

Transforming East Alabama Mathematics

The East Alabama Partnership for the Improvement of Mathematics Education

Sixth Annual TEAM-Math Partnership Conference
Kellogg Conference Center
Tuskegee University
September 11 - 12, 2009

Mini-Presentations

Session I: September 12, 2009, 9:40AM – 10:10AM

- **Title:** *Helping Teacher Integrate Inquiry and Technology - Connecting Multiple Representations of Motion*
Presenter: S. Raj Chaudhury, Associate Director of the Biggio Center for the Enhancement of Teaching and Learning, Auburn University, Auburn, AL
Location: Ballroom A

Abstract: Topics such as 'Motion' allow teachers to integrate concepts across the disciplinary boundaries of mathematics and science but they present special challenges in helping students make sense of multiple representation systems e.g. symbolic, numerical, graphical that are the typical tools of study. This talk will discuss the TELS online environment within which curriculum modules have been designed that allow teachers to promote an inquiry based approach to learning while scaffolding students' use of multiple representations. The TELS modules are embedded in the WISE environment which also provides strong support for teacher practice.

- **Title:** *Experiences and Perspectives of a Junior and Senior Teacher as Fellows in the TEAM-Math Teacher Leader Academy*
Presenter: Catie Culleton, Southside Middle School, Tallassee, AL and Debra Davis, Millbrook Middle Junior High School, in Millbrook, AL
Location: Meeting Room D-E

Abstract: This presentation is a personal account of two teachers that are enrolled in the TEAM-Math Teacher Leader Academy (TLA) which is a graduate program at Auburn University funded by the National Science Foundation for teachers seeking to continue their education. Debra Davis has taught mathematics for 22 years in a rural county in Alabama. Catherine Culleton is a third year teacher teaching Pre-Algebra and Algebra 1 in Tallassee, Alabama. Both teachers are enrolled in the Master of Science in Secondary Mathematics Education program. Ms. Davis and Ms. Culleton have had different experiences and backgrounds upon enrolling and being accepted into the program.

Title: *Implementation of Inquiry-Based Pedagogy Significantly Improves Middle School Student Achievement*

Presenter: John C. Mayer and Joshua H. Argo, Dept. of Mathematics, University of Alabama at Birmingham, Birmingham, AL

Location: Meeting Room F-G

Abstract: The Greater Birmingham Mathematics Partnership (GBMP) is a mathematics partnership of local school districts and institutions of higher education in the Birmingham area. The professional development provided to teachers by the Greater Birmingham Mathematics Partnership (GBMP) consists in large part of two-week intensive (all-day) summer mathematics courses for teachers modeling inquiry-based pedagogy. There are also grade-level sessions held several times during the school year, as well as sessions for administrators, parents, and the community. There are seven different courses that teachers can take during the summer, including *Patterns: an introduction to Algebraic Reasoning* (the basic course taken, pre-requisite to all the other summer courses), *Geometric and Proportional Reasoning*, *Probability*, *Numerical Reasoning*, and three more advanced algebraic reasoning courses.

A grade level at a school was classified as

- *high implementing* if all teachers at that grade level had taken at least one GBMP course, and at least 2/3 of the teachers scored 12.5 points or higher on the RTOP (*Reformed Teaching Observation Protocol* – a protocol for observing behaviors of teachers and students engaged in inquiry-based learning, scale 0-20), and
- *low implementing* if we had no observational data or not all teachers had taken at least one course.
- All others grades were classified as *moderate implementing*.

Students whose teachers provided a high level of implementation of GBMP inquiry-based pedagogy showed significantly more gains statistically ($p > 0.05$) in student achievement in mathematics on the SAT-10 than students whose teachers provided a moderate or low level of GBMP inquiry-based instruction. These findings were consistent across diverse school districts and grade levels.

In this talk, we will address

- the effectiveness of the professional development provided to teachers in the partnership,
- its impact on teacher pedagogical style and student achievement, and
- the possibility of bringing the gains seen in about 12% of students (the proportion taught by high-implementing teachers) to scale in a school, in a district, and in the partnership.

We will also address some data acquisition issues that partnerships would do well to consider when beginning such a study.

Figure 1 shows the results from grades 5 to 6 and Figure 2 shows the results combining all targeted grades (5-8).

Figure 1

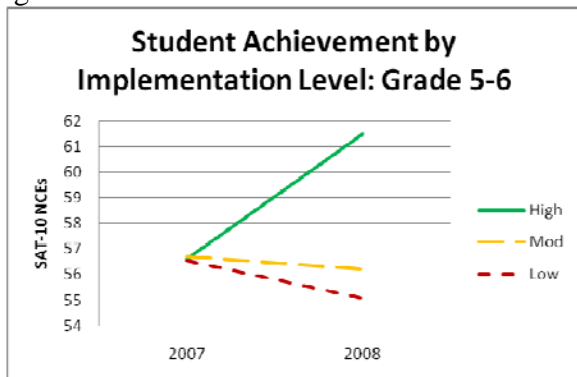
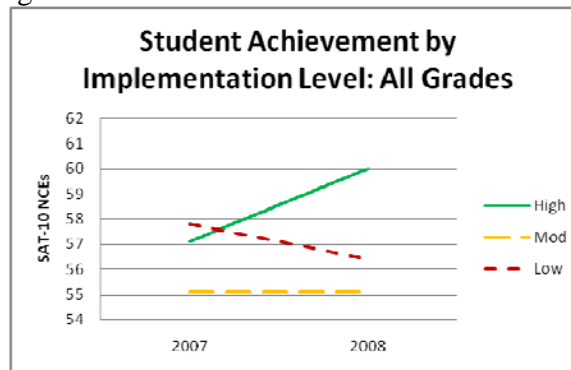


Figure 2



This research is supported by the National Science Foundation, Math/Science Partnership Program, through a \$10 million award to the Greater Birmingham Mathematics Partnership (GBMP). GBMP is a targeted partnership among 9 school districts in the Birmingham area with total student enrollment over 85,000, the University of Alabama at Birmingham, Birmingham-Southern College, and the Mathematics Education Collaborative of Bellingham, WA. Our research and professional development is targeted at middle school grades (5-8), though our project involves professional development for in-service teachers in grades K-20, as well as pre-service teachers at UAB and BSC. GBMP recently received a three-year *Phase II MSP* award to study bringing high implementation to scale.

Session II: September 5, 2008, 10:20AM – 10:50AM

- **Title:** *The Nature of Student Prediction Responses*
Presenter: Lisa Kasmer, Dept. of Curriculum and Instruction, Auburn University, Auburn, AL
Location: Ballroom A

Abstract: Research in various disciplines has substantiated the significance of using prediction to assist students' learning. Recent studies have examined the effect of using prediction in algebra classrooms, and have documented the validity of this construct in the teaching and learning of algebra. In spite of such significance and potential of using prediction, we know little about the kinds of predictions students make and what aspects of students' predictions can prompt learning, which is the focus of this study.

Prediction questions were developed by modifying teacher questions suggested by the curriculum or creating questions related to the mathematical concepts of each lesson. When the teacher presented these prediction questions in conjunction with the launch of the investigation, students recorded in writing their individual responses to each prediction question. The teacher elicited student responses as well as their rationale, without commenting on the accuracy of the prediction or the appropriateness of their reasoning. Students were also encouraged to discuss each other's ideas. The prediction questions and student responses were revisited during the summary segment of the lesson.

Students appeared to employ one or a combination of the following categories: (a) connections to previous knowledge, (b) visualization, (c) previous problems, (d) a mathematical procedure, (e) a guess, or (f) an indiscernible mechanism. Across the study, students seemed to use connections to previous knowledge and visualization more frequently than any other methods.

- **Title:** *Macon County Summer Academy of Math*
Presenter: Kamilya Green, grade 10 student, Booker T. Washington High School, Tuskegee, AL; Mohammed A. Qazi, Dept. of Mathematics, Tuskegee University, Tuskegee, AL and Bertha Walker, School Improvement Specialist, Macon County School District, Tuskegee, AL
Location: Meeting Room D-E

Abstract: The Macon County School District hosted the “Summer Academy of Mathematics” (SAM) at Booker T. Washington High School in Tuskegee, Alabama, over the summer of 2009. SAM is a five-week summer enrichment program which was designed to target rising 9th and 10th grade students in order to improve their skills in algebraic concepts. The program consisted of two instructional tiers: (1) job embedded professional development for secondary mathematics teachers; and (2) hands-on mathematics and problem solving for the students. At the Academy, students worked in a cooperative learning environment throughout the Academy, using manipulatives and technology. This session describes the planning, organization and implementation of the Academy by a partnership of school district officials, mathematics teacher educators, mathematicians, and school teacher leaders, all working closely together to improve mathematics education.

- **Title:** *A Secondary Teacher’s Perspective: Advanced Mathematical Connections to the Secondary Mathematics Curriculum*
Presenter: Nancee Garcia, Auburn High School, Auburn, AL
Location: Meeting Room F-G

Abstract: This session will briefly describe the content and experiences of the participants in the course “Advanced Mathematical Connections to the Secondary Mathematics Curriculum” that was offered at Auburn University in the Spring 2009 for secondary mathematics teachers. The course was co-taught by a mathematics professor and a mathematics education professor. The topics included Linear Algebra and Analytic Geometry, Number Systems, and Statistics and Data Analysis. This session will outline the content and give insight into teacher’s perceptions about the course and its usefulness in the secondary classroom.