Presidential Views: Interview with Hyman Bass

Every other year, when a new AMS president takes office, the *Notices* publishes interviews with the current president and with the president elect. What follows is an edited version of an interview with AMS president Hyman Bass, whose term began on February 1, 2001. The interview was conducted in October 2000 by *Notices* senior writer and deputy editor Allyn Jackson. An interview with past president Felix E. Browder appeared in the February 2001 issue of the *Notices*, pages 187–189.

Notices: *First, I'd like to ask you about the AMS' role in advocating support for basic research. Where do you think the AMS is right now in this area, and how do you see its activities evolving?*

Bass: I think right now we are probably in a better position than we have been in many years. A great deal of the credit goes to [past presidents] Arthur Jaffe and Felix Browder. Of course, this had a lot to do with changing conditions in the general environment for science. But I think that Arthur and Felix deserve credit for mathematics having played a significant role in improving the resource situation. The basic principle behind that, as I see it, was that mathematics moved from a stance of pursuing the narrow interests of the discipline to one of reaching out to the public with broad advocacy of support for basic science in general and doing this in partnership with the other sciences. In this mode, whatever gains mathematics enjoyed would be achieved in tandem with growth in support for science in general. The recent legislative initiative for doubling the NSF [National Science Foundation] budget over five years is confirmation of the wisdom of that strategy.

From my point of view, I don't see the need for major new initiatives by the AMS, but rather the need for sustaining the progress that's been achieved. I should add that major credit goes to the AMS Washington Office, especially the contacts that Sam Rankin has made with congressional staff there. Thanks to Sam's work, the Washington Office has become an extremely effective operation and a very productive investment on the part of the AMS.

Notices: *Have you heard about the new math initiative at the NSF?*[1] *What do you think of it?*

Bass: Well, I don't yet know much in detail about it, but I know from earlier statements that [NSF director] Rita Colwell had, within the NSF agenda, given a high priority to redressing what were perceived as imbalances in the funding for mathematics vis à vis the other sciences. What was noteworthy is that this case, which had long been made by mathematicians, was now being made by a life scientist who is directing the foundation.

When things get sufficiently out of balance, even the users of mathematics are threatened. And because mathematics is an enabling science, there are lots of "users". The life sciences have always been better treated by Congress and the public, because their applications are in some sense closer to personal use and recognized social needs. When the life scientists see ample documentation that the long-term health of basic science is under threat, then I'd like to think that they are persuaded by the logic of the facts and wise policy. But it takes people with a very broad vision of science as a global enterprise to reach conclusions like that. Most people operate in a much more narrow environment, and they seek to maximize resources only on a more limited scale.

So the bottom line on this—and I would say this as an overarching statement—is that I am lucky to come into a situation in which the AMS on every front is in a healthy condition, both as an organization and as a community. The most troubled part is probably the one where I am spending much of my time, which is education. But even there I think we're making significant progress.

Notices: *Let's talk a little bit about public awareness of mathematics.*

Bass: For one thing, there's now a lot more writing on mathematics for the general public than there has been in recent years. This is an area where a lot of interesting progress has been made, and of course public urgings to the math community to give more attention to public outreach

[1] *See "NSF Mathematical Sciences Initiative" by Philippe Tondeur in this issue of the* Notices, *and "NSF Launches Major Initiative in Mathematics", Allyn Jackson, February 2001, pages 190–192.*

and to writing good expository material helps nurture that. We have journals like the *Notices* which I think have been very successful at producing a lot of excellent material, not least your own writing, which I have long admired. The appointment of the new [public awareness] staff at the AMS is another step in that direction.[2]

Notices: *Is there a particular emphasis you think the AMS should have in its public awareness efforts?*

Bass: I don't have any specific emphasis in mind, but it should be pursued on a fairly broad front, and I think that our efforts should be treated in part as a learning experience. I think we should try to assess pretty carefully what works and what doesn't, because in these arenas we are starting to function essentially as amateurs. For example, in Washington there is a professional community that does political work, but we are not asking for the work to be done in that culture. We want the work to be done in a way that represents the culture of mathematics. In Washington we have developed a small cadre of professionally able people who have those skills. The same is true with public outreach. We should think that the product of our investment is twofold. One is to produce successful expository material and promotional material that reaches a public audience, and the other is to build a professional capacity to do this sort of work and to train others to do it. We have to think of the Washington outreach and public awareness outreach as partly educational and partly developing the professional culture for this kind of work. Once we know better how to do this, we can create internship opportunities for young people so that they can engage in this without abandoning their mathematical careers.

Notices: *You mentioned earlier your involvement in education. What is the AMS role in K-12 education?*

Bass: This is an area in which the AMS did not organizationally decide to move but in some sense was gradually moved into it by external developments, developments that reflect the broader growth of our professional community.

Historically, mathematicians' involvement in K-12 education was usually seen as episodic. Certain mathematicians chose to turn their interests and reflections in those directions, just as mathematicians might become interested in philosophy or poetry or music. Interest in education was not treated as a movement in the field, but as something congenial with it. Those efforts were hospitably received in the mathematical community and were treated as a wholesome part of the general culture, but not as central to it.

The situation is quite different now, but not because of change of individual interest or concern. A lot of it has to do with the whole interlocking dynamics of expansion of the field. For one thing, the size of the field is just much, much larger. The student enrollment in our universities, the number of people who need technical training, and then in turn the number of professional mathematicians are vastly larger. Mathematics as a profession has a social fabric that is quite different from what it ever had before. No one worries that mathematics is an endangered species; the ideas have gone on for many millennia, and it's unthinkable that mathematical ideas and culture would not continue to grow in time. But as a large professional community we inherit questions that are not about the continued growth and development of ideas, but about the sustained capacity to meet all the human needs and dependencies that are created by the large community that is trained to do this work. We have to think about the difficulties that are created by inadequate resources or dislocations caused by people having to leave the field and do something for which their mathematical training has not equipped them.

Hyman Bass

So a lot of issues that we face, even though they grew organically out of the growth of the field of mathematics, are not inherently mathematical problems. They are really problems of the professional community. By the same token, one can understand the growth and evolution of the AMS as responsive to these social dynamics in the profession. I can remember my early experiences on AMS committees, where it was hotly debated whether the AMS should become a large publishing organization. The idea of publishing was viewed as alien to its scholarly purposes and too much tinged with commercialism.

Notices: *Nobody worries about that anymore!*

Bass: Not only do they not worry about it, but in fact that very enterprise enables the AMS to function as a kind of enlightened patron of the very aspects of the culture that are somewhat fragile and that would not easily be supported by external organizations. But these things are always tradeoffs. We are a much larger and more structured organization. The first AMS meeting I went to was at Columbia, and there were on the order of 100 or 120 people, and one attended every lecture. There was more the feeling of a philosophical inquiry rather than a major enterprise.

In the post-Sputnik era what the country needed was a cadre of highly trained technical professionals, and our system developed a very high capacity to produce that. Many people failed and many were alienated or driven away from

[2] *See "AMS Establishes Public Awareness Office" in the "Inside the AMS" section of this issue.*

mathematics and science in the process, but that was considered okay, because the number of people that got through the filter was enough to meet national needs.

What we used to accomplish for a limited number of students we now must accomplish for nearly all students, without sacrificing quality levels. We need to be attentive to the ways in which the discipline has changed, to the presence of technology, to appropriate ways of presenting mathematical ideas in the classroom, and to contemporary understanding of instruction and student learning. This places great new demands on teachers. The country has undertaken to solve a problem it never has faced before—that is, to help all students attain high levels of mathematical proficiency.

One of the first things you have to do when you think about education is to decide what are the goals, what do you want people to learn? In the U.S. this is a matter for states and districts, sometimes even individual schools. Never in our nation's history have goals been articulated and shared at the national level. So the NCTM [National Council of Teachers of Mathematics] stepped into this policy vacuum. The standards NCTM created [in 1989] were based in part on a combination of educational research and the views of some disciplinary mathematicians, but largely also on the wisdom of practice and the knowledge base of professional practitioners. In my view, it was a positive event that the standards were developed by the professional organization of practicing teachers.

Creating standards is the first and the easiest step in this business. The next step is curriculum development, which is complex design work. The NSF funded many projects to develop curricula based on the NCTM standards. Starting in the mid-1990s, these curricula began entering schools. That was the first time this whole movement began to touch people's lives on a significant scale. This precipitated pockets of adverse reaction from parents, whose kids returned with homework that the parents sometimes did not know how to do or even recognize. And mathematicians are among parents. It was this concern with their childrens' schooling that first turned the attention of certain mathematicians toward school mathematics education.

When mathematicians first got vivid exposure to what was happening in the schools, many of them were outraged. For some it was a perceived neglect of "basic skills", generally understood to be the teaching of standard algorithms. This was often attributed to the early introduction of technology into the classrooms. As they looked closer they were often alarmed by the seemingly fragile mathematical understanding of the teachers. It's not as if these concerns were without cause. But the question is, What do you do with what you see? We can't invent solutions that pretend that the teachers we have are not there and that some ideal community of teachers is suddenly going to appear. The teachers in the schools are not dumb or stupid and stubborn. They are actually very dedicated people who love what they do. In most cases they wouldn't be there otherwise, because there are very few incentives. Most of them are actually quite smart and able to learn things. But they have had long experience with subject matter and with kids that is very different from mathematicians' experience. Teachers are very realistic and have a real sense of survival and pragmatism, and if they feel that mathematicians are people who are going to scorn them or humiliate them, they become defensive and will not view mathematicians as a source of help. That kind of thing has happened. The mathematicians see themselves as kind of intellectual philanthropists and believe the teachers do not want to receive the wisdom they're ready to offer. So there is a lot of that kind of alienation. I think that that's much of what the "math wars" are about.

I personally think the NCTM has achieved a great deal, and I think that the new PSSM document[3] is an extraordinary achievement that has been well informed by the advice that was sought from other professional communities. The NCTM has made serious and bona fide efforts to ground its policy documents in whatever research is available and in solicited advice from other professional communities. I think that a sensible and constructive way to make improvements is to improve the way the NCTM functions. We can't invent solutions to these educational problems that ignore the professional community of teachers. The rhetoric of mathematicians who publicly protest every single fault and detail in everything the NCTM does is simply not doing the work that's going to move us forward. The NCTM has demonstrated that it can productively accommodate constructively rendered criticism.

So finally let me answer your question. The question was, What does K–12 education have to do with the AMS? What I've described so far are ways in which individual mathematicians have been drawn into this. On the national level—and this is now public policy and part of legislation—it has been recognized that this is a national problem and that, in particular, mathematicians and scientists have a special responsibility that extends their traditional roles in research and education a

[3] Principles and Standards for School Mathematics, *published in April 2000, is the updated version of the NCTM standards. The* Notices *carried four articles on PSSM: "Revising the NCTM Standards", January 2000, page 5; "Updated NCTM Standards Released", June/July 2000, pages 683–684; "Principles and Standards for School Mathematics: A Guide for Mathematicians", September 2000, 868–876; and "Four Reactions to Principles and Standards for School Mathematics", October 2000, pages 1072–1079.*

the university level to concerns for K–12. This responsibility has taken concrete form in many funding programs. There is also the growing recognition of the fact that the teachers who teach in the schools and whose knowledge of mathematics we deride so much learned their mathematics primarily in mathematics departments. Therefore there is a kind of structural responsibility, even at the university level, to giving more attention to this. So for those various external reasons, the professional community of mathematicians and therefore the AMS—because it is the organization of that community—has an inherent interest in K–12 education issues.

It is appropriate for the AMS to create a legitimate and respected space for attention to that kind of concern, more or less on the order that it exists right now, with the Committee on Education, with programs at the national annual meetings, with articles in the *Notices* and elsewhere, and with a few other things. There's no recipe for what order of engagement is appropriate. That's largely up to the opinions and the practices of the community. But there are enough active mathematicians who are interested in educational issues that the level of attention given to them now seems appropriate. Mathematicians have important things to learn—about schools, about teacher education and teacher learning, about making change in schools, etc. The AMS can provide opportunities for such learning.

In addition, there is a huge number of things about math education now happening in the public domain. So at a very basic level, the AMS simply wants to remain aware of these currents. If mathematicians want to voice any concerns or opinions or contribute to educational work and policy, we need mechanisms by which connections can be made. The Committee on Education affords opportunities for this.

One motif that runs through everything we've talked about is outreach—outreach to the public, outreach to other disciplines, and outreach to education and to various policy arenas. The AMS, in a measured way and without undermining its central mission and its core commitments to mathematical research, is adapting flexibly to these expanding roles. As long as it performs those roles well and doesn't let them imbalance its central mission, I think that this is a healthy mode of operation.