



## **Engineering Faculty Members' Discussing the Role of University Policy in Addressing Underrepresentation**

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## Introduction

Despite over thirty years of research and outreach to recruit and retain female engineering students, women remain significantly underrepresented in engineering.<sup>1</sup> While a large amount of literature has been generated on gender inequalities in faculty careers, no research has been done to characterize what and how a large group of engineering faculty members thinks about gender in undergraduate engineering education. There is a critical need to identify what and how faculty members think about gender at the undergraduate level so that effective interventions can be designed to target those ways of thinking, and, ultimately, increase gender equity in engineering education.

This paper begins to address that gap in research by presenting findings on how a group of 32 engineering faculty members from three different institutions discuss policy in interviews aimed at understanding what and how engineering faculty members think about gender and women's underrepresentation in engineering. The central questions addressed in this analysis are:

- To what extent do policies come into play when engineering professors discuss underrepresentation?
- What roles do engineering professors see policy playing in women's underrepresentation in engineering?

An argument is put forth that there would be value in further, critical consideration of the roles policy does, can, and should play in underrepresentation, given that policies are essentially institutionalized values.

## Methods

This analysis is based on semi-structured interviews with 32 engineering professors from three different institutions in different parts of the United States. The interviews were conducted in Fall 2014. The project is on-going, and the goal ultimately is to interview 45 professors. Recruitment efforts are discussed in detail elsewhere.<sup>2</sup> The interviewees represented a mix of Assistant, Associate, and Full professors, and the full range of engineering disciplines that exist at each of the three institutions included in the study. Several also held administrative positions. There were 14 women interviewees and 18 men interviewees.

Recruitment was done through a combination of maximum variation sampling and purposeful random sampling.<sup>3</sup> The goal was to recruit interviewees who were randomly selected in order to avoid a participant pool who all had involvement with women in engineering initiatives, such as would have been the case if I had recruited through SWE listservs, for example. (That is not to say that the random sampling did not enroll some participants with involvement in women in engineering initiatives). Public, departmental websites were used to randomly generate names. Yet, within the parameters of random sampling, purposeful steps were taken to recruit a full

range of engineering disciplines, career levels, and an approximately even number of men and women.

The interviews covered a wide range of topics that have been identified in prior scholarship as contributing to either the gendering of engineering and/or women's underrepresentation in engineering. The overarching aim of the interviews was to better understand what and how engineering faculty members think about gender in engineering. As semi-structured interviews for which the majority of participants could not spare unlimited time, not every interview could cover every topic to the extent I would have liked. When time allowed, which was with twelve participants, I did specifically ask about policy toward the end of the interview. I asked if there were any ways in which university policies, either at the university, college, or departmental level, could be considered gendered or contribute to underrepresentation, and sometimes would follow with asking if they thought there were any ways in which policy could be used to increase the numbers of women in engineering.

## **Findings**

### *Open discussions*

Twelve of the 32 participants discussed some aspect of policy issues when answering questions not specifically about policy (although not all actually used the word *policy*). I begin the interviews by asking participants why they think women are underrepresented in engineering and what changes they think could be made to increase the numbers of women in engineering. I end the interviews by asking if there is anything I have not asked about that they think is important for understanding gender in engineering or women's underrepresentation in engineering. When participants did discuss policy on their own (without me asking about it specifically), it was in response to these two initial questions and that closing question.

Of those twelve, six discussed policies related to family and pregnancy, such as parental leave and stop the tenure clock, both in industry and academia; and three discussed something related to faculty hiring decisions and recruiting and hiring more women applicants. In other words, nine focused only on female faculty. Three interviewees discussed a policy issue related to undergraduate students, and one of those three also discussed policies to support female faculty. The student-related policies were:

- Requiring gender/diversity training for new faculty, and/or as part of annual evaluations
- Adding accountability for mentoring and retention of minority students/women into tenure and promotion criteria

### *Policy-specific questions*

Of the twelve participants who were specifically asked about policy, two said that from a policy perspective there were no problems, that they could not think of any way policies contributed to underrepresentation or ways in which policy could be used to increase the numbers of women in engineering. One elaborated that *if* there were biases, they were "individual" and "cultural" not policy biases, but did go on to say that maybe tenure and promotion could be changed to reward

mentoring of minority students. Seven participants said that there were policies that could be considered gendered or contribute to underrepresentation. Of those seven, four were again related to female faculty. Two mentioned policies related to family and pregnancy, such as parental leave, tenure clock, and childcare, but even one of those two said that she did not really think policies were the problem; rather, it is culture that is the problem:

Definitely the opportunity to extend your tenure clock by one year if you have children before tenure, qualifying for a course release when you have to care for a new baby, or if you just have a dependent actually for that matter. I think all of these are positive policies. I think it's difficult to say for a policy, because I don't think it's really about the policy. I think it's about the culture, not having to feel bad for leaving at 5:00 because you have to pick up your child from daycare. You can't have a policy in place to tell someone, "Don't make her feel bad." That's just a culture. That's why I'm having a hard time thinking of something, because I think that's mainly where the problem is, and then women have to work twice as hard to make up for what they think they need to be making up, because they feel people think of them as having other priorities besides writing 15 papers a year, things like that. So all these are very hard to become part of policies.

One participant discussed biases in teaching evaluations and reward structures that hurt female faculty, and another participant discussed faculty hiring decisions. Thus, the majority of policy discussions were again about policies related to female faculty rather than students.

Five participants (in addition to the one who mentioned rewarding mentoring in tenure and promotion decisions) discussed policies related to undergraduate students. (Not the same three who discussed policies related to students in open discussion.) All of these discussions were related to admissions. However, rather than identifying policies that contributed to underrepresentation, two participants discussed policies that helped minority students. They said that while it might not be a policy per se, there is an "emphasis to keep an eye" out for diverse applicants and a "well intentioned desire" to increase the numbers of minority students enrolled. In other words, they think current admissions practices help rather than hurt the numbers of women in engineering. The third participant said he stayed away from policy (when asked if there were policies that could be considered gendered or contribute to underrepresentation), but also said he could imagine that policy *could* be used to increase the number of women in engineering by implementing admissions policies aimed at enrolling more women; but he emphatically emphasized that he did not think that *should* be done. The fourth identified military service as a factor in gendered admissions. Admissions at his university were based solely on a point system, wherein applicants receive a certain number of points for GPA and a certain number of points for national standardized college entrance exam score – with one exception. Applicants receive extra points for military service, which the interviewee said could be considered a gendered policy because it is more likely to benefit men as they are more likely than women to have served in the military. In sum, only one participant identified a student-related policy that he perceived to contribute to underrepresentation.

## **Discussion and Conclusions**

Policy and culture are seen as separate, and policy is not readily thought of as a tool for addressing gender biases in undergraduate engineering education or women's underrepresentation in engineering. Moreover, to the extent that policy is thought of, it is for the most part related to female faculty, rather than students; thus reflecting the current research and intervention landscape. The lack of focus on policy reflects a broader trend in the interviews whereby participants externalize the problem of underrepresentation as located not in undergraduate education.

In some ways the small amount of attention paid to policy related to students is understandable. To be fair, I also did not originally think to include policy questions in my interview protocol. I did so only after one of the project's advisory board members suggested it. On one hand, this makes some sense. As the one participant stated, "You can't have a policy in place to tell someone, 'Don't make her feel bad.' That's just a culture." Certainly, it is true that "family friendly" policies have not solved inequalities female professors face, and that simply implementing a policy does not necessarily lead to cultural changes, highlighting a need to focus on policy *use*.<sup>4-5</sup>

On the other hand, there is much room for expanding and deepening how we think about the role of policy and taking a critical approach to questioning current policies, particularly as they relate to students. Beginning to think of policy and culture as two sides of the same coin wherein policies represent institutionalized culture or values would be an important step. If increasing recruitment and retention of women engineering students, and improving their experiences in engineering education really were a priority, then there are policy changes that could be made, as several participants recognized. For example, it may be wildly unpopular and personally risky to institute a policy requiring evidence of contribution to recruiting and retaining female engineering students in order to receive tenure: but that is not the same thing as saying it cannot be done. Likewise, it might seem ridiculous to only hire faculty who have taken or agree to take gender studies courses, but given the overproduction of PhDs and the large number of applications routinely received for open positions, it would be possible to do so if hiring committees valued that knowledge.

In addition to changing requirements for faculty practices, there are also administrative policies that could be considered. As one example, admissions policies present a site of potential intervention. Engineering education researchers have suggested that when sophomore students can matriculate directly into engineering rather than first having to pass through a first-year engineering program, it allows students to enter engineering who otherwise would not have been able to or would have been discouraged from entering an engineering major.<sup>6-7</sup> As another example, Lisa McLoughlin's research suggests that current recruitment and admissions policies could be changed to support increased numbers of women engineering students.<sup>8</sup> Attrition from engineering programs represents yet another site of potential policy intervention. Currently most engineering programs have no policy in place to gather qualitative information from students about why they are leaving the program. Instituting such a requirement would produce knowledge about local cultures that lead to attrition.

While these examples are certainly not exhaustive, my aim has been to prompt critical reflection about how current policies promote or mitigate biases and inequalities in undergraduate engineering education. Programs such as ADVANCE have contributed to our understandings of the ways in which university policies can negatively affect female faculty members and we know that biases permeate the system,<sup>9</sup> but we now need to turn that lens to explore policy issues that affect students. There is historical evidence that policies and values are intertwined in ways that can undermine diversity efforts.<sup>10</sup> Thus, any policy changes that are made with the intent of increasing diversity in engineering should entail concomitant consideration of how the policies are related to and interact with cultures and value systems into which they are introduced. Nonetheless, such challenges should not lead us to write off policy as an ineffective tool for greater equality in engineering education.

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