Session 3592

Mentoring Men of Color and Women to Faculty Positions: Results from a Faculty Survey

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Abstract
This paper reports on an engineering faculty survey designed to provide insights into why under represented (women, African American men, Latinos, and Native American men) enter academia. There continues to be a shortage of participation from these groups in the engineering field and even with all the efforts of people, foundations, and agencies, the numbers are not increasing. Determining what the factors are that motivate and encourage young people to pursue Ph.D.s and then select academic careers, is vital to the economic growth of America.

Introduction
The representation of men of color and women faculty in engineering in the U.S. is extraordinarily low. The most recent data (1997) indicate that female engineering faculty who have doctorate degrees employed at four-year colleges is at a level of 6.5% (tenured and non-tenured, tenure track). The number of doctoral engineers employed as postsecondary faculty in two and four-year colleges is so small for Black, Hispanic and Native Americans that they are go unreported since the number is less than 500.[1] The data at the graduate level is compelling since this is the population of individuals who represent the potential source of college faculty. Although the percentage of women receiving doctorate degrees in engineering in 2001 declined from 15.8% to 14.7%, the number increased from 937 to 1039 degrees granted.[2] Just 197 under represented people of color earned doctorate degrees in engineering in 1997 and remains the same in 2001.[3] This figure is actually inflated because the minority data are not disaggregated by gender and therefore women of color are double counted.

Increasing the presence of female faculty in engineering schools is critical since increasing the number of role models and mentors encourages the persistence of undergraduate and graduate women in technical fields.[4, 5] In one study, Robst found that a significant positive relationship exists between retention and the percentage of science, mathematics, and computer science (SMC) courses taken by female students that are taught by women.[6] Robst states that the larger the percentage of SMC courses taken with female faculty, the more likely female students will return for a second year. Sloat maintains that if we expect to and are serious about attracting more women into the sciences, the continuing need for female faculty in the sciences cannot be ignored.[7] The presence of female role models is critical to increasing the pool of young women pursuing degrees in science and engineering. Exclusive female colleges, where role models are abundant, have proven success in directing and retaining female students in science and math. Jadwiga reports that almost half of women's college graduates chose to work in traditionally male

dominated fields.[8]

Overview of the Faculty for the Future Initiative

Established in 1990, Faculty for the Future (FFF) was a ten-year, $20-million initiative of the GE Fund, the philanthropic foundation of General Electric. GE Fund data indicate that 200 men of color and women supported by FFF have earned Ph.D. degrees in engineering, related sciences and business during at 40 U.S. universities and went on to faculty positions. This represents nearly 5% of all women and minorities entering the faculty in these fields in the past five years. Approximately 900 FFF students still are working toward their degrees and may eventually seek academic employment.

Through a 2001 grant to WEPAN, Women in Engineering Programs & Advocates Network, the GE Fund is expanding the support to students with a web site linking women and minorities in these fields with faculty and research positions at universities across the country. WEPAN is working with several partners to implement this program including Penn State University, MentorNet, Texas A&M University, Stevens Institute of Technology, and Tufts University.

The Faculty for the Future web site offers a resume database with two primary functions, moderated e-forum discussions, electronic mentoring, and academic career guidance information. Colleges and universities can post openings for faculty positions, fellowships and research grants, and students can post their resumes and contact information. As of January 2003, 153 institutions had registered openings for 220 faculty positions and 66 other academic opportunities on the FFF web site. Candidate resumes totaled 339 (www.facultyforthefuture.org).

This paper reports on a faculty survey conducted by WEPAN as part of the Faculty for the Future initiative with a focus on the responses of engineering faculty.

FFF Faculty Survey

When researching the literature on how to encourage under represented PhD students to select academic careers, there is little available. There was information on why go to graduate school and how to mentor under represented graduate students. So, the decision was made to develop a faculty survey that would gather current information on how under represented engineering faculty were mentored to academic positions and how they mentor their current students to academic positions. The responses provide a small collection of faculty experiences about what was important in their career choice. It also provides insight into how these faculty, who are under represented themselves, encourage under represented students towards academic careers. This survey is not social science, rather a response to a wise Navajo woman who told the authors, "until there is critical mass of under represented people in STEM to survey, we should continue telling the stories of the few who are there."

Initial survey questions were compiled and then one-on-one interviews were conducted with six faculty. From these interviews, the faculty comments, and the interviewers experiences, the survey was revised. The surveys were then provided to the WEPAN list serve and the project team members for distribution.

This paper reports on responses from 43 under represented engineering faculty including: 25 white females; 9 African American females; 2 Latina females; 1 Asian female; 3 African American males; and 3 Latino males. According to Carnegie classification (http://www.carnegiefoundation.org/Classification/CIHE2000/PartIfiles/partI.htm), the under represented engineering responders represent:

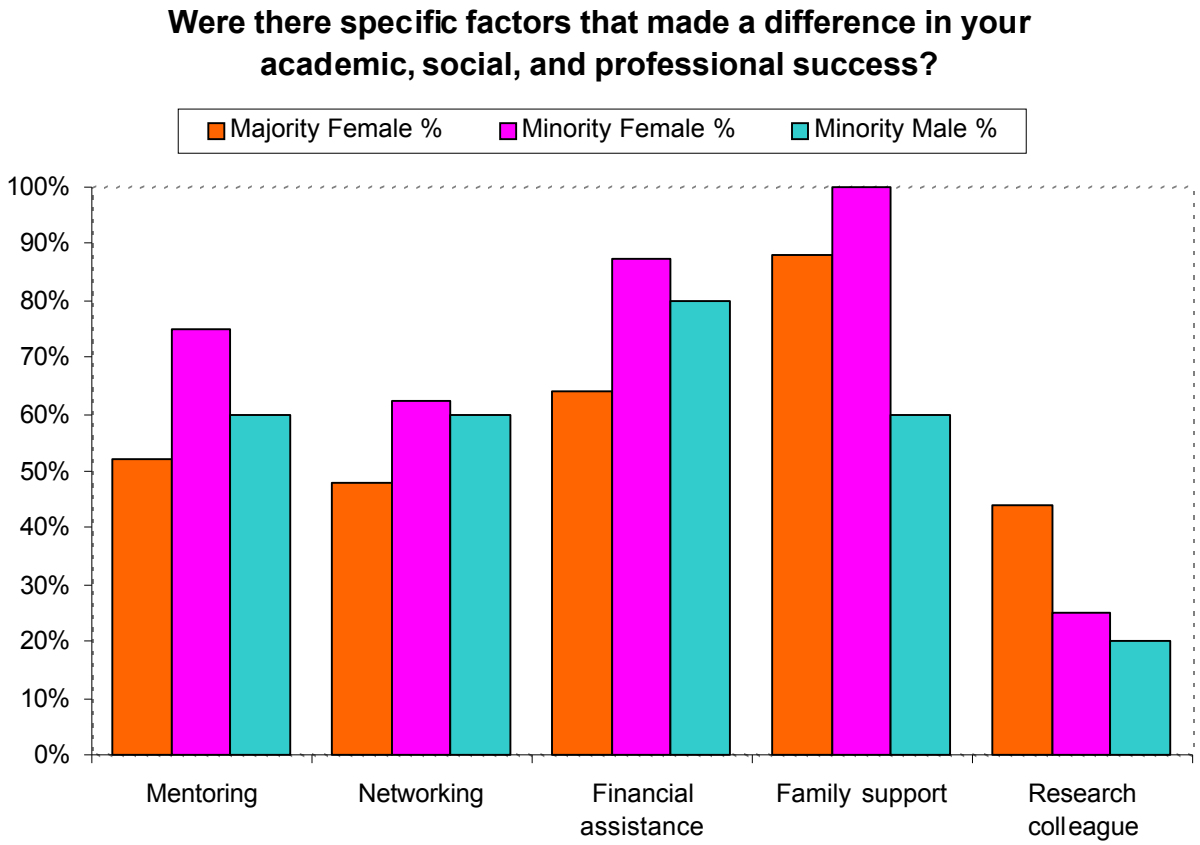
- 25 faculty members from Doctoral/Research Universities—Extensive;
- 7 faculty members from Doctoral/Research Universities—Intensive;
- 6 faculty members from Master's Colleges and Universities I;
- 2 faculty members from Baccalaureate Colleges—Liberal Arts;
  and 3 faculty members from Schools of engineering and technology.

This paper will report on the engineering and computer science faculty responses to the following questions:

- What were the factors that made a difference in your academic, social, and professional success?
- What are characteristics and/or behaviors you look for in identifying Ph.D. students as potential faculty?
- What strategies do you find useful/effective in mentoring under represented groups to faculty positions?
- Why encourage students to faculty careers?
- Do you mentor women and/or men of color differently than majority men?

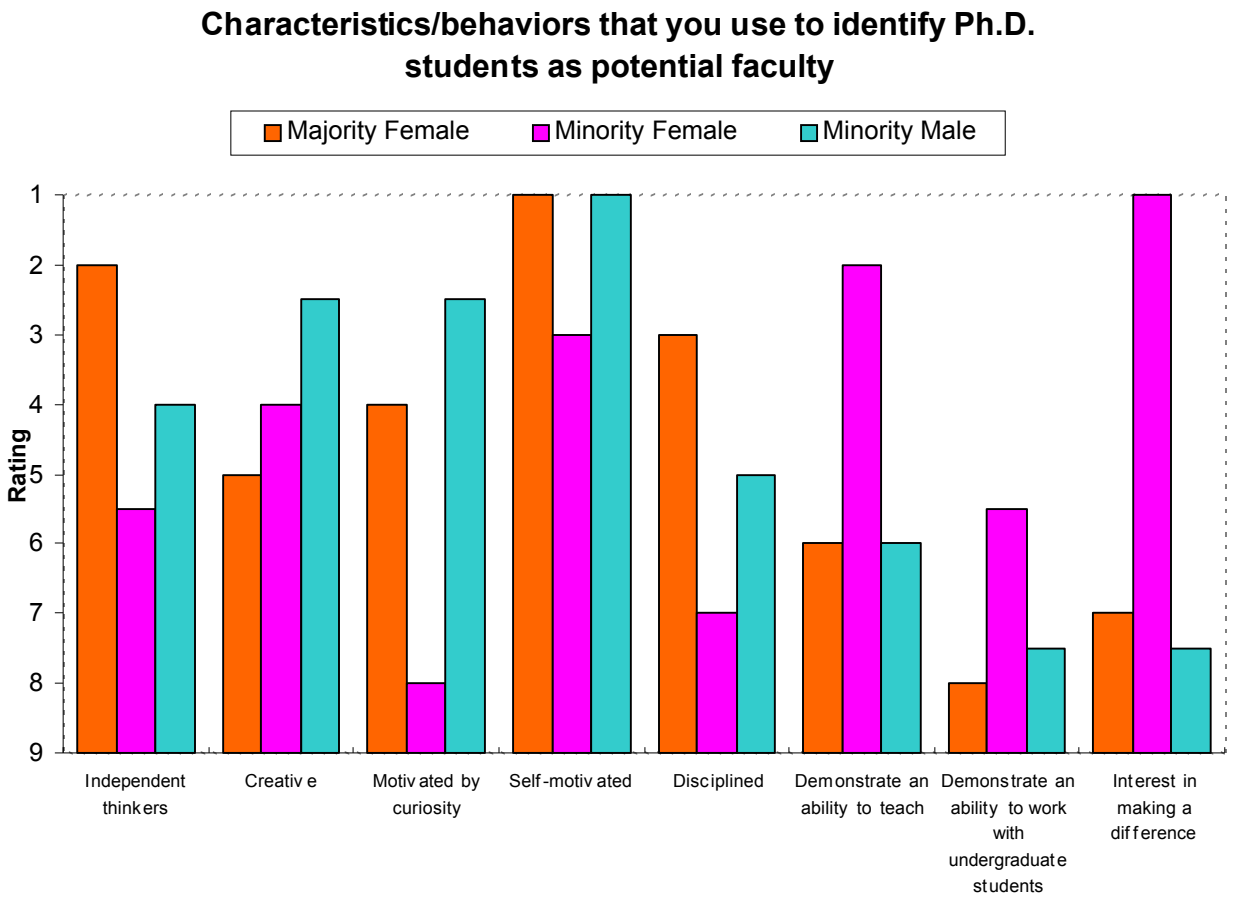
Results

When asked, "*What were the factors that made a difference in your academic, and/or professional success,"* overall, respondents listed family support and financial assistance as the top two factors that made a difference in their academic, social and/or professional success. When the data was disaggregated by sex, minority men listed financial assistance as the number one factor while women listed family support as number one.



When asked, *"Was there a person or an event that was particularly influential in your career path,"* forty-two percent of the respondents reported a faculty member and/or academic advisor. The second most important influence reported, was parents (12%), especially fathers. The faculty/advisor influence was true for both men/women and majority/minority faculty.

When asked, *"What are the characteristics and/or behaviors you look for in identifying Ph.D. students as potential faculty,"* the top five listed by the respondents overall, were: 1) self motivation, 2) independent thinkers, 3) disciplined, 4) motivated by curiosity, and 5) creative. When disaggregated by race and gender, minority women ranked "interest in making a difference" as the number one characteristic and "demonstrate an ability to teach" as the number two characteristic.



When asked, *"What strategies do you find useful/effective in mentoring under represented groups to faculty positions,"* respondents overall listed the top five strategies as: 1) taking graduate students to technical conferences where they present their work; 2) taking students to technical conferences where faculty member introduces them to others in the field; 3) sharing personal career experiences/successes and failures; 4) writing down a formal plan for student research; and 5) giving students at least one teaching experience (strategies 4 and 5 were also tied in the ranking).

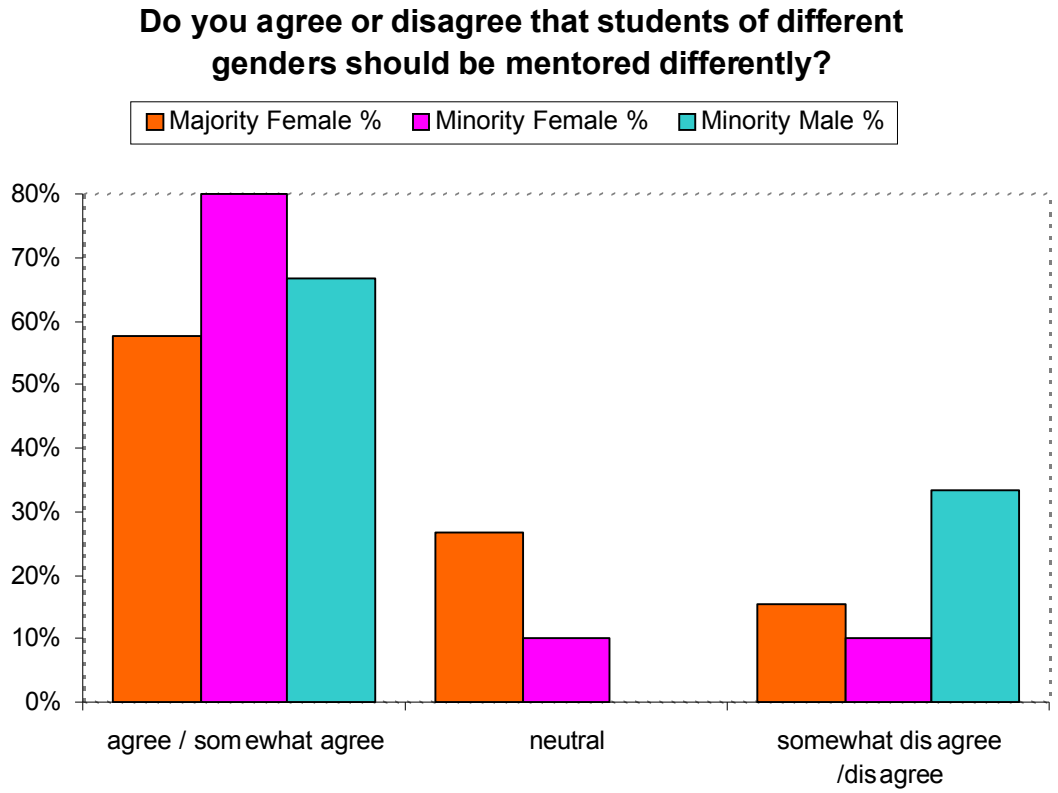
, "Why these experiences are so important," respondents particularly put importance on technical conferences by reporting:

"*Technical conferences let students practice skills, with some guidance and some backup, before they are expected to do them on their own. Prospective faculty members must be able to provide their own motivation and feedback. Gives insight into academia.*"

"Technical conferences are the heart and soul of research in academia. An understanding of how they work, what is expected, the networking experience is invaluable."

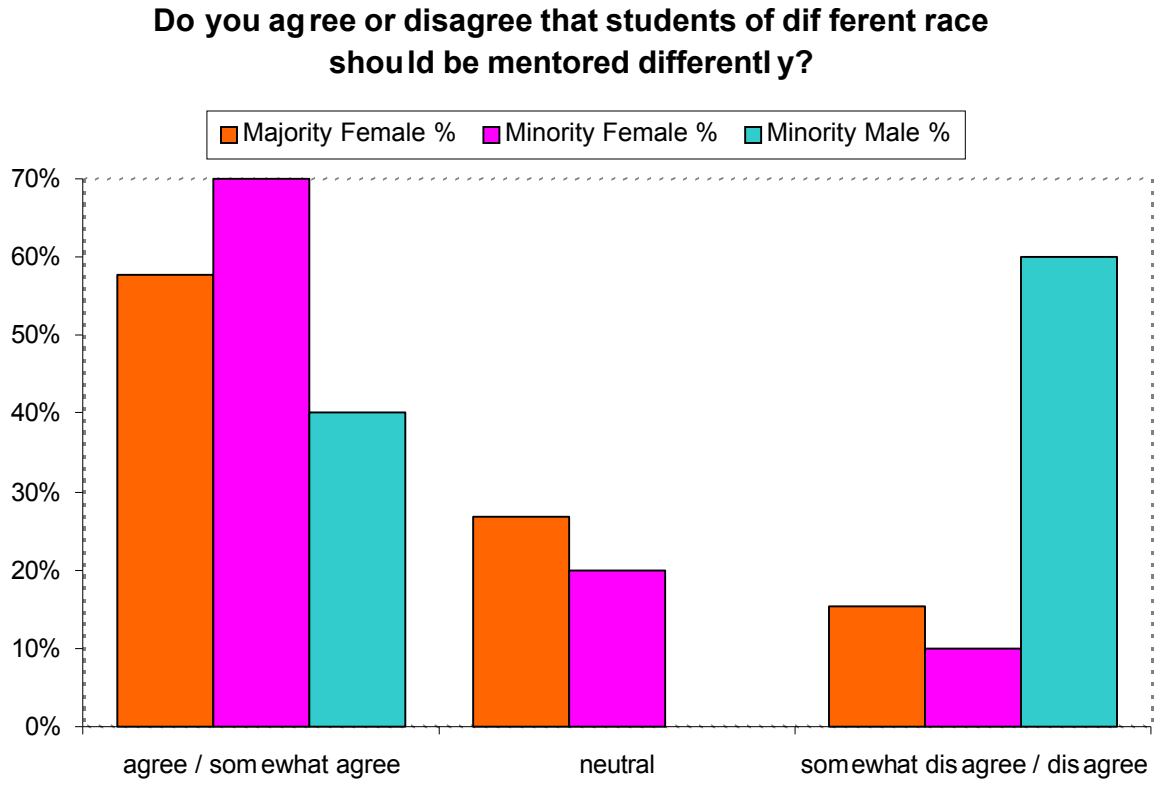
"Students must understand expectations. Students will be required to teach in an academic career and they should know what to expect. They will also need to be comfortable at conferences and giving presentations to peers in addition to students."

When asked, *"Research literature is unclear as to whether faculty members should mentor students differently based on their gender. Do they agree or disagree,"* fifty-nine percent say "agree" or "somewhat agree" that mentoring should be done differently based on gender.



"While the degree to which this is true depends on the individual, the lack of role models can make it more difficult for some students to envision themselves as successful in their field, which may hamper their ability and motivation to succeed. They cannot relate to their colleagues."
White Female

When asked, *"Research literature is unclear as to whether faculty members should mentor students differently based on their race. Do they agree or disagree,"* sixty-four percent say "agree" or "somewhat agree" that mentoring should be done differently based on race.



"Each student brings different issues to the table that should be handle differently by those most responsible for managing him/her. Just like each faculty member is different and require different start-ups/support from the administration, each student is not the same. My colleagues and I are in the same place, but we did not take the same road to get here. The road or experience determines who you are…same thing is true for students. Some minorities are first generation graduate students…some students have been planning PhD since grade school because their grandparents had advanced degrees. This has to be consider regardless of the race and gender of the student." *African American Male*

"Ultimately, the needs of independent students are as unique as the person themselves. However, there most likely are some broad themes that tend to be linked to gender and/or race. For this reason, it makes sense to consider these characteristics as you develop a mentoring model. On the other hand, be prepared that no two women, and no two Black / Asian/ Hispanic people are the same." *African American Female*

When asked, if there were *"topics or issues that you have found to be of particular interest or importance to female students,"* 51% responded "issues of balancing family and career." The number two issue reported was the difficulties faced as the only or one of a few women in the work place.

When asked, *"What do you enjoy most about an academic career/why would you encourage students to select an academic career,"* the top three responses with majority females, minority

females and/or males include, but not in the same rank order:

1) academic freedom and autonomy
2) working with/mentoring students in research
3) enjoy teaching

When asked, *"Do you believe there are barriers to under represented students pursuing academic careers,"* 28% reported they thought the current system did not promote success among under represented groups.

"The existing system was designed by and for men and it does not work well for women."

"The 'fraternity' of senior male white faculty is a difficult club to break into. It is difficult to be accepted at every step – from the search/hiring process through the promotion and tenure process."

"Prejudice: women/students of color are assumed incompetent unless proven otherwise."

When asked, "*What are the best strategies for over-coming these barriers,"* these recommendations were provided:

"Research and acknowledge the hurdles/barriers that are there and ways to level the field. Frank discussions of these issues. Changes in promotion and tenure guidelines."

"Find advocates from within the 'fraternity' of senior male white faculty at your and other departments."

Twenty-six percent of the respondents reported the lack of role models and isolation as the number two barrier to participation.

"Few women/minority faculty are in academia. There is a lack of role models."

"There is a real sense of isolation felt."

When asked, how to overcome these barriers, the recommendations were:

"Increase the participation of under represented faculty. Targeted and aggressive recruiting strategies and marketing campaigns need to be developed."

"Make the recruitment of women and minorities a high priority, cultivate your own and mentor them to take high visibility positions."

"There has to be a deep belief in the need for diversity, and personal ability and belief to effect change. The ability to decide, to lead by example."

Twenty-one percent of the respondents reported the number three barriers to participation are climate issues; racism and/or sexism.

"Tangible hostilities, prejudices and biases that require more proof of talents prior to acceptance as a professional. There are also intangible barriers that are implied in disciplines that have developed largely without the inputs of these groups. However, I have seen the opposite – where less was expected from women/professionals of color because of the perceived need to maintain "numbers of women/minorities."

"There are those who believe that women and students of color are not qualified to be students of academia, particularly in technical majors such as engineering. I also believe there exists a network that has not included or favored women or students of color in the past, and where some of these barriers are being broken, others are still in existence and quite difficult to

navigate."

Recommendations for overcoming these barriers include:

"Address chilly climate issues, not only through trying to change attitudes, but through excellent start up packages, putting new folks in touch with movers/shakers on campus, those with progressive attitudes."

"Change – but by whom. All you can do is work your best and take the opportunities that you can find. The system in universities is flawed."

"Though a 'Catch 22', the best method seems to be involvement of women/minorities in academia/professions in order to help include these perspectives in the agendas/goals/values of the various disciplines."

Conclusion

There is a dearth of women and men of color on engineering faculty. Students within this population need role models, effective mentoring, and encouragement to consider careers in academia where they are still pioneers. Isolation, lack of information, and a culture that includes critical barriers to success continues to exclude talented individuals from even pursuing, let alone succeeding in university faculty positions. Since little research has been done on how to effectively mentor under represented students towards faculty careers, the experiences of the faculty involved in this survey can be useful. These faculty suggest that effective mentoring is critical and recommend the following:

1) take graduate students to technical conferences where they present their work,
2) take students to technical conferences where the faculty member introduces them to others in the field,
3) share personal career experiences/successes and failures,
4) write down a formal plan for student research,
5) give students at least one teaching experience.

Mentors need to aware of and responsive to issues of gender and race to be most effective. More research is needed in this area to thoroughly understand all the issues involved in the mentoring of Ph.D. students to academic careers.

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