Peer-Mentoring for Untenured Women Faculty:
The Leadership Skills and Community-Building Workshop

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Abstract

Peer mentoring is a promising strategy for improving the presence, retention and advancement of women faculty members in engineering. Strategies for maintaining and increasing the representation of women faculty members in engineering departments may also increase the retention of female students pursuing engineering careers. As a first step toward providing peer-mentoring for untenured women faculty members, an Outward Bound-based Leadership Skills and Community-Building Workshop was held in August 2001. Participants included 14 untenured women faculty in engineering (including two of the organizers/authors), a psychologist (the third organizer/author), and one invited senior woman faculty member in engineering. Based on post-workshop participant reflections, significant positive impact on participants' informational, psychosocial and instrumental well-being was achieved. All attendees noted that the inclusion of a senior woman engineering faculty member greatly enhanced the value of the workshop. The peer-mentoring network that resulted from the Leadership Skills and Community-Building Workshop is providing affirmative opportunities for exchanging professional advice and support for participants in the short-term. Preliminary evidence suggests that these new skills and perspectives, as well as post-workshop peer-mentoring, will contribute to longer-term success in academe for the participating women faculty members in engineering.

I. Introduction

In 1999, women represented approximately 10% of the engineering workforce.[1] The representation of women engineers in higher education is even more sobering. Data from 1997 show that of employees at four-year colleges and universities with doctorate degrees in engineering, less than 7% were women.[2] Of the engineering faculty nationwide in 1991, 7% of Assistant Professors were women, 3% of Associate Professors were women and only 1% of Full Professors were women.[3] At a time when academic departments in engineering and computer science are losing talent to industry,[4] women remain an important and largely untapped labor force for teaching and supporting the next generation of engineers and computer scientists. With such low numbers, the potential for women faculty being isolated and left out of informal mentoring and support networks, is significant.[5]

While our primary concern is with supporting and promoting women engineering faculty members, a secondary benefit could be the influence on the female students these faculty members instruct. In 1998, women graduates of engineering programs represented just 18.6 % of the undergraduate, 20.3 % of the masters and 12.3% of the doctoral degrees in the U.S.[6] One

explanation for the dearth of students and professional women in engineering disciplines is the lack of female role models, instructors and faculty members in these areas.[7] Thus, strategies for improving the presence, retention and advancement of women faculty members in engineering may also increase the number of women students successfully pursuing engineering careers.

Creating mentoring opportunities is a promising strategy for improving retention and advancement of women faculty members in engineering. Mentoring is traditionally a developmental relationship in which an experienced person provides informational, psychosocial and instrumental support to a less experienced person. In return, the mentor gains personal satisfaction, respect from colleagues for successfully developing younger talent, and may grow intellectually as well. Informational support is provided when a mentor provides "information" to a newcomer or less senior colleague. Examples include telling a newcomer where to find supplies, the types of grants one should be writing, the journal outlets where one should be publishing or generally clarifying the rules for tenure. Psychosocial support boosts the psychological state of the protégé. Examples of psychosocial benefits include a mentor offering self-confidence-boosting advice, helping normalize the difficulties of being a new faculty member by self-disclosing their own early challenges, or providing constructive criticism in a supportive way. Very often, informational benefits and psychosocial benefits can occur simultaneously. Finally, instrumental benefits provide new opportunities for the newcomers. A mentor provides instrumental benefits by introducing them to important figures in their field, by recommending them for invited talks, by co-authoring grants and articles, or by suggesting the newcomer reviews an article in a journal where the mentor is an editor.

Quantitative studies on mentor functions and outcomes in organizations have shown that both formal and informal mentoring relationships are effective in promoting protégé advancement and compensation.[8] However, mentoring strategies that are effective for men in organizations are not necessarily well suited to women. While there are important variations across racial and class groupings, socialized gender differences between women and men have significant implications for mentoring.[9] For example, given that women more often prioritize successful group affiliation and value community, collaboration, egalitarianism and diversity more than their male counterparts,[10,11] community-building exercises and group-based mentoring are more likely to meet the needs of women faculty than advice from their department chairpersons and senior colleagues alone. Thus, deliberately constructed mentoring, networking and leadership programs, such as the one developed here, may be highly effective in combating isolation and providing the type of supportive and collegial experiences that influence professional development, retention and advancement for women in the engineering academy.[12,13]

II. Leadership Skills and Community-Building Workshop Format

The strategy selected for this innovation in peer-mentoring was a leadership skills and community-building workshop. Outward Bound Professional (www.outwardboundpro.com) was selected to facilitate and host the workshop, based on their Women Leading program for professional women and their High Performance Team curriculum module. As stated in promotional material,

> "The heart of the Outward Bound experience is *learning by doing*. … We believe that to create positive lasting change in the workplace, training/education must be challenging, enjoyable and on-going. We believe the difference between a high-performing team and a group not living up to its potential is the ability of the team to continually evaluate its performance and make corrections."

During our three-day workshop, the Outward Bound facilitators introduced us to the "Goals, Roles, Procedures and Interpersonal Interactions" (GRPI) model for creating and implementing action plans, helped us develop a "Team Charter" or mission statement, evaluated our individual and team performance using their "Plus/Delta Feedback" model (Plus: identify and provide feedback on what works well; Delta: what requires change) and led us in a team challenge sequence that culminated in a rock-climbing-based team challenge. In addition to these traditional Outward Bound activities, time was set aside for an invited participant to address the group as a whole. All meals were provided by and prepared by Outward Bound staff. Participants were responsible for cleanup. Sleeping arrangements were rustic, with participants on bunk beds in one of two cabins with running water in other facilities nearby. Additional details regarding daily activities are provided in Table 1.

Table 1. Workshop daily activities

Activities	Day 1	Day 2	Day 3
Team activity			
Team-building games	X		
Orienteering		X	
Climbing challenge			X
Individual activity			
Hike/walk	X		X
High ropes course		X	
Reflection time		X	
Rock climbing			X
Intellectual activity			
Social styles	X		
Invited speaker		X	

III. Participant Statistics

The attendees included 14 untenured women faculty members in engineering (including two of the author/organizers), one psychologist (the third author/organizer) and one invited participant, a senior woman faculty member in engineering. The invited participant, Ilene Busch-Vishniac is the Dean of the Whiting School of Engineering at Johns Hopkins University and well-known for her research in the areas of acoustics and electromechanical sensors. Throughout her career, and in her role as dean, she has been strongly committed to the support and advancement of women and minorities in engineering and in the academy.

The primary means of advertising the program was a personalized letter to deans of engineering in the New England Region (the primary regional focus area, selected a priori). The New England Region was chosen to be coincident with SWE Region F: Massachusetts, Maine, New Hampshire, Vermont, Rhode Island, Connecticut and eastern New York state. The list of deans was obtained from the Northeast Regional Dean's Council and included 24 colleges and universities. Secondary means of advertising to recruit participants from outside the region were email lists such as WEPAN and past participants of NSF-sponsored engineering education

workshops (Stanford and CMU program alumni in particular, all years). Many tenured and non-engineering faculty members responded to the email posting on the WEPAN electronic distribution list; several selected participants applied in response to the posting on the engineering education alumni list; and a few participants heard about the program through their deans.

Participants were selected from approximately 30 applicants nationwide and selected on the basis of (1) Region, (2) Tenure-track status in an engineering department, (3) Professional and individual diversity considerations. When selected from outside of the New England Region, cohort groups of two or more were prioritized to increase the likelihood of face-to-face peer-mentoring after the workshop. Home states of participants are given in Table 2. The 14 untenured engineering faculty members' academic experience ranged from first to fifth year; their fields of expertise included industrial, chemical, mechanical, biomedical, civil, environmental and general engineering as well as material science; and their current institutions ranged from research universities to liberal arts colleges. Several have already been awarded the prestigious National Science Foundation CAREER grant[1]. Nine of the fourteen participants are married; of those nine, slightly under half have one or more children (range: 1 – 3).

Table 2. Participants' home states and region

Home State	Participants
New England Region	
Massachusetts	6
Maine	0
New Hampshire	0
Vermont	1
Rhode Island	1
Connecticut	0
Eastern New York	1
Outside New England Region	
Nevada	1
Pennsylvania	2
Virginia	2

IV. Results

Qualitative analysis of participant feedback revealed significant positive impacts of the workshop. In particular, most participants cited specific benefits gained through the workshop that are likely to impact their daily lives, reported overcoming skepticism and cynicism of community, and expressed strong commitment to maintaining this peer-community as well as mentoring others upon their return to their workplace. Interestingly, the specific Outward Bound experience may have been critical to this workshop's apparent success in building community. Comments also reveal the merit of inviting a senior woman in the engineering academy to attend, speak to the group about her experiences and participate fully in the workshop. Excerpts from participant reflections are grouped below according to informational, psychosocial and

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[1] Since the conclusion of the workshop, one more participant has been awarded the NSF Career Grant.

instrumental benefits. Comments on the particular benefits of Outward Bound and the participation of the invited speaker Ilene Busch-Vishniac follow.

Informational Benefits:

Writing

    "The diagnostic [writing] survey handed out convinced me that perfectionism was slowing me down when approaching new manuscripts or essays. I now feel more confident in my writing skills and ability to put a piece of writing together more quickly."

    "I gained some very valuable professional advice… Writing has been a chore for me, but thinking about it as a sales pitch or advertising to the world about what cool stuff I've done, now that was an eye-opener."

Value of Consensus

    "I was very pleased with the way we were able to talk things out, which provided me with one more valuable lesson on the importance of listening to all voices and building consensus."

    "[I] wonder whether we don't often drive so hard to decisions and resolutions that we forget to take the time to consider the needs of every member of the team. Put into operational terms, I think this suggests that time spent … building consensus is time well spent."

Risk Management

    "The best part was the time to reflect, alone and as a group, about key aspects of how we as individuals interact with our roles as professors. How we handle risk and conflict and how we plan for our lives, our careers and the academy."

    "I learned … the distinction between perceived vs. real risk."

Psychosocial Benefits

Confidence

    "One thing I did get out was a little more self-confidence. … I learned iterative attempts at achieving a goal."

    "I take away from this experience a profoundly expanded sense of possibility, restored confidence in myself as well as others, a support network that has seen me in my most trying hour, and a set of tools for an upward spiral of self-improvement that I hope will be ongoing."

Loss of Isolation

    "Just knowing that I'm not alone is very comforting. Knowing that there are people I can vent to without feeling on guard provides me with a great sense of security."

    "The early group-building exercises were very effective at bringing me out from my sense of isolation."

Optimism and Trust

    "Through various experiences I had come to doubt that I would ever be part of a 'true community' … plus I had gained a little cynicism regarding the academic 'community.' … It was not until Saturday's self-reflection period that I realized that I wanted – really wanted – this group's connection to live beyond the temporary community of an intense common experience."

"My reflection of the … experience is how my internal environment went from feeling "duty-bound" to participate, to experiencing personal renewal, to daring to believe that our efforts (not my efforts but our efforts) would reach beyond the weekend."

Instrumental Benefits: Commitment to Future Community:

"We chose to say [to ourselves] 'Thanks for the boost and the personal growth opportunity. I am ready to go back now and not only make a difference in my workplace, but continue to maintain our community for each other, and to broaden its impact beyond us few 16 people.'"

"It feels wonderful to be part of a community that I know I can call upon if I need advice or solace, and with whom I can share my successes knowing that you actually do care to hear them. It feels even better knowing that I would do whatever is in my power to help any one of you."

"I am motivated to continue to spend some time each week on some type of mentoring or support activity with other female engineering faculty."

The Outward Bound Experience

"Physical health is probably second in importance to mental health. The Outward Bound experience was a physically rewarding experience."

"I really liked the Relationship-Results-Process triangle and the idea of putting yourself in a certain space for a given activity or a given class discussion/interaction/teaching moment."

"… I was able to use the Outward Bound process to reflect upon what happened for me that morning [on the high ropes course] and what I could do differently. … I … resolved to make some changes. … Indeed, my second experience [rock climbing] was very different. I amazed myself…"

Senior Speaker/Role Model Participant

The inclusion of a senior faculty member/role model influenced not only the workshop experience but also participants' decisions to apply. "I was very interested in hearing from the advertised 'senior woman faculty,' who could surely provide some interesting tips and perhaps become a networking resource," reported one attendee. At the workshop, the presence of Ilene Busch-Vishniac and the sharing of her personal story were "inspiring," "a great example" and extremely valuable according to nearly all attendees (from informal discussions not recorded). Many questions during her address to the group focused on her marriage, decision to have children, and the timing of her personal life choices. Post-workshop, frequent email exchange between Dean Busch-Vishniac and the other participants has occurred both individually and through the e-list, concerning professional as well as personal issues.

V. Discussion

The purposes of the Leadership Skills and Community-Building Workshop were to provide peer-mentoring, leadership training and networking opportunities for a group of untenured women faculty members in engineering, traditionally an isolated and minority group in their respective departments and universities. The comments above and the continuing connections among participants suggest that peer mentoring and community was developed during the intensive

Outward Bound experience. While the longevity of specific benefits gained in the workshop (confidence, loss of isolation, increased optimism and trust in community, commitment to future community-bulding and peer-mentoring) cannot be assessed at this time, early self-reporting indicates that significant positive change has occurred. At the least, significant positive interactions among junior women faculty occurred and participants reported being very satisfied with the three-day experience.

It appears that the selection criteria (Region, Tenure Track, and Diversity) added value to the experience and the subsequent outcomes. To date, those participants in driving distance from one another report the most sustained connections. Thus, Region may influence the longevity of connection among participants. The Tenure Track criterion clearly established a shared mission among participants and considerable shared experience and life history. The Diversity criterion, which considered industrial, research and teaching experience, engineering discipline and race/ethnicity, also appears to have been of value. Shared experiences in industrial settings and research areas in particular were the basis of many informal one-on-one discussions. However, the lack of a shared sub-discipline within engineering for all participants limited the development of shared professional resources such as syllabi, course notes, homework sets, and will limit the future interactions of participants at discipline-specific national meetings.

Interestingly, the Outward Bound experience may have been a key factor in establishing community. Many reported having been to other similar but less successful workshops previously and commented on the usefulness of specific features of the High Performance Team curriculum module.

A secondary purpose of the workshop was to expose younger women to a successful woman role model in an informal and intimate setting. According to participant feedback, there was clear merit in not limiting the workshop to a purely peer group. The inclusion of a senior woman speaker and role model, specifically Dean Ilene Busch-Vishniac, who participated fully in the Outward Bound experience, enhanced the value of the workshop for all participants. Dean Busch-Vishniac provided significant informational and psychosocial support by sharing guidelines for tenure, political pitfalls and professional advice, by sharing her personal story with the group and by encouraging participants individually during the three-day experience. It is significant that she continues to make herself available to this group of untenured faculty who in turn continue to contact her for information, support and feedback. In these ways, Ilene Busch-Vishniac served as a personal and professional role model for participants and may become a mentor to some in the long-term.

The gender-specific focus of this mentoring program was motivated by several factors. First, the small numbers of untenured women faculty nationally, and the relative singularity of women in their home departments and colleges, warrant the targeted use of a mentoring program focusing exclusively on this population. Second, the use of same-gender, peer-mentoring has been theorized to be particularly effective for women faculty in engineering, based on the sociology of gender.[9] Therefore, mentoring and community-building programs that bring together women faculty in similar situations are likely to fill unmet professional needs of these faculty members for networking, information exchange, and support. Same-gender, peer-mentoring programs that focus on leadership and professional development may be important components of retaining women engineers in academia.

VI. Conclusions

The 2001 Leadership Skills and Community-Building workshop was successful in providing informational, psychosocial and instrumental benefits to participating untenured women faculty in engineering, developing community among participants, and introducing untenured women faculty to a successful senior woman in the engineering academy. Networking and peer-mentoring among this cohort of faculty has been initiated and is continuing via electronic communication. This workshop is the first in a three-year series designed to support the advancement and retention of this cohort of women new faculty members. In the second and third years of the program, we will organize skills-based reunion workshops facilitated by our relatively close geographical proximity and serving to strengthen and broaden the peer-mentoring network. The impact of this intervention on personal and professional success and satisfaction will be assessed over the planned three-year duration of the program.

VII. Acknowledgements

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