American Mathematical Society
Committee on Education Meeting
October 19-21, 2006
Washington DC

Summary Report

The Committee discussed a number of issues related to mathematics education. Guests of the Committee included representatives from the American Council on Education, Education Development Center, National Science Foundation, Achieve, Math for America, The College Board, Council of Graduate Schools. The meeting was very well attended, with 73 participants, including 35 chairs and representatives of mathematical sciences department.

Discussion on Mathematics Education

James Glimm (Stony Brook University/AMS President Elect) opened the meeting with a discussion on mathematics education, particularly undergraduate education. He referred to a number of recent studies on the teaching of calculus that find that there are problems in the system. Glimm advocated for the mathematics community to look for ways to improve the teaching of calculus (and other courses). He had some suggestions for the AMS and the Committee on Education on this point, including: 1) making available to incoming department chairs and directors of undergraduate instruction a collection of recent reports on the topic of mathematics education and, generally, on chairing a mathematics department; 2) providing help sessions whereby those schools who have achieved improvement in their teaching can be a resource for other universities; 3) addressing the undergraduate instruction issue as a supplement to the AMS department chairs workshop held at the Joint Meetings. He also made some recommendations for mathematics departments, including: 1) rewarding good teaching; 2) building support within a department structure for concern about teaching; 3) working with poor teachers to improve their teaching. Glimm cited some other examples of how universities are addressing teaching improvement.

Report on The Institute for Mathematics and Education

Bill McCallum (University of Arizona/COE Chairman) reported on a new initiative at the University of Arizona – The Institute for Mathematics and Education. The aim of the institute is to provide a place for disciplined collaborative work between mathematicians, educators and teachers. The goals of the institute are: 1) focused collaboration aimed at concrete improvements in mathematics education; 2) norms for interdisciplinary scholarship; and 3) a professional culture which respects and rewards collaboration.

McCallum informed attendees of one of the Institute's coming events -- a Workshop on Mathematics Courses for Teacher Education to be held March 1-4, 2007 in Tucson, Arizona.

Report on the Secretary of Education's Commission on the Future of Higher Education

Bill Parsons (American Council on Education-ACE) discussed the report from U.S. Secretary of Education Margaret Spellings appointed commission regarding the future of higher education. The report is entitled "A Test of Leadership: Charting the Future of U.S. Higher Education." Parsons gave attendees some background on the commission and its report, including information on the makeup of the panel, hearings and testimony.

The report includes findings and recommendations in four basic areas: access, affordability, quality and accountability. One significant proposal that Parsons discussed was with regard to Pell grant awards – the proposal is to increase the average award from the current level of 48 percent of the cost of an average four year public university to 70 percent. Parsons also mentioned that the report does embrace the funding levels recommended in the President's American Competitiveness Initiative (ACI).

ACE President David Ward was the only commission member to not offer his signature on the report presented to Secretary Spellings. Parsons explained that Ward found fault with some of the report's recommendations and detailed some of them for meeting attendees. He also discussed some of the positive and non-controversial recommendations of the report to give attendees an overview of the findings in the report.

"Collaborations Between Mathematicians and Educators"

Sarah Sword (Education Development Center) introduced the panel to discuss collaborations between mathematicians and educators. The panel consisted of three teams: Jim Lewis and Ruth Heaton from the University of Nebraska; Glenn Stevens and Steve Rosenberg from Boston University; and Karen King from New York University and Irwin Kra from Math for America.

Glenn Stevens and Steve Rosenberg presented information on two collaborative efforts at Boston University. One is the Program in Mathematics for Young Scientists (PROMYS) and the other is the Focus on Math MSP. PROMYS was founded in 1989 and grew from a focused program for high school students to a program that works with teachers in school settings that includes three elements – an immersion experience, a research experience and a leadership experience. The Focus on Math MSP was launched in 2003 and Rosenberg discussed its efforts in bringing together mathematicians, math education professors and high school district leaders to work on meaningful content in the state's exit exams.

Jim Lewis and Ruth Heaton then presented information on the Math in the Middle Partnership (M^2) at the University of Nebraska-Lincoln. The goal of M^2 is to improve K-12 student achievement in mathematics and to reduce achievement gaps in diverse student populations. Lewis and Heaton discussed the program in some detail and then talked about what they have learned about the process of collaboration.

Irwin Kra, Executive Director of Math for America (MfA), introduced the organization to meeting attendees. This foundation was established in 2004 to improve the quality of mathematics education in U.S. public schools. Kra discussed MfA partners and programs and also talked about the Math and Science Teaching Corps Act of 2006, legislation introduced in early 2006 that would create a national teaching corps based on MfA's successful NYC programs. Kra then described the Newton Fellowship Program, which recruits and trains teachers for placement in the NYC public high schools. Karen King then discussed the MfA/NYU partnership for the Newton Fellowship Program. King also described two other programs that grew out of the MfA/NYU model that are also related to mathematics teacher preparation – the Gateway Project and the Partnership Project.

Achieve's American Diploma Project

Laura McGiffert Slover discussed Achieve's work in raising academic standards and achievement in America's schools to better prepare students for postsecondary education, work and citizenship. She highlighted Achieve's central initiative, the American Diploma Project (ADP). The project, which has grown to a network of 26 states, involves a wide variety of K-12, higher education and business representatives. ADP research has found a common core of knowledge and skills in math and English that are necessary for success in postsecondary education and for acquiring "good jobs." Specifically, it found that to be college and work ready, students should complete a rigorous set of courses that includes a math requirement of four courses, with a content equivalent to Algebra I and II, Geometry and a fourth course such as Statistics or Pre-calculus, in addition to English requirements. The project concludes that states should align standards and assessments with skills required to succeed in both college and work.

The College Board's Mathematics and Statistics Standards for College Success

Andrew Schwartz (The College Board) presented The College Board's newly released Mathematics and Statistics Standards for College Success. He distributed copies of the publication to all attendees and gave some background information on the development process for the document. He then discussed some of the standards presented in the document.

Panel on Common Language for Standards Documents

Joan Ferrini-Mundy (Michigan State University), Laura McGiffert Slover (Achieve) and Alejandro Uribe (University of Michigan) presented three different perspectives on standards documents. Slover kicked off the panel by talking about how difficult the process of writing standards documents can be. She talked about what the process requires, particularly with regard to balance -- such as in balancing the wide variety of perspectives that are brought together during the process, balancing topics, balancing critical thinking with procedural knowledge and so on. She also discussed what Achieve looks for in its standards review process: rigor, focus, coherence, specificity, clarity and measurability.

Uribe discussed why mathematicians should participate in the standards writing process. He spoke about what mathematicians have to offer the process, including: precision in mathematical language, perspective on what topics are more fundamental or important for higher education, and enthusiasm and appreciation for the beauty of mathematics. Uribe also discussed the importance of communication and collaboration between mathematicians and educators to this process.

Ferrini-Mundy talked about how standards documents should provide two things: 1) precision and rigor in mathematics; and 2) direction for K-12 mathematics teaching. She used some examples to highlight the tension that sometimes comes from trying to achieve these two goals.

Council of Graduate Schools Ph.D. Completion Project: Report from Participating Mathematics Departments

Daniel Denecke (Council of Graduate Schools) introduced the relatively new Ph.D. Completion Project, which was designed to address the causes behind student attrition from doctoral programs and address the fact that historically underrepresented minorities complete programs at lower rates than majority students and that women are completing at lower rates than men, particularly in STEM fields. He explained that the completion project is funded by the Pfizer pharmaceutical company and by the Ford Foundation. It involves 21 grant-recipient universities and 24 additional partnering universities. Denecke further explained that it is not just an intervention project, but is a research project with components that include completion data, attrition data, exit surveys, and policy and activities assessment.

Alejandro Uribe (University of Michigan), DeWitt Sumners (Florida State University) and Loek Helminck (NC State University) then spoke about their universities' involvement in the project. Uribe provided some statistics and information on the math Ph.D. program at the University of Michigan and then discussed some components of their program, including a summer institute, a mentoring program, and a program review. Sumners then talked about FSU's involvement in the project as an unfunded partner. He discussed the challenges that exist in their mathematics Ph.D. program and the changes they have made to address these challenges. Helminck gave an overview of the doctoral programs at NC State and then discussed the math program's goals and commitments, recruitment measures, opportunities and retention.

National Council of Teachers of Mathematics Curriculum Focal Points

Sybilla Beckmann (University of Georgia) presented NCTM's recent Curriculum Focal Points as the "next step" following the publication of standards in 1989 and 2000. Three curriculum focal points have been identified and described for each grade level from pre-K to grade 8, along with connections to guide integration for forming a comprehensive mathematics curriculum. These focal points are meant to be major instructional goals and desirable learning expectations. Their implementation should help build students' mathematical competency.

Beckmann went through the focal points grade-by-grade and expanded on their descriptions with specific examples of mathematical problems that illustrate the content suggested for the curriculum at that level.

Computer Testing
Frank Quinn (Virginia Tech) discussed developments in computer testing as determined, in part, as a result of a computer-assisted education project at Virginia Tech. He described what he calls "teaching tests," which are not assessment tools, but are designed to play a central and active role in the learning process in low-level math courses. These "teaching tests" are more difficult and comprehensive than typical assessment tests and students use them to learn by taking them multiple times and using them in place of homework.

Quinn talked specifically of Virginia Tech's large computer-assisted education program. He illustrated the costs involved in the program, both financial and in teaching time. He also discussed the considerable efficiency they have found in using these tests and talked about the educational outcomes.

Report on Activities of the Centers for Inquiry-Based Learning, Sponsored by the Educational Advancement Foundation
Educators at four universities are working to incorporate the Inquiry-Based Learning (IBL) philosophy into their classrooms. Michael Starbird (University of Texas at Austin) discussed IBL and how the University of Texas at Austin is implementing it. Using IBL, students learn mathematical concepts through individual critical thinking rather than by simply listening to lectures or reading texts.

Starbird talked about two points in their curriculum where IBL has a role to play -- introduction to proof and introduction to research. He spoke of the courses created using IBL and the way these classes are conducted. Currently, IBL classes and course materials at his university have been developed for number theory, analysis, discrete mathematics and topology.

Future Plans of the Preparing Mathematicians to Educate Teachers Project
Alan Tucker (SUNY at Stony Brook) is one of the PIs on the Preparing Mathematicians to Educate Teachers (PMET) project funded by the National Science Foundation. The project has four major components: 1) faculty development through workshops and mini-courses; 2) information and resources provided through talks, articles and websites; 3) regional networks to help initiate, support and coordinate efforts at individual institutions; and 4) mini-grants for individual institutions to improve their teacher education programs and develop new instructional materials. Looking to the future, Tucker referenced another round of standards that is set to be issued in a few years and he encouraged consensus building within the mathematics community prior to assessing any new standards documents.

Committee on Education Meeting Topics Discussion
Bill McCallum introduced the idea of having invited department chairs submit potential topics of discussion for future Committee on Education meetings. These proposals would need to specify a topic, explain why the topic would be of interest to the community and who has expertise on this topic. The Committee on Education would review these submissions and, if chosen, the AMS Washington office would work with the person making the suggestion to put it on the agenda. There was some discussion about how this approach would work, including how much of the work the person suggesting the topic would be responsible for.

COE activities at New Orleans, LA Joint Mathematics Meetings, January 2007
Bill McCallum reported that the AMS Committee on Education will host a panel discussion at the Joint Meetings in New Orleans, LA in January 2007. The panel discussion will be on the National Mathematics Advisory Panel and will be held on Monday, January 8th from 8:30 to 10:00 am.

Dates of Future Meetings
The committee chose dates for the next two years' meetings. They were scheduled for Thursday to Saturday, October 25-27, 2007 and Thursday to Saturday, October 23-25, 2008 in Washington, DC.