Presidential Views: Interview with Hyman Bass

Every other year when a new AMS president takes office, the *Notices* publishes interviews with the incoming and outgoing presidents. What follows is an edited version of an interview with AMS president Hyman Bass, whose term ended on January 31, 2003. The interview was conducted in November 2002 by *Notices* senior writer and deputy editor Allyn Jackson. Bass is professor of mathematics education and Roger Lyndon Collegiate Professor of Mathematics at the University of Michigan, Ann Arbor.

An interview with AMS president elect David Eisenbud will appear in the March 2003 *Notices*.

Notices: *You have had a lot of contact with mathematicians during your presidency. Based on those contacts, what do you see as the biggest challenges facing the profession?*

Bass: There are two perennial issues. One has to do with resources to support the research enterprise. That is a constant campaign with federal and public agencies. And the other is whether we are drawing enough talent into the field to maintain quality and productivity.

The Carnegie Foundation [for the Advancement of Teaching] has begun an initiative to examine the doctorate[1] and it has commissioned essays by people in different areas. I wrote one of the essays, in which I draw attention to a distinction between mathematics as a discipline and mathematics as a profession. The "discipline" refers to our traditional concept of the field as a body of knowledge and an intellectual heritage to which people contribute: They generate new knowledge, they warrant and document that knowledge, they assimilate it, they record it in the literature, and they transmit it through education. This has happened throughout the history of mathematics in different forms and at different levels of intensity. Until the middle of the twentieth century, mathematicians, as a community, were sociologically pretty much at the level of a village. There were very small numbers of highly dedicated people whose involvement in the field grew from a love of knowledge and a philosophical commitment.

Mathematics has now grown into a profession. This is driven partly by the growing recognition of the importance of mathematics in social and economic needs and partly by the building up of a professional, intellectual community that is vastly larger in size than anything before in history. We are a much larger, more complex community. A lot of the problems facing mathematics are the persistent problems of maintaining a large professional community and maintaining its standards and norms. We also have to make sure that supporting resources from public institutions remain robust and that our commitment to serve the public needs remains strong and effective. Related to this is capacity building, the need to bring talent into the field. We need to make the significance and importance and beauty of the field apparent to the public and to make mathematics as a profession attractive to talented young people.

Notices: *What is the AMS doing to try to make the profession more attractive?*

Bass: The AMS has a proud record of intervening when outside conditions put some of our valued cultural institutions at risk, something that it has been able to do through a combination of using corporate income and member contributions. When the community perceived gaps in federal programs for mid-career support, the AMS established the Centennial Fellowship program. At the time of the collapse of the Soviet regime, the U.S. mathematics community contributed generously to protective measures for the remarkable Russian mathematical community. At a time when public institutions held back on resources to encourage talented and highly motivated young people—for example, termination of the NSF Young Scholars Program—the AMS took some small but important initiatives to fill in the gaps in those resources, for example by creating the AMS Young Scholars Fund. This "Epsilon Fund", which is symbolically and materially quite important, enhances support for enrichment programs for young people. This kind of gesture is very congenial and recognizable to mathematicians because, in our educational roles, nur-

[1] *See* http://www.carnegiefoundation.org/CID/index.htm.

turing young talent is in some sense our favorite activity. In some ways these enrichment programs are at odds with prevailing ideologies in education, which argue that such programs are elitist. Strangely, there is not the same disposition toward encouraging high talent in athletics, or music. Actually, everyone benefits from very high performance in mathematics; it is a public good. A lot of people mistakenly believe that anything dedicated to very high performance is inherently inequitable. Not only is that wrong, but I think it is a disservice to underprivileged students in education because the premise is that somehow they are not going to be capable of performing in the same way.

The AMS has spent a lot of time on building a better public image of mathematics, to make it better appreciated by the public: getting better press coverage, writing popular material, and staging various kinds of public displays of what mathematics does. But we fail to recognize adequately that we have a fantastic slave audience right at our feet. Much of people's attitudes toward the discipline and toward the profession is formed in the classrooms that we control. Of course we do not want to conduct our classrooms as PR enterprises. But implicitly, the way we instruct provides huge opportunities for giving our field a better public face.

Saying that does not offer a solution to the problem, because doing the kind of teaching and instruction that would really make a difference is a pretty demanding professional undertaking in its own right. This is a part of our professional culture to which, historically, we have not greatly attended. We have assumed that if you have expert knowledge of the subject matter, good expository skills, and a reasonably friendly personality, then you have all the necessary resources for effective instruction. Education, like clinical medicine, is a profession of human improvement. The latter requires not only a knowledge of biochemistry, drugs, and bedside manner, but also a detailed and practiced knowledge of the human body and the ways it can malfunction. Similarly, mathematics teaching requires not only a sound and comprehensive knowledge of the subject matter and good presentation skills, but also a knowledge of student thinking and of how to usefully assess student understanding of what is being taught.

Education is a body of knowledge and a field of expert practice where there are things to be learned. Unfortunately, given the way the political environment has evolved, there is a tendency in many quarters to completely discredit the field of education or not even to acknowledge that it exists, much less that we have something to learn from it. So this is difficult territory right now.

Notices: *Are the "math wars" over? And if so, who won?*

Hyman Bass.

Bass: No, they are not over. Right now two things are going on. One is a contest of ideas: what are the problems in education (most people agree that the fundamental problem is that U.S. students are not becoming mathematically proficient), and what are the best ideas to help solve them? The other is a contest of power and authority. Here the issue is not, What are the best ideas? but, Who is best qualified and who is appropriately authorized to make decisions about what should be done? For example, some mathematicians believe that research mathematicians, with perhaps some advice from a few friendly school teachers, are the sole and final authority in fashioning policies in school mathematics education. (The history of school reforms authored mainly by mathematicians, for example the New Math, is hardly something to celebrate.) Unfortunately a lot of energy is spent on the latter kinds of issues.

We need to push the politics into the background and try to frame things so that ideology does not play such an important role. The fundamental problem is that the learning and teaching of mathematics is not happening at the quality levels and scale that we need. Everybody agrees that that is pretty much what the problem is. So one strategy is to focus attention on the specific educational problems. Deborah Ball and I have tried to do this in our work. For example, we show a group of mathematicians and educators a video of a math class. In the video a teacher is trying to teach some topic. A kid says something, and it is obviously mathematically significant, but it is not clear what is going on in the kid's head and it is not clear what the teacher should do with it. This is the kind of decision making teachers have to do every day, and it draws on mathematical knowledge and understanding. If we present a scenario like that to an audience of mathematicians and educators, ideology completely disappears. The range of opinions and views is totally unpredictable, based on public stances people have taken. This shows two things. First, there is less disagreement about real fundamentals than one might think, and there is a lot of earnest interest. And secondly, it makes people realize that there is a huge amount of work to be done before we understand these problems well.

Notices: *What is the AMS doing in education right now?*

Bass: The official instrument for educational issues in the AMS is the Committee on Education. It has been carrying on some very good work. It functions in a mode somewhat parallel to the Committee on Science Policy. It meets with representatives of organizations and federal agencies to find out about things happening in the field, it undertakes initiatives of its own, and it stages presentations by experts at the Annual Meetings and venues like that. In contrast with the MAA [Mathematical Association of America], the AMS has not been a very active agent in education. But I think the AMS has done quite a bit to raise awareness in the field.

The AMS has collaborated with other organizations on projects like the *Mathematical Education of Teachers* [MET] report.[2] That is a natural site for us to be involved, because part of the instructional mission of mathematics departments consists of courses for pre-service teachers. Mathematics departments feel pretty strongly that those courses should be taught in mathematics departments, not in schools of education. On the other hand, the level of quality of attention that has been dedicated to those courses has been highly variable. As the debates in education have heated up, we have come to recognize that the mathematical knowledge of teachers is really a crucial factor. This recognition draws a lot of focus on the quality of those courses. The MET report was a way of mobilizing the field to make it clear publicly, not only to the outside but to our own community, that this is a very important problem site that has to be met responsibly and that resources are needed to help the profession address it.

Another effort is a project we are tentatively calling MIME, for Mathematicians in Mathematics Education. The premise is that research mathematicians have important things to contribute to public education. These contributions might be in, for example, developing or critiquing curricula or assessment instruments, or in professional development for in-service teachers to strengthen their mathematical background. This activity is not unlike other kinds of interdisciplinary work, where mathematicians can function as consultants: They work with other people to try to understand the nature of the mathematical aspects of the problems at hand, and they try to communicate so that the mathematics can be understood and used by other people. In areas other than education, we take it for granted that to do that kind of work productively you need to know something about the other field. We have not treated education that way.

The first step of the MIME project is to assemble a group of mathematicians who are interested in the possibility of contributing in these ways. The second step is to conduct workshops to provide professional development to these mathematicians. For example, suppose we want to focus on curriculum development. That is a field in which there is a lot of expert knowledge. The workshop could address such questions as, How are curricula actually used by teachers and in schools? What characteristics of them besides mathematical accuracy are important to consider? How do you contextualize mathematics problems appropriately?

And the third step relates to the fact that in some sense we are marketing something. We have to make it known to the potential client communities, the people who make policy decisions in educational environments. We also have to make sure that what we are doing meets their needs. The AMS plans to apply to the federal government for funding for the MIME project.

Notices: *Just to sum up, can you say a few words about how you see the AMS overall? How is it functioning? What does it need to work on further? What is it doing well?*

Bass: I think the AMS is just great. It is one of my favorite organizations, period. It is extremely well run. [Executive Director] John Ewing is an absolute gem. The leadership, the morale of the staff, the whole culture of the organization is absolutely fabulous. I think it is underappreciated by the field. The Washington office, *Math Reviews*—each of these is exemplary in professional quality and effectiveness.

As I mentioned earlier, in my essay for the Carnegie Initiative on the Doctorate, I focus on the distinction between mathematics as a discipline and mathematics as a profession. The professional organizations are a big part of that professional life. How does a new doctorate, someone coming into the field, think about membership in the AMS? I think the AMS does a huge amount that benefits that person, but often in invisible ways. This brings to mind John F. Kennedy's invocation, "Ask not what your country can do for you—ask what you can do for your country." I think we have to get across that message, that we are part of a community, and a whole lot of what holds that community together and really keeps it going and healthy is carried by the professional organizations. In some sense, the invisibility of the AMS is a virtue. This is similar to how a well-run department protects young people from administrative burdens. The young people should appreciate what is being done for them and know that some day they are going to have to do the same for the next generation. We have to develop a more holistic sense of what we are as a profession and as a professional community.

[2] *See "Spotlight on Teachers", by James Lewis,* Notices, *April 2001, pages 396–403; and "Two Reactions to* The Mathematical Education of Teachers*", by Amy Cohen and Steven G. Krantz,* Notices, *October 2001, pages 985–91.*