

**NH-MSP Grant,
Middle School Initiative
Extension 2005-2007
for
UNH Middle School Mathematics Partnership:
Systemic Professional Development for Improvement of Middle School Mathematics**

In the Spring of 2004 the University of New Hampshire entered into a partnership (funded by NH DOE Mathematics/Science Partnership Initiative) with selected New Hampshire middle schools that aimed toward a sustained effort for improving the quality of teaching and learning of mathematics at the middle school level. In the years of 2005-2007 the partnership will continue to build and extend the successes of a mutually beneficial program that can be sustained beyond the period of initial funding.

Our long term goal is to enhance and maintain continuous professional development of middle school mathematics teachers throughout their career with the intent of achieving improved student knowledge of high-quality mathematics. The focus of the program will be to develop and sustain activities that will strengthen the mathematics content knowledge of in-service mathematics teachers at the middle school level. The project will support middle school mathematics teachers' intellectual growth by improving their subject matter knowledge as a basis for further enhancement of their pedagogical skills. More particularly, the project will strive to strengthen teachers' understanding of the methods of inquiry in mathematics that include reasoning with symbols and various representations, argumentation, and understanding proofs as a tool for discovery and justification.

The professional development program we propose seeks to improve the achievement in high-quality mathematics by all students at the middle school level. Numerous studies show that many teachers, especially at the middle school level do not have sufficient content knowledge or adequate educational background for teaching mathematics (NCR, 2001). It has been found (Carlsen, 1988; Ball & Bass, 2000) that teachers with deep conceptual understanding of mathematics not only know more content but also use their content knowledge more effectively in their classrooms.

The proposed program will develop summer courses and a series of monthly workshops that focus on strengthening deep conceptual understanding of the mathematics content. The emphasis will be placed on making teachers knowledge of mathematics explicit rather than tacit by building their understanding of the **Why** in mathematics vs. just knowing **How**. The activities will enhance teachers' knowledge of important relationships and connections among mathematical ideas; special attention will be paid on the use of various visual as well as symbolic representations in mathematics. Reasoning, proofs, and problem solving will be at the core of our activities as essential tools for conceptual understanding of mathematical ideas. The summer courses and school year workshops will be discursive by nature, fostering discussions and exploration. In addition, the project will offer a series of workshops focused on the Lesson Study model of professional development as a way to enhance teachers' ability to incorporate and develop all aspects of their teacher knowledge – knowledge about curriculum, lesson planning, content and pedagogy. Finally, throughout this project we will develop avenues for systematic evaluation and refinement of the program.