

Appalachian Math and Science Partnership (AMSP)

Research Conference Program

Radisson Plaza Hotel, Lexington, Kentucky

June 6, 2007

08:00 – 09:00 Registration and Breakfast

09:00 – 09:30 Opening Address (Dr. John Yopp, University of Kentucky)

09:30 – 10:30 Keynote Speech

The Connected Classroom for Promoting Mathematics and Science Achievement: Implementation and Research Trial. *Douglas Owens, Ohio State University*

10:30 – 10:45 Break

Section One: Large-scale Studies of AMSP Teachers and Students

10:45 – 11:15 Presentation 1.1

Evaluating the Effectiveness of the Appalachian Math and Science Partnership on Student Achievement. *Betsy Evans & Eugenia Toma, University of Kentucky*

The purpose of this study is to assess whether the Appalachian Math and Science Partnership (AMSP) has been effective in reducing the educational achievement gaps that exist in Central Appalachia. This study looks at 1,171 Kentucky public schools over six years for a total of 5,086 observations and controls for achievement prior to the introduction of the AMSP program. The statistical analysis focuses on math scores and science scores reported by the Kentucky Department of Education. The study calls for future studies using individual student data matched to specific teachers.

11:15 – 11:45 Presentation 1.2

The Challenge of Separating Project Effects on Student Achievement: The Case of ARSI and AMSP. *Xin Ma & Lingling Ma, University of Kentucky*

When multiple educational projects operate in an overlapping or rear-ended manner, it is a challenge to separate unique project effects on schooling outcomes. Our analysis represents a first attempt to address this challenge. Using data from the Commonwealth Accountability Testing System that the state of Kentucky has implemented for years, we separated the effects of two educational projects aimed at improving mathematics and science education in the Appalachian region: the Appalachian Rural Systemic Initiative (ARSI) closely followed by the Appalachian Mathematics and Science Partnership (AMSP).

11:45 – 12:15 Presentation 1.3

Reaching Rural Mathematics Teachers through Technology. *JoAnn Cady, Thomas Hodges, & Mark Taylor, University of Tennessee*

Traditional forms of licensure for middle grades teachers often fail to address both the content and pedagogical needs for teaching middle school students. Rural middle grades mathematics teachers also have difficulty finding opportunities for professional development near their homes or schools. With funding from the Appalachian Mathematics and Science Partnership, the authors developed four online classes to reach these rural teachers. Current research regarding adult learners, professional development, and adolescent learning were used in designing these classes. Early findings indicate participation in these classes resulted in growth in pedagogical content knowledge of mathematics and increases in their collegial interactions.

12:15 – 01:15 Lunch

01:15 – 01:45 Presentation 1.4

The Effect of the Appalachian Math and Science Partnership on Student Achievement. *Eugenia Toma & Megan Streams, University of Kentucky*

The goal of this study is to investigate determinants and patterns of teacher compensation over a six-year period in Kentucky, with specific attention to potential differences between Appalachian and non-Appalachian districts. Policymaker concern over student achievement gaps in math and science in Appalachia has led to new initiatives to improve teacher preparation and ongoing professional development in these areas. We address the following research questions in this project: How do measures of teacher compensation in Appalachian and non-Appalachian districts and schools in Kentucky compare? What is the compensation of teachers relative to other comparable professions in the two regions? We use a novel statewide six-year dataset of individual teacher salaries, credentials, experience, and other school and district characteristics to address these questions.

01:45 – 02:25 Section One Panel Discussion 1.5

Panelists: Dr. Ron Atwood, University of Kentucky
 Dr. JoAnn Cady, University of Tennessee
 Dr. Stephen Henderson, Kentucky Science and Technology Corporation
 Dr. Douglas Owens, Ohio State University
 Dr. Edna Schack, Morehead State University

02:25 – 02:40 Break

Section Two: Appalachian Teachers' Content Knowledge

02:40 – 03:10 Presentation 2.1

Specialized Understanding of Mathematics: A Study of Prospective Elementary Teachers. *Meg Moss, Pellissippi State Technical Community College*

Elementary teachers need a specialized mathematical knowledge for teaching. This presentation will begin by considering what this specialized knowledge is and how to assess it. Then research results will be shared of a study of prospective elementary teachers before and after their mathematics teaching methods at four universities. The research examines what mathematics these prospective teachers had as they entered their methods course, whether it grew during their methods course, and what learning opportunities during their methods course may have led to growth

03:10 – 03:40 Presentation 2.2

Effects of Casey County, KY Partnership Enhancement Project on Teacher Confidence in Inquiry Pedagogy, Core Content, and Student Achievement. *Timothy Bradshaw & Jeffrey Osborn, University of Kentucky*

Efficacy of the Casey County Partnership Enhancement Project on increasing teachers' ability to infuse inquiry based activities into the core content of all science classes, increasing teacher confidence in standards based core content, and increasing student achievement on standards based testing is examined. When surveyed at the conclusion of the professional development activity, positive teacher perceptions of understanding inquiry based science education averaged 100% and positive teacher perceptions of comfort level with teaching in an inquiry based style averaged 71%. Teacher's physics content knowledge increased substantially over the professional development activity (45.83% to 72.31%), while knowledge of biology and chemistry content did not change.

03:40 – 04:10 Presentation 2.3

Are Inservice Elementary Teachers Prepared to Teach Fundamental Concepts of Magnets and the Behavior of Magnets? *Ron Atwood, John Christopher, & Rebecca McNall, University of Kentucky*

A set of five multiple-choice tasks with popular non-scientific conceptions embedded in the distracter options was the primary source of data for this descriptive study. In addition, an explanation of each multiple-choice selection was requested, as was an indication of the level of confidence with which the selection was made and an explanation provided. The non-random sample consisted of 20 inservice elementary teachers from central Appalachia. Results, discussed by task, reveal the teachers as a group had been inadequately prepared. Implications for both preservice and inservice teacher education are discussed.

June 7 (Thursday)

08:30 – 09:00 Breakfast

09:00 – 10:00 Keynote Speech

Rural Science Education: Aligning Purposes, Policies, Programs, and Practices. *John Staver, Purdue University*

10:00 – 10:30 Presentation 2.4

Developing a Research Lesson for Preservice Teachers. *Patrick Coen, Eastern Kentucky University; Landrea Miriti, Bluegrass Community & Technical College; Michael Ratliff, Lindsey Wilson College; & Edna Schack, Morehead State University*

Often pre-service elementary teachers become pre-occupied with remembering/mastering procedures for performing operations with fractions. They lose sight of the importance of understanding the unique value or amount represented by a fraction in a variety of situations. Our goal was to create a research lesson that assists in developing an understanding of the concept of a fraction and awareness of and connections between multiple representations of fractions. Data collected through our first cycle of Lesson Study (plan, teach, debrief, revise) informed the revisions that led to greater emphasis on the development by students of a working definition of a fraction.

10:30 – 10:45 Break

10:45 – 11:25 Section Two Panel Discussion 2.5

Panelists: Dr. Jeff Bieber, University of Kentucky
Dr. Beth Goldstein, University of Kentucky
Dr. Jane Jensen, University of Kentucky
Dr. John Yopp, University of Kentucky

Section Three: Exploring Partnership in Appalachia

11:25 – 11:55 Presentation 3.1

Appalachian Aspirations. *Jane Jensen, University of Kentucky*

This study explores the transition from high school to college for 18 Appalachian students and questions how the students' personal beliefs regarding the nature of knowledge in the domains of math and science are influenced by their interpretations of formal credentialing and place-based local knowledge systems. By talking with students, their peers, and their family members in two geographically similar, yet economically different communities, this research also examines the critical component of parent/community engagement in student achievement and contributes to

our understanding of the rural context as it pertains to learning and teaching in mathematics, science, and technology (MST).

11:55 – 12:55 Lunch

12:55 – 01:25 Presentation 3.2

Examining AMSP Partnerships: Increasing Capacity for Distributed Leadership. *Barbara Duncan, University of Kentucky*

This project examines leadership in relation to 10 AMSP Partnership Enhancement Projects. In particular, this study analyzes how leadership is distributed across institutions, people, and resources in relation to partnership outcomes. Methods involve a survey and a structured interview of project leaders, higher education partners, and participating teachers. Preliminary insights from this research suggest that while these partnerships greatly benefited from improved math and science curricula and teacher preparation, perhaps the most significant and sustainable leadership outcomes stem from the relationships, collaborations, and inter-district awareness that develop from partnership networks.

01:25 – 01:55 Presentation 3.3

Partnerships in Context. *Jeff Bieber, Karen Carey, & Beth Goldstein, University of Kentucky*

Researching what attributes allow partnerships to develop and flourish, we analyzed partnership activity data to identify one “high activity” and one “low activity” locale. At these locales, we conducted interviews of 42 individuals (school personnel, community organization personnel, and university faculty). Interviews explored general partnerships, educational partnerships, and AMSP partnerships particularly. From these comparative data, Social Network Analysis maps were developed depicting the variety of partnership networks at each site. Results document that the extent of AMSP involvement is in part an outcome of 1) local conceptualizations of how to value partnership; 2) local interaction patterns; and 3) key actors.

01:55 – 02:25 Presentation 3.4

The Effects of Peer Coaching on Teachers’ Collaborative Interactions and Student Achievement. *Sarah Murray, Central College*

This study examined the AMSP Mentored Implementation Program (MIP). An intervention group of six teachers receiving peer coaching through the MIP and their 202 corresponding students was compared with a control group of 5 teachers and their 105 students who did not participate in the MIP. Analysis of peer feedback discourse revealed the conferences focused primarily on questions related to clarifications of observations and feedback concerning the mathematical content and strategies implemented during the classroom observation. Teachers reported that the discussion and information shared had a positive effect on their teaching and that they would participate in future MIP peer collaborations. Peer coaching had no significant effect on students’ performance.

02:25 – 02:40 Break

02:40 – 03:10 Presentation 3.5

Appalachian Mathematics and Science Partnership (AMSP) Needs Analysis Surveys: Methodology and Results. *Harold Peach, Josh Paulette, Barbara Shoemaker, Donald Long, University of Kentucky; & Stephen Henderson, Kentucky Science and Technology Corporation*

This brief research note details a survey that was conducted by the Appalachian Mathematics and Science Partnership in the fall of 2006 and the spring of 2007. This survey consisted of a ‘paper’ survey administered to a focus group, which facilitated the development of an online survey that was administered to 2,175 educators from AMSP partner school districts. The justification for and methodology and results of this survey are detailed below. This survey indicated that most respondents were, in general, quite willing to identify need areas as salient for their school or district, and that administrators were more likely to identify salient need areas than were teachers.

03:10 – 03:50 Section Three Panel Discussion 3.6

Panelists: Dr. John Christopher, University of Kentucky
 Dr. Patrick Coen, Eastern Kentucky University
 Dr. Meg Moss, Pellissippi State Technical Community College
 Dr. Jeff Osborn, University of Kentucky
 Dr. John Staver, Purdue University

03:50 – 04:10 Announcement and Discussion on Research Monograph (Dr. Xin Ma)