AMS COMMITTEE ON EDUCATION
Meeting held Friday-Saturday, October 26-27, 2001, Washington DC

Summary Report

The involvement of professional mathematicians in K-12 education was the theme chosen for this meeting by CoE Chair Roger Howe. Despite difficult travel conditions, about 45 people attended the meeting. In addition to Committee members, invitees included several department chairs/leaders, Congressional staff, representatives from federal agencies and other mathematical organizations, plus a couple of young visitors (current and former graduate students). Over the course of busy two days the discussions ranged over the extent of AMS involvement in current mathematics education issues and initiatives. Roger Howe set the tone by noting that, as a result of recent CoE comments on the draft of the NAEP Mathematics Framework for 2004, presented by Herb Clemens at a recent public session, the committee has been invited to write introductions to three of the five subject areas in the Framework. CoE is currently working on the drafts.

Mathematics Publishing*:*
Representatives from publishers of mathematics textbooks (K-12) were for the first time invited to CoE. Pat Brill (Harcourt School Publishers) and Rosi Marshall (Scott Foresman) described how they worked with mathematicians in their projects, the kind of input they found most valuable, and some of the difficulties encountered. CoE members learned about the constraints under which textbook publishers work, and felt that the ensuing dialog was helpful in sharpening their understanding of the issues involved. A particular problem faced by publishers is the lack of uniformity of the various state standards that must be met, and they would be very grateful for whatever mathematicians could do to promote national standards. Brill and Marshall stayed for most of Friday's sessions and the dialog continued.

Andy Magid, who had represented CoE at a meeting of the American Association of Publishers, described his interactions with the representatives from the mostly large publishers in attendance.

National Science Foundation
Philippe Tondeur (DMS) and Dennis Davenport (EHR) described NSF education projects affecting mathematical sciences. Tondeur noted that NSF's FY2002 budget still working through Congress would end up with a respectable mathematics budget, in a not-very-good science budget. However, FY2003 will be massively affected by the September 11 attacks and the budget for mathematics will be hard to predict. Davenport gave details of the NSF initiatives offering funding for mathematics education projects.

U.S. Department of Education
Patricia O'Connell Ross reported that although there was still no FY2002 budget for the Department, the Administration has made it very clear that there will be substantially more money for education, and that the big focus will be on reading. Although the U.S. culture works against any national standards, the federal government will be holding states accountable for Dept. of Education investment. The Department's most important research initiative is the Inter-agency Education Research Initiative (IERI), a cross-agency, cross-disciplinary, long-term approach to translate the findings of research projects and clinical trials into practice in large numbers of schools. Administered jointly with NSF and NIH (which has invested in reading research for many years, resulting in a knowledge base sufficiently robust to provide some confidence about what intervention works best) the portfolio currently has a majority of reading programs; very few mathematics proposals have been received.

The following day, Carole Lacampagne and Deborah Ball spoke on the progress of the Rand Mathematics Study Panel, whose draft report will soon be available on the Web. Roger Howe has also been involved in this panel, which had arisen out of the Department's concerns about the quality of research in education, and mathematics education in particular. Research was scattered, did not accumulate into a large research knowledge base, and, even when of high quality, did not translate into practice. What is proposed is a coordinated research agenda, focused on teaching and learning of algebra (broadly defined), identification and development of mathematical practices, the nature and uses of knowledge in mathematics teaching, and how such knowledge can be effectively deployed in practice. There was much discussion about this

project, and CoE was asked to participate in refining the draft. Both CoE members and department chairs were asked to organize review groups to provide feedback.

Education Trust.
Concluding the K-12 segment of the agenda, Jan Somerville brought data on the cohort of students who are graduating from high school, and what seems to make a difference in their success. Those few places making large gains in graduating students are unequivocal that their goal is to raise the bar and provide all students with college preparatory courses. But in order to have a clear target, K-12 people are asking higher education institutions for some consensus on what it means to be "college ready" – what skills and knowledge are necessary to begin credit level work. Somerville is working with states to see if there are a few important things on which a consensus could be reached.

MAA project on the transition from school to college mathematics.
Bernard Madison is looking at issues at the boundary between school and college mathematics, noting that the fastest growing courses in high school are mathematics courses for college credit. The 2000 CBMS Survey is providing data on dual credit courses – 13.6 percent of college algebra courses are done in high school. Madison is also examining college placement exams and expectation statements.

Senator Joseph Lieberman's "Tech Talent Bill"
Kendra Sharp, a Congressional Fellow in Lieberman's office, said that this bill, recently introduced in Congress, aimed at increasing the number of science, mathematics and technology degrees by offering incentives to universities and colleges. To be administered by NSF, grants would be made to institutions that propose to introduce innovative methods to increase, and retain, the number of majors. With bipartisan support, this bill has good prospects for approval in both Senate and House. A demonstration program would be funded initially, with the hope that it would grow and serve as an incentive to institutions to change behavior. Some concerns were expressed at the meeting about the danger of institutions increasing the numbers, but lowering standards.

Carnegie Project on the Doctorate.
Moving up the pipeline, the committee heard from George Walker about this project, the largest ever engaged in by the Carnegie Foundation. Noting that if one wants to change academic culture, one has to address the important role that the PhD plays. Disciplines are being asked to define "stewardship" in a disciplinary context, after which Carnegie will first work with four to six departments in each discipline to implement innovative, multi-department programs. After examining the results of these experiments, Carnegie will work to facilitate broad adoption of successful models. Walker asked CoE "What does stewardship entail for mathematics?" and "How do we structure a doctoral program to prepare stewards of the discipline?" Carnegie have commissioned essays from mathematicians (AMS President Hyman Bass has been asked to write one) and will organize discussion sessions at disciplinary society meetings and Carnegie-sponsored "convenings".

Mathematical Education of Teachers.
Jim Lewis outlined the recent report "Mathematical Education of Teachers" (MET), the outcome of a CBMS project funded by the Dept. of Education. The report has been distributed to all mathematics departments, colleges of education, deans, and professional organizations. A national summit will be held in November, funded by Exxon and NSF, at which 270 participants are expected.

Alan Tucker spoke about an MAA project, "Preparing Faculty to Teach Teachers", an outgrowth of the MET report. A planning grant had been received from Exxon. Tucker noted that mathematicians would be regressing to the norm by resuming their involvement in K-12 teaching that had fallen off in the second half of the 20th Century. A workshop will be held after the Joint Mathematics Meetings in January 2002. The group intends to organize workshops in states where regional follow-up meetings will be possible, and future articles are planned, along the lines of a recent one on outreach by John Conway, published in the *Notices of the AMS*. The aim of the project is to create a climate where faculty are more receptive to teacher education issues, are sensitive to the needs of prospective K-12 teachers, able to "deprogram" inculcated incorrect or negative ideas about mathematics and foster the correct ideas. Regional networks, web sites, mini-grants are also planned.

MAA Committee on the Undergraduate Program in Mathematics (CUPM).
Tom Rishel reported on work of CUPM and its subcommittee on calculus reform and the first two years of college (CRAFTY). CUPM has been working on recommendations for the undergraduate mathematics and Rishel said the goal is to have a document ready this year. Recommendations have moved away from individual courses to broader recommendations on the critical skills ("habits of mind") needed for mathematics majors. MAA will hire a professional writer to prepare the final version. Roger Howe noted that David Bressoud has been CoE's representative to CUPM, participating in the work over the last few years. CoE will send a representative to a CUPM meeting at the August 2002 MathFest, which will produce a final draft report. CoE will then be called on to assemble a subgroup (ARG) to comment over fall and winter of 2002-2003 on the final draft. Rishel reported that CRAFTY has concentrated in the first two years of college mathematics, sponsoring workshops and discussion papers. A dissemination workshop will be held in November. Reports from various disciplines are available on the Web at //academic.bowdoin.edu/faculty/B/barker/dissemination/Curriculum Foundations/

AMS-MAA Preparation of Future Faculty (PFF) project.
This three-year NSF-funded project ends in November, CoE heard about the experiences of participants from three of the four mathematics departments receiving PFF subawards: Arizona State University (graduate student); SUNY, Binghamton (former graduate student, now a faculty member at King's College), and Virginia Tech (graduate coordinator). Each reported enthusiastically on the value of this program.

Mathematicians and Education Reform Forum.
Naomi Fisher reported that the AMS-MER Professional Master's Program project would end in November, having conducted three workshops and created a directory of Master's programs (soon to be available on the AMS website). A new 3-year AMS-MER project has received funding from NSF – *Excellence in Undergraduate Education: Confronting diverse student interests* – which will include six workshops for department teams.

CoE at San Diego Joint Mathematics Meetings, Jan. 2002
CoE will sponsor an address by Lee Stiff, President, National Council of Teachers of Mathematics, entitled "A conversation with the NCTM President – Facing the challenges of mathematics education together". CoE Chair Roger Howe intends to prepare for thoughtful reactions to Stiff's talk, to stimulate discussion. Date: Wednesday, January 9, 8:30 to 10:00 am.

Submitted by Monica Foulkes
American Mathematical Society

November 6, 2001