A Study of Science Education Positions, Search Process, and Hiring Practices

Lloyd H. Barrow *Paul J. Germann*

Southwestern Bell Science Education Center

The purpose of this study was to analyze science education searches and hiring practices for faculty positions listed in The Chronicle of Higher Education for an academic year. Chairs of searches completed a survey about successful and unsuccessful searches. Over 70% of searches were successful in hiring new science education faculty with 33% being veteran science education faculty.

The purpose of this study was to analyze science education searches (including science or other education responsibilities) and hiring practices for positions advertised in The Chronicle of Higher Education (TCHE) during a single academic year. Successful and unsuccessful searches were compared for recommended strategies for securing high quality science education faculty applicants and attributes desired. This study provides baseline information regarding job searches for doctoral graduates with specialization in science education at domestic institutions of higher education.

Related Literature

Herling (1994), provided advice to department chairs, stated "the need to consider planning for faculty recruitment rather than counting on the luck of the draw" (p. 18). Earlier, Boice (1992) noted there is very limited research on faculty recruitment and hiring process. There are numerous resources for how to conduct a search. For example, Ryan and Martinson (1996) identified concerns in soliciting high quality specific applicants (like science education faculty) rather than generalists. They also supplied suggestions to address concerns of advertising the position: content of announcements, providing accurate information to all applicants, treating candidates honestly, conducting campus interviews, avoiding problems in searches, and dealing with discrimination issues. Rees (1998) developed a checklist of criteria to review when their campus started a job search after a four year campus hiring freeze.

Herling (1994) analyzed 312 institutions who had recruited new faculty in the field of communication and mass media. Regarding having the terminal degree completed, 32.9% required and 52.9% preferred having the dissertation defended. For mass media positions, required/preferred

teaching experience was 43.4%/54.7%, professional experience 50.9%/43.4%, research experience 9.4%/67.9%, and publications 9.4%/67.9%. In contrast for speech communication positions, the required/preferred teaching experience was 45.1%/51.3%, professional experience 11.0%/65.8%, research experience 13.4%/40.2%, and publications 11%/48.8%. Herling concluded that department chairs wanted new faculty who have completed their Ph.D., able to conduct and publish their research, and previous teaching experience.

Hettich, Cleland, and Jewitt (1997) conducted a survey of 64 undergraduate psychology positions at small liberal arts institutions that were listed in the APA Monitor during the 1995-96 academic year. Respondents indicated that their "first cut" was based upon their academic degree institutions, teaching experience/interest with undergraduates, perceived "fit" at small liberal arts institutions, teaching experience with 2 of 5 designated courses, and a research agenda. The successful finalists were able to articulate their teaching experience and philosophy in their cover letter and/ or separate teaching philosophy statement. There was no significant difference between total years of teaching experience between applicants who did or did not make first cut. The applicant pool was typically reduced to a "short list" of six where they participated in a telephone interview. Generally, two candidates were invited for campus interviews. Their analysis showed 88% were for tenure track positions, 93% expected the Ph.D. to be completed by the time they are hired, 92% stressed importance of teaching experience, 97% had "eagerness" to work with undergraduates. Several other criteria were experiences at similar type institutions (44%), successful research record (64%), and prestige of graduate institution (35%).

Reys (2000) studied Ph.D. programs in mathematics education for the late 1990's, He reported far greater number of positions in mathematics education in TCHE than number of doctorates awarded in mathematics education listed by National Research Council. Reys, Glasgow, Ragan, and Simms (2001) used a survey of doctoral programs in mathematics education to collaborate National Research Council reports about increased awarding of doctoral degrees. They reported that nearly 80% of respondents considered there were more positions for individuals with a doctorate in mathematics education than qualified candidates. Glasgow (2000) surveyed 361 doctoral graduates in mathematics education who received their Ph.D. between 1993-95. More than 67% are employed at non-doctoral granting institutions. Subsequently, Reys (2002) surveyed 119 institutions of higher education about 134 mathematics education positions and found 51% were housed in the mathematics department, 44%

in schools of education, and remaining 5% were joint appointment. Reys reported the typical number of applicants were less than 10, mode number of applicants interviewed was 2, and 49% of the positions were not filled. Chairs of search committees noted the range of backgrounds of graduates with a doctorate in mathematics education and difficulty in finding applicants with Ph.D. in mathematics education with K-8 teaching experience.

Methodology

For a 12 month period (August-July), a total of 122 science education positions were listed in TCHE. A survey was developed and mailed to the chair/contact person listed in TCHE ad. The survey consisted of five parts: status of search, structure of the committee, applicant pool, interview process, and other (responsibilities of new hires, suggestions for securing high quality applicants, desired attributes of applicants and anticipated additional science education vacancies). Categories of each section of the survey were developed from interacting with experienced search committee members, department chairs and deans from various institutions of higher education. The survey was field tested with a panel of science education faculty and graduate students. Unclear items were revised for the final version. Berty's (1979) guidelines, (e.g. providing adequate space for handwritten responses and a cover letter that stated purpose, appealing to professional responsibilities and/or confidentiality of respondents, utilizing letterhead with personal signature, providing a self-addressed stamped return envelope, ensuring confidentiality on responses, providing telephone number and e-mail address in case of questions, and indicating specific return date) were followed in processing the survey. An electronic version was available, but only four respondents chose to use this format. A second mailing was conducted and resulted in 77 returns. This return rate of 63% for the two mailings exceeds the 42%-60% expected by McMillan and Schumacher (1989).

Results

A total of 71.4% of the searches were successful in hiring new science education faculty. The science education positions were more than 60% replacement for retired faculty or vacated positions. It was surprising that more than 36% were new positions. During the previous academic year, 36.4% were unsuccessful searches. A review of subsequent year positions found that not all these vacancies were re-advertised in TCHE. Of the 55 successful searches, more than 33% hired were veteran science

education faculty from other institutions and almost 30% were new Ph.D. (Table 1).

In addition to the TCHE listing, almost 86% of the positions were also posted on one or more websites. Slightly over 33% also sent electronic announcement, personal letter to selected faculty, announcement to association members, and/or posted at professional meeting(s). A total of 5 of the 19 unsuccessful searches only used one additional recruitment strategies in addition to TCHE. This is compared to the 17 of the 55 successful institutions who used only one advertisement recruitment strategy beside TCHE. Over 80% of the search committees had a member from the sciences, but less than 32% had a K-12 representative. Regarding the applicant pool, 22% had 15 or fewer applicants, 27% had 10 or fewer applicants, and 14% had 5 or fewer applicants. Slightly over 50% of the searches used a telephone interviews and slightly over 25% conducted interviews at professional meetings. Approximately 66% of institutions invited two or three finalists for campus visits. Slightly over 75% of finalists made a research presentation and almost 60% were expected to teach a class. However, less than 25% interacted with area schools.

Table 2 contains a comparison between successful and non-successful searches for the strategies used to attract high quality science education candidates. Successful search chairs' top three strategies were to start early in the academic year, networking, and be aggressive with multiple announcements in the search process. While non-successful chairs' top two suggestions were need for competitive salary and search early in the academic year. The desired attributes of applicants from successful searches were K-12 teaching experience, strong science background, well-developed research agenda, and strong background in education. The attributes desired from unsuccessful searches were K-12 teaching experience, strong science background, and previous publications/presentations at professional meetings. Using the Carnegie ranking of institutions (Evangelauf, 1994), the largest group for successful and not successful searches were at masters comprehensive institutions. Research and Doctoral level institutions were generally successful in hiring science education faculty. The responsibility of new hires is very diverse (Table 3). Almost 17% of the institutions are providing course reduction during the first year. The top three responsibilities were teaching secondary methods, supervision of student teachers, and teaching elementary science methods.

Discussion

The conclusions from this study are that there are successful strategies and procedures for securing new science education faculty.

Specific suggestions are to start the search process early in the academic year, utilize more than the TCHE to advertise the position, be aggressive in the search process, and provide a competitive salary. The position announcement should be explicit about all responsibilities desired for the ideal candidate. Different positions have specific responsibilities and science education positions were available at all levels of Carnegie ranked institutions. Search committees should expect less than 20 applicants for the science education positions.

Applicants for positions can expect to have a telephone interview as it was reported by Hettich, Cleland and Jewitt (1997). This study found that two or three finalists were invited to a campus interview where Hettich, Cleland and Jewitt (1997) and Reys (2002) identified two as the mode for campus interviews. The completion of the Ph.D. was less important in this study than reported by Herling (1994) in the field of communication and mass media. This could reflect the perception that there are more positions in science education than Ph.D.s. A similar pattern was reported by Reys (2000) for mathematics education positions. Having a research agenda was important according to Herling (1994) and in this study more than 75% of the finalists had to make a research presentation during their campus interview, even though less than 1/3 of the positions were at a doctoral granting institution.

Desired attributes by science education research committees, regardless whether successful or not, had identical top three attributes. They were: K-12 teaching experience, strong science background, and publications/presentations experiences. Being successful in a new position is dependent upon utilizing training, experiences, and adapting to campus expectation in teaching, scholarship, and service. Like Glasgow (2000), more than 2/3 of science education positions were non-doctoral granting institutions.

The successful science education searches greatly exceeded what Reys (2002) reported for mathematics education. For institutions contemplating recruiting new science education faculty, the composition of the committee, timing, and explicitness of the posting should be considered due to the large number of science education positions.

Applicants for science education positions can utilize these findings to plan for their employment at an institution of higher education. The development of a current vita, teaching philosophy, and research agenda needs to be started the year before you anticipate your employment. Faculty and peer graduate students can critique these documents to verify they represent you as a science educator. Graduate students could use

Heiberger and Vick (2001) as a resource in preparing for their higher education faculty searches. Considering the type of institution/location you desire to be employed will help identify where to submit applications. Remember that your cover letter should address the explicit responsibilities of their ideal candidate. Just because you don't have all attributes, don't eliminate yourself. Check carefully whether their attributes are required or preferred. Having K-12 teaching experience, strong science background, and publications/presentations will make applicants more successful in the search process. If lacking publications/presentations, the year before seeking employment provides time to address those personal weaknesses.

Science education faculty can help their doctoral candidates to prepare for employment at an institution of higher education. Long term planning will help applicants prepare for positions that match their abilities. Providing assistance with publications for research and/or practitioner journals like conference presentations will make them more employable.

References

Berty, E. (1997). *Ye olde mail survey.* Charleston, W.V. (ERIC Document Reproduction Service No. ED1777/0).

Boice, R. (1992). *The new faculty member: Supporting and fostering faculty development.* San Francisco: Jossey-Bass.

Evangelauf, J. (1994, April 5). A new Carnegie classification. *The Chronicle of Higher Education, 40,* A17-25.

Glasgow, R. (2000). An investigation of recent graduates of doctoral programs in mathematics education. Unpublished doctoral dissertation, University of Missouri, Columbia.

Heiberger, M. & Vick, J. (2001). *The academic job search handbook.* Philadelphia: University of Pennsylvania Press.

Herling, T. (1994). *Communication faculty recruitment 1993-1998: A survey of staff needs.* A paper at annual meeting of Association for Education in Journalism and Communication Staff.

Hettich, P., Cleland, J. & Jewitt, D. (1997). *Small liberal arts college seeks assistant professor.* A paper presented at the Annual Convention of the American Psychological Association, Chicago (ERIC Document Reproductive Service No. ED 417647).

McMillan, J, & Schumacher, S. (1989). *Research in education: A conceptual introduction* (2nd Ed). Glenview, IL: Scott, Foresman and Company.

Rees, R. (1998). *An equitable recruitment and living process in academy? A case study.* Paper presented at American Educational Research Association annual meeting, San Diego.

Reys, R. (2002). Mathematics education positions in higher education and their applicants: A many-to-one correspondence. Notices of the American Mathematical Society, 49 (2), 202-7.

Reys, R. (2000). Doctorates in mathematics education: An acute shortage. Notices of the American Mathematical Society, 47 (10), 1267-70.

Reys, R., Glasgow, R., Ragan, G. & Simms, K. (2001). Doctoral progress in mathematics education: A status report. In Kilpatrich, J. & Reys, R. (Eds). *One field, many paths: Doctoral programs in mathematics education.* Providence, RI: American Mathematical Society Mathematical Association of America.

Ryan, M. & Martinson, S. (1996). An analysis of faculty recruiting in schools and departments. *Journalism and Mass Communication 50* (3), 4-12.

Table 1. Demographic Information about Position, Search, Hiring, Announcement, Committee Structure, Applicants and Interview Process

	N	%
Position:		
Replacement for retired faculty	26	33.8
Replacement for faculty who left institution	21	27.3
Replacement for deceased faculty	2	2.6
New position with hard money	28	36.4
New position with soft money	0	0.0
Considered entry level	55	71.4
Unsuccessful search in previous year:	28	36.4
Candidate rejected offer	11	14.3
Inadequate number of applicants	25	32.5
Change in position responsibilities	1	1.3
Search results:		
Hired faculty	55	71.4
Filled with visiting faculty	1	1.3
Failed search	21	27.3
Experience of new faculty:		
Recent graduate	22	28.6
Experienced faculty from another institution	26	33.8
Dissertation yet to be defended	6	7.8
Public school faculty	1	1.3
	N	%
Announcement other than TCHE:		
Posted on website	66	85.7

Announcement to association members	26	33.8
Electronic note to selected faculty	27	35.1
Personal letter to selected faculty	20	26.0
Area newspapers	8	10.4
Minority/multicultural listing	6	7.8
Professional journal	5	6.5
Structure of Search Committee:		
Representative from Sciences	63	81.8
Representative from K-12 schools	24	31.2
Release time/support for chair	4	6.5
Number of applicants:		
1-5	11	14.3
6-10	21	27.3
11-15	17	22.1
16-20	4	5.2
21-25	6	7.8
26-30	5	6.5
31-35	2	2.5
36-45	3	3.9
46-55	1	1.3
56-65	1	1.3
66-75	1	1.3
Telephone interview conducted:	39	50.6
Interviews at professional meeting:	20	26.0
Number of candidates invited to campus:		
None	6	7.8
One	10	13.0
Two	25	32.5
Three	26	33.8
Four	9	11.7
More than four	1	1.3
Finalist present their research:	56	76.6
Finalist to teach a class:	43	55.9
Finalist interacted with area schools:	18	23.4

Table 2. Suggestions to Attract and Hire Quality Applicants by Successful and Not Successful Searches

Suggestions	Successful N	Not Successful n
Competitive salary	3	4
Search early in academic year	12	2
Contact good institutions	3	1
Candidates active professionally	1	1
Suggestions	**Successful N**	**Not Successful n**
Patience	2	1

Stress student relationships	-	1
Highlight campus location	-	1
Academic preparation	2	1
Personality/positive attitude	-	1
Moderate course load	1	1
Family concerns	-	1
Networking	7	-
Be aggressive recruiter/widely advertise	5	-
Release time for chair	1	-
Conduct phone interviews	1	-
Contact references before campus visit	2	-
Early offer	1	-
Observe teaching & research presentation	1	-
Involve K-12 personal	1	-
"Grow you own"	1	-
Invite candidates early	2	-
Keep open for ABD candidates	1	-
Additional incentives-start up, professional development	2	-
Candidates submit philosophy/scholarship plans	2	-
No response	15	10
Desired Attributes:		
K-12 teaching experience	14	8
Strong science background	8	3
Publication/presentation experiences	4	3
Commitment to profession	-	2
Movement from soft-money positions	1	1
Strong background in education	5	2
Multi-cultural background	1	-
Effective teaching	2	2
Commitment to students	1	1
Supervision experience	-	1
Commitment to technology	1	1
Well developed research agenda	6	1
Commitment to institution	-	2
Collaborative	4	-
Doctorate completed	2	-
Grant writing	2	-
Interact with K-12 schools	2	-
Experienced college faculty	2	-
Enthusiasm	1	-
Curiosity	1	-
No response	19	6

Suggestions	Successful N	Not Successful n

Carnegie Rank:		
Research I	8	2
Research II	3	-
Doctoral I	6	-
Doctoral II	1-	
Master's Comprehensive I	25	13
Master's Comprehensive II	1	4
Baccalaureate I	1	
Baccalaureate II	4	2

Table 3. Responsibilities of New Hire

	n
Teach Secondary Science Methods	15
Course reduction	13
Student teaching supervision	10
Teach elementary science methods	9
Graduate course	6
Teach biology for non-majors	6
Interact K-12 schools	6
Committee Work	6
Research	5
Advisor	4
Teach earth science course	1
Teach introduction to computing	2
Teach middle school methods	2
Reduced committee assignment	2
Supervise laboratories	2
Mathematics methods	2
Accreditation related	2
Course development	2
Research methods	1
Teach general education	1
Teach genetics	1
Teach environmental science course	1
Graduate student committee	1
Introduction to physical science	1
Grant writing	1
No response	5