and not-so-small --- children.

Wilson Lecture (Lakeview Room)

Origami and Magic Tricks: Sneaking Mathematics into Children's Lives

Dr. Neil Calkin

Founder's Reception (Lakeview Room)

Lunch and Business Meeting (Lakeview Room)

Thursday, February 23, 2012		Friday, February 24, 2012							
Harris Room	Welwyn Room	Walden Room	Keynes Room	Olmstead Room	Audubon Room	Burnham Room			
Kadian M. Callahan Prospective middle school teachers' experiences and conceptions of mathematics teaching and learning: A mixed-methods study	James Dogbey Using Variables: Do Math Curricula Provide Support for Teachers?	Gemma Foust Mojica Use of a Learning Trajectory in the Professional Noticing of Children's Knowledge of Equipartitioning	Brenda Strassfeld A High School Math Teacher's Lament: Don't Give Me a Geometry Class to Teach	Catherine Schwartz, P. Holt Wilson, Timothy Hendrix, Katherine Mawhinney, Carol Midgett Examining teachers' integration and use of multiple domains of mathematics knowledge for teaching in simulated contexts of practice	Kelli Slaten Self-Awareness as Assessment: What Educators Can Learn About Students' Mathematical Understanding	Paul McCombs An Investigation of Students Understanding of Series			
Janet Herrelko What do student teachers learn from Clinical Rounds?	Margaret Rathouz Making Connections: Preservice Teachers' Understanding of the Decimal System	Hope Marchionda & Janet Tassel Promoting Professionalism in Preservice Teachers	Jeffrey Hall & Gregory Chamblee The Impact of Interactive Whiteboards on Secondary Mathematics Teaching and Learning: A Longitudinal Study of Current Users and Future Users	Hannah Slovin, Judith Olson, & Melfried Olson Teachers' classroom practices using technology for formative assessment: The connection to knowledge and perceptions of mathematics, learning and teaching	Nancy Cerezo, Sharyn Disabato, & Lin Carver What does reading have to do with a math test?	Mikhail Türegün Cases of faux ami in an introductory statistics course			
Anne Reynolds & Mike Mikusa Integrating the mathematical practice standards: are middle grades teachers ready?	Adele Hanlon Spatial Thinking and Pre-service Elementary Teachers	Diana S. Perdue Approach Training: Extending Teaching & Learning via Hybrid Mathematics Classes	Lianfang Lu Toward the development of discourse in secondary mathematics classrooms	Tracey Howell The Four-Year Evolution of a Professional Development Series and Its Positive Impact on Participating Teachers	Lynn Columba Embedding Mathematical Discourse in Shared Storybook Reading: Effect on Young Learners' Mathematical Performance	Jayleen Wangle Calculus Students' Mathematical Beliefs			
Scott Courtney The Role of Model Lessons in Mathematics Teacher Education	Tracy Goodson-Espy Project NC NAEP: How NAEP Data Can Improve Mathematics Teaching and Learning	Carolyn Pinchback Preservice Teachers: Fractions and the Common Core State Standards	Elaine Young, Sarah Ives, Joe Champion, & George Tintera Teachers' Participation in a Grant-Supported Masters of Science in Mathematics Degree Program	Tony Thompson Algebra 1 teachers' perceptions and knowledge of teaching students with learning disabilities	Lynae Sakshaug Real-Life Ratio Problems: Challenges for Math Teachers	Kansas Pope The Great Divide: Exploring Differences Between Teacher Perceptions of Instruction and Classroom Observations			
Sandra Davis Trowell Joy- Making sense of one students' experiences in a non-routine mathematics problem solving course	Keith Adolphson Technology and Elementary Preservice Teachers	Megan Stotz ABC's and 123's: Using Literature to Teach Mathematics	Temple A. Walkowiak & Robert Q. Berry Mathematics Instructional Quality and Students' Opportunities to Learn Mathematics	Eileen Durand Faulkenberry Do You See What I See? An exploration of self-perception in the classroom.	Sarah Johnson & David Pugalee Secondary Students' Multistep Problem Solving in STEM Contexts	Nancy Payne & Jessie Store An Investigation of Algebraic Reasoning Using Function Machines			
Martha Tapia Math is unisex: Are students still anxious?	Catherine Schwartz Developing the practice of teacher questioning through a K-2 elementary mathematics field experience	William McCalliard & Sarah Berenson Combinatorics and Sample Space Construction: A learning Process	Mary Harper Reform in a College Mathematics Class: Beliefs about Mathematics and Mathematics Pedagogy	Winifred A. Mallam & Mary B. Swarthout What's the MERT in Research Collaboration?	Ann R. Crawford & Cynthia Copolo Looking at Learning: Levels of Understanding in High Cognitive Demand Word Problems, Grades 6-	Bob M. Drake The "Write Stuff" for Learning Mathematics	8		

Friday, February 24, 2012		Founder's Lecture (Lakeview Room) Why Mathematics?: Redefining Core Understandings for Gen-Zers and Beyond Dr. Jayne Fleener						
4:00 - 4:45	<p>Sean Yee Applying conceptual metaphor theory to understand mathematical problem solving</p> <p>Valerie Sharon, Dustin Jones, & Linda Reichwein Zientek Prospective Teachers' Ability to Solve Algebra Equations</p> <p>Melanie Autin, Hope Marchionda, & Summer Bateiha The Effects of a Transactional Approach to Teaching Introductory Statistics</p> <p>Alan Zollman An Analysis of STEM Education Projects in the US: Characteristics and Concerns</p> <p>Tyrette Carter Professional Development: NASA and Inquiry in mathematics</p> <p>Dohyoung Ryang Developing the Mathematics Teaching Efficacy Beliefs Instrument for Middle Grades Teachers</p> <p>George Tintera & Ping-Jung Tintera Pedagogy of Teaching Linear Equations</p>							
5:00 - 5:45								
	<p>Harris Room</p> <p>Jean McGehee A Study of Teachers Making the Transition to Implement Common Core Standards in Algebra I</p> <p>Brian R. Evans Elementary Teachers' Mathematical Content Knowledge, Efficacy, and Problem Solving Abilities in Alternative Certification</p> <p>Pat Lamphere Jordan Pre-service Secondary Students' Connections of Whole Number Operational Meanings and Algebraic Reasoning</p> <p>Travis A. Olson & Melfried Olson Examining the role of instruction in mathematics to prepare preservice teachers for mathematics instruction in middle grades.</p>	<p>Welwyn Room</p> <p>Sarah Ives & Elaine Young Tower of Hanoi: Reflections from Prospective Elementary Teachers Engaged in "Hard Fun"</p> <p>Summer Bateiha Creating a Meaningful Connection Between Mathematics and Social Issues</p> <p>Juliana Utley, Adrienne Redmond, & Kansas Pope Examining the Experiences of Novice Mathematics and Science Teachers</p> <p>Vivian R. Moody, Hope Marchionda, Summer Bateiha, Kanita DuCloux, & Kari Everett Negotiating Knowing and Teaching: Pre-service Teachers' Beliefs and Conceptions about Mathematics and Teaching Mathematics</p>	<p>Walden Room</p> <p>Darinda Cassel, Carol Lucas, & Adele Hanton Algebra Content and Pedagogy for Alternately Certified Teachers</p> <p>Daniel Brahier Reasoning and Sense Making in Practice</p> <p>Sarah Smitherman Pratt Using design experiment to explore multiplication in a middle grades mathematics methods course</p> <p>Brian R. Evans A Comparison of Two Alternative Pathway Programs in Secondary Mathematics Teacher Certification</p>	<p>Keynes Room</p> <p>Kathy Horak Smith & Kansas Pope Pre-Service Teachers and the NCTM Process Standards</p> <p>P.H. Wilson, K. Richardson, C. Seaman, A. Floyd, W. Rich Core-Math: Supporting the Implementation of the Common Core State Standards for Mathematics Using Learning Trajectories</p> <p>Jessie Chitsanzo Store, Sarah B. Berenson, & Nancy Tilley Payne Enactment of Justification Tasks in Elementary Schools: A Multi-case Study</p> <p>Holly Henderson Pinter & Temple A. Walkowiak Research to Practice: Using the M-Score Observational Measure to Inform Professional Development</p>	<p>Olmstead Room</p> <p>Edward Wall Perceptions of Studying</p> <p>Jeremy Strayer The Impact of Professional Development on Teachers' Perceptions of Their Classroom Learning Environment</p> <p>Megan Che Middle Grades Single-Sex Mathematics Classrooms: Preliminary Findings from a Critical Discourse Analysis</p> <p>Mikhail Türegün ARTIST talk: An approach to assessment in a first year statistics course</p>	<p>Audubon Room</p> <p>Gabriel Matney, Jonathan Bostic, & Dan Brahier Overcoming a Common Storm: Designing the PD Teachers Need for Successful Common Core Implementation</p> <p>Thomas J. Faulkenberry Examining the role of testing in learning mathematics: Directions for future research</p> <p>Traci L. Carter, Jennifer D. Cribbs, and Vecihi Serbay Zambak The Impact of Technology Integration on the Mathematical Reasoning of Preservice Secondary Mathematics Teachers</p> <p>Gabriel Matney & Jack Jackson Researching Connections between Real-World Assessments and Student Experiences</p>	<p>Burnham Room</p> <p>Suzanne L. Reynolds Preservice Teachers' Analysis of a Textbook Lesson on Volume</p> <p>George A. Pattison III (aka George A. Wyer) Overcoming Blocks to Learning Mathematics: A Clinical Process Paradigm for Teaching and Learning Mathematics</p> <p>James Carrier Student strategies suggesting emergence of mental structures</p> <p>Darinda Cassel & Kerri Richardson Fifth Grade Wordle Comparisons</p>	
	<p>Lunch</p>							
12:00 - 1:00								
1:15 - 2:00	<p>Keynote Address (Lakeview Room) Teacher Learning and Innovation: Challenges for Professional Development Dr. Paola Sztajn</p>							
	<p>Saturday, February 25, 2012</p>							



Thursday, February 23, 2012

Registration (Midway Room)	4:30 pm - 7:30 pm
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Founder's Reception (Lakeview Room)	6:45 pm - 8:30 pm



Friday, February 24, 2012

Registration (Midway Room)	7:30 am - 5:30 pm
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8:00 am - 8:45 am

Sessions 1 - 7

Session 1

Harris Room

Title: Prospective Middle School Teachers' Experiences and Conceptions of Mathematics Teaching and Learning: A Mixed-Methods Study

Presented by: Kadian M. Callahan

Abstract:

The study described in this paper is part of a larger study that is examining the interdependence of mathematics teaching and learning during an undergraduate mathematics content course for prospective middle school teachers (PMSTs). The focus of the present study is on understanding the nature of PMSTs' experiences during the course and relationships to their conceptions of mathematics teaching and learning. Their identification of engaging in various types of active-learning opportunities that were valuable for learning mathematics suggests that their conceptions of the teaching and learning process may be changing as a result of engaging in those experiences.

Session 2

Welwyn Room

Title: Using Variables: Do Math Curricula Provide Support for Teachers?

Presented by: James Dogbey

Abstract:

The concept of variable is an important tool in the teaching and learning of school mathematics. In spite of this importance, working with variables has been found to be difficult for many students as well as mathematics teachers. One way of solving this problem is to provide curriculum support for teachers on the uses of variables. This study used content analysis to examine three contemporary middle grades mathematics curricula on the support they provide for teachers on how to enact variables ideas in their classrooms. Findings revealed that each of the curricula examined provided some guidance to teachers to enact variable ideas in the classroom. However, the nature and amount of support provided were different in different curriculum. Implications for curriculum and teacher development are presented.

8:00 am - 8:45 am

Sessions 1 - 7

Session 3

Walden Room

Title: Prospective Elementary Teachers' Use of a Learning Trajectory in the Professional Noticing of Children's Knowledge of Equipartitioning

Presented by: Gemma Foust Mojica

Abstract:

Teacher noticing is an important construct in articulating how teachers make sense of children's thinking and use this reasoning as they engage in the practice of teaching. This study investigated 56 prospective elementary teachers' professional noticing of children's mathematical thinking, a specialized form of noticing identified by Jacobs, Lamb, and Philipp (2010). Results of prospective teachers' use of an equipartitioning learning trajectory in attending to children's strategies, interpreting children's understandings, and deciding how to respond on the basis of children's understandings will be presented.

Session 4

Keynes Room

Title: A High School Math Teacher's Lament: Don't Give Me a Geometry Class to Teach

Presented by: Brenda Strassfeld

Abstract:

The proposal will share an intervention that took place during a research study about 520 high school mathematics teachers' beliefs about teaching geometry. A three factor solution emerged from the factor analysis of a questionnaire. The factors reflected a disposition towards activities, a disposition towards an appreciation of geometry and its applications and a disposition towards abstraction. These results enabled classification of teachers into one of eight groups depending on whether their scores were positive or negative on the three factors. Knowing the teacher typology allows for appropriate professional development activities to be undertaken. This was done in the case study where techniques for scaffolding proofs were used as an intervention for a teacher who had a positive disposition towards activities and appreciation of geometry and its applications but a negative disposition towards abstraction. The intervention enabled the teacher successfully to teach her students how to understand and construct proofs.

Session 5

Olmstead Room

Title: Examining teachers' integration and use of multiple domains of mathematics knowledge for teaching in simulated contexts of practice

Presented by: Catherine Schwartz, P. Holt Wilson, Timothy Hendrix, Katherine Mawhinney, and Carol Midgett

Abstract:

This session focuses on findings from research exploring the way teachers engaged in professional development as part of a large MSP project integrate and use multiple domains of mathematics knowledge for teaching (Ball, Thames, & Phelps, 2008) within a simulated context of practice. After a brief overview of the project, video clips from the professional development will be used to explore how participants draw upon their understandings of number and operation properties, how students come to know these ideas, and pedagogical choices to make instructional decisions.



Friday, February 24, 2012

8:00 am - 8:45 am

Sessions 1 - 7

Session 6

Audubon Room

Title: Self-Awareness as Assessment: What Educators Can Learn About Students' Mathematical Understanding

Presented by: Kelli Slaten

Abstract:

As part of an ongoing study concerning students' self-awareness of their learning, this presentation focuses on students' written reflections which describe their mathematical learning. Typically, assessment practices gauge student learning by utilizing outcome-oriented approaches. Students prepare for assessments by memorizing as many facts as possible and many instructors assess students on predetermined sets of key information. However, allowing students to reflect on and describe their own mathematical learning has several benefits for both student and instructor. Students' self-awareness of their learning helps them make cognitive connections and provides instructors with invaluable information about what their students have actually learned.

Session 7

Burnham Room

Title: An investigation of Students Understanding of Series

Presented by: Paul McCombs

Abstract:

This talk will discuss undergraduate college student understanding of series in calculus. In particular, we will discuss some of the research that has been conducted with student understanding of infinity, limits and sequences and see how this may relate to understanding of series.

9:00 am - 9:45 am

Sessions 8 - 14

Session 8

Harris Room

Title: What do student teachers learn from Clinical Rounds?

Presented by: Janet Herrelko

Abstract:

This research sought to learn the impact of taking mathematics pre-service teachers on clinical rounds (organized pre-observations, observations, and research-based practice? Preparing teachers to be student focused rather than teacher-centered and using research-based classroom practices rather post debriefing) with practicing teachers. Would these classroom observations and discussions help the pre-service teachers see the need for than folk pedagogy is difficult during the senior year of undergraduate work. Two sets of rounds were conducted during the methods semester when 90 hours of field work were required. The evidence of success has come in the lesson plans submitted by the pre-service teachers.

Session 9

Welwyn Room

Title: Making Connections: Preservice Teachers' Understanding of the Decimal System

Presented by: Margaret Rathouz

Abstract:

How do we support elementary preservice teachers' (PSTs') development of knowledge about decimals and their relationships to fractions and whole number place value? During this interactive session, participants will analyze tasks and PSTs' thinking around decimal amounts and representations. We will present data regarding changes (over the course of a decimals unit within a mathematics class) in the kinds of strategies, explanations, and representations PSTs used to compare decimal amounts such as "16 tenths" and "134 hundredths." We will share conjectures about how cognitively demanding tasks within the decimal unit promote deeper mathematical understandings.

Session 10

Walden Room

Title: Promoting Professionalism in Preservice Teachers

Presented by: Hope Marchionda and Janet Tassell

Abstract:

In this session we will discuss what professionalism means in the context of teaching mathematics and how the perceptions and expectations of students, teachers, administrators, and communities can affect how teachers perceive professionalism. We will then share how WKU's Noyce Program seeks to promote professionalism in its Scholars as well as in other preservice teachers. We will also discuss some of the successes and obstacles we have encountered during our efforts to promote professionalism within our program. Participants will be invited to share how their teacher preparation programs are promoting professionalism to help prepare better STEM teachers.

Session 11

Keynes Room

Title: The Impact of Interactive Whiteboards on Secondary Mathematics Teaching and Learning: A Longitudinal Study of Current Users and Future Users

Presented by: Jeffrey Hall and Gregory Chamblee

Abstract:

The purpose of this study was to assess the perceptions of Interactive Whiteboard (IWB) use by current users and future users in the secondary mathematics classroom. Four teachers were interviewed once per year for three years regarding IWB impact on lesson planning, classroom use, assessments, and student learning. Over three years, IWBs became increasingly vital to the users, lesson planning became easier, and the perceived value of IWBs to student learning grew more positive. The future users' perceptions remained relatively positive and consistent throughout. Implications for mathematics teacher professional development and how teachers perceive mathematics instruction will be discussed.

Session 12

Olmstead Room

Title: Teachers' classroom practices using technology for formative assessment: The connection to knowledge and perceptions of mathematics, learning and teaching

Presented by: Hannah Slovin, Judith Olson, and Melfried Olson

Abstract:

We report on research conducted with six seventh-grade mathematics teachers who participated in a two-year professional development research study on implementing formative assessment in networked classrooms. While the full study used a variety of both quantitative and qualitative data sources, this report focuses on data from the semi-structured interviews conducted at the end of the project. We describe three of the categories—formative assessment, pedagogy, student role—that emerged from the coding (Strauss & Corbin, 1998) and relate these to teachers' use of the technology.

Session 13

Audubon Room

Title: What does reading have to do with a math test?

Presented by: Nancy Cerezo, Sharyn Disabato, and Lin Carver

Abstract:

High stakes math tests involve far more than math skills. Our research analyzes the types and wording of problem solving items on standardized tests used in various states. The readability of typical items will be discussed and this information will be used to address the reading skills needed to successfully complete these items.

Session 14

Burnham Room

Title: Cases of faux ami in an introductory statistics course

Presented by: Mikhail Türegün

Abstract:

A research study on students' use of statistical language/terminology to express their understanding of various statistical concepts as they responded a number of journal prompts will be presented. Implications of standard and non-standard language/terminology usage in introductory statistics are discussed.

10:00 am - 10:45 am

Sessions 15 - 21

Session 15

Harris Room

Title: Integrating the mathematical practice standards: are middle grades teachers ready?

Presented by: Anne Reynolds & Mike Mikusa

Abstract:

The Common Core Standards for Mathematics includes 8 Standards for Mathematical Practice that “describe ways in which developing student practitioners of the discipline of mathematics increasingly ought to engage with the subject matter.” For several years mathematics and mathematics education faculty on our campus have co-taught classes intended to address the mathematical content needed by middle grades mathematics teachers whose original license included minimal mathematics content in their professional preparation. In this session we will examine research data from these classes to see how these teachers will potentially make sense of these standards for their own classrooms.

Session 16

Welwyn Room

Title: Spatial Thinking and Pre-service Elementary Teachers

Presented by: Adele Hanlon

Abstract:

Although spatial thinking is an integral piece in the fields of Science, Technology, Engineering, and Mathematics it is under-emphasized in the K-12 classroom. This research follows a class of pre-service elementary teachers enrolled in a mathematics course covering geometry content and pedagogy through their journey of evolving beliefs regarding spatial thinking. For this group of pre-service teachers it is ascertained how their newly acquired awareness of spatial thinking not only impacted their field experience but also how they believe it will impact their classrooms.

Session 17

Walden Room

Title: Approach Training: Extending Teaching & Learning via Hybrid Mathematics Classes

Presented by: Diana S. Perdue

Abstract:

This workshop will illustrate how to create classes that extend your students learning time, engage them in motivational and meaningful mathematics tasks, & enhance their mathematical understanding. This "approach training" for teachers includes proven methods that work and offers specific solutions for your classroom challenges. It IS possible to have a fun, interactive, student-centered lesson that meets standards (common core & state) with your students, using your materials, in your school. I will show you how in this demonstration workshop. Attend, learn, & leave with specific tools & techniques that you can implement the very next day in your classroom. FINALLY, professional development that is useful, reality-based, and achieves results!

Session 18

Keynes Room

Title: Toward the development of discourse in secondary mathematics classrooms

Presented by: Lianfang Lu

Abstract:

In this paper, the author analyzed the discourse structures of the reformed mathematics teaching in secondary schools in China. In particular, three lessons that represent three different approaches of implementing the reform mathematics curriculum from 25 lessons conducted by leading teachers were compared and contrasted. The findings reveal that dynamics of discourse requires teachers to change expectations for learning from efficiency and skills to possibilities of learning, to appreciate and believe in individual autonomy, and to embrace uncertainty and let go of control. It offers insights for preparing pre-service teachers for the implementation of common core standards in mathematics classrooms in the US.

Session 19

Olmstead Room

Title: The Four-Year Evolution of a Professional Development Series and Its Positive Impact on Participating Teachers

Presented by: Tracey Howell

Abstract:

This paper will discuss one component of a school mathematics project, which was designed and implemented over the last four years to recruit and retain mathematics teachers at ten low performing high schools and to supplement their mathematics content knowledge. The project (called The Cumulative Effect) emphasized a comprehensive talent development approach to professional development and embraced the idea that teachers must continue to learn and grow as educators if they are to be truly committed to the academic growth of every student. The evolution of the professional development series along with the survey results will also be discussed.

Session 20

Audubon Room

Title: Embedding Mathematical Discourse in Shared Storybook Reading: Effect on Young Learners' Mathematical Performance

Presented by: Lynn Columba

Abstract:

The purpose of this session is share research on (1) whether teachers can be trained to increase their use of mathematical discourse during shared storybook reading; (2) whether such an intervention would have a demonstrated effect on children's use of mathematical discourse and their early mathematical knowledge; and (3) whether teachers generalize their use of math talk to routine and activities outside of shared story time. Analysis of data from four preschool classrooms will be presented. Discussion will focus on the role that mathematical discourse, along with hands-on materials and shared reading, can play in supporting young learners' conceptual development.



Friday, February 24, 2012

9:00 am - 9:45 am

Sessions 8 - 14

Session 21

Burnham Room

Title: Calculus Students' Mathematical Beliefs

Presented by: Jayleen Wangle

Abstract:

The purpose of this study is to explore calculus students' beliefs about the nature of mathematics. Research shows this is important to investigate because students' beliefs influence their mathematical understanding. Based on responses from a written questionnaire, five students were chosen to be interviewed. Students' beliefs varied from mathematics is numbers to mathematics is logic. Some calculus students continue to view mathematics as procedural, whereas others have a more mature understanding of the nature of mathematics. Future research is needed to determine if the beliefs about mathematics held by calculus students influence their conceptual understanding of foundational topics.

11:00 am - 11:45 am

Sessions 22 - 28

Session 22

Harris Room

Title: The Role of Model Lessons in Mathematics Teacher Education

Presented by: Scott Courtney

Abstract:

Over the past two decades, research in teacher education and teacher change has highlighted the importance of providing teachers with opportunities to both experience reform-oriented (i.e., "model") lessons as students of mathematics and to reflect on such experiences as teachers. The presentation will provide insight into teachers' ways of operating as they engage with and attempt to re-construct a reform oriented lesson, and will suggest a framework for the productive design and implementation of such model lessons in both pre-service teacher education and professional development settings.

Session 23

Welwyn Room

Title: Project NC NAEP: How NAEP Data Can Improve Mathematics Teaching and Learning

Presented by: Tracy Goodson-Espy

Abstract:

The presentation discusses the results of the National Science Foundation sponsored project, NC NAEP: Improving Mathematics Content and Methods Courses. This project created a set of curricular materials from NAEP problems, results, and student work, to be used in mathematics content and methods courses for elementary and middle school pre-service teachers. The materials were tested in multiple universities within the UNC system and produced improvements in mathematical content knowledge and mathematics efficacy beliefs on pre-service teacher populations. The presentation will share the curricular materials and the results of the implementation of the materials.

Session 24

Walden Room

Title: Preservice Teachers: Fractions and the Common Core State Standards

Presented by: Carolyn Pinchback

Abstract:

Preservice teachers often struggle with fractions and the operations of fractions and mixed numbers. Based upon a diagnostic test, intervention activities, journal entries, and the alignment of the Common Core State Standards, the speaker will share her findings.

Session 25

Keynes Room

Title: Consequences of Secondary Teachers' Participation in a Grant-Supported Masters of Science in Mathematics Degree Program

Presented by: Elaine Young, Sarah Ives, Joe Champion, George Tintera

Abstract:

This report describes outcomes of grant-supported participation of secondary mathematics teachers in a Master's of Science in Mathematics degree program at a mid-sized university in the southern U.S. Data sources include background information, course artifacts, grades, teaching observations, and employment records of 138 participating teachers during 2004 - 2011. Cohorts of up to 30 inservice mathematics teachers enrolled in one graduate mathematics course per semester at no cost. Findings include implications surrounding four patterns of participation: (1) transitioning to teacher-leadership, (2) developing competency in mathematical knowledge, (3) progressing sporadically, and (4) plateauing at a culminating master's project.

Session 26

Olmstead Room

Title: Algebra I teachers' perceptions and knowledge of teaching students with learning disabilities

Presented by: Tony Thompson

Abstract:

This research investigated Algebra I teachers' perceptions and knowledge of teaching students with learning disabilities (SLD). A Likert-scale survey developed by the researcher was completed by 24 of 36 Algebra I teachers in 2 counties in the southeastern US. Algebra I teachers report that they: (a) do not have the time or support needed to be successful teaching SLD; (b) feel SLD are not prepared for Algebra I and negatively impact the achievement of other students; and (c) do not often use "best practices" for teaching SLD (e.g., manipulatives, calculators). Demographic variability in responses will be discussed.



Friday, February 24, 2012

11:00 am - 11:45 am

Sessions 22 - 28

Session 27

Audubon Room

Title: Real-Life Ratio Problems: Challenges for Math Teachers

Presented by: Lynae Sakshaug

Abstract:

This session is about the challenges encountered by math teachers as they attempted to solve real-life math problems. The problems and the teachers' challenges with the concept of ratio will be shared. The math teachers in the study were teaching higher-level mathematics and were successfully solving other challenging, algorithm-based problems with success. A discussion of their understanding, the impact on their teaching, and the resulting impact on student learning of the concept will be part of the session.

Session 28

Burnham Room

Title: The Great Divide: Exploring Differences Between Teacher Perceptions of Instruction and Classroom Observations

Presented by: Kansas Pope

Abstract:

This study was part of a larger study that focused on ways a college-level mathematics instructor promoted metacognitive development in her geometry course designed for pre-service elementary teachers. The qualitative analysis of interview transcripts and classroom observations suggested differences between the instructor's descriptions of her classroom and what occurred during classroom observations. The findings from this study suggest a continued need for greater understanding and clarity of common buzzwords used in the mathematics education community.

12:00 pm - 1:45 pm

Lunch and Business Meeting
(Lakeview Room)

Session 29

Harris Room

Title: Joy- Making sense of one student's experiences in a non-routine mathematics problem solving course

Presented by: Sandra Davis Trowell

Abstract:

In order to understand factors and experiences that influence mathematics learning, we can learn through the examination of a student's experiences in a mathematics course. More specifically, in this session one student's experiences are elaborated upon as she took part in a non-traditional mathematics course that focused upon problem solving. Through interviews and classroom observations, we can more closely examine what the student Joy made of these experiences and how her beliefs and ideas about mathematics classrooms were challenged.

Session 30

Welwyn Room

Title: Technology and Elementary Preservice Teachers

Presented by: Keith Adolphson

Abstract:

Pre-service elementary education students often have a very narrow view of mathematics and what it means to teach mathematics. Technology can provide a vehicle to cause them to reconsider those ideas. This presentation discusses an on-going, longitudinal study exploring pre-service teachers' experiences with technology, both as learners and as future teachers of mathematics, and the effect on their subsequent conceptions of what it means to teach mathematics.

Session 31

Walden Room

Title: ABC's and 123's: Using Literature to Teach Mathematics

Presented by: Megan Stotz

Abstract:

Have you ever wanted to use literature in your math lesson but not sure where to start? Curious about how to link the two in a stronger way? Then ABC's to 123's is the presentation for you! ABC's and 123's: Using Literature to Teach Mathematics will show you the connection between mathematics instruction and literature in a meaningful way. Come explore new titles, researched based instructional strategies, and more!

Session 32

Keynes Room

Title: Mathematics Instructional Quality and Students' Opportunities to Learn Mathematics

Presented by: Temple A. Walkowiak and Robert Q. Berry

Abstract:

This study used observational methodology to examine and describe how differences in teacher characteristics played out in the context of mathematics lessons in elementary school classrooms. Through the presentation of two cases of teachers based on their mathematical knowledge for teaching and mathematics teaching efficacy, the findings demonstrate the differences in students' opportunities to learn mathematics in the two sets of classrooms.



Friday, February 24, 2012

2:00 pm - 2:45 pm

Sessions 29 - 35

Session 33

Olmstead Room

Title: Do You See What I See? An exploration of self-perception in the classroom.

Presented by: Eileen Durand Faulkenberry

Abstract:

Teacher self-reports on their instructional practices in the classroom can provide valuable data for assessing changes in classroom practices. However, there is a long-standing concern about the validity of self-report data. This paper will examine this validity by comparing teachers' perceptions of their classroom practices with third-party observations.

Session 34

Audubon Room

Title: Secondary Students' Multistep Problem Solving in STEM Contexts

Presented by: Sarah Johnson and Dr. David Pugalee

Abstract:

MINDSET is a NSF sponsored program designed to improve students' multi-step problem solving abilities and knowledge of STEM connections to mathematics. The resulting curriculum is appropriate as a fourth year secondary mathematics course. A test of multi-step problem solving measured student performance pre- and post- participation in the MINDSET project. In general, student's demonstrated difficulty with problems that were multi-step though some improvements in performance were identified. Results will illustrate strengths and weaknesses in students' problem solving processes. These initial results provide implications related to the curriculum and how to address problem solving in upper level secondary mathematics courses.

Session 35

Burnham Room

Title: An Investigation of Algebraic Reasoning Using Function Machines

Presented by: Nancy Payne and Jessie Store

Abstract:

The National Council of Teachers of Mathematics (2000) content standards advocates that algebra should be taught at all grade levels with the goal to develop students who are capable of reasoning, problem solving, communicating their ideas and using proof. Teachers can help students improve their algebraic skills by using relevant tasks and instructional practices that elicit students reasoning. One type of task that promotes algebraic reasoning is a function machine. This study will report on the types of function machine tasks that promoted algebraic reasoning in students in grades three through five during an afterschool enrichment program.

Session 36

Harris Room

Title: Math is unisex: Are students still anxious?

Presented by: Martha Tapia

Abstract:

This study examined attitudes toward mathematics of 129 students enrolled in mathematics courses at a private liberal arts college by use of the Attitudes Toward Mathematics Inventory (ATMI). Data were analyzed using a multivariate factorial model with four factors of mathematics attitudes as dependent variables (self-confidence, value, enjoyment of mathematics and motivation) and sex and mathematics anxiety as independent variables. Math anxiety was found to be statistically significant on self-confidence, enjoyment of mathematics and motivation.

Session 37

Welwyn Room

Title: Developing the practice of teacher questioning through a K-2 elementary mathematics field experience

Presented by: Catherine Schwartz

Abstract:

This session includes a brief reporting of findings from research on a field experience designed to help elementary preservice teachers learn how to use questioning during formal and informal interviews to analyze student mathematical thinking in K-2 classrooms. Preservice teachers were specific and accurate in identifying a mathematical goal and analyzing student thinking, but were less successful in their explicit discussion about the practice of teacher questioning. Participants will focus on generating ideas about tasks and measures that could be used in field experiences to foster beginning teachers' development of questioning and other practices.

Session 38

Walden Room

Title: Combinatorics and Sample Space Construction: A learning Process

Presented by: William McGalliard and Sarah Berenson

Abstract:

Using a mixed methods design, we investigate the relationship between prospective teachers' uses of combinatorial reasoning to construct and make generalizations for the enumeration tasks necessary in constructing sample space. Our findings suggest that there is an association between students' strategies for enumerating sample space and the ways they then generalize that enumeration. Both quantitative and qualitative evidence for our conclusions will be presented, and implications for teacher education will be discussed.

Session 39

Keynes Room

Title: Reform in a College Mathematics Class: Beliefs about Mathematics and Mathematics Pedagogy

Presented by: Mary Harper

Abstract:

This study investigated the beliefs about mathematics and mathematics pedagogy of pre-service teachers and how they are potentially affected by a college mathematics class that is taught in a non-traditional manner. In particular, from the preservice teachers' perspective: what impact, if any, does participation in this course have on mathematical beliefs?; what interaction, if any, is there between mathematics beliefs and pedagogical beliefs in this mathematics content course?; what experiences, if any, in this mathematics content course do the preservice teachers feel caused perturbation?; and what influence, if any, do preservice teachers believe the curriculum and structure of this class had on their mathematical empowerment?

Session 40

Olmstead Room

Title: What's the MERiT in Research Collaboration?

Presented by: Winifred A. Mallam and Mary B. Swarthout

Abstract:

Are you alone or lacking a critical mass of colleagues as a mathematics education researcher? Would you like to know about ways to encourage collaboration with other mathematics education faculty at similar higher education sites? MERiT may be the answer. What is it? How does it work? Where can it lead? What research is coming from MERiT? What does it take to adapt this idea to your situation? Come hear from two veterans of MERiT [one a conference organizer and one a participant] as they share what this experience has done for their research lives.

Session 41

Audubon Room

Title: Looking at Learning: Levels of Understanding in High Cognitive Demand Word Problems, Grades 6-8

Presented by: Ann R. Crawford and Cynthia Copolo

Abstract:

This research analyzes student understanding in number sense, fractions, and geometry into six levels applying holistic rubrics. Two open ended word problems were given in grades 6-8 at two middle schools as a post assessment in a ten week problem solving study. Results indicate that students often lack reversibility within concepts and have a static rather than fluid concept understanding. Students need to be able translate their visual image of a problem situation into a proper pictorial or numerical representation. We will discuss the importance for teachers to write and use rubrics to analyze levels of their own student understanding.



Friday, February 24, 2012

3:00 pm - 3:45 pm

Sessions 36 - 42

Session 42

Burnham Room

Title: The "Write Stuff" for Learning Mathematics

Presented by: Bob M. Drake

Abstract:

Understanding concepts has long been the goal of mathematics instruction, yet classroom teachers frequently find themselves struggling to help students comprehend difficult concepts. Writing is the key to fostering deeper understanding, retaining learning, and applying information to novel situations. This study describes techniques for using writing to help students, K-12 and beyond, develop a deeper understanding of mathematics concepts.

4:00 pm - 4:45 pm

Sessions 43 - 49

Session 43

Harris Room

Title: Applying Conceptual Metaphor Theory to Understand Mathematical Problem Solving

Presented by: Sean Yee

Abstract:

Last year, my pilot study demonstrated significant results in how students perceive mathematical problem solving using conceptual metaphor theory (CMT). Currently, a larger study is underway to confirm these results and compare them to their teacher's perceptions of mathematical problem solving. Problem solving has been perceived for the last 30 years as a process. However, my pilot study showed that many students did not perceive problem solving as a process, rather metaphors such as journeys, buildings, or discovery. My current study expands on the pilot study's results to help teachers and students understand each other's perception of problem solving.

Session 44

Welwyn Room

Title: Prospective Teachers' Ability to Solve Algebra Equations

Presented by: Valerie Sharon, Dustin Jones, and Linda Reichwein Zientek

Abstract:

Algebra has been identified as an indicator of future earning and college success. The foundations of algebra begin in elementary school, and elementary teachers need to be competent in their ability to solve algebra equations. The present study examined 475 prospective teachers' ability to solve three algebra equations. Calculators were not allowed, and two equations contained fractions. We will provide the prospective teachers' skill levels and demonstrated errors solving the algebra equations.



Friday, February 24, 2012

4:00 pm - 4:45 pm

Sessions 43 - 49

Session 45

Walden Room

Title: The Effects of a Transactional Approach to Teaching Introductory Statistics

Presented by: Melanie Autin, Hope Marchionda, and Summer Bateiha

Abstract:

Traditional classroom instruction consists of teacher-centered learning in which the instructor presents course material through lectures. A recent trend in higher education is the implementation of student-centered learning in which students take a more active role in the learning process. The purpose of this study was to determine if a transactional approach to an introductory statistics course affects students' attitudes towards statistics, perceptions of statistics, and perceptions of their knowledge of statistics. Preliminary findings from data collected from a traditional teacher-centered course and from a transactional course will be presented.

Session 46

Keynes Room

Title: An Analysis of STEM Education Projects in the US: Characteristics and Concerns

Presented by: Alan Zollman

Abstract:

This presentation centers on an analysis of STEM Education projects in the US. What do successful STEM Education projects look like? What are the characteristics of successful projects that help teachers experience, plan, teach, reflect and transform the new content knowledge and pedagogical skills from the projects into their own teaching? From these projects, can we also identify the areas of future needs for STEM Education professional development?

Session 47

Olmstead Room

Title: Professional Development: NASA and Inquiry in mathematics

Presented by: Tyrette Carter

Abstract:

The purpose of this session is to describe the NASA Earth Systems Science Summer Research Institute and how the professional development caused the mathematics teachers to shift their teaching practices from procedural methods to a more conceptual approach. The Institute provided support for 40 secondary teachers (middle and high school) in mathematics and science disciplines. Hence, the teachers developed 5E (engage, explore, explain, elaborate and evaluate) inquiry-based modules connected to the Common Core Standards. The goal of the project was for the teachers to integrate NASA material based on the Earth Systems Science Graduate students' research into their curriculum.



Friday, February 24, 2012

4:00 pm - 4:45 pm

Sessions 43 - 49

Session 48

Audubon Room

Title: Developing the Mathematics Teaching Efficacy Beliefs Instrument for Middle Grades Teachers

Presented by: Dohyoung Ryang

Abstract:

Self-efficacy has a power to predict a person's future behavioral actions. A preservice teacher's future teaching performance can be better predicted by the individual's efficacy beliefs than by one's actual ability. Research showed that teachers with lower efficacy beliefs are less likely to teach mathematics. Therefore, it is important to develop valid and reliable instruments to measure changes in an individual's sense of teaching efficacy. The Mathematics Teaching Efficacy Beliefs Instrument (MTEBI) provides valid information on US preservice teachers' efficacy beliefs in mathematics teaching. However, the MTEBI was developed for elementary preservice teachers. Teacher efficacy is context specific as well as subject matter specific. In the teacher education program, middle grades teacher preparation is a separated from elementary teacher preparation and also from secondary preparation. Because of this contextual disparity, it is uncertain that the MTEBI is appropriate for the middle grade preservice teachers. This presentation proposes the development of the MTEBI for middle grades preservice teachers.

Session 49

Burnham Room

Title: Pedagogy of Teaching Linear Equations

Presented by: George Tintera and Ping-Jung Tintera

Abstract:

"Unintended consequences of good teaching" was identified by Wagner and Parker in as one of three possible impediments to the learning of algebra. Many problems related to linear equations can be recast to avoid reflexive and unnecessarily complicated calculations so as to lessen an impediment to the learning of linear equations. An "information processing approach" was used to demonstrate that this recasting could increase the accuracy of getting the correct answer and decrease the time needed to learn and solve problems in this style of learning.

5:00 pm - 5:45 pm

Founder's Lecture
(Lakeview Room)



Saturday, February 25, 2012

Registration (Midway Room)

7:00 am - 9:00 am

8:00 am - 8:45 am

Sessions 50 - 56

Session 50

Harris Room

Title: A Study of Teachers Making the Transition to Implement Common Core Standards in Algebra I

Presented by: Jean McGehee

Abstract:

This study reports the insights and “aha” moments developed at a summer professional development workshop designed to help Algebra I teachers transition to the Common Core State Standards (CCSS). More importantly, it compares the teacher insights to observations of their instructional practice. In particular, the teachers were excited about a unit that used knowledge of linear functions to develop exponential functions. Through use of the Reformed Teaching Observation Protocol, site visits will reveal the level of implementation of the activities presented to them. I will also report pre-test/post-test data for the project's impact on teacher knowledge.

Session 51

Welwyn Room

Title: Tower of Hanoi: Reflections from Prospective Elementary Teachers Engaged in “Hard Fun”

Presented by: Sarah Ives and Elaine Young

Abstract:

Prospective elementary teachers generally have negative views towards mathematics, especially towards their own abilities within mathematics (Ball, 1990). Engaging them in challenging yet accessible problem-solving activities can potentially impact these strongly held negative beliefs. Prospective elementary teachers in a mathematics content course engaged in the cognitively demanding task of exploring the Tower of Hanoi problem. Ongoing qualitative analyses of over 400 reflective journals collected over 9 semesters revealed positive impacts on students' attitudes and beliefs towards mathematics.

Session 52

Walden Room

Title: Algebra Content and Pedagogy for Alternatively Certified Teachers

Presented by: Darlinda Cassel, Carol Lucas, and Adele Hanlon

Abstract:

Middle school teachers who are alternatively certified to teach mathematics face many challenges. To assist twelve such teachers to increase both their content and pedagogical knowledge for teaching algebra a one week workshop was conducted by the presenters. Pre- and post- tests were administered to assess pedagogical knowledge and mathematics self-efficacy. This presentation will give a summary of the activities and discussions that took place in the workshop as well as the results of the assessments. Two of the teachers will share the workshop experience from their viewpoint as participants.

8:00 am - 8:45 am

Sessions 50 - 56

Session 53

Keynes Room

Title: Pre-Service Teachers and the NCTM Process Standards

Presented by: Kathy Horak Smith and Kansas Pope

Abstract:

The NCTM Process Standards provides direction for developing rich mathematical learning opportunities. Many teacher preparation programs seek to provide standards-based instruction for pre-service teachers with the intent they will in turn employ similar instructional approaches in their future classrooms. The purpose of this study was to better understand the impact of standards-based instruction on pre-service teacher's understandings of and potential use of the NCTM Process Standards through the use of reflective journal responses. Journal prompts asked students to both reflect on and critique the use of the Process Standards during a lesson that was just completed.

Session 54

Olmstead Room

Title: Perceptions of Studying

Presented by: Edward Wall

Abstract:

All too often I find mathematics students and teachers viewing success in mathematics as mystically accruing to those that are in some way mathematically gifted. Success in mathematics is not like being seven feet tall; it takes a certain amount of focused effort from student and teacher alike. Within my presentation I explore some of the entailments of such effort. While my focus is somewhat general, I draw many of my examples from the elementary school mathematics classroom; a context I know well, a context where I have worked and now, myself as a student of teaching, study.

Session 55

Audubon Room

Title: Overcoming a Common Storm: Designing the PD Teachers Need for Successful Common Core Implementation

Presented by: Gabriel Matney, Jonathan Bostic, and Dan Brahier

Abstract:

Classroom implementation of the Common Core State Standards (CCSS) requires significant professional development that is sustained over time, develops teachers understanding of the Standards for Mathematical Practice, and begins with the content and professional needs of the teachers it serves. This study examines elementary and middle school teachers' perceived content needs related to the CCSS mathematics content domains, their perceived professional needs, and the connection between these perceptions and statewide assessment data. K-5 teachers indicated a great need in Operations and Algebraic Thinking and Numbers and Operations on Fractions. Middle school teachers expressed a major need in better understanding modeling, statistics and probability, geometry and measurement, and proportional reasoning. K-9 teachers perceived professional needs and implications for designing professional development for inservice teachers are discussed.



Saturday, February 25, 2012

8:00 am - 8:45 am

Sessions 50 - 56

Session 56

Burnham Room

Title: Preservice Teachers' Analysis of a Textbook Lesson on Volume

Presented by: Suzanne L. Reynolds

Abstract:

This session discusses a study which examined how preservice teachers used a textbook lesson on volume to create a lesson plan for a fifth grade class. A case study of fictitious preservice teachers' analysis of the lesson was used to prompt actual preservice teachers to reflect on the lesson. The study showed that preservice teachers often pick-and-choose what parts of the lesson they will include which results on an emphasis on procedural knowledge without significant attention to student learning, possible student misconceptions, notation, and mathematical terminology.

9:00 am - 9:45 am

Sessions 57 - 63

Session 57

Harris Room

Title: Elementary Teachers' Mathematical Content Knowledge, Efficacy, and Problem Solving Abilities in Alternative Certification

Presented by: Brian R. Evans

Abstract:

The purpose of this study was to understand teachers' mathematical content knowledge, efficacy, problem solving abilities, and teacher beliefs in an elementary education mathematics methods course for special education teachers in alternative certification programs. Findings revealed a significant increase in mathematical content knowledge and teacher efficacy. Additionally, teachers were found to have high efficacy at the end of the semester and strong problem solving abilities.

Session 58

Welwyn Room

Title: Creating a Meaningful Connection Between Mathematics and Social Issues

Presented by: Summer Bateiha

Abstract:

Despite more than two decades of research efforts advocating teaching mathematics for social change, many educators still question whether or not integrating ideas of social well-being into a mathematics content course is worthwhile and/or can be done without compromising the mathematical focus. This study examines how one educator transformed a content course for preservice teachers without "lessening" the mathematics.

9:00 am - 9:45 am

Sessions 57 - 63

Session 59

Walden Room

Title: Reasoning and Sense Making in Practice

Presented by: Daniel Brahier

Abstract:

A full-year professional development project was conducted with 32 mathematics teachers of grades 6-12 in which teachers explored ways to promote reasoning and sense making in the classroom, following the recommendations of NCTM in the document High School Mathematics: Focus on Reasoning and Sense Making. This session will describe the design of the program and highlight several preliminary results on the effects of this program on classroom teaching strategies and student achievement in the classes of project teachers.

Session 60

Keynes Room

Title: Core-Math: Supporting the Implementation of the Common Core State Standards for Mathematics Using Learning Trajectories

Presented by: P.H. Wilson, K. Richardson, C. Seaman, A. Floyd, and W. Rich

Abstract:

Bringing together the expertise of mathematicians and mathematics educators from UNCG and curriculum specialists from Asheboro City Schools and Randolph County Schools, the Core-Math project delivers professional development that supports K-5 teachers in using learning trajectories as a lens for learning the mathematics content of the standards, the ways in which students come to understand mathematics, and student-centered instructional practices to promote mathematics learning. The product of the project will be a set of scalable professional development modules to support teachers across North Carolina in effectively implementing the Common Core State Standards for Mathematics through the use of research-supported practices.

Session 61

Olmstead Room

Title: The Impact of Professional Development on Teachers' Perceptions of Their Classroom Learning Environment

Presented by: Jeremy F. Strayer

Abstract:

The QUANT Institute has focused on providing professional development opportunities aimed at helping Ohio's teachers enact high cognitive demand probability and statistics tasks in their classrooms over the last four years. Recent research has shown that maintaining a standards-based learning environment (SBLE) in the classroom is a critical piece of improving student achievement in standards-based mathematics classrooms. This presentation will highlight key components of the QUANT Institute, its impact on participating teachers' classrooms, and its impact on participating teachers' perceptions of their classroom learning environment. Time will be provided to discuss and identify important research questions related to SBLEs.



Saturday, February 25, 2012

9:00 am - 9:45 am

Sessions 57 - 63

Session 62

Audubon Room

Title: Examining the role of testing in learning mathematics: Directions for future research

Presented by: Thomas J. Faulkenberry

Abstract:

Cognitive psychologists consistently find that taking a memory test not only assesses what people know, but also that the simple act of taking the test aids in long-term retention. Furthermore, when comparing taking a memory test with doing additional study sessions, testing results in an enhanced ability to retrieve items after long time periods. So far, most educationally relevant research on the testing effect has focused on prose materials, not mathematics. In this paper, I survey the literature behind the testing effect and outline a basic plan for research on the role of testing as a pedagogical tool in mathematics.

Session 63

Burnham Room

Title: Overcoming Blocks to Learning Mathematics: A Clinical Process Paradigm for Teaching and Learning Mathematics

Presented by: George A. Pattison III (pka George A. Wyer)

Abstract:

Having privately “cliniced” students experiencing blocks to learning Mathematics, it is surprising most blocks have little to do with Mathematics! My clinical process approach involves at most two students per session, while focusing on revealing underlying causes. My purpose here is twofold. First, I will describe a paradigm (theoretical framework) for supporting the identification and remediation of blocks to learning Mathematics. Second, I will consider implications of this Mathematics Clinical Process Paradigm for (1) classroom instruction, (2) creating textbooks and other instructional materials, (3) teacher and clinician training, and (4) Clinical Process research into the teaching and learning of Mathematics.



Saturday, February 25, 2012

10:00 am - 10:45 am

Sessions 64 - 70

Session 64

Harris Room

Title: Pre-service Secondary Students' Connections of Whole Number Operational Meanings and Algebraic Reasoning

Presented by: Pat Lamphere Jordan

Abstract:

This qualitative study addressed the ways secondary pre-service candidates were able to connect ideas from the meanings of whole number and fraction operations to algebraic reasoning. Subjects were asked to respond to a survey by writing number sentences based on a variety of whole number operational meanings and then translate those ideas into algebraic equations. Examples of the pre-service candidates' problems and an identification of each based on operational meaning will be presented and discussed.

Session 65

Welwyn Room

Title: Examining the Experiences of Novice Mathematics and Science Teachers

Presented by: Juliana Utley, Adrienne Redmond, and Kansas Pope

Abstract:

This qualitative study focused on descriptive teacher behavior over time graphs to examine the experiences of 11 novice teachers that participated in an exploratory project to learn how teacher educators might provide guidance and support. Findings suggest novice teachers' encouraging and discouraging experiences directly impact their thinking about remaining in teaching. If teacher educators are aware of specific types of encouragers or discouragers, they can develop more effective programs to help novice teachers continue to choose teaching through and beyond the induction years.

Session 66

Walden Room

Title: Using Design Experiment to Explore Multiplication in a Middle Grades Mathematics Methods Course

Presented by: Sarah Smitherman Pratt

Abstract:

A design experiment was conducted in a middle grades mathematics methods course to examine pre-service and lateral entry teachers' understandings of multiplication. Algeblocks were used during data collection, and word problems were written each session as a way to analyze and self-analyze conceptual understandings of multiplication of integers and of binomials, with the result of improving the participants' mathematical knowledge for teaching (MKT). The data collected demonstrated that the design experiment was a successful tool in examining their process for learning and that the participants shifted in their engagement in mathematical tasks that improved their ability to think more flexibly.



Saturday, February 25, 2012

10:00 am - 10:45 am

Sessions 64 - 70

Session 67

Keynes Room

Title: Enactment of Justification Tasks in Elementary Schools: A Multi-case Study

Presented by: Jessie Chitsanzo Store, Sarah B. Berenson, and Nancy Tilley Payne

Abstract:

The Common Core Curriculum Standards for mathematics requires teachers to employ teaching practices that promote justification of mathematical ideas. This expected teaching practice is situated in substantial research on students' difficulties to justify mathematical ideas. In exploring these difficulties, research has tended to focus on conceptions of justifications or proofs. However, Bieda (2010) recommends that, to better understand students' practices in justifications, there is a need to understand how teachers who have undergone professional development enact justification tasks. As part of the ON TRACK project, this multi-case study reports practices of 3 elementary school teachers in enacting justification tasks.

Session 68

Olmstead Room

Title: Middle Grades Single-Sex Mathematics Classrooms: Preliminary Findings from a Critical Discourse Analysis

Presented by: Megan Che

Abstract:

This session opens a discussion on the affordances and limitations of Critical Discourse Analysis as a methodology for contributing to our understandings of single-sex mathematics learning environments. In particular, this session focuses on a critical examination of utterance-level actions that influence constructions of normality in these single-sex mathematics learning environments for middle grades students. I will share transcript excerpts and details of the Critical Discourse Analysis process so that attendees can interrogate the meaningfulness of the preliminary findings.

Session 69

Audubon Room

Title: The Impact of Technology Integration on the Mathematical Reasoning of Preservice Secondary Mathematics Teachers

Presented by: Traci L. Carter, Jennifer D. Cribbs, and Vecihi Serbay Zambak

Abstract:

Does technology hinder the development of mathematical reasoning skills or not? It is important to explore preservice secondary mathematics teachers' (PSMT) ability to think and reason about mathematics as it can influence their beliefs and future instructional practices. By using the Mathematical Task Framework developed by Stein and Smith (1998), a cross-case analysis was conducted with PSMT's to better understand their ability to reason about mathematics and integrate relevant technology. The data collected also indicate how using technology can impact the level of reasoning used when completing mathematical tasks.



Saturday, February 25, 2012

10:00 am - 10:45 am

Sessions 64 - 70

Session 70

Burnham Room

Title: Student strategies suggesting emergence of mental structures supporting logical and abstract thinking: Multiplicative reasoning

Presented by: James Carrier

Abstract:

Here we build upon the research of Clark and Kamii, (1996); Confrey, (1994); Harel and Sowder, (2005) and many others who investigate the development of multiplicative reasoning. This study examines the thinking of 14 fourth graders and concludes that the levels of multiplicative reasoning can be further defined in terms of indicators and refined in terms of student strategies.

11:00 am - 11:45 am

Sessions 71 - 77

Session 71

Harris Room

Title: Examining the role of instruction in mathematics to prepare preservice teachers for mathematics instruction in middle grades.

Presented by: Travis A. Olson and Melfried Olson

Abstract:

It has been suggested instruction in mathematics courses for secondary teachers (PSSTs) should emphasize the connection between the mathematics being learned by PSSTs and content they will teach. In prior work we identified PSSTs struggle to explain, via modeling and representations, solutions for equations involving contextualized fraction problems. In this session, we discuss instruction PSSTs receive in mathematics courses and how it specifically addresses content found in the Common Core State Standards. We report on an effort to determine whether, and in what way in their mathematics content courses, PSSTs encounter various mathematical concepts for teaching secondary mathematics.

Session 72

Welwyn Room

Title: Negotiating Knowing and Teaching: Pre-service Teachers' Beliefs and Conceptions about Mathematics and Teaching Mathematics

Presented by: V.R. Moody, H. Marchionda, S. Bateiha, K. DuCloux, and K. Everett

Abstract:

This presentation provides the results of a longitudinal study that examined the mathematics teaching efficacy of elementary and middle school pre-service teachers enrolled in the three-course sequence, Mathematics for Elementary Teachers. Over the course of three semesters, this study documented pre-service teachers' beliefs about mathematics and their capabilities for teaching mathematics. Particularly, the researchers sought to understand how pre-service teachers view themselves as mathematics students and how this viewpoint influences their conceptions about teaching mathematics. Particularly, pre-service teachers were asked about their perceptions of their own understanding of mathematics and whether their own understanding was sufficient for effectively teaching mathematics.



Saturday, February 25, 2012

11:00 am - 11:45 am

Sessions 71 - 77

Session 73

Walden Room

Title: A Comparison of Two Alternative Pathway Programs in Secondary Mathematics Teacher Certification

Presented by: Brian R. Evans

Abstract:

The purpose of this study was to compare the mathematics content knowledge, attitudes toward mathematics, and concepts of self-efficacy held by teachers in two alternative pathways to mathematics teacher certification: New York City Teaching Fellows and Teach for America. Both groups constituted a large part of the adolescent mathematics graduate degree students at the partnering university in which this study took place. Findings revealed that there were no differences between Teaching Fellows and TFA teachers in mathematics content knowledge, attitudes toward mathematics, and concepts of self-efficacy.

Session 74

Keynes Room

Title: Research to Practice: Using the M-Scan Observational Measure to inform Professional Development

Presented by: Holly Henderson Pinter and Temple A. Walkowiak

Abstract:

An understanding of mathematics instructional quality requires an understanding of the quality of teacher-student interactions. Developmental theory and research suggests the interactions between the teacher and students in a classroom are critical to student development and learning, and hence, are central to the classroom quality (Morrison & Connor, 2002; Pianta et al., 2008; Rutter & Maughan, 2002). Examining the nature of teacher-student interactions explains the primary mechanism of their influence on children's learning. This work elaborates on common elements that exist in high quality mathematics instruction and their potential implications for betterment of classroom instruction through the use of the Mathematics Scan (M-Scan) as a tool for linking research to practice.

Session 75

Olmstead Room

Title: ARTIST talk: An approach to assessment in a first year statistics course

Presented by: Mikhail Türegün

Abstract:

Assessing students' conceptual understanding during and/or after an introductory course in statistics will be outlined. Implications and benefits of integrating a high quality and timely conceptual assessment of students' progress into a first course in statistics are discussed.



Saturday, February 25, 2012

11:00 am - 11:45 am

Sessions 71 - 77

Session 76

Audubon Room

Title:

Researching Connections between Real-World Assessments and Student Experiences

Presented by: Gabriel Matney and Jack Jackson

Abstract:

Case Study research was conducted on one 7th grade teacher and her classes while learning about proportional reasoning. The school serves inner-city students of high poverty in a large Midwest city. Students were engaged in a curriculum rich in real world explorations of scale drawing and proportional reasoning. Two assessments were taken that involved different real world contexts scenarios than what the students explored in class to determine issues of transfer and enacted experience.

Session 77

Burnham Room

Title: Fifth Grade Wordle Comparisons

Presented by: Darlinda Cassel and Kerri Richardson

Abstract:

Researchers analyzed actions of two fifth grade classrooms completing the same mathematical task. The students' responses to the tasks and interactions during the tasks were recorded and submitted to Wordle (program for showing the words most spoken in a text). The researchers will discuss what Wordle revealed about the differences and similarities of the two classrooms.



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