NSF Math and Science Partnership Projects
Session Descriptions

Consortium for Achievement in Mathematics and Science (CAMS)
Presenters: Margo Bartiromo and Zende Clark
Location: Harrison

Project Background: CAMS is a partnership of the Merck Institute for Science Education, four urban school districts in New Jersey, Kean University, and the Educational Testing Service. The partnership targets middle grades science and mathematics instruction, with the ultimate goal that all middle school students will understand and be able to apply key concepts in those disciplines. Professional development is centered on the instructional materials used in the classrooms, working to deepen teacher content and pedagogical content knowledge in relation to those materials. Program components include support for principals in understanding the partnership's vision for effective instruction, in–class coaching support for teachers, and analysis of formative and summative assessments for implications for instructional improvement.

Session Description: This session will describe the workshops offered in CAMS for middle grades science teachers with varied content backgrounds and science teaching experience. The primary goal of the workshops is to develop teachers' capacity to effectively implement their student instructional materials. The presenters will describe the structure of a typical workshop, the learning experiences provided to teachers, and the various tools used to support teachers in developing their knowledge and skills.

El Paso Math and Science Partnership
Presenters: Diana Garcia–Chavez and Alicia Parra
Location: Jackson

Project Background: The El Paso MSP, which concluded in September 2009, was a program of the El Paso Collaborative for Academic Excellence at the University of Texas at El Paso (UTEP). Its partners included the University of Texas at El Paso, the El Paso Community College, the Education Service Center–Region 19, and 12 urban and rural school districts. The partnership aimed at improving student achievement in mathematics and science among all students, at all PreK–12 levels, and significantly reducing the achievement gap among groups of students. A key element of the program was professional development that focused on deepening teachers' understanding of the most important mathematics and science content and pedagogy, strengthening teachers' knowledge of how children learn, and providing teachers opportunities to develop, practice, and reflect upon new knowledge and strategies. The MSP program offered: (1) multiple–day summer institutes for classroom teachers, with follow–up sessions during the school year; (2) a Leadership Academy to deepen the content knowledge of school and district administrators; and (3) training to develop the skills and knowledge of instructional coaches working with teachers in schools across the region.

Session Description: The Pedagogical Content Knowledge (PCK) tools are a series of short literature reviews and instructional guides focused on key math and science concepts that engage teachers in the study of content to address common student learning misconceptions and provide strategies for responding to those misconceptions. During the session, participants will learn about the PCK tool on proportional reasoning, discuss the tool, and identify common student misconceptions related to proportional reasoning.

Math in the Middle Institute Partnership, NebraskaMATH
Presenters: Ruth Heaton and Jim Lewis
Location: Madison

Project Description: Two NSF–funded Math Science Partnerships, Math in the Middle Institute (M^2) and NebraskaMATH have resulted in a partnership of the University of Nebraska–Lincoln, Nebraska's Educational Service Units, and over 100 local school districts including the state's two largest districts, Omaha Public Schools and Lincoln Public Schools. M^2, which began in 2004, is an Institute for middle grades teachers of mathematics whose goal is to strengthen the mathematical and pedagogical knowledge of participating teachers to improve classroom instruction. The program consists of a 25–month Master degree program, with courses offered as summer institutes and online during the school year, and culminating with a capstone action research project. The Math in the Middle Institute Partnership website (http://scimath.unl.edu/MIM/) has a section for others doing professional development. Within this "Products" section, users can find a link to descriptions of the 12 courses for teachers in grades 5–8 that were offered as part of Math in the Middle Institute. A variety of course materials are available on this site for five of the courses as well as contact information for acquiring access to materials from the other seven courses. Many examples of participants' mathematics expository papers and action research projects are also available within this "Products" section.

Nebraska Math (http://scimath.unl.edu/nebraskamath/index.php), which began in 2009, is a targeted partnership that expands the work of M^2 and aims to improve achievement for all students and narrow achievement gaps among at–risk populations. Two professional development programs, Primarily Math and Nebraska Algebra, focus on key transition points along the mathematics education continuum: kindergarten through early primary and the role of Algebra 1 as central to success in mathematics in high school.

Session Description: This session will focus on Mathematics as a Second Language, the first course in the Math in the Middle Institute graduate program for middle grade (5–8) teachers. The presenters will discuss learning goals for the course, and approaches to engaging teachers from varied backgrounds in learning mathematics for teaching, as well as how to ensure that the opportunities for learning mathematical knowledge for teaching are rigorous, appropriate, and accessible for all teachers.

Milwaukee Mathematics Partnership (MMP): Sharing in Leadership for Student Success
Presenters: DeAnn Huinker and Kevin McLeod
Location: Monroe

Project Background: The MMP is a collaboration of the University of Wisconsin–Milwaukee, Milwaukee Public Schools, and Milwaukee Area Technical College. The initiative has focused on the development of distributed leadership around mathematics teaching and learning in Milwaukee Public Schools. Each year since its inception in 2003, the MMP has provided a series of monthly professional development sessions targeting a selected mathematics content strand (e.g., algebra and algebraic reasoning, measurement and geometric reasoning). The focus has been on "big ideas" in mathematics, with teacher leaders considering their own knowledge, knowledge held by other teachers and by students, and how those ideas are addressed in state standards.

Session Description: This session will describe two series of "High School labs" run by the MMP: one for teachers of 9^{th} grade algebra, and one for teachers of 10^{th} grade geometry. The primary goals of the labs were to familiarize teachers with the approach to mathematical content and pedagogy in the recently–selected district textbooks, and to provide a forum for collaborative discussion and lesson–planning around students' understandings, preconceptions and misconceptions. The labs themselves were planned and facilitated by design teams of mathematicians, math educators, and classroom teachers. We will describe the format of a typical lab, and present tools that were used to assist teachers in focusing on the "big ideas" in a lesson during the lesson–planning component of the lab.

North Cascades and Olympic Science Partnership (NCOSP)
Presenter: George Nelson
Location: Van Buren

Project Background: NCOSP is a partnership of Western Washington University, Everett Community College, Northwest Indian College, Skagit Valley College, Whatcom Community College, and 26 predominately rural school districts. Prospective teacher leaders explored a small number of scientific topics in depth in residential summer academies, with the goal of improving their content knowledge and reinforcing conceptual, constructivist science teaching strategies. Participants are expected to use what they have learned in facilitating professional learning communities in their schools in focusing on effective teaching and learning, encouraging their colleagues to take advantage of opportunities the partnership is providing on the college campuses to enhance both preservice and inservice teacher content and pedagogical content knowledge.

Session Description: This session will describe the design of learning experiences for teachers in the area of Astronomy as defined by the Washington State Standards. The big ideas of the standards are: K–1 Observing the Sun and Moon, Grades 2–3 The Sun's Daily Motion, Grades 4–5 Earth in Space, Grades 6–8 The Solar System, and Grades 9–11 Evolution of the Universe. The audience for the institute is a group of 80 K–8 teachers, and 60 Grade 6–12 teachers who chose the topic to meet their perceived content needs. Many of the teachers have already participated in physics, geology, and biology institutes but vary substantially in their mathematics sophistication and prior knowledge in Astronomy. The 30 hours of content experiences focuses primary on deepening teachers' content knowledge, using differentiated instructional techniques, but also explicitly addresses the pedagogical models they will experience.

NSF Institute: Preparing Virginia's Mathematics Specialists
Presenters: Bill Haver and Vickie Inge
Location: Wilson

Project Background: The NSF Institute: Preparing Virginia's Mathematics Specialists is a partnership of Virginia Commonwealth University, Norfolk State University, University of Virginia, nine school districts, and the Virginia Mathematics and Science Coalition. The project has focused on the development of graduate degree programs aligned with a new state license for K–8 Mathematics Specialists in Virginia, in an effort to improve the quality of mathematics instruction across the state. Professional development has focused on deepening teachers' content and pedagogical content knowledge and leadership skills. The program consists of graduate degree programs with coursework in both mathematics and education leadership, offered at each of the three participating universities. Courses are designed and taught by a collaboration of mathematics and education faculty members and school district staff. Research has been conducted on the impact of Mathematics Specialists.

Session Description: This session will focus on developing algebra readiness and beginning algebra concepts for K–8 teachers and Mathematics Specialists who will be coaching K–8 teachers. We offer teachers a three credit graduate level course, typically meeting for 55 contact hours. We make use of the *Developing Mathematical Ideas Casebooks: Reasoning Algebraically about Operations* and *Patterns, Functions and Change*. Making extensive use of case studies, we help teachers develop their own mathematical ideas through thinking about how children encounter big ideas. A major theme of our approach is that teachers must understand ideas in multiple ways so that they can support students as they develop their understanding.