

Jobs in Mathematics Education in Institutions of Higher Education in the United States

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In February 2002 a report on the job shortages in mathematics education appeared in the *Notices* [1]. The present article provides an update on the continuing job opportunities in mathematics education in higher education. It also provides current information on salaries for assistant professors, job expectations, and start-up packages offered to new hires.

Survey Procedures

An examination of postings of national searches for positions in mathematics education at institutions of higher education was conducted. The sources examined were ads in the *Chronicle of Higher Education*; job announcements posted by professional organizations, including the Association of Mathematics Teachers Educators (AMTE), the Special Interest Group for Research in Mathematics Education (SIG-RME), the National Council of Teachers of Mathematics (NCTM), and the Mathematical Association of America (MAA); and personal letters received by this author from faculty at institutions announcing available positions.

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From October 2006 to March 2007, 185 institutions reported a national search for at least one tenure-track position in mathematics education. In April 2007 an email was sent to the chair of each search committee inviting them to complete a survey that was posted online. The intent of the survey was to learn the outcome of the searches. About one-fourth (51) of the institutions responded that their search was in mathematics rather than mathematics education, or was either abandoned or postponed due to budgetary restraints so they did not complete the survey. Eight other institutions reported no hire had been made and their search was continuing, so they did not complete the survey. Two follow-up notes to search chairs requesting completion of the survey resulted in a total of 108 out of the remaining 126 institutions (about 86%) providing data related to their job search in mathematics education.

Each respondent was asked to report their unit (mathematics department or college/school of education) and their type of institution (four-year institution awarding baccalaureate (four-year BS), baccalaureate/masters institution (BS/MS), or doctoral granting institution (doctorate)). This information was used in organizing the results to provide a finer-grain picture of the findings. All data received by July 31, 2007, are reported here.

Announcing Positions

Respondents were asked where they announced the job search. Three venues were most often cited. These included: placing an ad in the *Chronicle of Higher Education* (93%), sending an email or letter to selected faculty at other institutions alerting them to the position (65%), and posting the job announcement on the NCTM website (58%). Posting the job listing on other professional association websites was also common, most notably with AMTE (43%) and MAA (23%). Other strategies for

announcing positions included distributing job announcements at professional meetings (e.g., Psychology of Mathematics Education-North American (PME-NA), NCTM, National Council of Supervisors of Mathematics (NCSM), the AMS/MAA Joint Meeting, and Mathematicians and Education Reform (MER)). Several respondents reported announcing the position to professional associations that explicitly focus on women and minorities (e.g., Association for Women in Mathematics, and Benjamin Banneker Association).

About the Positions

The 108 institutions responding to the survey reported 128 job searches being conducted for positions in mathematics education slated to begin in fall 2007. The positions were nearly equally split between mathematics departments (64) and colleges/schools of education (62) with two joint appointments. Of these positions, about two-thirds (82) were reported as replacements for faculty whereas 46 were reported as new hires to accommodate increasing institutional needs. Eighty-six of the 128 positions (67%) were at an entry level (assistant professor), four were at the associate professor level, nine at full-professor level, and 29 were reported as “open”. An open position expands the search field and allows the search committee to recommend hiring at any professorial level, thereby providing maximum flexibility in the search process. All but three of the searches were for tenure-track positions.

Expectations

In order to obtain some information on the expectations associated with the jobs, several questions were asked. One question took this form—Which describes the research/publication expectations for your position? Over 80% of the mathematics departments and colleges/schools of education, including every doctoral granting institution, reported that research and scholarly publications were essential for gaining promotion and tenure. While teaching was valued by all of the institutions, it was rated a lower priority by doctoral granting institutions. For example, 40% of the four-year and masters granting institutions identified “excellent teaching” as the number one priority for tenure and promotion, whereas every doctoral granting institution identified scholarly publications as the number one consideration for tenure and promotion.

The teaching expectations covered a wide scope of courses ranging from mathematics content courses to graduate courses in mathematics education. Teaching undergraduate courses in mathematics was the most frequently cited expectation in mathematics departments, while teaching graduate courses in mathematics education was the most frequently cited teaching responsibility

in colleges/schools of education. It was surprising that about the same number of mathematics departments (25) and colleges/schools of education (21) reported undergraduate mathematics courses would be included in the teaching assignment, and even more surprising that five colleges/schools of education included teaching graduate courses in mathematics as a likely first-year teaching responsibility of the new hire.

Some job announcements explicitly requested a new hire in mathematics education have expertise and/or interest in working in grade-level areas of mathematics education (elementary, middle school, secondary, or K-12). While some institutions were specific in their request for elementary, middle or secondary expertise, the modal response for both mathematics departments and colleges/schools of education was that the new hire is expected to have competence in working with elementary, middle, and secondary mathematics teachers.

Taken collectively, these results suggest that a majority of mathematics education positions in higher education expect the new hire to be able to do research; produce scholarly publications; work with elementary, middle, and secondary teachers; and be capable of teaching courses in mathematics and mathematics education.

Salaries and Start-Up Packages

This survey included searches at all ranks, but salary ranges were not provided for open positions. Furthermore, it would not be appropriate to pool salary ranges for assistant and associate professors together. Since assistant professors represented the largest number of searches (86), only salary range information for assistant professors is reported.

An examination of Table 1 shows a salary range of at least US\$25,000 for the assistant professor positions; however, the most commonly reported salaries for mathematics departments and colleges/schools of education fell between US\$45,001 and US\$50,000. This compares with a modal salary range of US\$40,000-\$45,000 reported in 2002 (1). However, Table 1 also shows that nearly 30% of the salaries in mathematics departments were less than US\$45,000 compared with about 15% of the salaries in colleges/schools of education. Positions were not distributed equally throughout the country so a comprehensive comparison of salary by geographic location is not possible.

All but seven institutions provided start-up packages. The size of these packages ranged from US\$1,000 to US\$20,000, and provided funds to help jump-start research agendas. Start-up funds ranging from US\$1,000 to US\$5,000 were most common, but nearly 25% of the start-up packages were reported to be about US\$10,000.

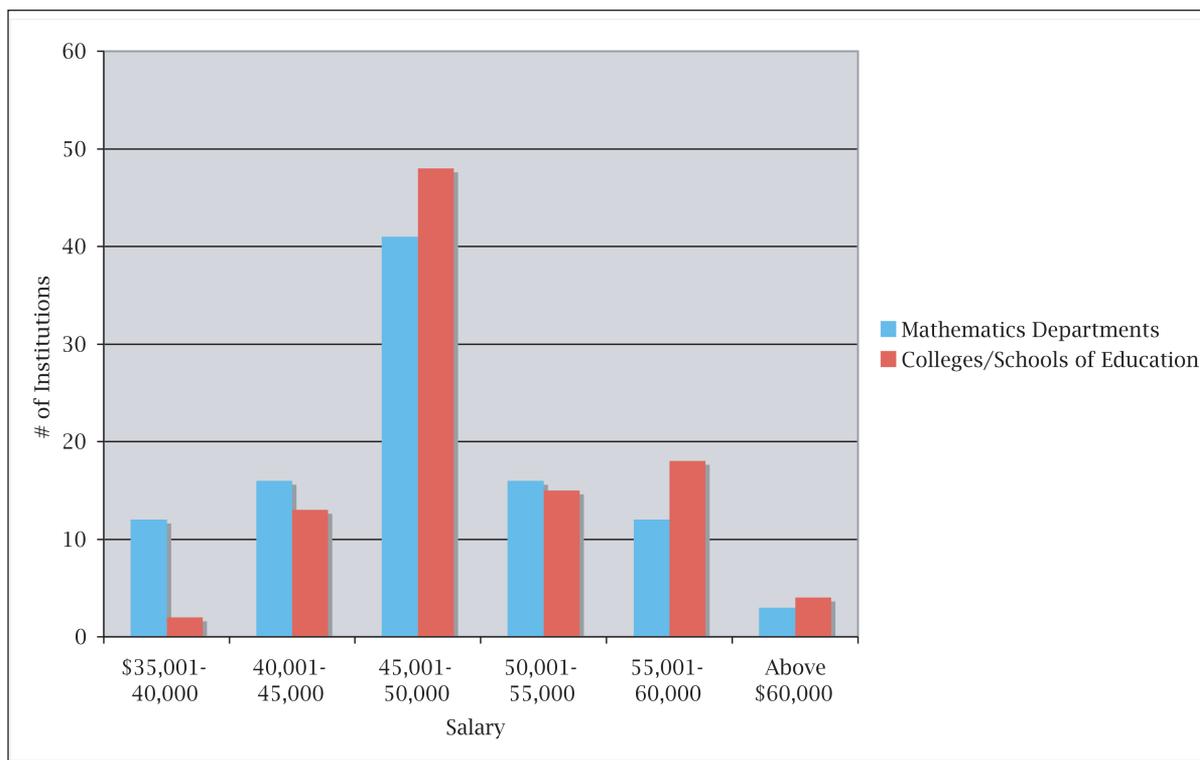


Table 1. Salary ranges by institutions and units for the rank of assistant professor reported by frequency and percent (N=86).

Applicants

Institutions reported a wide range of applicants for the announced positions in mathematics education. In mathematics departments the number of applicants ranged from two to over one hundred with a median of twenty-two, while in college/schools/departments of education the range was from zero to forty-five, with a median of thirteen. In fact, five education schools reported receiving no applications for their mathematics education position.

Mathematics departments reported that nearly half of the applications were from people holding a Ph.D. in mathematics. This prompted one chair of a search committee in a mathematics department to comment:

I find it rather distasteful that folks with absolutely no experience or training in mathematics education will apply for a tenure-track job in mathematics education. That would be akin to someone with my training and experience applying for a tenure-track job in pure mathematics (no, actually it's worse...I have a masters degree in pure mathematics, so I have some background in the area).

To me, that means they value the specialty of mathematics education so little, or they know so little about the

specialty, that they assume they are (over)qualified for the job simply because they have a mathematics doctorate, and have taught at the college level. It truly demonstrates ignorance of what the job of a mathematics educator can and does entail, and demonstrates to some degree the challenges that we as mathematics educators constantly face in gaining full acceptance into the mathematics community at large.

On the other hand, a different perspective on mathematicians applying for mathematics education positions is provided by the search chair at another institution who said:

I found that the teaching statements of the new Ph.D.s in math were much better than they were a few years ago (when they would just talk about being nice and learning everyone's name and organizing their lecture notes). We had a number of applicants who had done things like taught math for elementary teachers (in a mentored way) and participated in many programs related to math education. I found that to be a promising development...I myself am kind of a "hybrid", in that I have a Ph.D. in math, but mostly work w/preservice elementary teachers...ten years ago,

Type of Institution	Mathematics Department	School /College Education	Joint Math/Ed	Total
4-year BS only	9 (7)	2 (1)	0	11 (8)
BS/MS	30 (24)	13 (6)	0	43 (30)
Doctoral	25 (11)	47 (29)	2 (0)	74 (40)
Total	64 (42)	62 (36)	2 (0)	128 (78)

Table 2. Jobs searches in mathematics education and positions filled by type of institution and academic home. (N=128). Note: The number in parentheses denotes the number of successful hires.

I barely knew anyone like me...now I see a lot more potential...so, the distinction between math/math ed isn't always sharp.

About one-third of the mathematics departments and about one-half of the colleges/schools of education did phone interviews to initially screen applicants, and they typically interviewed between two and eight people. Institutions reported inviting between one and six people to campus for interviews, with about two-thirds of the institutions interviewing two or three candidates on campus.

Filling Positions

Table 2 reports the number of openings by institution and departmental unit and the number of hires. Overall, about 60% of the positions were filled, with about two-thirds of the positions in mathematics departments being filled compared to about 55% in schools/college of education. Of the forty-two hires in mathematics departments, one-third of them reported hiring a person with a Ph.D. in mathematics. Four-year and master level institutions had the lowest rate of success in hiring faculty in mathematics education.

The percentage of unfilled positions in mathematics education for 2007 (40%) is consistent with previously reported studies documenting that between 40 and 50% of announced positions in mathematics education in institutions of higher education typically go unfilled [1, 2]. Of the seventy-eight hires reported in this survey, 44% were new graduates with doctorates in mathematics education, while the majority of hires (56%) were faculty moving from one institution to another. This represents an increase in the percent of faculty moving from one institution to another compared to what has been reported [2].

The chairs of unsuccessful searches were asked: "What is the reason you did not hire?" The reason most often cited for not hiring was that their top candidate decided to go elsewhere. The second most often cited reason was "no appropriate candidates" followed by "our salary was not competitive."

While about 80% of the institutions making a hire reported hiring their first choice, other insti-

tutional representatives expressed frustration with the challenge of hiring a mathematics educator. Frustration was particularly high in departments of mathematics, where the mathematics educator must be acceptable to a search committee composed of mathematicians and mathematics educators. One chair at a four-year masters level institution said:

The department found the top three acceptable but we could not hire them for various reasons. The department found the fourth choice unacceptable although he was acceptable to the mathematics education group. This is the third year of a failed search. We may now lose the position to a pure math type and that might have been the agenda at the end of the search.

Another search chair at a doctoral institution recalled how the lack of coordination at their institution resulted in a failed search. The chair lamented:

Ideally, we hoped to get someone with elementary & secondary experience. It was very difficult to find someone with elementary teaching experience and a strong background in mathematics. The Math Department was concurrently running a search that was problematic as some of the potential candidates applied for both jobs and wanted to be brought out just once for interviews. As math education and mathematics are in different colleges within the university, we could not accommodate this request and subsequently lost candidates.

Another chair of an unsuccessful search from a doctoral institution offered this advice from their experience:

We began the search and selection of candidates to visit campus far too late. This could have been avoided with better cooperation from the administration. But, overall, we learned that searches have to begin early with interviews in January, or earlier.

Recruitment of faculty in mathematics education is a continuing challenge that is made more difficult if institutions cannot agree on acceptable qualifications for applicants. This may explain why neither of the joint appointment positions were filled. It is important that searches are coordinated when different units are involved and that qualifications are agreed upon. This coordination is of critical importance with respect to joint appointments. However, it is important regardless of whether the tenure home is in the department of mathematics or in colleges/schools of education as new hires can sense an unfriendly environment or one where tension exists between faculty members across different units.

Discussion

This survey documents the continuing shortages of candidates for mathematics education positions in institutions of higher education. Mathematics departments and colleges/schools of education of all types of institutions (four-year BS, BS/MS, and doctoral) experienced unsuccessful searches. There are well over one hundred positions in mathematics education in higher education annually [3, 4], yet less than one hundred new graduates in mathematics education are produced annually [5]. Furthermore, Glasgow reported that of the new graduates with doctorates in mathematics education, less than one-half of them become candidates for positions in higher education. The severity of the shortage is reflected in the fact that over one-half (56%) of the new hires represented mathematics education faculty moving from one institution to another. While these moves fill one position, they create a new position at the institution vacated. When asked if they would be searching for a new position in mathematics education in 2008, fifty-six institutions said "Yes" and five indicated they would be recruiting two or more new faculty members in mathematics education.

The Carnegie Foundation for the Advancement of Teaching (<http://www.carnegiefoundation.org/classifications/>) reports there are over 4,000 institutions of higher education in the United States and less than 10% of them are doctoral granting institutions. Yet this survey is heavily weighted with respondents from doctoral institutions (over 60%), which are more likely to be conducting national searches for positions in mathematics education. Junior colleges were not represented in the survey. The 108 institutions reported in this survey all engaged in national searches, and about 40% of the positions were unfilled. It is likely that the unfilled faculty mathematics education positions in institutions of higher education is much greater than reflected in this survey.

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