

**Research Council on
Mathematics Learning
(RCML)**

Thirty-Seventh Annual Meeting

***Real Challenges in
Mathematics Learning***

**March 11-13, 2010
Conway, Arkansas**

Sponsored by

The Arkansas Center for Mathematics & Science Education

&

The Department of Mathematics
University of Central Arkansas

37th Annual Research Council on Mathematics Learning (RCML) Real Challenges in Mathematics Learning March 11-13, 2010

University of Central Arkansas, Conway, Arkansas

The Arkansas Center for Mathematics and Science Education (ACMSE) and the Department of Mathematics welcome you to the University of Central Arkansas. We extend a "big thank you" to the session presenters, RCML Board, 2010 Conference Committee, and all of those who helped organize this year's conference.

We hope your stay in Conway is pleasant and the conference provides you with information and knowledge that will enhance your teaching. If we can be of further assistance, please contact Anita Luyet at 501- 450-3426 (office), Brenda Graham/Jennie Welter at 501-450-3147 or Belinda Robertson at 501-450-0598 (cell).

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37th Annual Conference of the Research Council on Mathematics Learning Schedule of Events

All sessions will be held on 1st and 2nd floors of
Mathematics and Computer Science (MCS) Building

Thursday, March 11, 2010

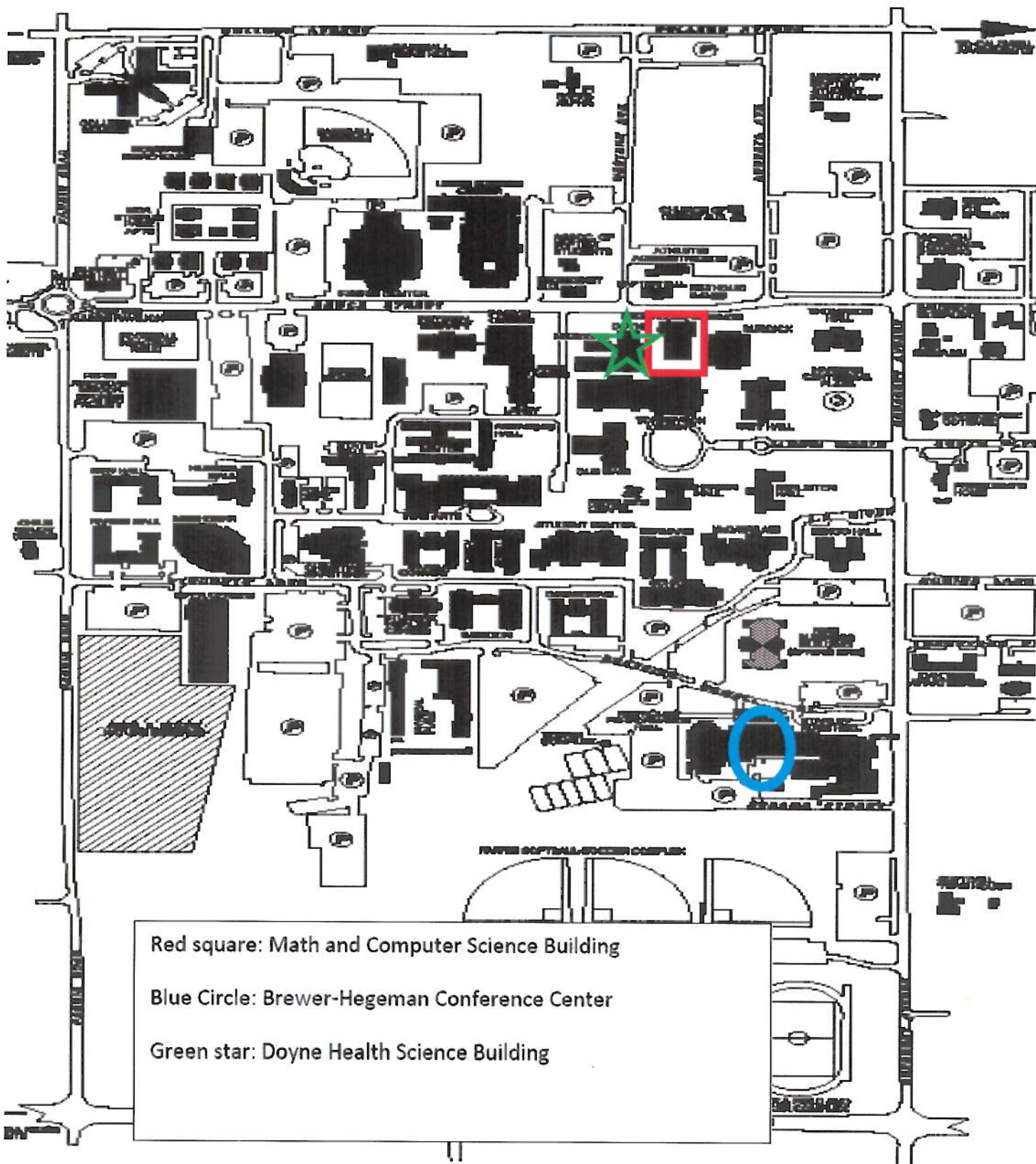
Registration at the Hilton Hotel	2:00 pm – 6:00 pm
Reception at the Hilton Hotel	6:00 pm – 7:30 pm

Friday, March 12, 2010

Registration (MCS)	8:00 am – 5:30 pm
Sessions 1 – 8 (MSC)	9:00 am – 9:45 am
Sessions 9 – 16 (MSC)	10:00 am – 10:45 am
Sessions 17 – 24 (MSC)	11:00 am – 11:45 am
Lunch & Business meeting (Brewer-Hegeman Room 5A-B)	12:00 pm – 1:45 pm
Sessions 25 – 32 (MSC)	2:00 pm – 2:45 pm
Sessions 33 – 40 (MSC)	3:00 pm – 3:45 pm
Wilson Speaker (Doyne Health Science Lecture Hall)	4:00 pm – 4:45 pm
Dinner (On your own)	

Saturday, March 13, 2010

Registration (MCS)	8:00 am – 10:00 am
Founder Speaker (Doyne Health Science Lecture Hall)	8:30 am – 9:15 am
Sessions 41 – 48 (MSC)	9:30 am – 10:15 am
Sessions 49 – 55 (MSC)	10:30 am – 11:15 am
Sessions 56 – 63 (MSC)	11:30 am – 12:15 pm
Box Lunches provided (MSC)	
Executive Board Meeting	2:00 pm – 4:30 pm



Red square: Math and Computer Science Building

Blue Circle: Brewer-Hegeman Conference Center

Green star: Doyne Health Science Building

Thursday, March 11, 2010

Registration at the Hilton Garden Hotel

2:00 pm – 6:00 pm

Reception at the Hilton Garden Hotel

6:00 pm – 7:30 pm

Dinner on your own

9:00 am – 9:45 am

Friday, March 12, 2010

Sessions 1 - 2

Session 1

Room MCS 103

How Age Contributes to Preservice Elementary Teachers' Perceptions about Math Teaching

Ann Wheeler, Texas Woman's University

In this case study research, I examined 12 preservice elementary teachers (six nontraditional and six traditional) and how age plays a role in their beliefs about mathematics teaching. Data collection included preservice and teacher interviews, as well as bimonthly classroom observations. Through analysis of the data, I found that most participants held belief systems about teaching mathematics similar to their instructors. In addition, nontraditional preservice teachers, collectively, held higher self confidence levels in teaching K-6 mathematics than traditional participants. Implications for teaching consist of providing preservice teachers with homework assignments that include family involvement and offering traditional preservice teachers additional support to reduce potential self confidence issues about teaching K-6 mathematics.

Session 2

Room MCS 104

Virtual Manipulatives and Pre-Service Teachers: Content Knowledge, Attitudes and Usage

Yan Zhang, Texas Tech University

Dr. Rebecca Ortiz, Texas Tech University

This study investigates the impact of virtual manipulatives on pre-service teachers' fundamental mathematical understanding as well as their attitudes towards using virtual manipulatives. The participants, in their last semester prior to student teaching, were pre-service teachers enrolled in a mathematics pedagogy class. A pretest measuring content knowledge was used to collect data. After using virtual manipulatives in the class, participants completed the posttest. An attitude survey investigated the pre-service teachers' beliefs regarding advantages and disadvantages of using virtual manipulatives and their confidence of using the manipulatives in teaching. Through analysis of data, growth in the mathematical knowledge of pre-service teachers as well as their belief in the value and expected future use of virtual manipulatives was examined.

Session 3

Room MCS 105

Cancelled

Session 4

Room MCS 110

Effects of Research Projects on Undergraduate Pre-Service Teachers Sense of Teacher Efficacy

Gabriel Matney, University of Arkansas - Fort Smith

Jack Jackson, UA- Fort Smith

Teacher efficacy has been linked with a host of educational outcomes including professional commitment, willingness to adapt instructional strategies, a desire to find better ways of teaching, teaching enthusiasm, etc. (Tschannen-Moran et. al., 1998). This paper describes a research study on pre-service secondary mathematics candidates in which candidates were given one of two types of mathematics education research projects: philosophical or in the field. The research project came as an assignment in a mathematics methods class and involved the study of effective teaching in economically poor areas. The results of the efficacy differences will be described and analyzed as well as discussion of future research needed.

Session 5

Room MCS 111

What's Different? Changing the Way We Teach

Bob Drake, University of Cincinnati

Workshops don't work. Until the culture involved in teaching mathematics changes within a school district, there is little hope for altering the emphasis on rote mathematical skills to one emphasizing meaningful mathematics instruction. This study examines the essentials for effectively changing the mathematics "culture" within individual schools, and within a district. This presentation outlines key components necessary for changing the culture, and describes a three year process in which all schools in a small low-income Midwestern district implemented changes.

Session 6**Room MCS 112****Mathematics Learning for English Language Learners Supported by Inquiry and Technology**

Alex Rolon, Lehigh University

Dr. Lynn Columba, Lehigh University, Teaching Learning and Technology

The United States is becoming more diverse with time. This trend is also evident in our classrooms. Teaching is a rewarding, yet challenging career. As educators we strive to provide the best quality education for all students. However, many challenges emerge with diverse classrooms, especially those where English is not the predominant language among students. English language learners (ELLs) are more visible in mainstream American educational system. English language learners benefit from mathematics classes that are highly interactive, emphasize communication, and incorporate problem solving and inquiry-based learning activities. This presentation considers the role of inquiry-based learning and technology-use in diverse mathematics classrooms and how these two teaching methodologies support the needs of ELLs.

Session 7**Room MCS 219****Applications of Diffusion**

David Ekrut, University of Central Arkansas, Mathematics Department

The design of this talk is to discuss the importance of studying diffusion as well the importance of the mathematics behind diffusion. We will briefly look at the mathematics pertaining to my area of research, which is to impose compatibility between the diffusion equation and a general second order partial differential equation. We will do this in the most general of terms. Then I will talk about the different areas that knowledge of the diffusion equation will impact.

Session 8**Room MCS 220****Establishing a Professional Development Community**

Eileen Faulkenberry, Texas A&M University-Commerce

Maribeth Nottingham, Texas A&M University at Commerce

Through a grant, we have established a Learning Academy for Math and Science teachers which provides an opportunity for them to pursue a Masters Degree in Math or Science Education as well as bi-monthly seminar meetings focusing on content-specific pedagogical knowledge. Through the Learning Academy we are exploring diverse models of professional development and instructional strategies including Lesson Study and Problem-Based Learning. We will discuss the creation and maintenance of the Learning Academy.

Session 9

Room MCS 103

The Role Age Plays in Preservice Elementary Teachers' Beliefs about Mathematics

Ann Wheeler, Texas Woman's University

During this session, I will discuss my dissertation findings about six nontraditional (based on age) and six traditional preservice elementary teachers and their beliefs about mathematics. I will share how participants of varying ages described their standards and/or nonstandards aligned views of mathematics and how their views may have evolved over time. Implications for teaching will also be discussed.

Session 10

Room MCS 104

How Does the Understanding of Mathematical Language Affect a Student's Ability to Perform Mathematically

LaTanya Carter, University of Central Arkansas

It is often stated that the language associated with algebra is like a foreign language to most students. "Even if the students succeed in wading through the excessive amount of unfamiliar vocabulary, they may still not have acquired meaning for equations because of the vagueness and generality of this construction (Kieran, 1999)." This project explored the significance of vocabulary on the understanding of algebraic concepts. By providing a take home activity that required the students to have a clear understanding of a set of given vocabulary words directly associated with the upcoming section, this project investigated whether or not having an understanding of the vocabulary prior to class lecture enhanced their understanding of the algebraic concepts. Analysis of the data indicated the class using the vocabulary activity scored higher on the short and long term post test.

Session 11

Room MCS 105

Building an Assessment Model for Undergraduate Mathematics

Bea Babbitt, University of Nevada, Las Vegas (UNLV)

Accreditation bodies have asked universities to define and document student attainment of learning outcomes. Universities across the U.S. have worked to devise assessment plans that address the attainment of learning outcomes for their general education requirements that usually include mathematics. In addition, mathematics departments have struggled to define and assess learning outcomes for multiple student subgroups including developmental students; science, engineering, and business majors; mathematics majors; and future teachers among others. This presentation will describe multiple mathematics assessment models that are being implemented across the country including the one under development at our own institution. Strategies for devising an assessment plan that is meaningful, manageable, and sustainable will be discussed.

Session 12**Room MCS 110****Conceptual Change Theories: An Overview****Beth Cory**, Sam Houston State University

In this session, an overview of various conceptual change theories will be presented. Conceptual change refers to the type of learning necessary when new knowledge conflicts with the learner's prior knowledge. While conceptual change theories have been used mainly by science educators, they can provide a "powerful explanatory framework for explaining students' difficulties with mathematics" as well (Vosniadou & Verschaffel, 2004). Supporting research and educational implications of each perspective will be presented. Advantages and drawbacks of competing perspectives will be discussed.

Session 13**Room MCS 111****Preservice Teachers: Fraction Operations, Error Patterns and Confidence****Elaine Young**, Texas A&M University-Corpus Christi

Preservice teachers often struggle with fraction operations. The error patterns they show are similar to those of young students. Their level of confidence in correctly completing fraction operations often does not match their competence level. Measures were taken before and after preservice teachers experienced a reformed mathematics content course for teachers.

Session 14**Room MCS 112****Visualizing the Change in Teacher Perspective****Eileen Faulkenberry**, Texas A&M University-Commerce

This presentation will focus on teachers' perspectives about their math classrooms and their version of the ideal math classroom and how these perspectives change throughout the course of the professional development. The growth will be analyzed through qualitative methods including word clouds.

10:00 am – 10:45 am

Friday, March 12, 2010

Sessions 15 - 17

Session 15

Room MCS 219

Proportional Reasoning in Single-Sex Middle School Classrooms: A Longitudinal Study

Elaine Wiegert, University of South Carolina Upstate

S. Megan Che, Clemson University

This session addresses the development of proportional reasoning in middle school students who receive instruction in single-sex classes. Before formal instruction with regard to the development of proportional reasoning, sixth grade students were asked to solve a gender-neutral problem that required proportional reasoning to arrive at a correct solution. Student responses were analyzed to determine the sophistication of multiplicative reasoning used to arrive at the solution. In the eighth grade, after formal instruction with regard to developing proportional reasoning, students were again asked to solve the same gender-neutral problem that required proportional reasoning to arrive at a correct solution. The solutions were analyzed to determine the sophistication of multiplicative reasoning. Sixth grade solutions were matched to eighth grade solutions at which point the sophistication of both solutions were compared.

Session 16

Room MCS 220

Making Mathematical Connections in the Grades 6-16 Curriculum

Carol Lucas, University of Central Oklahoma

This presentation will share the results of an assignment given to students in a class for pre-service secondary mathematics teachers. A broad mathematical topic such as fractions or triangles was selected by each group of students. The students then explored how the topic occurred through the broad areas of mathematics including algebra, geometry, number, and data as well as across grade levels (6 through university) with an emphasis on showing connections among mathematical concepts and procedures. Each group then developed a presentation for the class and a written paper. Examples from their work will be shared, but more importantly, their reflections on what they learned from this assignment will be presented.

11:00 am – 11:45 am

Friday, March 12, 2010

Session 17

Session 17

Room MCS 103

College Algebra - Feast or Famine

Charles Watson, University of Central Arkansas

This session will explore the utility of College Algebra as the foundation of General Education courses for college students. On many campuses it is the most populated course: others treat it as remedial. Factors that contribute to the ever changing dynamics of College Algebra include; increased mathematics requirements for high school graduation; concurrent credit; high campus failure rates; National Standards for Secondary Mathematics; ACHIEVE and the National Algebra II exam; and finally research on predicted entry and failure rates based on the ACT College Entrance Exam. Consideration of these issues may provide insight into the future utility of College Algebra at the university level.

Session 18**Room MCS 104****Implementing Inquiry-Based Learning Geometry with Pre-service Teachers****Jennifer Stone**, University of Central Oklahoma**Adele Hanlon**, University of Central Oklahoma**Dr. Carol Lucas**, University of Central Oklahoma

Teachers are always looking for better ways to educate their students. Rather than the traditional lecture method, we have adjusted our pedagogy to a more student-centered focus where students are the teachers and the teacher acts as the facilitator. During each geometry class, the instructor guides the students in asking and answering one another's questions. We adopted D. Aichele and J. Wolfe's text *Geometric Structures: An Inquiry-Based Approach for Prospective Elementary and Middle School Teachers* as a basis for our shift in methodology. We reduced our class sizes with the help of a grant from the Educational Advancement Foundation. Smaller class sizes allow students to gain a more in-depth understanding of geometric concepts and real-world applications as they take an active role in their learning. In this presentation, we will share hands-on examples of how we use IBL within our geometry classroom along with the results of our research.

Session 19**Room MCS 105****Solving an Algebra Problem Using Multiple Representations****Angela Krebs**, University of Michigan - Dearborn

The role of algebra in the mathematics curriculum has changed considerably over the past few decades. Traditionally, children studied arithmetic in grades K-8. Then, if the students were "college intending" they took algebra in high school. In this traditional model, many students never studied algebra at all. Now national standards call for algebra to be a K-12 strand of mathematics, and the new Grade Level Content Expectations have greatly increased the role of algebra in Michigan elementary and middle schools. This view of algebra has increased the need for elementary and secondary teachers to have a deep understanding of algebra. In this session, the presenter will consider how asking preservice and inservice teachers to think about multiple representations can deepen their algebraic understanding.

Session 20**Room MCS 110****How Demographics Affect Mathematics Scores on the ACTAAP: 2007 Snapshot****Oyemolade Osibodu**, University of Georgia

The purpose of this study is to examine how demographic characteristics affect mathematics scores on the Arkansas Comprehensive Testing, Assessment and Accountability Program (ACTAAP). The study examined the relationship between the total percentage of students who scored proficient or advanced and the following demographics: male, female, average daily attendance, millage, number of students receiving free lunch, number of students considered gifted and talented, Asian, Black, Hispanic, Native and White. The study focused on 40 school districts (in different regions of the state of Arkansas) divided into three sub groups: district size less than 750, district size ranging between 750 and 2000 and district size greater than 2000. Using the statistical software, MINITAB, data were analyzed by applying correlations, linear regression and analysis of variance (ANOVA). The results of the study suggest that the prevalent cause of low test scores in the state of Arkansas may be the high number of students qualifying for free lunch and the low millage rates, corresponding to previous research in this field.

Session 21**Room MCS 111****Integrated Performance Tasking: The Use of Gardening Projects to Decrease Elementary Teachers' and Students' Math Anxiety****Brandi King**, University of West Florida**Dr. Sandra Davis**, University of West Florida

This study will summarize integrated performance tasks and their potential use in elementary school settings to reduce mathematics anxiety. Research in elementary mathematics content literacy indicates a problem in which elementary school teachers do not have the content knowledge for teaching conceptual mathematics. This has led to anxiety in elementary teachers. Current theories of teaching and learning suggest that teachers develop communicative competence in mathematics when they have opportunities to interact with one another and students. Performance tasking is a way to promote inquiry and higher-level thinking, which is well documented. The need for communicative interaction in a relaxed environment is an important component for increasing student and teacher communication and lowering anxiety when learning mathematics. Gardening project performance tasks encourage the learning of mathematics in real-world environments where communication is more common than students sitting in desks and listening.

Session 22**Room MCS 112****Closing the Gap Between Reform and Middle Level Mathematics Teaching****Donna Foss**, University of Central Arkansas

The objectives were to identify the middle level mathematics teachers' conceptions of mathematics teaching and learning and ascertain changes in their conceptions and instructional behavior at the end of a three-year professional development (PD) project. These changes were studied through the qualitative analysis of their reflective journals and observations of their teaching to determine the extent to which their conceptions and their instructional behaviors exemplified the PD vision. Supported by the evidence in their journals and teaching observations, the reflection process narrowed the gap between their teaching practice and the PD vision of reform. The results imply that the PD project focus should be at least considered for future programs; 1) strengthening teachers' mathematical content knowledge, 2) building proficiency in the use of effective teaching strategies, 3) developing mentor relationships between middle level teachers and university faculty, and 4) supporting teachers in the selection and implementation of reform curricula.

11:00 am – 11:45 am

Friday, March 12, 2010

Sessions 23 - 24

Session 23

Room MCS 219

An Analysis and Comparison of Five Math Curricula

Betty Eaton, University of Central Oklahoma

Darlinda Cassel, PhD., University of Central Oklahoma

Since the Russians sent Sputnik into orbit Americans have been obsessed with improving students' math skills. A plethora of mathematics curricula has been developed in an effort to meet this need. Yet there exists a wide disparity of thought concerning what elements are most crucial in accomplishing this feat. While basic computational skills are important, today's technologically ever-changing world requires problem solving abilities and a depth of mathematical understanding that is often missing. What basic elements are being included in current prominent commercial math curricula? How do these elements line up with a student centered constructivist approach to learning?

Session 24

Room MCS 220

A Framework for Assessing Conceptual Understanding of the Range, IQR and SD

Mike Turegun, Oklahoma City Community College

Stacy Reeder, PhD., University of Oklahoma

A research study on developing a framework for assessing conceptual understanding of the Range, interquartile range (IQR), and standard deviation (SD) among community college students in an introductory statistics course taught with an emphasis on active learning will be presented. A detailed analysis of data from students' responses to open-ended questions will be presented in light of the Structure of Observed Learning Outcome (SOLO) taxonomy (Biggs & Collis, 1982).

Friday, March 12, 2010

Noon – 1:45 pm

Luncheon and Business Meeting

Brewer-Hegeman Conference Center

Room 5A & 5B

Session 25**Room MCS 103****Lesson Study in a Title 1 Elementary School****Virginia Usnick**, University of Nevada Las Vegas**Marilyn Sue Ford**, University of Las Vegas

Results from the first year of a two-year, grant-funded lesson study project at a highly diverse elementary school will be presented. Changes implemented part way through the year as well as successes and failures will be discussed. Others involved in lesson study are encouraged to attend.

Session 26**Room MCS 104****Traveling Representations in a Fifth Grade Classroom: An Exploration of Algebraic Reasoning****Kerri Richardson**, University of North Carolina at Greensboro**William A. McGalliard III**, University of North Carolina at Greensboro

In this 3-day teaching experiment along with follow up interviews, we examined algebraic concepts related to pattern-finding tasks with 25 fifth grade students. Our specific focus centered on representations from a realistic mathematics education perspective, meaning a model of a situation toward a model for a situation. Within this context, we found certain situational models that seemed to travel and permeate throughout the entire class. Students were able to generalize and justify based on the models developed during whole class discussions. Several weeks after the teaching experiment, follow up interviews indicated that the representations generated were still prevalent in students' descriptions of the activities. Findings, analysis of findings, and implications of the study will be discussed.

Session 27**Room MCS 105****Creating a Context to Promote Algebraic Reasoning****Jessie Store**, University of North Carolina at Greensboro**Tyrette Carter**, North Carolina A & T University

Teaching algebraic reasoning in reform-based classrooms is a challenge to many teachers whose practice is grounded in traditional classroom cultures. Teachers and students may experience a clash between old beliefs, knowledge, and practice when a change in classroom norms are introduced. This paper discusses the successful practices of a researcher in a traditional rural fifth grade classroom (n=25). Her goal was to introduce the students to productive sociomathematical norms and algebraic reasoning. Video, audio, field notes and students' artifacts from the first day of a teaching experiment were the sources of data. By carefully selecting the tasks, and facilitating interactions in class, the researcher created a classroom culture where students were motivated to justify their answers, explain their reasoning, and value each others ideas. Prompts that did not accomplish goals and implications for teacher practice will be discussed.

Session 28**Room MCS 110****T⁴: A Successful Model for Professional Development****Bob Mann**, Western Illinois University**Dr. Donna McCaw**, Department of Educational Leadership, Western Illinois University

Teachers Training Teachers with Technology is a grant-funded program that allows math and science teachers to work together with University faculty and 6th-12th grade students. The unique program integrates math, science, and technology in a successful format for both teachers and their students. Presenters will share the structure and results of this professional development model and discuss the benefits and challenges of such a program.

Session 29**Room MCS 111****Effectiveness of Professional Development in Teaching Mathematics and Technology Applications****Houbin Fang**, University of Southern Mississippi

This study investigated whether a four-week professional development workshop for math teachers helped improve their ability to integrate technology into instruction and teach math concepts. Instruments for data collection included four different types of surveys that asked questions concerning their technology skills and confidence in teaching various math topics. Results of the study revealed that the professional development workshop did improve their technology skills in using graphing calculators and different software programs, as well as increasing their overall confidence in teaching different math topics such as fractions, percentages, real numbers, etc.

Session 30**Room MCS 112****Cancelled**

Session 31

Room MCS 219

Cancelled

Session 32

Room MCS 220

Mathematics Education in China Today vs. 25 Years Ago

David Boliver, University of Oklahoma and The College of New Jersey

Through video, slides, and discussion we will note changes apparent in the substance and context of Chinese mathematics education as seen both recently and in a trip made 25 years ago. We are able to see changes in curriculum, teacher culture, and student culture. Participants will be encouraged to consider how this may affect their own teaching situations.

Session 33**Room MCS 103****How do Content Courses Affect Changes in Student Beliefs About Teaching and Learning Geometry as Well as Increasing Content Knowledge?****S. Kathy Westbrook**, University of West Georgia**Joy Black**, University of West Georgia

Research has indicated that elementary teachers might not have the depth of mathematical content knowledge needed to teach mathematics successfully (Greenberg & Walsh, 2008). Additionally, many teachers believe that the focus of mathematics is procedures and formulas with the goal of obtaining the correct answer (Mewborn, 2007). In an effort to better prepare pre-service teachers, curricula with problem solving activities and directed inquiry learning projects were used in mathematics content classes for elementary teachers. Content tests and attitude surveys, both pre- and post, were administered to all the geometry classes for K-8 grade teachers to determine changes in both content knowledge of geometry as well as attitudinal changes about teaching and learning geometry. Does the content knowledge of our pre-service teachers increase and how do their attitudes about teaching and learning mathematics change?

Session 34**Room MCS 104****Developing Graduate Programs for K-8 Teachers-Furthering the Conversation****Keith Adolphson**, Eastern Washington University**Kerri Richardson**, University of North Carolina Greensboro

Pre-service and in-service elementary teachers often have a very narrow view of mathematics and, consequently, the teaching and learning of mathematics. Part of our job is to challenge and encourage both pre-service and in-service teachers to confront those ideas. A related programmatic issue is finding adequate numbers of suitable mentors who "walk the walk" with respect to teaching from a reform-based perspective to provide appropriate field experiences for pre-service teachers. This session describes and compares the experiences of two different institutions as they negotiated the process of developing new graduate mathematics education programs designed to further the growth of mathematics teaching and learning in in-service teachers and expand the pool of accomplished mentors for pre-service teachers. Discussion will focus on the impetus for and goals of the new programs, program design, and lessons learned.

Session 35**Room MCS 105****Comparison of Fraction and Proportional Reasoning Skills of One-Year and Two-Year Advanced 8th Graders****Kim McComas**, University of Arkansas, Fayetteville

With increased emphasis on algebra for all has come an increase in the number of students taking Algebra 1 in seventh grade. A student taking seventh grade Algebra misses out on the regular seventh grade curriculum which includes further experience with fractions and proportional reasoning. My research compared the fraction and proportional reasoning knowledge of two groups of advanced eighth graders: those who had seventh grade algebra (two year advanced) and those who had seventh grade pre-algebra (one year advanced.) A fraction diagnostic measure was given to a sample of 122 eighth graders. An independent sample t-test indicated that students who had taken seventh grade algebra scored significantly higher than the other advanced group, implying that lack of seventh grade fraction instruction did not affect their fraction knowledge. Further data is being analyzed to see if there is a qualitative difference in how these two groups solve proportional reasoning problems.

Session 36**Room MCS 110****The Affect of Errancy: Shame and Guilt****Edward Wall**, City College of New York

In this talk I take up some aspects of the interplay between right and wrong answers in the elementary school mathematics classroom and mathematics classrooms beyond. My focus will be primarily on how classroom doing of ostensibly wrong answers—that is, public errancy—impacts students' study of mathematics. I note that it has been argued elsewhere that a teacher's framing of errancy can have, simultaneously, profoundly moral and intellectual consequences. I build on such work in this talk and attempt here to analytically illuminate some of what underlies such consequences—both the powerful and problematic—and sketch how the fine line between the intellectual and moral might, in such light, be traversed within the pedagogical practices of the elementary school mathematics classroom and mathematics classrooms beyond. I emphasize in advance I do not intend this to be a harmonious synthesis of the intellectual and moral. Instructional work that builds on student error, I claim, is fundamentally rooted in what might termed a significant pedagogic discomfort.

Session 37**Room MCS 111****Blind Faith Mathematics: Pre-Service Teachers' Conceptual Understandings of Operations with Integers****Stacy Reeder**, University of Oklahoma**Summer Bateiha**, University of Oklahoma

Why does a negative times a negative equal a positive? The purpose of this study was to examine pre-service teachers' conceptual understandings of operations with integers. It further explored the participants' willingness to accept, without questioning, mathematics "rules" that do not make sense to them as a natural part of what it means to learn mathematics. The results indicated that the unquestioning acceptance of "rules" leads to a limited or non-existent conceptual understanding of operations with integers.

Session 38**Room MCS 112****Illustrative Case Studies from Project IMPACT****Joyce Swan**, University of Tennessee, Martin**Stephanie Kolitsch, Ph. D.**, University of Tennessee, Martin

The presenters will discuss patterns of change in teaching methods revealed from qualitative data collected during a 3-year professional development program. Three participants were chosen for case studies. The cases were selected for study because their data sets were complete, and they clearly articulated their thinking and experiences. Types of data collected, collection methods, analysis approaches, and insights gleaned will be communicated. Changes in teaching styles include incorporation of discovery learning, use of small group work, emphasis on both classroom discourse and learning through problem solving, increased use of technology and manipulatives, collaboration in partnerships and enhanced personal reflective behavior.

Session 39

Room MCS 219

Pre-service Elementary Teachers Understanding of Pattern and Function

Valerie Sharon, Sam Houston State University

This study sought to describe how pre-service elementary teachers conceptualize and communicate their understanding of function while experiencing the concept through pattern finding activities. Using the framework of the hermeneutic circle, this paper describes how investigating the relationship between explanation and understanding may be used to gain insight into how individuals conceptualize mathematical ideas. The participants first worked independently on two pattern finding tasks, then paired up to share their strategies. Immediately after sharing their strategies, the participants teamed to solve four problems of a similar nature. Transcripts of the conversations during the shared activities, along with written work from both individual and paired activities were analyzed. The results of this study have the potential of affecting curricular choices made by mathematics teachers' educators as well as providing a framework for future investigations into how individuals conceptualize mathematical ideas.

Session 40

Room MCS 220

Arkansas' Infrastructure of Centers for Mathematics and Science Education

Suzanne Mitchell, Arkansas State University

Arkansas has developed a Network of Centers for Mathematics and Science Education at 15 colleges and universities. The STEM Network serves to enrich the knowledge and teaching practices of teachers in mathematics, science, and technology by linking institutions of higher education to K-12 public schools, educational service cooperatives, government agencies and businesses. Based on current research, the Network of Centers works to keep the public informed about STEM opportunities and offers implementation assistance as it relates to trends in education.

4:00 pm - 4:45 pm

Friday, March 12, 2010

Doyne Health Science Building
Lecture Hall

2010 Wilson's Speaker



Dr. Vijaya Gompa
Jackson State University, Jackson, MS
vijaya.gompa@jsums.edu

Title: Providing Effective Mathematics Instruction to Overcome Challenges and Increase Achievement in Mathematics

Abstract: Dr. Vijaya Gompa will present a talk on educating mathematics to K-16 students addressing inequity and achievement gaps due to gender, race, economic, and geographic factors. This talk will also include teaching strategies to raise expectations and provide strong support for all students in order to achieve measurable improvements.

Dr. Vijaya Gomba is a Professor in the Department of Mathematics at Jackson State University. She serves as Coordinator of Mathematics Programs at Charles A. Tindley Accelerated School (Indianapolis, Indiana) and the coordinator of Master of Science and Mathematics in Teaching Programs in Mathematics, Biology, Physics, and Chemistry (Jackson State University). She also taught at Clinton Senior Junior High School (Michigantown, Indiana). She holds a Ph.D. in mathematics and a highly qualified teacher license in mathematics, physics and chemistry for grades 5-12 in Indiana and for grades 7-12 in Mississippi.

Dr. Gomba has published several peer-reviewed articles in mathematics and mathematics education. She served as a member of the editorial board for two international peer-reviewed journals and as a lead reviewer for NCATE. She has also presented SPA (Specialize Professional Association) training for mathematics educators and DCA (Dynamic Classroom Assessment) workshops for elementary and high school teachers. She worked on several projects to improve K-12 and teacher education.

8:30 am – 9:15am
Building

Saturday, March 13, 2010

Doyme Health Science

Lecture Hall

2010 Founder's Speaker



William R. Speer, Ph.D.
University of Nevada, Las Vegas
william.speer@unlv.edu

Title: "NRC, RCDPM, RCML: A Glance Back and We Strive Forward"

Abstract: Every organization can benefit from a retrospective of where they began, where they've been, and how they got to where they are today. Through such an exercise, we can learn from both the successes and the mistakes embedded in our history to help mold and shape our future directions. Those old enough to remember should come and reminisce for awhile and be willing, in the truest spirit of this organization, to share what we know with others that have joined us along the way. Let's all speculate on the promise of what the future might hold for the organization.

William R. Speer, Dean of the College of Education and Professor of Mathematics Education, is the Director of the UNLV COS/COE Center for Mathematics and Science Education and Director of International Student Teaching at the University of Nevada, Las Vegas. He is also an Emeritus Professor of Mathematics and Computer Education at Bowling Green State University, Bowling Green, Ohio. He was a Fulbright Scholar to the Bahamas and a Visiting Professor at Northern Arizona University's Science and Mathematics Learning Center.

Dr. Speer is a Founding Member of the Research Council on Mathematics Learning. He is a past president of several professional organizations and serves on several boards, councils, commissions and committees. He is a member of NCTM (41 years) and a participating member of AMTE since its inception. Dr. Speer is the major author on the teaching standards that NCTM released in 2007 under the title of *Mathematics Teaching Today*.

Dr. Speer is the primary author of the Wiley text, *TODAY'S MATHEMATICS: Concepts, Classroom Methods and Instructional Activities*, twelfth edition, focusing on content/teaching methods for the elementary and middle grades. He is currently the General Editor for the NCTM annual yearbooks covering the years 2011-13 and has authored numerous articles in various professional journals. He has served as editor of the IDEAS section for the *Arithmetic Teacher* journal and editor of the INVESTIGATIONS section of *Teaching Children Mathematics* journal. He has also served on the Editorial Board for the research journal, *FOCUS on the Learning and Teaching of Mathematics* (now known as *INVESTIGATIONS in Mathematics Learning*).

Dr. Speer has been the recipient of annual college and university-wide teaching, research, and service awards at both Bowling Green State University and the University of Nevada Las Vegas. He is the recipient of the Northern Illinois University Golden Anniversary Alumni Award from the College of Liberal Arts and Sciences. His service has been recognized by his selection for the Christofferson-Fawcett Award for Lifetime Achievement in Mathematics Education and the George Mallinson Award for Distinguished Contributions to Mathematics and Science Education

Dr. Speer has lectured extensively throughout the United States and in 26 countries on six continents. Perhaps most importantly, he has classroom experience at each level and enjoys sharing and learning about how research informs teachers and how the classroom lends itself to generative studies of teaching/learning.

Session 41**Room MCS 103****Engaging Students in Realistic Mathematics: Police Station Problem****Dennis Show**, University of Central Arkansas

The city of Conway, AR just built a new police station located at the corner of Prairie St. and Front St., but, is it the best location to minimize the response time to a call when one comes in? This is the question that we will answer using a technique called method of random search. By analyzing the district breakdown of the city of Conway, the frequency of calls to each district, and the gridding of the city, we can answer that burning question, and either get sleep knowing that we are safe, or, begin to take action to ensure that our city can be as safe as possible.

Session 42**Room MCS 104****Mathematics Content Proficiency and Beliefs in the NYC Teaching Fellows Program****Brian Evans**, Pace University

The purpose of this study is to understand the mathematical content proficiency new teachers have both before and after taking a mathematics methods course in the New York City Teaching Fellows (NYCTF) program. Further, the purpose is to understand attitudes toward mathematics and teacher self-efficacy that Teaching Fellows have over the course of the semester. Findings revealed a significant increase in both mathematical content knowledge and positive attitudes toward mathematics for the Teaching Fellows. Further, Teaching Fellows were found to have generally positive attitudes and high self-efficacy at the end of the semester. Additionally, relationships were found between attitudes and self-efficacy. Finally, Teaching Fellows generally found that classroom management was the biggest issue in their teaching, and that problem solving and numeracy were the most important topics addressed in the methods course.

Session 43**Room MCS 105****The Pathway to Addition and Subtraction of Integers****Catherine Ulrich**, The University of Georgia

In this presentation, I lay out a clear distinction between the students' addition and subtraction schemes in the domain of whole numbers and in the domain of integers. This is done using two methodologies. The first is a conceptual analysis of addition and subtraction in the two contexts. The second is retrospective analysis of qualitative data from a constructivist teaching experiment. The presentation will end with a discussion of implications for practice. In particular, there is a clear need for teachers to be made aware of the distinction between addition and subtraction in the two domains in order to identify students' difficulties caused by the conflation of the operations. Further research into the effects of introducing a clear distinction in terminology or notation between the different operations may be profitable.

Session 44**Room MCS 110****Five Step Process for Improving Student Achievement in Mathematics****Linda Griffith**, University of Central Arkansas

The five steps that have been identified as necessary for student achievement increases are: vertical and horizontal alignment of both curriculum and instruction, selection of appropriate instruction material and professional development, creation of a pacing guide, use of formative and interim assessments, and monitoring and modification. More details on each of these will be given in the paper.

Session 45**Room MCS 111****Casework Research Into The Natural Learning of Curricular Mathematics****Clyde Greeno**, MAEI Mathematics Institute

Most professional mathematics educators already have ample opportunities and resources for fruitfully indulging in scientifically palatable casework research into mathematical learning and the instructional guidance, thereof. The typically missing ingredients are: (1) an inspiration for doing so; (2) a community of colleagues who are so engaged; (3) a communications medium for those researchers to publish and access information about such research and findings; and (4) community-shared knowledge of viable research methods that can routinely yield scientifically credible results of potential significance for beneficial reforms of nationwide practices of mathematics learning and instruction. Clinical methods for casework research long have been scientifically used in medicine and psychology. Hopefully inspiring, this session airs how clinical methods can readily be used by individual researchers – including those not associated with a “clinic”, as such. Participants will be urged to form a network for exchanging professional papers about casework research of that kind.

Session 46**Room MCS 112****Mathematics in Context: Deer Hunting Model****Benjamin Bell**, University of Central Arkansas

Since the new vision of algebra emphasizes problems in contexts that engage students, this project demonstrates a mathematical model centered on deer hunting, a popular pastime in Arkansas and many other states. This presentation models the relationship between the deer and the deer hunters. Using the existing numbers of deer and deer hunters in Arkansas, a model based on the current growth and death rates for each was constructed to determine if the current hunting regulations will drive the deer to extinction, a deer population boom, or a sustainable equilibrium. A dynamic system was used to obtain a vector field which led to the graph of the model. Sensitivity analysis was performed on the deer and the deer hunter’s population caps, the loss rates, and the growth rates.

Session 47

Room MCS 219

Practicing Piaget - Elementary Candidates' Interpretation of the Conservation Tasks

Pat Jordan, Oklahoma State University

Eight elementary candidates were assigned to administer a set of the Piagetian conservation tasks to a student between the ages of 5 and 9. This paper reflects on the ways the elementary candidates set up the tasks, the questions they posed, their interpretations of the responses of the students, and the types of activities could be developed to enhance the students' skills. The data is drawn from the elementary candidates' report on their interview session and questions will be identified as low level or high level and the interpretation skills will also be analyzed for depth of understanding and incorporation of ideas of conceptual understanding demonstrated by the students.

Session 48

Room MCS 220

Algebraic Applications for the Solution of Non-Routine Mathematics Problems

Oakley (O.D.) Hadfield, New Mexico University

The majority of mathematics teachers tend to agree that effective instruction provides ample opportunity for students to become accomplished problem solvers. As students progress to introductory Algebra courses, they learn several routine applications of Algebra to both real world and hypothetical problems. However, most textbook problems are somewhat routine, and are therefore primarily exercises rather than problems. This presentation will offer several non-routine problems that are often more easily solved by turning to algebraic equations that are based on given relationships between variables. Because the problems are a few of the favorites of the presenter, some will be somewhat challenging and/or counter-intuitive. The presentation will also include several hints for the teaching of non-routine mathematics problem solving.

Session 49

Room MCS 103

Reading and Writing and 'Rithmetic: An Examination of Reading Strategies in Math

Maribeth Nottingham, Texas A&M University at Commerce

Reading strategies were taught along with problem solving strategies in order to facilitate reading of the problem and communication of the solution. Preliminary results of this study show an increased ability to solve problems and communicate solutions as students learn to self-select reading strategies.

Session 50**Room MCS 104****My Story: From Perturbed Mother to Purposeful Math Teacher**

Jenny Little, University of Central Oklahoma

Darlinda Cassel, Ph.D., Department of Curriculum and Instruction, University of Central Oklahoma

Presentation will provide discussion of how a student's journey in making sense of mathematical learning in the classroom is achieved through the process of personal growth in her own mathematical thinking.

Session 51**Room MCS 105****Discourse and Academic Rigor in Single-Sex Mathematics Classrooms**

Elaine Wiegert, University of South Carolina Upstate

S. Megan Che, Clemson University

In this session, classroom discourse and task cognitive demand in single-sex middle grades mathematics classrooms will be discussed. Since the U. S. Department of Education relaxed its stance on Title IX of the Elementary and Secondary Education Act in the fall of 2006, the number of schools choosing to offer instruction in single-sex classes is increasing. Understandings about mathematics teaching and learning in such settings from studies in this country are limited. Because more schools may be opting to offer instruction in single-sex classes, it is important to examine academic rigor and classroom discourse to determine if high standards and expectations for learning are maintained for both girls and boys in single-sex classes. As the number of single-sex mathematics classes continues to grow, there will be an increasing need for theoretical and practical findings on mathematics teaching and learning in such settings to guide teachers and teacher educators.

Session 52**Room MCS 110****Teachers Connecting Dots: the Path from Learning Mathematics to Teaching Mathematics**

Michael Mikusa, Kent State University

Anne Reynolds, Kent State University

During our session we will provide the participants with an overview of the content courses we have co-created and co-delivered to middle grades teachers with colleagues from mathematics and mathematics education. We will present our shared understanding of learning the mathematics taught at the middle grades at a "deeper" level. We are currently exploring ways to help teachers confront the question: "What does it mean for a middle grades' teacher to understand the topics they teach?" We invite participants in our session to experience some examples of teacher disconnect between the mathematics they are learning and the mathematics they are teaching, also attempts made to confront this disconnect. We encourage those who are working with teachers to respond to our research and findings.

Session 53**Room MCS 111****Relationship Between Metacognitive Awareness, Teaching Efficacy, and Attitudes of Pre-service Elementary Teachers**

Kansas Pope, University of Central Oklahoma
Juliana Utley, Oklahoma State University

Research has taken a close look at various characteristics of the pre-service elementary teacher including their metacognitive awareness, teaching efficacy, and attitudes towards mathematics. It has also been common to discuss the implications of each of these characteristics in the development of the teacher. Because of the impact each characteristic has on their development, it is also important to understand the effect of the combination of these characteristics on the pre-service elementary teacher. This study will discuss the metacognitive awareness of preservice elementary teachers and potential relationships among metacognitive awareness, teacher efficacy, and attitudes toward mathematics. Presenters will provide suggestions to further understand this relationship and its impact on teacher development.

Session 54**Room MCS 112****Challenges of Teaching Core Mathematics Courses for Middle School Pre-service Educators**

Winifred Mallam, Texas Woman's University

The session will discuss the mathematical backgrounds, attitudes, and achievement of students in 2 university core mathematics courses, "Quantitative Literacy" and "Introduction to Mathematics". Meeting the mathematical needs of the students can be a challenge as they enter with varying mathematical backgrounds. Discussion will focus on students who are preparing for Early Childhood-Grade 6 or Middle School certification.

Session 55**Room MCS 219****Educational Technologies: Help or Hindrance to Learning and Teaching?**

Jean McGehee, University of Cental Arkansas
Jon Sumners, University of Central Arkansas

Educational technologies in the mathematics classroom have exploded from calculator use to hand-held devices and multimedia presentation software such as the interactive whiteboards. A senior student and I have compiled the arguments for and against these technologies and have conducted a statewide survey to determine the extent of use of the different technologies as well as their effectiveness. We are examining the correlation between technology use and student performance on the statewide assessment. We will present our literature review and survey results as well as the survey instrument.

Session 56

Room MCS 103

Sustaining Secondary Mathematics Students' Dispositions Through Problem Solving and Communication

Roland Pourdavood, Cleveland State University

Raymond Skitzki, M.E.D., Shaker Heights High School

This qualitative study investigates secondary mathematics students' dispositions in two classrooms taught by the same teacher. The research questions are: What is the relationship between mathematics classroom discourse and students' mathematical dispositions? And, how may students' mathematical dispositions be strengthened and sustained as they take more participating role in an inquiry-based classroom? Data sources include survey questionnaires, transcripts of audiotapes from interviews with the participating students, and transcripts of audiotapes from two classrooms discourses, researchers' field notes, and students' written solutions to various non-routine problems. The findings of the study suggest that the classroom teacher's teaching strategies are mainly responsible for the transformation of students' attitudes and beliefs. Furthermore, sustaining students' mathematical dispositions requires competent teachers who have good understanding of mathematics contents and pedagogy relative to how students learn mathematics. This implies a need for more consistent mathematics curriculum and more compatible instructional methods across k-12 schools.

Session 57

Room MCS 104

Student Achievement in Solving Math Word Problems

Banmali Banerjee, Paterson Public Schools, Montclair State University, New Jersey

High school students' achievement in solving mathematical word problems continues to be low on the state, national, and international assessments. Based on the factors identified by previous research studies that influence word problem solving performance such as comprehension, representation, ability to connect mathematical concepts, and attitude, this study used a diagramming method to evaluate the achievement on and attitude toward math word problems of 172 grade 11 students from a New Jersey urban school. Preliminary analyses of the data from the study with a pre and posttest research design showed that the diagramming method improved achievement of both Hispanic English Language Learners (ELLs) and African American learners whose First Language is English (EFLs), but significantly of ELLs. The students' achievement and attitude toward word problems showed unpredictable patterns.

Session 58

Room MCS 105

Cancelled

Session 59**Room MCS 110****The Arts and Social Justice Mathematics: How Using Movies, Literature, and the Internet Can Promote Critical Mathematical Fluency**

Summer Bateiha, University of Oklahoma

The use of various forms of the arts that address important social issues can bridge the gap between abstract mathematics and a more concrete "real world." This session will present an overview of how the arts can be used in conjunction with social issues to create mathematical fluency. Data about students' perceptions of the use of social justice arts in conjunction with mathematics will be presented from both a methods class and a content course.

Session 60**Room MCS 111****A Comparison of Preservice Elementary Teachers and Fifth Graders Algebraic Reasoning**

Katrina Staley, North Carolina A&T State University

This study focuses on the similarities and differences of how preservice teachers and fifth graders generalize and justify their algebraic reasoning through pattern finding activities. Twenty-five subjects in two teaching experiments were given the same tasks and manipulatives to find a linear relationship using pattern blocks. Sources of data included audio, video, and student artifacts. Fifth graders spent more time exploring the patterns in the tasks while preservice teachers were predisposed toward developing a symbolic rule to describe their generalizations. Both samples were successful in forming generalizations. However, nearly all fifth graders were able to provide justifications on the first task while many of the preservice teachers were not successful until day three. We conjecture that an emphasis on formalizing may impede the process of justification.

Session 61**Room MCS 112****The Working Memory Demands of Simple Fraction Strategies**

Thomas Faulkenberry, Texas A&M University - Commerce

This presentation reports the results of two experiments that were designed to analyze the working memory demands of simple fraction comparison strategies. Both experiments involved a speeded fraction comparison task. In the first experiment, participants provided trial-by-trial reports of their mental strategies. Reaction time analysis showed patterns consistent with recent neuroimaging work indicating a visuo-spatial basis for numerical magnitude comparison. In the second experiment, participants engaged in a secondary task that selectively loaded different components of working memory. The data confirmed the role of visuo-spatial working memory in fraction comparison. In addition, working memory load was found to impair the execution of both procedural and conceptual strategies, but a slight advantage persisted for conceptual strategies. The implications of these results will be discussed in the context of our current understanding of basic mathematical cognition.

Session 62**Room MCS 219****Overcoming the Challenges in Teaching and Learning as a Foreign Teacher**

Ali Ikiz, Fayetteville State University

Teacher migration has been an important issue for the United States education system. Besides the migration and visa problems every new teacher from overseas brings new challenges for the students, parents, and the school districts, etc. Although there has been a significant amount of research on teacher migration, most of this has focused on visa issues and related recruitment processes, namely from a job satisfaction point of view. The review of the literature revealed that there was not enough research on the recruited teachers' challenges after they start teaching. Observations and preliminary interviews showed that they are having academic, pedagogical and cultural challenges as well.

The data for this study comes from some selected charter school in the United States. The teachers consented to participate in this study are mainly from Turkey and majority of them had taught outside Turkey before they migrated to the States. Data showed that the compatibility of the origin country's education system to the United States system is vital to have a successful career in the States. In addition the previous experiences from other countries help to overcome many challenges.

Session 63**Room MCS 220****A Case Study of Reform Efforts in Chinese Secondary Mathematics Classrooms**

Lianfang Lu, Louisiana State University

This study describes an on-going teaching experiment in the mathematics classrooms in a junior high school in Southwest China. Specifically, culture and practices of the reform classrooms are examined including classroom organizations, interactions, norms, and teachers' and students' perceptions of their mathematics classrooms practices. The study also attempts to manifest the multiple levels of cooperation among classroom teachers, local teaching and research coordinators, and school administrators in supporting the classroom teachers to make changes in their daily practices.