

MMP BACKGROUND

The Milwaukee Mathematics Partnership (MMP) is an initiative of the Milwaukee Partnership Academy (MPA). The MPA, founded in 1999, is a comprehensive reform effort to improve mathematics and literacy at all grade levels, PK-16, through Milwaukee's public schools and institutions of higher education.



Core Partners of the MMP



University of Wisconsin-Milwaukee (UWM) is the premier urban campus in the UW system. Through its educational initiatives, UWM strives to achieve not only quality teaching and learning in MPS, but also quality education of teachers at UWM, MATC, and other local institutions of higher education. Approximately 65% of the teachers employed by the Milwaukee Public Schools have degrees from UWM, so efforts to strengthen knowledge through improved math content courses will have an obvious impact on MPS students.

Milwaukee Public Schools (MPS) is the largest public school district in the state of Wisconsin, with over 100,000 students within 165 schools. The MMP will prepare MPS students and teachers to succeed in challenging mathematics. The core goal of the MMP is to improve mathematics achievement in MPS through stronger teaching and learning.



Milwaukee Area Technical College (MATC) is the largest two-year technical college in the Midwest. Almost 80% of MATC graduates work in the greater Milwaukee area and 98% are employed in Wisconsin. MATC and UWM are co-developing core mathematics content courses to improve the mathematical preparation of prospective K-8 teachers. MATC is also establishing a mathematics curriculum strand aligned to 4-year programs to ensure a successful transition for pre-service teachers that transfer from a 2- to 4-year institution.



Distributed Leadership Positions

The MMP has introduced a distributed mathematics leadership model that is centered on school-based professional learning communities. The following new positions were created as a result of this model.

- Mathematics Teaching Specialists** work within the district to address the larger issues of comprehensive mathematics reform, as well as supporting the Math Teacher Leaders who work at the school level.
- Math Teacher Leaders** are classroom teachers with specialized mathematics training who serve as active partners on their schools' Learning Teams, and focus the school on implementation of the Comprehensive Math Framework. They also act as a mentor to other teachers in their school, particularly new teachers, and serve as a link to the district as a whole.
- Teachers-in-Residence** are exemplary teachers who were placed on special assignment at UWM to link mathematics teacher preparation and urban classroom practice. They work closely with UWM mathematics faculty to revise the math content courses (see center panel). They also participate in workshops and courses to deepen their mathematics content knowledge for teaching, and will be prepared to return to MPS in teacher leadership roles.

Principal Investigator:

Dr. DeAnn Huinker, University of Wisconsin – Milwaukee
huinker@uwm.edu

Co-Principal Investigator:

Dr. Kevin McLeod, University of Wisconsin – Milwaukee
kevinm@uwm.edu

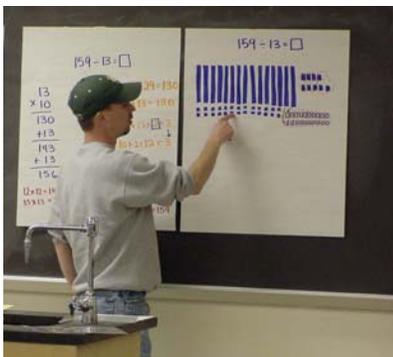
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Mathematics Design Teams

A unique feature of the Milwaukee Mathematics Partnership is a collaborative approach to redesigning mathematics curricula geared specifically toward building the mathematical content knowledge that teachers need to know through their pre-service coursework at UWM. Design teams comprised of faculty from the Math Department, School of Education, and an in-service teacher or teacher-in-residence work together to develop in-depth understanding of mathematics content in alignment with the recommendations of the *Mathematical Education of Teachers* (CBMS, 2001) and *Adding It Up* (NRC, 2001a) reports.

The design teams have piloted three new courses for elementary and middle school teachers in problem solving, geometry, and discrete probability and statistics. These courses are created and co-taught by the team members. Each course is further developed through a piloting and revision process. The design team process provides a deliberate and sustained focus on identifying the mathematical knowledge needed for teaching mathematics, on understanding its specific uses in teaching, and the careful development of well-designed and taught courses.

PROBLEM SOLVING AND CRITICAL THINKING FOR ELEMENTARY EDUCATION MAJORS



COURSE OBJECTIVE: This course addresses the five NCTM Process Standards (Problem Solving, Reasoning and Proof, Communication, Connections, and Representation), to build a strong foundation for the teaching and communication of mathematical concepts, and to provide a guided opportunity for the implementation of problem-solving instruction in a classroom.

DESIGN TEAM: Richard O'Malley (Math), Hank Kepner (Math Ed), Sharonda Harris (teacher), Kelly Kaiser (Math)

GEOMETRY FOR ELEMENTARY EDUCATION MAJORS

COURSE OBJECTIVE: This course develops students' familiarity and facility with geometry, both as an applicable collection of methods for studying properties of figures in space, and as a logically interconnected subject in which a few basic principles give rise to a huge variety of geometric facts and techniques.



DESIGN TEAM: Ric Ancel (Math), Hank Kepner (Math Ed), Melissa Hedges (teacher)

DISCRETE PROBABILITY AND STATISTICS FOR ELEMENTARY EDUCATION MAJORS

COURSE OBJECTIVE: Everyday life is filled with events that seemingly occur in a random manner. Simple examples are the outcome of flipping a coin or winning lottery numbers. More sophisticated examples include the number of phone calls received by an exchange, and the amount of rainfall in a month. The aim of this course is to develop probability models for some simple and complex random occurrences and to use the theoretical probabilities to make inferences. Simulations of random experiments are a central part of the course.



DESIGN TEAM: Dick Stockbridge (Math), Hank Kepner (Math Ed), Bernard Rahming (teacher), Pat Hofensperger (teacher)

ALGEBRAIC STRUCTURES FOR ELEMENTARY EDUCATION MAJORS

INTENDED OBJECTIVES: To provide a higher level understanding of the basic patterns and rules which govern everything from number systems to geometric transformations to the manipulation of polynomial expressions.

DESIGN TEAM: Craig Guilbault (Math), Hank Kepner (Math Ed), Connie Laughlin (teacher)

MATHEMATICAL EXPLORATIONS FOR ELEMENTARY TEACHERS, I & II

INTENDED IMPLEMENTATION DATE: Year 3

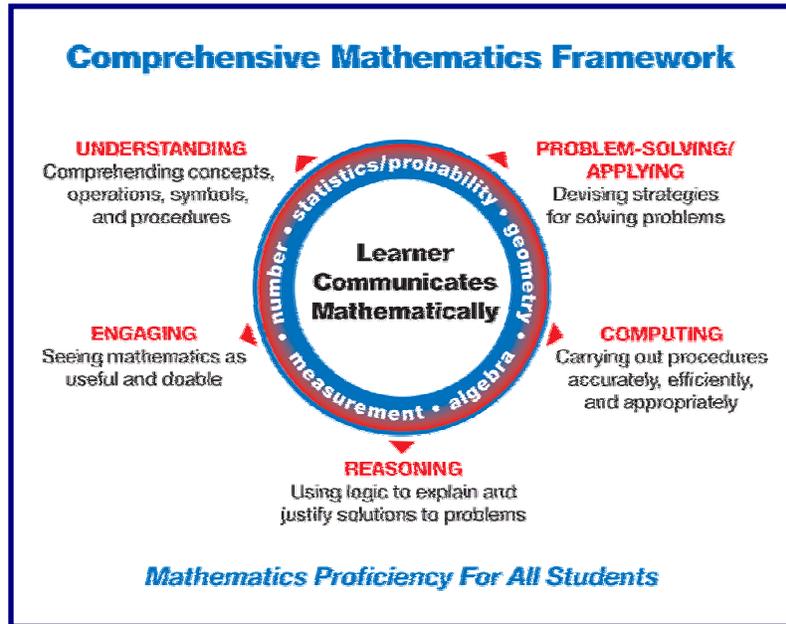
DESIGN TEAM: Gary Luck (Math), Kevin McLeod (Math), DeAnn Huinker (Math Ed), Meghan Steinmeyer (teacher), Bernard Rahming (teacher)

CAPSTONE COURSE FOR HIGH SCHOOL TEACHERS

INTENDED IMPLEMENTATION DATE: Year 4

DESIGN TEAM: Kevin McLeod (Math), Hank Kepner (Math Ed), Dan Lotesto (teacher)

CHALLENGING MATHEMATICS



THE COMPREHENSIVE MATHEMATICS FRAMEWORK

(CMF) is a collective vision of deep learning and quality teaching of challenging mathematics.

In a survey taken prior to the formation of the MMP, 86% of Milwaukee schools reported that such a vision was lacking. The CMF ties the 5 Wisconsin content standards together with the 5 components of mathematical proficiency described in the NRC report *Adding It Up*. It drives classroom practice, defines high-quality teaching of challenging mathematics, and is incorporated into the entire teacher learning continuum from teacher preparation through induction and continuing professional development. In Fall 2004, 100% of Milwaukee schools reported an awareness of the CMF.

GRADE LEVEL LEARNING TARGETS AND PERFORMANCE ASSESSMENTS

Milwaukee Public Schools have developed learning targets in mathematics for each grade level (K-12), aligned to the Wisconsin Model Academic Standards. The district has now begun the process of developing sample classroom assessments based on these standards (CABS). Teams from MMP, made up of university mathematicians and math educators, Teachers-in-Residence, and MPS teaching specialists, run regular workshops and retreats to explain the use of the learning targets and CABS to classroom teachers.

ENSURING SUCCESSFUL COLLEGE TRANSITION

University mathematicians collaborate with MPS teachers to align challenging mathematics courses for MPS students with the preparation of students for entry to higher education. The goal is not only a reduction in the number of students assigned to remedial courses in college, but also a strong foundation for students to be successful at all levels. Faculty from UWM and MATC work together to ensure alignment of courses in these two post-secondary institutions.

IMPROVING TEACHERS' CONTENT KNOWLEDGE

At UWM, design teams containing mathematicians, math educators and TIRs are developing courses for pre-service K-8 and high-school teachers, as recommended by the CBMS MET report (see center board).

The MMP runs regular retreats and workshops designed to improve the mathematical content knowledge of in-service teachers.