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Fostering Development of Women Faculty in Geotechnical Engineering

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Abstract

A one-day workshop was convened to address obstacles to success of American women faculty in Geotechnical Engineering. The workshop, sponsored by the National Science Foundation (NSF), was held in October 2003, in conjunction with another workshop for the United States Universities Council on Geotechnical Education and Research (USUCGER). At that time, the 17 participants represented 40% of all tenure-track women faculty in Geotechnical Engineering at American universities. The workshop provided an opportunity to discuss academic career issues, including diversity, research, teaching and service. Concerns voiced by the participants spanned all of these topics. The leading need that emerged was for childcare during professional activities away from home. For most major concerns, specific action items resulted, and these are presented. The NSF, USUCGER, professional organizations such as the American Society of Civil Engineers, university governance, and the women faculty themselves were seen as potential catalysts for problem-solving. Some concerns such as service loads and recognition for diversity-based contributions still defied the envisioning of specific action items.

Key Words: Geotechnical Engineering, Women, Education, Universities, Retention, Recruitment, Gender, Tenure, Promotion

Introduction

A one-day National Science Foundation (NSF)-sponsored workshop to convene female geotechnical engineering faculty was held on October 1, 2003, a day prior to the *National USUCGER Workshop*, also sponsored by NSF, at the Omni CNN Hotel in Atlanta, Georgia. (USUCGER is the United States Universities Council on Geotechnical Education and Research, www.usucger.org.) The workshop provided an opportunity to discuss academic career issues, including diversity, research, teaching and service. All tenure-track female geotechnical faculty members were invited. Those who attended the workshop for women also attended the *National Workshop*, thereby increasing the representation of women in USUCGER activities.

The workshop was designed to foster technical, intellectual and personal exchange among geotechnical women in the academic community. According to the membership rolls of USUCGER and additional knowledge collected by the authors, the 17 participants (Fig. 1) represented 40% of all tenure-track women faculty holding geotechnical academic positions at American universities at that time. According to the same sources, in American universities, women hold approximately 10% of all tenure-track positions in geotechnical engineering. Women faculty from academic research universities, as well as predominately undergraduate teaching institutions attended. The attendees reflected a good distribution of academic rank and a broad range of technical expertise and geographic locations (Fig. 2). Interestingly, over 40% of all women tenure-track geotechnical faculty earned their doctorate degrees from only 5 universities (Table 1). The other 24 were the only female doctoral degree recipient from that institution currently in a tenure-track role.



Figure 1. Participants at the 2003 NSF Workshop on Fostering Academic Development of Women in Geotechnical Engineering (top row from left to right: Priscilla Nelson, Giovanna Biscontin, Ellen Rathje, Lynn Salvati, Laurie Baise, Christina Curras, Marika Santagata, Sandra Houston, Beena Sukumaran, Andrea Welker, Susan Burns, Rick Fragaszy; bottom row from left to right: Amy Rechenmacher, Mary Roth, Barbara Luke, Sarah Gassman, Patricia Gallagher, Deborah Goodings, Debra Laefer)

Table 1. All Tenure-track Women Faculty in Geotechnical Engineering at U.S. Institutions Shown by by Ph.D.-Granting Institution

Institution	Number of Ph.D awardees
University of California, Berkeley	6
Northwestern University	5
University of Texas, Austin	3
Cambridge University	2
Univ.of Illinois, Urbana-Champaign	2

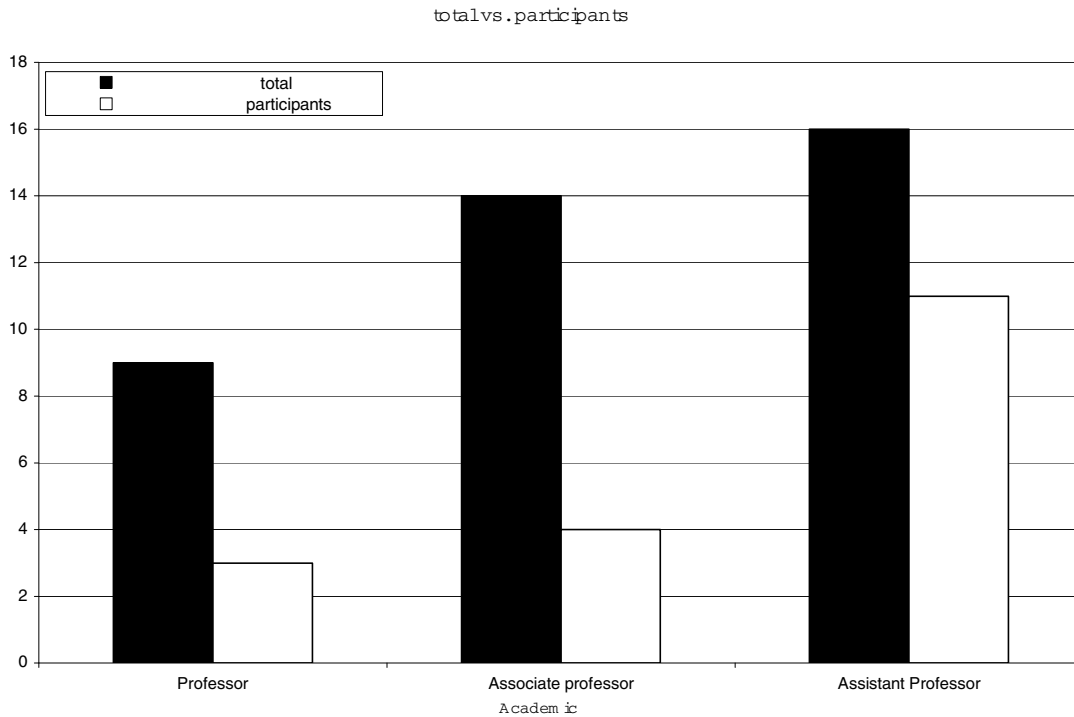


Figure 2. Population of total women geotechnical engineering faculty and subset of workshop participants by academic rank

The broader impacts of this workshop were designed to include both short- and long-term benefits, as well as to instill in its participants a sense of belonging within the academic Geotechnical Engineering community, to which their contributions are essential. The short-term benefits were to be the development of an active network of mentors and peers for women within the geotechnical community, increased awareness of research and funding opportunities/collaborations, and increased participation of women at the *Fourth USUCGER National Workshop*. The long-term benefits were to assist in the increased retention of women as active researchers, educators and mentors within Geotechnical Engineering and increased diversity within Geotechnical Engineering.

The workshop format consisted of roundtable discussions, informal presentations, and two guest lectures (Fig. 3). The intensive event fostered exchange between the participants, helped identify common interests and issues, and aided in the development of collaborative efforts within the geotechnical community. Jane Ammons of the Georgia Institute of Technology and Priscilla Nelson of NSF were the guest speakers. Their presentations focused on successful strategies for the advancement of academic women in engineering (what works and what does not) for various topics including mentoring/recruiting women, collaborative research, networking, conflict resolution, and working with colleagues. The workshop outcome was the development of a list of action items with recommended strategies for each.



Fig. 3. (a) Invited Speaker Jane Ammons of Georgia Tech and (b) Breakout Session

Survey and Structure

Prior to the workshop, surveys were sent to all known tenure-track women geotechnical faculty. Questions probed for background information on education and personal issues, as they related to professional success, as well as inquiries regarding professional advancement. The results of these surveys were used to help inform the workshop agenda and shape the initial discussion topics. During the workshop, the participants broke out into three groups and were asked to identify key issues related to the following: academic careers, research, teaching, professional and community service, outreach, and diversity. They were then asked to identify the top issue in each of these five categories and to brainstorm action ideas, best practices, goals, etc., and to choose two top action items to share with the other groups. Based on the outcomes of the small group work and subsequent group discussions, a list of action items, best practices, and recommended strategies was assembled.

Results

The workshop results are summarized in Table 2. The top issue of concern was clearly childcare, especially temporary care away from home. The situation is critical because many of the women have spouses/partners working far from home and no extended family nearby with whom to leave children, complicating travel for field site visits, conferences, and professional service activities, such as proposal review panels. Because

such activities are considered to be critical for professional advancement and networking and are hard to accommodate because of a lack of reliable away-from-home childcare, there was a strong feeling that NSF could set the example with their proposal review panels by (1) providing on-site childcare for panelists, (2) encouraging those who could not attend in person to participate via teleconference, and (3) making travel allowances for childcare. The professional organizations could also be strongly encouraged to provide childcare during conference events, even if there was an associated cost to the users.

Table 2. Summary of Major Impediments and Possible Improvements to Female Faculty Recruitment and Retention in Geotechnical Engineering

Impediment	Cause	Possible Improvements
Lack of childcare away from home inhibits participation in professional activities requiring travel	<ul style="list-style-type: none"> • 80+ hour work weeks • Spouses/partners with major careers • Spouses/partners with heavy travel schedules • Spouses/partners living/working in different cities • Living far from extended family 	<ol style="list-style-type: none"> 1. On-site childcare at NSF (and elsewhere) for proposal review panelists 2. Participation in panels via teleconferencing for those that cannot travel 3. Permit travel funds to be used for daycare costs 4. National organizations to offer daycare during professional meetings and conferences
Lack of mentorship	<ul style="list-style-type: none"> • Often double isolation of being the only female in the department and being one of only a few geotechnical faculty members, therefore dual challenges of advocating for gender equity and for programmatic resources. 	<ol style="list-style-type: none"> 1. Create formal mentorship programs for junior women faculty consisting of two mentors: one within the department and one outside.
Truncated leadership opportunities	<ul style="list-style-type: none"> • The homogeneous “establishment” on ASCE committees and journal editorial boards. • Lack of information about academic opportunities 	<ol style="list-style-type: none"> 1. Lobby Geo-council for policy statement to ensure that full consideration is given to women for membership and leadership roles 2. Better use of the USUCGER women’s email listserve to announce academic positions of department heads, deanships and award nomination deadlines
Dearth of female candidates/collaborators	<ul style="list-style-type: none"> • Limited supply of women geoprofessionals, inadequate avenues of communication 	<ol style="list-style-type: none"> 1. Have Geo-Institute publish research abstracts of recent graduates 2. More use of the newly-updated USUCGER women’s email listserve to announce academic positions for junior faculty and networking opportunities

Table 2 cont'd. Summary of Major Impediments and Possible Improvements to Female Faculty Recruitment and Retention in Geotechnical Engineering

Impediment	Cause	Possible Improvements
Inadequate communication among geotechnical women faculty	<ul style="list-style-type: none"> • Few women Ph.D. graduates had mentoring from other women in graduate school, few know other women faculty in geotechnical engineering when taking their first post • Small group, geographically dispersed 	<ol style="list-style-type: none"> 1. Use email listserv to hold continuing discussion/dialogues on professional and technical topics 2. Women faculty who are geographically proximate to get together periodically for infrequent social/networking events 3. Build regional communication networks sufficiently broad to include all campuses within the region, and to ensure that no one is excluded 4. Hold gatherings for women geotechnical faculty members at national conferences
Teaching concerns, ranging from quality to quantity to in-classroom bias	<ul style="list-style-type: none"> • Finding time to teach well, keeping syllabi updated, linking the classroom to the real world. • Negotiating course loads, addressing trend for diminishing support from teaching assistants • Bias/preconceptions of female faculty (from student, colleagues, and staff) 	<ol style="list-style-type: none"> 1. Have USUCGER take a leadership role in the development of teaching modules 2. Create USUCGER-based resource files of teaching materials (e.g. example problems, syllabi, etc.)
Effective service	<ul style="list-style-type: none"> • How to get/give effective mentoring • Selecting appropriate and worthwhile service opportunities • Difficult to turn down requests to serve on committees, especially when a “token” female is needed (e.g. search committees) 	<ol style="list-style-type: none"> 1. None proposed
Making diversity a real issue	<ul style="list-style-type: none"> • Only lipservice paid in many institutions • Service and scholarship in this area not fully counted as an important contribution 	<ol style="list-style-type: none"> 1. None proposed

The next most important concern was a lack of mentorship, as many women in geotechnical engineering face the double isolation of being the only female in their department, as well as one of few Geotechnical Engineering faculty members, particularly in smaller programs. Consequently, these women have the double challenge of striving for gender equity and competing for programmatic resources. To counter this, a formal mentorship program was proposed that consists of two mentors for new women geofaculty: one within her department and one outside. Such a system would provide needed support, while tempering effects of personal or political agendas of specific individuals.

Another major concern of many of the attendees was a lack of full access to leadership opportunities, especially through professional organizations. Positions such as those on ASCE committees and journal editorial boards are critical for learning and for exposure, particularly to senior people in the field who will eventually be needed to supply letters in support of tenure and promotion. The proposed solution included raising the concern at the Geo-Council (the National Council for Geo-Engineering and Construction; www.geocouncil.org), possibly to advocate a policy that female membership on geotechnical committees and journal boards be given full consideration.

Additionally, the group suggested that better use be made of the newly updated USUCGER women's email listserve: to announce academic positions, openings for department heads and deanships, and calls for nominations for awards. Part or all of these problems stem from or are exacerbated by the small number of Geotechnical Engineering women in tenure-track positions; thus concerns were raised regarding the identification of new female Ph.D. graduates in geotechnical engineering and their research interests, for dual consideration of hiring and collaboration opportunities. In addition to the USUCGER women's email listserve, publishing research abstracts of recent graduates in the American Society of Civil Engineers (ASCE) Geo-Institute's newsletter was proposed. A related topic was improving communication amongst existing women faculty.

At the local level, the Geotechnical Engineering women faculty should try to have infrequent but regular interactions with others in their vicinity. This would be supplemented by new regional networks that encompass all universities within range and by holding social/networking events for women faculty at national conferences. Finally, the USUCGER women's email listserve could be used to hold continuing discussions/dialogues, with rotating responsibilities to select/facilitate topics.

Concerns about teaching ranged from quality to quantity, as well as gender bias of students, colleagues and staff at some universities, particularly those in the South. Real concern was voiced over how to teach well, while keeping the classes interesting, updated, and linked to the real world. USUCGER was seen to be a possible venue for taking a leadership role in the creation of teaching modules and materials such as syllabi and problem sets.

The main concerns related to service were how to get and give effective mentoring, selecting appropriate and worthwhile service roles (e.g. committee work, paper reviewing, departmental open house representation) and learning to say "no", especially when a "token" female is needed on search committees and in similar roles. No specific recommendations were made as to how to tackle these concerns. The group was similarly without suggestions on how to make diversity a real issue in Engineering colleges, as opposed to a topic of lipservice, when service and scholarship in this area may not be fully counted as valuable contributions, when tenure and promotion decisions are made.

Of note about the concerns raised at the workshop is that many are the same that were reported by Bhatia (1989) at the first NSF-sponsored workshop for women Geotechnical Engineering faculty when they numbered less than 10 tenure-track positions in U.S. universities and colleges, as well as in 1993 by women structural engineering faculty when they numbered only 43 tenure-track positions in U.S. universities and colleges (Trautner et al., 1996). Additionally, it was noted at the most recent workshop (2003), that many of the issues facing women faculty, especially those at the assistant professor

level, are similar to those that face new male faculty who have professional spouses/partners. Thus, many of the issues related to tenure expectations; balancing teaching, research and service; and traveling for professional activities, are valid for both men and women in dual-career households.

These important issues raised fundamental questions about how to effectively recruit and retain women in Geotechnical Engineering in both academics and the profession at large. As such, a large-scale survey is now being planned by the authors to investigate a wide variety of possible input factors, motivators, and impediments from undergraduate enrollment numbers and early mentorship to involvement in professional activities dating back to student chapter opportunities.

Conclusions

Concerns of women faculty in Geotechnical Engineering spanned the triumvirate of research, teaching and service. The leading need was for childcare during professional activities away from home. The NSF, USUCGER, professional organizations such as ASCE, academic departments, and the women faculty themselves were seen as being able to take leadership roles in problem-solving for many of these topics, but some concerns such as service loads and recognition for diversity-based contributions still defied specific action items.

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