Review of AMS Employment Activities

The AMS Committee on the Profession (CoProf) is charged—as are the other AMS policy committees—with periodically reviewing AMS activities within its purview. This is a summary report, written by the Subcommittee on Employment Issues and adopted by CoProf, on activities in the area of Ph.D. employment.

Background

The harsh employment environment over the past five years is a major problem facing the profession. Is this just a cyclical demand-vs.-supply trough, deepened by general economic retrenchment and the singular influx of mathematicians from China and Eastern Europe? Or does it reflect the inevitable end of exponential growth in basic science as a whole, accompanied by fundamental changes in public attitudes toward academia? Thoughtful analyses can be accessed from CoProf's e-MATH page [2] or from News/Commentaries on SIAM's gopher [3] or from Geoff Davis's policy page [4].

What should the profession and, in particular, the Society do?

The 1991 Task Force

In 1991 the Society formed a Task Force on Employment, whose report is available on e-MATH [5]. The task force postulated that continued robustness of the profession requires broader training of mathematics Ph.D.s to prepare them better to meet the full range of society's mathematical needs. To this end the AMS should foster wider recognition of the possibilities and challenges of nonacademic employment, and it should encourage doctoral programs to place more emphasis on development of teaching and communication skills.

The task force recommended further that the Society advocate for a larger pool of postdoctoral positions with imaginative teaching and/or industrial components to strengthen professional development of mathematicians. In addition, the task force called for promotion of industrial internship programs as a means of developing awareness of each other's potential value among both employers and mathematicians. (In 1993 CBMS submitted a proposal to the NSF for establishing postdoctoral fellowships with major emphasis on research, educational, interdisciplinary, or industrial experience. The NSF subsequently funded fifteen industrial fellowships. Another proposal to study the feasibility of a national industrial internship program was not funded.)

The task force also discussed expansion of academic employment opportunities, recognizing that universities are generally cutting back, so that very cogent arguments will be needed by mathematics departments to back up requests

This report, with links to the references, can also be found on e-MATH [1].

for additional resources. Areas which could be explored are:

1. The need for small classes to improve the quality of mathematics instruction.
2. The designing of courses that can entice students preparing for other careers where mathematics can be useful.

A related recommendation is the expansion of professional master's programs. (The AMS has commissioned a Task Force on Excellence in Mathematics Scholarship, whose report is expected in 1997. This report should be of considerable value in negotiations with administrators about departmental needs.)

For the shorter term the task force recommended upgrading electronic employment services, designing of a standard cover sheet for academic employment applications, and recruiting more nonacademic employers for the annual Employment Register. They also recommended holding seminars and intensive workshops dealing with specific employment areas such as teaching in two-year or four-year liberal arts colleges and careers in government, commerce, and industry. Their idea of organizing full-scale workshops outside the setting of national meetings has not as yet caught on. (MAA did sponsor a minicourse, by Curtis Bennett and Richard Phillips, on "Today's Job Market for Math Ph.D.s", at the January 1995 San Francisco meeting.) In all other respects these short-term recommendations have been implemented by JCEO (see **Ongoing Employment Services** below).

CoProf

At its first semiannual meeting (October 1993) CoProf undertook a review of AMS actions taken pursuant to the task force report. The results are discussed below (**Task Force Follow-up**).

At the same meeting CoProf drafted a statement on "Supportive Hiring Practices", which was adopted in essence by the Council in January 1994 [6]. A similar statement has been adopted by MAA and AWM. It calls on Ph.D.-granting departments to ensure that their students are aware of the realities of the job market and to prepare them for a broad range of careers. It urges departments to make every effort to make multiyear appointments and to eliminate altogether exploitative part-time positions.

The statement was widely publicized and received notice in the national press. CoProf discussed proposals that the AMS call for a reduction in the size of graduate programs, especially "weaker" ones. The consensus of the committee is embodied in the following extract from a statement on "Graduate Programs in Mathematics", adopted by the Council in January 1995. (The full statement appeared in the June 1995 *Notices*, p. 690 [7]. For a more global view, see also the National Academy report, "Reshaping the Graduate Education of Scientists and Engineers", National Academy Press, Washington, DC, 1995 [8].)

> It is not the Society's role to attempt to regulate the size of graduate programs in mathematics. However, we urge individual departments to reexamine the content, focus, and size of their programs and consider possible restructuring or reallocation of resources to better serve their needs and the needs of their students and graduates. In some cases this may involve shifting resources from graduate programs to postdoctoral programs or from Ph.D. programs to master's programs. It may also involve broadening the training of graduate students to prepare them for nonacademic as well as academic careers.
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> Addressing the interlinked questions of graduate education and employment of mathematicians is and will remain a high priority for the American Mathematical Society. The Council pledges to continue to commit Society resources and efforts to help enhance career opportunities for its members.

Task Force Follow-Up

In May 1994 CoProf recommended that the AMS continue to work along lines recommended by the task force, especially through its unique capabilities to gather and disseminate the information people need for making intelligent decisions on matters related to the employment situation.

Here, in brief, are some particular suggestions made and related outcomes.

- Publicize related activities of other professional organizations. Outstanding examples are (a) SIAM's "Mathematics in Industry" (MII) project ([9], final report at [10]), as well as Mathematics That Counts [11], and (b) a multiyear project of the Joint Committee on Preparation for College Teaching [12]. Also, the Young Mathematicians Network has set up an excellent informational resource on its WWW home page [13]. CoProf sponsored a talk by Paul Davis, the director of MII, at the 1995 annual meeting. The AMS-SIAM Sloan-funded project (see below) is building, in part, on material developed by SIAM's project.

- Substantive information on the history and present state of the job market should be made available to all members of the mathematical community, for example, in regularly appearing articles. See "Mathematical Employment in the 1990's", which appeared in the 1994 edition of *Assistantships and Graduate Fellowships in the Mathematical Sciences*[2]. See also the recently revised JCEO pamphlet "Seeking Employment in the Mathematical Sciences" [14].
- Continue to sponsor talks and panel discussions concerning employment issues at national meetings. Moreover, these talks and discussions should be made available to those who cannot attend. At the 1995 annual meeting CoProf sponsored a talk by Stanley Benkoski of Wagner Associates on "Preparing for a Job outside Academia"; see [15] or the October 1994 *Notices*, pp. 917–919. At the 1996 Orlando meeting Annalisa Crannell, a member of CoProf's Employment Issues subcommittee, moderated an MAA-sponsored panel discussion on applying for jobs. For the summer 1996 Seattle meeting she is organizing a three-hour CoProf-sponsored program on "Preparing Ourselves and Our Students for Careers in Mathematics".
- Set up e-MATH directories on employment and career matters containing copies of the most relevant articles as well as guides to further reading and make provisions for ongoing publicity and maintenance of these directories. CoProf's e-MATH page [2], [17] now points to a number of such articles. Several other electronic sources have been mentioned above.
- Publish descriptions, from which others could draw inspiration and practical advice, of graduate programs which stand out in preparing students for careers in teaching, in interdisciplinary work, or outside academia. Models for such publication are the SIAM booklet on "How to Start an Industrial Mathematics Program in the University", by Friedman and Lavery, and the MAA publication "You're the Professor, What's Next?" [16]. Another fine example is the article by James Glimm on the Stony Brook program in industrial mathematics, "Mathematics Speaks (and Listens) to Industry", *SIAM News*, January 1995.

[2]*Impetus for this article came from a suggestion by Harriet Lord in response to an advertised solicitation for written or oral input for the Open Forum on Employment sponsored by CoProf at the sectional meeting in Brooklyn in April 1994. About a dozen people altogether responded to the solicitation or attended the forum.*

Ongoing Employment Services

Through both bad and good times the AMS has provided a variety of employment information and data-gathering services, sponsoring the AMS-MAA-SIAM Joint Committee on Employment Opportunities (JCEO) and the AMS-IMS-MAA Data Committee.

The most visible activity of JCEO is the Employment Register run at the annual winter meeting. Recent years have seen substantial improvements in the scheduling algorithm and procedures used to bring applicants and employers together and in the arrangement of physical facilities. In addition, JCEO has organized panel discussions and help programs for applicants. For example, at the Cincinnati annual meeting (January 1994) there were panel discussions on "Effective job seeking in today's market" and on "What can be done about employment of mathematicians in the 90s and beyond?"

Registration procedures and information exchanges will be transformed in coming years to an electronic format. This will result in major qualitative changes in the delivery and use of employment information and interview services.

Efforts have been undertaken to increase nonacademic employer participation in the Register. In view of the oversupply of qualified candidates in the present job market, such efforts have met with limited success.

The applicant/employer ratio at the Register has gone from 1.6 in 1988 to 7.6 in 1995, while the number of applicants per position has gone from .8 (for 418 positions) to 7.6 (for 108 positions). (The rise in this ratio was one of the earliest among the belatedly noticed indicators of deteriorating demand for mathematics Ph.D.s in the 1990s. Another widely available one was the experience of new Ph.D.s at one's own institution.)

JCEO oversees the publication of "Employment Information in the Mathematical Sciences" (EIMS), the most complete listing of open positions for mathematicians. Classified and other ads appear in each issue of the *Notices* as well. EIMS also contains informative articles on employment issues. The EIMS listings can be found on e-MATH [17], as can selected articles from past issues and the full text of the JCEO pamphlet "Seeking Employment in the Mathematical Sciences" [14].

JCEO has sought to help alleviate growing strain on both sides of the academic employment process by distributing a uniform Application Cover Sheet [18], along with recommendations for Professional Standards in Hiring Practices, both of which appear regularly in the *Notices* (for example, February 1996, pp. 236–237).

Surveys

The Data Committee is a joint committee of the AMS, IMS, and MAA. It is charged with coordinating the data collection, analysis, and reporting activities of the three sponsoring societies.

The principal activity of the committee is the design and analysis of the Annual Survey. The survey reports on employment experiences of new Ph.D.s in mathematics, statistics, biostatistics, applied mathematics, and operations research. It also reports on salary levels of new doctoral recipients and on salaries of mathematical sciences faculty at all levels in four-year colleges and universities. Recent annual reports have also studied recruitment of faculty for academic positions at four-year colleges and universities in the USA. Reports on the Annual Survey are published in the *Notices*; see [19].

The Data Committee routinely provides support for the information needs of other professional undertakings, such as the AMS Task Force on Employment and the SIAM project on Mathematics in Industry. In response to a recommendation of the employment task force, the Data Committee has recently completed a longitudinal study of employment experiences of 1990–91 doctoral recipients. This Employment Profile Survey was reported in the July 1995 *Notices* [20].

There is continuing demand from the community for more information about employment. Currently, for example, the Committee is considering suggestions to extend the longitudinal study and to determine characteristics of the full population of job seekers.

The Sloan Project

In 1994 the Sloan Foundation, concerned about employment prospects of young scientists across the board, invited professional societies to submit proposals for actions to alleviate the problem. A response from the AMS and SIAM resulted in a $345,000 grant for a joint project. The following description is excerpted from the announcement on pp. 64–65 of the January 1995 *Notices* [21].

> The project will forge links between the academic mathematical sciences community and business, industry, and government. Its centerpiece will be the creation of a database of profiles of individuals who use mathematics extensively in their work. The profiles will describe the individuals' jobs, mathematical backgrounds, and additional training they needed for their work. Case studies of individuals will be accessible over the Internet, will appear in the news publications of the two societies, and will be collected into brochures. It is planned to assemble a cadre of volunteers who can assist mathematical sciences departments in advising and mentoring students, to prepare them for successful careers outside academia. A *query and discussion* electronic bulletin board will be set up to provide a forum in which graduate students, faculty, and mathematicians and others outside academia can make contacts. The project will also have a career management component to help graduate students learn how to conduct non-academic job searches (résumé development, interviewing skills, salary negotiations, etc.) Lifetime career management, including career switching, will be covered too.

Under the direction of Dr. Linda C. Thiel of Ursinus College, the project is now well under way. Dr. Thiel presented an update in a CoProf-sponsored session at the 1996 Orlando meeting. A Mathematical Careers Bulletin Board, a Mathematical Applications Index, and additional career planning resources can be found at [22].

The project is intended to be not just a temporary response to a bad job market, but rather the foundation for a permanent community resource.

Conclusion

In addition to providing traditional employment services, the Society has responded actively to the present severe situation. Much remains to be done. CoProf welcomes input from the membership on all matters concerning the profession. Comments and suggestions concerning employment-related policy can be directed to the Subcommittee on Employment Issues, `cp-emp@ams.org`.

References

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[21] http://www.ams.org/publications/notices/199501/inside-sloan.html
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