

**American Mathematical Society
Committee on Education Meeting
October 24-25, 2003
Washington DC**

Summary Report

The Committee discussed a number of issues related to mathematics education, including expanded learning and professional development for pre-service and in-service teachers; graduate education in mathematics; the new SAT test; new projects at the NSF; and several programs, partnerships and initiatives which focus on improving mathematics education. Guests of the Committee included representatives from the NSF, Achieve, the College Board and the U.S. Department of Education and several mathematicians involved in educational projects. The meeting was well attended with 49 participants, including chairs of doctorate-granting departments of mathematics from across the country.

Presentation on Preparing Materials and Structuring Mathematics Courses for Pre-Service Teachers
Jim Milgram (Stanford University) presented the case for significant improvement in the K-12 education system in this country. He discussed how standard interventions have failed children and he called for increasing pre-service requirements to address the problem, citing the state of California and its written standards and the University of Georgia with its increase in content requirements for pre-service mathematics teachers as examples. These measures are moving the system towards successful mathematics education, but there is much more work to be done.

Milgram discussed the measures he believes necessary to get back on track, including giving states standards, changing K-8 teacher certification requirements and giving teachers in-service support in mathematics.

Milgram is currently part of a project funded by the Funds for the Improvement of Education (FIE) focused on analyzing the mathematical issues required for effective instruction of pre-service and in-service teachers. A committee has been assembled to work on the project whose objectives are to create course construction guides for development of core college level courses for pre-service K-8 teachers and to develop guides for creating effective in-service math institutes for K-8 teachers. A rough draft of the committee's recommendations are due by the end of December 2003.

The New SAT Mathematics Test

Robin O'Callaghan of The College Board discussed the state of the SAT test in mathematics. She gave background information on the test, including its configuration, content areas and question types. She also gave several examples of the types of questions on the current SAT test and distributed copies of the SAT test preparation booklet. Changes that were made to the test in 1994 were also discussed, including allowing calculators, adding topics and student-produced response questions.

O'Callaghan then presented the changes to the SAT mathematics test that will take place in 2005. The new SAT will eliminate quantitative comparison questions, there will be some content changes, a new configuration and it will be further aligned with curricula. There will be significant change in the algebra and functions portions of the test, as well as changes in other areas including geometry and measurement. The SAT advisory committee also made other broad recommendations including multiple solution strategies, estimation and multiple representations. Other policy changes recommended by the advisory committee included figures being drawn to scale, continuing to give formulae and allowing scientific level calculators which are what students are using in the classroom. In addition to changes in the

mathematics portion of the test, there will also be changes in the reading and writing portion. The first administration of the new SAT test will be in March 2005.

Achieve's Mathematics Achievement Partnership

Laura McGiffert of Achieve discussed the organization's Mathematics Achievement Partnership (MAP) program. She began by giving some background on Achieve and then outlined Achieve's MAP initiative, which was started in 1999 following the Third International Mathematics and Science Study (TIMSS). TIMSS compared U.S. students' performance to that of students from around the world and found that there were serious problems in mathematics education in this country, particularly by the time students reached middle school. The MAP initiative is working to help address these problems.

Achieve partnered with ten states to embark on the MAP initiative with the goal of improving middle school mathematics achievement by raising expectations and improving teaching. The MAP initiative utilized a panel of university mathematicians, mathematics educators and state and local supervisors of mathematics education to develop *Foundations for Success*, which outlines student knowledge expectations at the end of 8th grade. Initially, the MAP initiative was looking to develop a common assessment of student knowledge to be used across the states, but it had to make a strategic shift following the institution of the "No Child Left Behind" legislation. The climate under this new legislation was less supportive of a common assessment.

MAP is currently working with a New England consortium in addition to its ten partner states. The states want to collaborate on improving their own assessments, improving the quality of the data that drives decision making and perhaps collaborating on a set of standards for teacher knowledge at the elementary and secondary levels. Achieve is working to develop guidelines to help states achieve the level of success outlined in *Foundations for Success* and are doing this by "backmapping" – looking backward to see what steps are necessary to achieve the outlined goals. Achieve is planning to have a consultation draft of the K-8 benchmarks published in March 2004 and will ask the AMS Committee on Education to formally review it prior to publication.

U.S. Department of Education Mathematics and Science Partnerships (MSP) Program and the Mathematics and Science Initiative (MSI)

Patricia O'Connell Ross gave a description of the "No Child Left Behind" program and then described the Title II program, which is a \$3 billion program that funnels money to the states to address the need of improving teacher quality. Within Title II, there are mathematics partnership programs. Initially, the bulk of the funds for the mathematics partnership went to the National Science Foundation (NSF). Now there are two programs – one at the NSF and one at the Dept. of Education.

The Dept. of Education Mathematics and Science Partnerships (MSP) Program gives formula funded dollars to states with the intent of increasing the academic achievement of students in mathematics and science by providing for the professional development of teachers with a focus on content knowledge and related teaching skills. The core partners of the program must be arts and science faculty in higher education and high-need school districts, although other partners are also allowed. It is a discretionary grant program administered by the states with annual evaluation reports submitted to the Secretary of Education. The size of the grants range from \$500,000 to \$15 million and are mostly funding multi-year partnerships. The 2003 total funding amount for this program is \$100 million.

The Dept. of Education Mathematics and Science Initiative (MSI) was launched this year and focuses on achieving three goals: conducting a broad based public engagement campaign that draws attention to the need for better mathematics and science education in U.S. schools; initiating a major campaign to recruit, prepare, train and retain teachers with strong backgrounds in math and science; and developing a major

academic research base to improve our knowledge of what boosts student learning in mathematics and science in the classroom.

Ross also reported that the Dept. of Education will hold a Summit on Science on March 16, 2004 during “Excellence in Science, Technology and Math Education (ESTME) Week,” March 15-20, 2004.

National Science Foundation Math and Science Partnership (MSP) Program

Diane Spresser, Senior Program Coordinator of the MSP Program at the National Science Foundation - Directorate for Education and Human Resources (NSF-EHR) outlined the MSP Program as a major research and development effort designed to improve K-12 student achievement in mathematics and science.

In 2002-03, the MSP Program supported 12 awards for Comprehensive Partnerships that implemented change in mathematics and/or science educational practices resulting in improved student achievement across the entire K-12 spectrum. It made 23 awards for Targeted Partnerships in mathematics and/or science with a focus on narrower grade bands in K-12. It also provided one prototype award for an Institute Partnership in the areas of content and leadership.

In 2004, NSF seeks to support three types of MSP projects: Targeted Partnerships for the secondary grade levels; Institute Partnerships; and Research, Evaluation and Technical Assistance (RETA) in support of the Institute Partnerships. The 2004 Institute Partnerships will be focused on the development of school-based intellectual leaders and master teachers; and teachers of mathematics or the sciences in the secondary grades and elementary specialists. Participants will be experienced teachers who want to deepen content knowledge and build leadership skills. The Institutes will be multi-year programs of coherent study within a particular discipline. The 2004 RETA proposals must support the work of the Institute Partnerships through research on the characteristics that define and contribute to the development of teacher intellectual leadership; development of assessments on teacher growth in content knowledge, leadership and/or reflective practice; or research on the attributes of challenging mathematics/science content.

National Science Foundation Mathematics Education Portfolio Review

Janice Earle, Senior Program Director of the Division of Elementary, Secondary, and Informal Education (ESIE) – a division of the NSF-EHR -- provided an update of the Mathematics Education Portfolio Review. This portfolio review gives the NSF a means by which to critique its mathematics education programs across divisions in order to determine their value to the mathematics education system. The criteria used to judge the portfolio includes determining the relevance of the portfolio, its quality and performance. The data reviewed by expert panels includes EHR program solicitations and “Dear Colleague” letters from 1994-2002; a random sampling of projects; “profile” cases on projects that have had a significant impact; analysis of responses by external resource groups (some 20 mathematics and general education organizations were invited to participate); and presentations from their first expert panel meeting that looked at the mathematics education system as a whole.

During this review process, the expert panel also raised some issues including the appropriateness and centrality of mathematics content in programs; NSF infrastructure, processes and procedures; long term impact and sustainability of programs; and the size, scope and duration of awards. The panel will meet again in January 2004 to formulate a plan for the future based on these issues. The final report on the Mathematics Education Portfolio Review is due in February 2004.

National Science Foundation New Pipeline Projects

John Conway (University of Tennessee), Program Director for the Division of Mathematical Sciences (DMS) at the NSF, gave an overview of some new pipeline programs at the DMS. These programs fall under the project name “Enhancing the Mathematical Sciences Workforce in the 21st Century” and consist of three parts: Vertical Integration of Research and Education (VIGRE); Mentoring Through Critical Transition Points (MCTP); and Research Training Groups (RTG) – the last two are new.

The goal of RTG is to provide groups of researchers having related research goals in the mathematical sciences with funds to foster research-based training and education. There is \$4 million available for this project with possibly nine awards up to \$500,000 per year for five years. The MCTP will provide a system of mentoring, devoted to points of transition in a mathematical sciences career path that are critical for success, from undergraduate studies to the early years in a tenure track position. There is \$4.5 million available for this project with possibly six awards up to \$500,000 per year for five years. Another project is Interdisciplinary Training for Undergraduates in Biological and Mathematical Sciences (UBM). UBM was started on a trial basis this year with award amounts that will range up to a total of \$100,000 for up to two years.

Professional Development Programs for Vermont Teachers

Ken Gross (University of Vermont and Lesley University), the Director of the Vermont Mathematics Initiative (VMI) gave an overview of the VMI and the Vermont Mathematics Partnership (VMP). The VMI began five years ago and is a comprehensive, professional development masters degree program for training K-6 mathematics teacher leaders – a three year program at the University of Vermont. There are approx. 150 teachers in the program representing 60% of Vermont’s school districts and the goal is to put a mathematics teacher leader in every elementary school in the state. The VMP is one year old and is funded jointly by the NSF through the MSP Initiative and by the U.S. Department of Education and builds upon the VMI by expanding from K-6 to middle level, high school and into the pre-service area as well.

The principle that these programs are built on is that it is the teacher that makes the difference in effective mathematics education and these programs strive to arm teachers with the knowledge and skills they need to become leaders in their classrooms, schools and districts.

Status Report on the MAA CUPM Curriculum Guide 2004

Michael Pearson, Director of Programs & Services for the Mathematical Association of America (MAA) gave a status report on their Committee on Undergraduate Programs in Mathematics (CUPM) project. The 2004 publication will be the sixth set of guidelines over the past fifty years that makes recommendations to guide mathematics departments in designing curricula for their undergraduate students. Many recommendations in this new guide echo those in previous reports, but the biggest difference between the 2004 guide and previous editions is that it will address the *entire* college-level mathematics curriculum – earlier reports focused on undergraduate programs for mathematics majors only.

The pre-publication draft of the new report was completed in September 2003 and the expected publication date of the final report is late January 2004. The Calculus Reform And the First Two Years (CRAFTY) Curriculum Foundation’s reports will be published along with the CUPM guidelines and bundled together to be sent to all mathematics departments in the U.S.

Review of AMS Educational Activities

Roger Howe, CoE Committee Chairman, reminded the committee that at last year’s meeting, the CoE set up a five year cycle of reviews of AMS education activities -- a review of the Young Scholars Program is this year’s charge. In 2004, CoE is to look at graduate education. A subcommittee will be formed to conduct this review process.

Report on the AMS Young Scholars Program

Bob Devaney (Boston University) presented the written report prepared by the CoE subcommittee consisting of Devaney, Bill McCallum and Louise Raphael on the review of the AMS Young Scholars Program. This report was prepared for the AMS Executive Committee and Council as part of the educational activities review process established at last year's CoE meeting. Overall, the committee found the Young Scholars Program to be well received in the mathematics community with very positive effects. The committee's recommendation is to continue the program and possibly enhance it by seeking outside support, perhaps through industry and/or through foundations.

The Committee on Education voted to accept the subcommittee's Report on the AMS Young Scholars Program as presented and is submitting it to the AMS Executive Committee and Council as part of this summary report (**see Attachment #1**).

Graduate Education and the Carnegie Foundation Initiative on the Doctorate (CID)

Hyman Bass (University of Michigan), John D'Angelo (University of Illinois at Urbana-Champaign), and John Ewing (AMS) led a panel discussion on the Carnegie Foundation Initiative on the Doctorate (CID) – a multi-year research project aimed at improving the doctorate in American universities. There are eight partner mathematics departments (Duke University; Ohio State University; SUNY at Stony Brook; University of Chicago; University of Illinois at Urbana-Champaign; University of Michigan, Ann Arbor; University of Nebraska-Lincoln; and University of Southern California) participating in the initiative, which is examining six fields of study. Discussion focused on the stewardship of the profession and the best way to improve it.

CoE Activities at Phoenix, AZ Joint Mathematics Meetings, January 2004

Roger Howe reported that CoE would sponsor a panel discussion entitled "The Evolution of State Mathematics Standards: How Can Mathematicians Contribute?" on Saturday, January 10 from 8:30-10:00 am. Howe will moderate the panel, which will include panelists: Johnny Lott of NCTM and the University of Montana; Laura McGiffert of Achieve; a representative of the Association of State Supervisors of Mathematics (ASSM); and a mathematician.

Date of Next Meeting

The next meeting of the AMS Committee on Education was scheduled for Friday-Saturday, October 22-23, 2004 in Washington, DC.

Submitted by Anita Benjamin
American Mathematical Society
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