

Project M³: Mentoring Mathematical Minds (Workshop)

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Abstract

Project M³: Mentoring Mathematical Minds is a 5-year Javits research grant project designed to provide challenging, motivational curriculum units for students with mathematical promise in grades two through six. In this workshop, participants will be actively involved in exploring activities from the project that are designed to develop problem solving heuristics and strategies through the use of rich learning tasks, questioning strategies, hints for students having difficulties, “Think Beyond” questions to assist with the differentiation of the tasks, both verbal and written.

Overview

Project M³: Mentoring Mathematical Minds is a 5-year Javits research grant project designed to provide challenging, motivational curriculum units for students with mathematical promise in grades two through six. These units are unique in that they combine exemplary teaching practices of gifted education with the content and process standards promoted by the National Council of Teachers of Mathematics. The content at each level includes number and operations, algebra, geometry and measurement, and data analysis and probability.

Students are encouraged to think deeply about important mathematical concepts and thus discover the complexity and beauty inherent in the study of mathematics. The program uses engaging, inquiry-based investigations to foster mathematical discovery and learning. The focus of the pedagogy is encouraging students to act as practicing mathematicians by emphasizing verbal and written communication. Instructional strategies include use of a verbal discourse model to create a classroom environment in which all students participate in high-level and in-depth discussions. Written communication is emphasized in each lesson as students justify their thinking and create new and interesting problems to solve.

Research was conducted on the implementation of 11 units in 11 different schools, 9 in Connecticut and 2 in Kentucky. These schools were of varying socioeconomic status with a diverse student sample. Units have been used across the United States, Canada and Singapore, and research results are uniformly positive. On both multiple-choice tests and open-ended questions used to measure grasp of concepts and problem solving, students did better than peers who showed the same potential but weren't placed in M³ classes. Results show statistically significant gains across all mathematical concepts in each unit from pre to post testing on criterion-referenced unit tests.

For each of the last three years, a unit from Project M³ has won an award from the curriculum studies division of the National Association for Gifted Children (NAGC) and has been judged to be an exemplary model of curriculum for high-ability learners. Project M³ provides the first set of research-based mathematics units designed for talented elementary students and with advanced mathematics content to promote challenge and enjoyment. For more information see <http://www.projectm3.org/>.

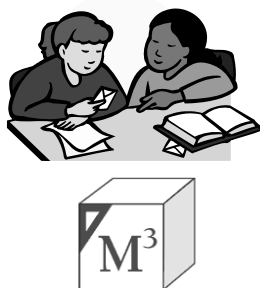
Goals

Goals of the project include:

- Creating challenging and motivational curriculum units for students;
- Providing ongoing professional development for teachers;
- Increasing math achievement and attitudes toward math in talented and diverse students;
- and
- Narrowing the gap in math achievement for students with talent potential from economically disadvantaged backgrounds, those with limited English proficiency, and minorities.

Workshop Description

In this workshop, participants will be actively involved in exploring activities from the project that are designed to develop problem solving heuristics and strategies through the use of rich learning tasks, questioning strategies, hints for students having difficulties, “Think Beyond” questions to assist with the differentiation of the tasks, and verbal and written discourse. The strategies for oral discourse on following bookmark will be used to give participants a brief view of the program implementation.



Role of a Student Mathematician

- Repeat/rephrase
- Agree/disagree...and tell why
- Add on to...
- Wait, think, and go deeper
- Talk to a partner
- Record reasoning and questions

Role of a Teacher/Mentor

- Ask questions that encourage creativity and reasoning
- Elicit, engage and challenge each student's thinking
- Listen carefully to students' ideas
- Ask students to clarify and justify their ideas
- Attach notation and language to students' ideas
- Decide when to provide information, clarify, model, lead or let students struggle
- Monitor and encourage participation