

University of Nebraska - Lincoln

DigitalCommons@University of Nebraska - Lincoln

Journal of Women in Educational Leadership

Educational Administration, Department of

10-2006

Recruiting and Retaining Women Faculty in Science and Engineering

Dorothy Brockopp

University of Kentucky, dorothy.brockopp@bhsi.com

Mindy Isaacs

University of Kentucky, Mindy0503@yahoo.com

Pam Bischoff

Ragged Edge Community Theater (KY), suebug67@hotmail.com

Kimberly Millerd

University of Kentucky, kimberly.millerd@ky.gov

Follow this and additional works at: <http://digitalcommons.unl.edu/jwel>



Part of the [Educational Administration and Supervision Commons](#), and the [Women's Studies Commons](#)

Brockopp, Dorothy; Isaacs, Mindy; Bischoff, Pam; and Millerd, Kimberly, "Recruiting and Retaining Women Faculty in Science and Engineering" (2006). *Journal of Women in Educational Leadership*. 206.

<http://digitalcommons.unl.edu/jwel/206>

This Article is brought to you for free and open access by the Educational Administration, Department of at DigitalCommons@University of Nebraska - Lincoln. It has been accepted for inclusion in Journal of Women in Educational Leadership by an authorized administrator of DigitalCommons@University of Nebraska - Lincoln.

Recruiting and Retaining Women Faculty in Science and Engineering

Dorothy Brockopp
Mindy Isaacs
Pam Bischoff
Kimberly Millerd

The purpose of this project was to assess the perceived efficacy of university-based activities designed to improve the recruitment and retention of women in academic science and engineering (S&E). Numerous approaches to recruitment and retention have been described and implemented but little change occurs. An evaluation of suggested activities by 35 S&E women faculty was conducted using quantitative and qualitative methods. Eight of 25 activities were strongly recommended by participants as effective strategies related to recruitment and retention. Mentoring, as frequently operationalized, was not found to be effective. Several recommendations are offered to improve the system of mentoring.

Although female undergraduate students are beginning to outnumber male students, women faculty at most institutions of higher education are in the minority. The often cited reason for this discrepancy is that there are not enough women prepared to assume faculty roles. This reason is no longer valid. During the academic year 2001-2002, more doctorates were awarded to women than men. Thus, more women are earning degrees that lead to faculty roles however, little change in the ratio of male to female faculty at institutions has occurred. This situation is particularly problematic in the fields of science and engineering (S&E). Although there are a sufficient number of women gaining graduate degrees in S&E to warrant a substantial increase in the number of women faculty, the ratio has not changed from previous estimates (Wilson, 2004). Women are gaining the educational preparation for an academic career but are either rejected for faculty positions, do not remain on faculty, or are not choosing the university as their workplace (Wyer, Barbercheck, Giesman, Ozturk, & Wayne, 2001).

Women may be reluctant to accept a faculty position in S&E or remain in academia once there, because the commitment required precludes a

About the Authors

Dorothy Brockopp, RN, PhD, is Full Professor and Assistant Dean for Undergraduate Studies in the College of Nursing at the University Kentucky (UK). She serves as Chair of the President's Commission on Women at UK. Her research interests include women with life threatening illnesses and the management of pain. Email: dorothe.brockopp@uky.edu

Mindy Isaacs is a doctoral candidate in the Counseling Psychology program at the University of Kentucky. She serves as a research assistant for the President's Commission on Women at UK. She has a bachelor's degree in psychology and a master's degree in clinical psychology. She has previously served as coordinator of an eating disorders and substance abuse prevention program. Her research interests include women's issues such as career advancement, sexual assault, sexual harassment, substance abuse and eating disorders. Email: mindy0503@yahoo.com

Pam Bischoff holds a BA in Arts Administration from the University of Kentucky. She is the Executive Director of the Ragged Edge Community Theater in Harrodsburg, KY. Previous positions include Executive Director of the Kentucky Guild of Artists and Craftsmen and Administrative Staff Associate of the University of Kentucky President's Commission on Women and Diversity. Email: suebug67@hotmail.com

Kimberly Millerd serves as Communications Associate for the Council on Postsecondary Education. When she participated as an author in this article, she was serving as Administrative Associate for the President's Commission on Women at the University of Kentucky. Kimberly has a bachelor's degree in communications from the University of Kentucky and previously served as Sales and Marketing Assistant for the *Chronicle of Higher Education*. Her professional interests include gender and diversity issues in postsecondary education, college access marketing and communications, and event management. Email: Kimberly.millerd@ky.gov

comfortable balance between work and family responsibilities (Monhardt, Tillotson & Veronesi, 1999; Zakian et al., 2003). They also may perceive these roles as highly competitive and prefer work that is more collaborative in nature (Monhardt et al., 1999). Other factors, such as the traditional male-oriented structure of universities, the expectation that faculty not be deterred from their pursuits by caregiving activities, and a culture that often penalizes women while demanding more from them, adds to the reasons why women may choose non-academic careers. Although family-friendly policies are being adopted by universities, it remains more difficult for women than men

to be successful in academia (Hopkins, Bailyn, Gibson, & Hammonds, 2002; The Study of New Scholars, 2004; Zakian et al., 2003).

Data to date suggest that women choosing to pursue careers in academic S&E may find it necessary to make difficult life choices such as waiting post-tenure to have children or deciding not to have children (Tracy, 1998). If a woman takes a position in academia but decides to forgo a tenure-track position in order to spend time with family, she may suffer in terms of salary, career advancement and job security (Hopkins et al., 2002; Kulis, 1998; Zakian et al., 2003).

Men in academic settings guide most policies, procedures and future planning activities. This male influence is particularly apparent in S&E. Women are minorities within academic S&E, and comparatively few women reach full professor, often a pre-requisite for important decision-making committees such as promotion and tenure. In addition, few women hold dean or chair positions within colleges, and these positions often offer opportunities to change policies and procedures (Hopkins, et al. 2002; The Study of New Scholars, 2004; Zakian et al., 2003). In regard to scholarship, men have dominated the research arena in S&E for many years. They tend to define scholarship narrowly in terms of the traditional scientific method, and women's interests may be more psychologically or sociologically oriented (Monhardt et al., 1999). Because men are the majority in these fields and hold most positions of power, a differing view of what constitutes science may penalize women. Research suggests that women's scholarship has been devalued in comparison with men's and their successes limited as a result (Wenneras & Wold, 2001).

Women face premature placement in administrative roles in academic S&E, such as assistant dean and department chair. These roles leave them little time for the scholarship necessary to reach full professor (Wenneras & Wold, 2001). Also, women are often required to have more publications and national recognition than their male colleagues to succeed (Olson, 2002). Evaluation inequities exist related to the scholarship of women compared with men (Wenneras & Wold, 2001). As a result of these problems, job satisfaction among women faculty tends to be lower than job satisfaction among men (Hopkins et al., 2002).

Although numerous activities have been initiated to increase job satisfaction, enhance success, and recruit and retain women in academic S&E, few outcome studies have been conducted. Research in the area has focused largely on identifying the impediments to success (Hanson, Fuchs, Aisenbrey, & Kravets, 2004; Rosser & Lane, 2002). In addition, the most important participants in any investigation—the women faculty themselves—have not been asked to identify those activities that would be most likely to

assist them with their careers. This gap in the literature forms the foundation for this study. The intent of this project was to examine data regarding the efficacy of activities suggested in the literature as a means to furthering the careers of women faculty in S&E. Mentoring was given special attention in this project because a number of books and articles identify mentoring as a meaningful process in career development. Unfortunately, there are little data available to support or refute this position (Ensher & Murphy, 2005).

Method

Participants

Thirty-five of 106 women faculty in S&E (response rate 33%) agreed to attend a two-hour discussion related to the effectiveness of activities designed to recruit and retain women in academic S&E. Forty-three percent had been employed by the university for five years, 39% for 6-10 years, and 17% for 11-31 years. Twenty-one percent were social scientists, 66% basic scientists and 13% engineers.

Design and Procedure

Participants first responded to a 24-item questionnaire by identifying their level of agreement that an activity would be effective (see appendix). A five-point Likert scale was used to determine level of agreement (1 = strongly disagree to 5 = strongly agree). Participants were also asked to identify whether or not they would be willing to be involved in the listed activities. Questionnaire activities were derived from the literature on women scholars in S&E (Rosser & Lane, 2002) and/or were based on discussions with successful (full professors, administrators) S&E women prior to the meeting. A comments section was available with each item and additional concerns were requested at the end. Participants also completed an open-ended questionnaire related to their experiences with mentoring. The focus on mentoring was the result of repeated descriptions in the literature suggesting mentoring as a powerful mechanism for promoting success (Grant & Ward, 2000; Moody, 2004; Muller, 2000; Murphy & Ensher, 2001; Quinlan, 1999; Schwiebert, Deck, Bradshaw, Scott, & Harper, 1999).

Participants formed small groups of their choice (six to eight) led by facilitators (one per group) from the President's Commission on Women. They were asked to complete the questionnaire and then to discuss university-based activities that they believed would be most effective in recruiting and retaining women faculty in S&E.

Results

Tables 1 and 2 display the results of the questionnaire. Activities receiving a mean score of 4 and above (4 = agree) were divided into three categories: direct support for scholarly pursuits (e.g., financial support for laboratories, summer projects, and grant writing seminars); recognition and support of care giving needs (e.g., improve childcare and stop the tenure clock for care giving); and changes in the system (e.g., promotion and tenure committees and search committees). Educating those individuals, mainly men, who play a role in the success or failure of women academics was perceived as very important. Understanding barriers by assessing gender equity indicators and conducting objective exit interviews was also a priority. Desire to participate in these activities varied from 25% to 74% and may have been a function of the individual's career path (e.g., some participants did not have children or their children were grown and they would not be interested in participating in those activities).

Facilitators recorded the discussion in the small groups and these data were analyzed for themes. Agreement on each theme ranged from 88% to 96%. Three themes related to the needs of women faculty emerged from the small group discussions: (a) the provision of accurate information regarding procedures and policies related to promotion and tenure (P&T), (b) a more dynamic administrative structure that would be responsive to the needs of women faculty, and (c) improvements in the overall climate for women faculty on campus. Participants reported that women faculty frequently were not given the information necessary to assist them to make tenure. When information was given it was often given informally, was partially correct or incorrect, and was not provided in a timely manner. No one suggested that information was intentionally withheld, but participants noted that adequate support in relation to informing women regarding university and/or department expectations was not seen as a priority.

Women stressed that more flexible, responsive administrative structure was necessary if a variety of work-life issues were to be addressed. On-site child care and tenure clock options should be seriously considered if administration was more responsive to the needs of the women on campus. Traditional views and administrative structure were seen as impediments to moving forward on these issues.

Participants perceived an overall improvement in the climate on campus was essential to recruitment and retention of women faculty. Negative stereotypical responses to women regarding child-rearing, scholarly pursuits, and personality traits were seen as deterrents to retention of women faculty.

There was concern that rewards in terms of resources were based on gender stereotypes with women receiving less support for scholarly endeavors.

Data on mentoring showed that 72 % (18 out of 25) of those participants who had experienced mentoring agreed that it had been ineffective in assisting them to be successful. Twenty-eight percent (7 out of 25) of those mentored agreed mentoring was helpful in advancing their careers. Twenty-nine percent (10 out of 35) of all participants had not had a mentoring experience. Fifty-four percent of all participants (19 out of 35) agreed that administrators, mentors, and new or junior faculty needed to be educated as to the role and purpose of the mentor. Thirty-one percent (11 out of 35) of participants agreed that mentoring must be strongly supported by university senior administration and that at least one mentor needs to come from the specific discipline and/or the research area of the person being mentored.

Discussion

This study examined the effectiveness of current activities designed to recruit and retain women faculty in S&E. Data collected support the premise that women faculty in S&E want direct support for their scholarly pursuits, understanding of care-giving needs, and, in some instances, assistance with those needs.

In relation to scholarly pursuits, there was a strong indication that the traditional structure of academia may itself be a barrier to success for many women. For example, research productivity may decline because the tenure clock coincides with childbearing years for most women. Reactions were mixed regarding the proposed option of modifying the tenure clock based on care giving needs. Some women did not want *special* [italics added] treatment because anecdotal evidence suggests that promotion and tenure committees will often not consider extensions of the tenure clock when making promotion decisions. Modification of the tenure clock is discussed in the literature as a method for assisting women's advancement through the ranks; however evidence indicates that the implementation of this policy is flawed.

Although women were concerned about the potential conflict between care giving and an academic career, they also wanted more information about potential barriers to promotion and strategies that promote success. Comments in small groups included, "I didn't know how to put a dossier together," "I wasn't sure what our promotion and tenure committee wanted," and "my male colleagues seem to understand the system better than I do." This lack of understanding/information may relate to the perception on the University's campus that for the most part, mentoring as established, has not

worked. Participants concluded that one or more mentors are needed within the area of their expertise to provide assistance with their scholarly work and to effectively guide them through the promotion process.

Two immediate recommendations that emerge from this study are (a) design a system of mentoring that meets the needs of faculty as they move through the faculty ranks and (b) propose a modification of the tenure clock for men and women based on care-giving needs. The mentoring system should be devised so that areas of expertise as well as guidance through the system are addressed. Education of all promotion and tenure committee members must accompany the proposed possibility of modifying the tenure clock so that the extension is considered during deliberation of the faculty member's performance.

In summary, data suggest that promotion and tenure policies within universities need to be clearly articulated. In addition, the administrative structure of the university needs to create greater flexibility regarding promotion of faculty and a more positive climate for women needs to be developed to support career advancement. There was strong support for mentoring in terms of guidance for scholarly activities within the faculty member's discipline. In order for the mentoring relationship to be effective, both mentors and mentees require training on how to structure this relationship so that both benefit. Major issues in this study revolved around providing timely and accurate information, increasing flexibility, and improving the general climate in relation to women.

References

- Ensher, E., & Murphy, S. (2005). *Power mentoring: How successful mentors and protégés get the most out of their relationships*. San Francisco, CA: Jossey-Bass.
- Grant, L., & Ward, K. B. (2000, Winter). Promise and limits of mentoring in academic science: A look at research on impact and effectiveness. *AWIS Magazine*, 29, 6-9.
- Hanson, S. L., Fuchs, S., Aisenbrey, S., & Kravets, N. (2004). Attitudes toward gender, work, and family among female and male scientists in Germany and the United States. *Journal of Women and Minorities in Science and Engineering*, 10, 99-129.
- Hopkins, N., Bailyn, L., Gibson, L., & Hammonds, E. (2002). *The status of women faculty at MIT: An overview of reports from the schools of architecture and planning; engineering; humanities, arts, and social sciences; and the Sloan School of Management*. Cambridge, MA: Massachusetts Institute of Technology, Committees on the Status of Women Faculty.
- Kulis, S. (1998). Organizational variations in women scientists' representation in academia. *Journal of Women and Minorities in Science and Engineering*, 4, 43-67.
- Monhardt, R. M., Tillotson, J. W., & Veronesi, P. D. (1999). Same destination, different journeys: A comparison of male and female views on becoming and being a scientist. *International Journal Science Education*, 5, 533-551.
- Moody, J. (2004). *Faculty diversity: Problems and solutions*. New York, NY: RoutledgeFalmer.
- Muller, C. B. (2000, Winter). MentorNet: Using the internet to develop the next generation of women scientists and engineers. *AWIS Magazine*, 29, 19-23.
- Murphy, S. E., & Ensher, E. A. (2001). The role of mentoring support and self-management strategies on reported career outcomes. *Journal of Career Development*, 27, 229-246.

- Olson, K. (2002). Who gets promoted? Gender differences in science and engineering academia. *Journal of Women and Minorities in Science and Engineering*, 8, 347-362.
- Quinlan, K. M. (1999). Enhancing mentoring and networking of junior academic women: What, why, and how? *Journal of Higher Education Policy & Management*, 21, 31-43.
- Rosser, S. V., & Lane, E. O. (2002). Key barriers for academic institutions seeking to retain female scientists and engineers: Family-Unfriendly policies, low numbers, stereotypes, and harassment. *Journal of Women and Minorities in Science and Engineering*, 8, 161-189.
- Schwiebert, V. L., Deck, M. D., Bradshaw, M. L., Scott, P., & Harper, M. (1999). Women as mentors. *Journal of Humanistic Counseling, Education & Development*, 37, 241-254.
- The Study of New Scholars, Harvard Graduate School of Education*. (n.d.). From Gutman Library, Cambridge, MA. Retrieved April 29, 2004, from <http://www.gse.harvard.edu/~newscholars/summary.html>
- Tracy, K. B. (1998). From our readers: Women in science: The myth of "Having It All." *Equity & Excellence in Education*, 31, 68-72.
- Wenneras, C., & Wold, A. (2001). Nepotism and sexism in peer-review. In M. Wyer, M. Barbercheck, D. Giesman, H. O. Ozturk, & M. Wayne (Eds.), *Women, science, and technology: A reader in feminist science studies* (pp. 46-52). New York: Routledge.
- Wilson, R. (2004, December 3). Where the elite teach, it's still a man's world. *The Chronicle of Higher Education*, pA8.
- Wyer, M., Barbercheck, M., Giesman, D., Ozturk, H. O., & Wayne, M. (2001). Science, sex, and stereotypes: Cultural images of science and sciences. In M. Wyer, M. Barbercheck, D. Giesman, H. O. Ozturk, & M. Wayne (Eds.), *Women, science, and technology: A reader in feminist science studies*. New York: Routledge.
- Zakian, V., Draine, B., Ferrand, L., Girgus, J., Lee, R., Paxson, C., Peters, C., Rubenstein, D., Troian, S., Walker, S., & Ward, B. (2003). *Report of the task force on the status of women faculty in the natural sciences and engineering at Princeton*. Princeton, NJ: Princeton University, Task Force on the Status of Women Faculty. <http://www.princeton.edu/pr/reports/sciencetf/>

Appendix

Recruiting and Retaining Women Faculty in Science and Engineering

1. Circle the number that represents your agreement that the activities described in the following items would promote the success of women in academic science and engineering. (1 = strongly disagree, 5 = strongly agree)
2. Identify (circle yes or no) whether or not you would participate in the activities described below.

Question 1: Would each suggested item promote the success of women in academic science and engineering?						Question 2: Would you participate in this activity?	
1. Develop a program of advocacy in which senior faculty would be trained and receive a stipend to mentor incoming or junior women faculty	1	2	3	4	5	Yes	No
2. Provide funding for all female assistant and associate professors in science, engineering, and math (SEM) to attend a professionally directed leadership/management program	1	2	3	4	5	Yes	No
3. Organize monthly luncheons for women in SEM that would include deans and chairs of SEM as well as senior administrators. The focus of discussions would be related to strategies for success in academics	1	2	3	4	5	Yes	No
4. Provide opportunities for every woman faculty member in SEM to meet with the area committee to better understand the tenure path	1	2	3	4	5	Yes	No
5. Develop an exit interview process for women in SEM that would provide valuable information regarding barriers to success (e.g., hiring an external interviewer)	1	2	3	4	5	Yes	No
6. Develop a component of the Women's Commission website focused on Women in SEM	1	2	3	4	5	Yes	No
7. Provide additional funding for start-up packages for new female faculty in SEM	1	2	3	4	5	Yes	No
8. Provide education/support for teaching activities	1	2	3	4	5	Yes	No
9. Develop term professorships for 5-6 women faculty in SEM (e.g., \$50,000 each for 5 years)	1	2	3	4	5	Yes	No

Question 1: Would each suggested item promote the success of women in academic science and engineering?						Question 2: Would you participate in this activity?	
	1	2	3	4	5	Yes	No
10. Improve child care options on campus	1	2	3	4	5	Yes	No
11. Develop policies/procedures that would encourage the hiring of dual career couples	1	2	3	4	5	Yes	No
12. Stop the tenure clock for women for childbearing (1 year for each child)	1	2	3	4	5	Yes	No
13. Provide assistance to women SEM faculty (e.g., clerical support) to facilitate research publication	1	2	3	4	5	Yes	No
14. Provide additional funds for travel to conferences, national labs or consultation	1	2	3	4	5	Yes	No
15. Provide funds for extramural pre-review of grant proposals	1	2	3	4	5	Yes	No
16. Recognize success of SEM women on campus by featuring their work at a seminar	1	2	3	4	5	Yes	No
17. Provide grant writing seminars	1	2	3	4	5	Yes	No
18. Require SEM women to be involved in all search processes	1	2	3	4	5	Yes	No
19. Provide small summer research grants	1	2	3	4	5	Yes	No
20. Develop and maintain a database in SEM on gender equity indicators	1	2	3	4	5	Yes	No
21. Establish a visiting Women's Scholars Program	1	2	3	4	5	Yes	No
22. Provide required education for the area committee relative to gender equity	1	2	3	4	5	Yes	No
23. Devise a strategic plan for advancement of women in each SEM department	1	2	3	4	5	Yes	No
24. Provide seminars for department chairs to address all aspects of being a successful chair including advancement of faculty	1	2	3	4	5	Yes	No
25. Develop mandatory sexual harassment workshops for all faculty	1	2	3	4	5	Yes	No

Optional: For purposes of planning and implementing programs and activities, please supply your department name. _____

Please provide us with other suggestions of ways to promote increased participation and advancement of women in academic science and engineering careers.

Table 1

Activities Designed to Diminish Barriers to Success: Responses of Women Faculty in S&E Regarding Structural Barriers (n = 35)

Activity	M	Standard Deviation	Responses to Items (# & %)	Compliance to Activity (# & %)
Funding for startup packages	4.2	0.96	33/94%	24/69%
Establish visiting women S&E scholars program	4.2	0.93	35/100%	26/74%
Funding for travel to conferences for consultation, etc.	4.1	1.05	35/100%	29/83%
Grant writing seminars	4.1	1.02	35/100%	25/71%
Funding for summer research grants	4.0	1.1	35/100%	24/69%
Develop term professorships for 5-6 women faculty in SEM	4.0	1.2	35/100%	25/71%
Develop policies/procedures that would encourage the hiring of dual career couples	4.0	1.0	35/100%	24/69%
Advocacy	3.9	0.99	35/100%	29/83%
Provide leadership workshops	3.8	1.2	34/97%	24/69%
Recognize S&E success at seminars	3.7	1.2	35/100%	21/60%
Hold monthly lunches with administration	3.6	1.3	35/100%	25/71%

Note. Compliance with activity indicates whether participants would be willing to participate in the activity if it is offered to them.

Table 2

Activities Designed to Diminish Barriers to Success: Responses of Women Faculty in S&E Regarding Cultural Barriers (n = 35)

Activity	M	Standard Deviation	Responses to Items (# & %)	Compliance to Activity (# & %)
Provide seminars for dept. chairs on equity	4.6	0.6	33/94%	24/69%
Devise a career plan for women in S&E	4.5	0.75	34/97%	27/77%
Institute dual career program	4.5	0.78	35/100%	20/57%
Educate area committees	4.2	1	35/100%	22/63%
Conduct exit interviews-external	4.2	0.98	35/100%	25/71%
Develop database of gender equity indicators	4.2	1.01	34/97%	24/69%
Improve campus child care options	4.14	0.86	35/100%	13/37%
Stop tenure clock for childbearing	4.1	1.17	35/100%	13/37%
Provide clerical support to facilitate research	3.9	1.36	35/100%	24/69%
Hold mandatory sexual harassment workshops	3.9	1.22	35/100%	23/66%
Meet with area committee	3.8	1.27	35/100%	24/69%
Provide educational support for teaching	3.7	1.4	35/100%	25/71%
Develop website for women in S&E	3.6	1.2	34/97%	21/60%
Require SEM women to be involved in all search processes	3.15	1.23	35/100%	22/63%

Note. Compliance with activity indicates whether participants would be willing to participate in the activity if it is offered to them.