

A Mentoring Paradigm for URM and Emeriti Engineering Faculty: Does Quantity of Contact Determine the Quality of the Relationship for Mentees?

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**ASEE National Science Foundation Grantee's Poster
Executive Summary**

Introduction

American higher education institutions are faced with a lack of underrepresented minority (URM) faculty in engineering, with only 6.3% of all engineering faculty identifying as URM (National Action Council for Minorities in Engineering, 2014). An increase in mentoring opportunities has been heralded as a way in which to ensure their retention, tenure, and promotion in academia (Blackwell, 1989; Hyers, Syphan, Cochran, & Brown, 2012; Stanley, 2006). Researchers have found that mentoring by senior faculty is a means by which URM faculty gain knowledge about important career information that many majority men acquire through informal networks (Hyers et al., 2012; Stanley, 2006). This executive summary reports on the efficacy of a new mentoring and advocacy-networking paradigm designed to support URM engineering faculty promotion efforts by mentorship from emeriti faculty. This effort was sponsored by the National Science Foundation (14-7680) under the call and corresponding office for Broadening Participation in Engineering.

The project, entitled Increasing Minority Presence within Academia through Continuous Training (IMPACT), began in Fall 2015 with the intent of serving as an innovative complement to prevailing approaches that support career mentorship opportunities of URM faculty and the career engagement of emeriti faculty. Synergistic pairings of early- through mid-career URM engineering faculty from a variety of institutions with strategic emeriti engineering faculty were created based upon technical expertise. Under this mentoring paradigm, URM faculty benefit from participation in activities designed to further their socialization process into the engineering academic profession and to afford them access to the vast insights, greater discretionary time, and networks of accomplished emeriti faculty. Incentives for emeriti faculty to participate in the IMPACT project are the formalized opportunity to continue to engage in the discipline by providing professional expertise and to contribute to a more diversified next generation of engineering faculty.

The mentoring and advocacy-networking paradigm was developed through an extensive review of the literature across disciplines with a targeted focus on diverse mentoring relationships in science, technology, engineering, and mathematics fields (Johnson, 2015; Kram, 1985; Zellers, Howard, & Barcic, 2008). The model moves beyond advisory mentoring to include professional networking and advocacy by emeriti faculty who are uniquely situated to provide these resources. The new paradigm encompasses three domains of mentorship: (1) career development (emeriti faculty provide assistance in the retention, tenure, and promotion of URM faculty); (2) sponsorship (emeriti faculty create opportunities for networking, exposure, and visibility with potential research collaborators and grant program officers); and (3) coaching (emeriti faculty share their wisdom about the discipline and provide professional and personal advice in

successfully navigating academic careers). This study specifically addresses the career development, sponsorship, and coaching activities in which the mentoring matches engaged, as well as mentees' opinions on the quality of their mentoring relationship and the mentorship received. Survey results on the efficacy of the mentoring paradigm and the ways in which quality can be mediated by the quantity of contact are addressed by three research questions:

1. How do mentees rate the quality of their mentoring relationship? Does the quality differ by amount of contact?
2. How do mentees rate the mentoring relationship? Does the rating differ by amount of contact?
3. In which career development, sponsorship, and coaching activities have mentees engaged with their mentors? Do the reported activities differ by amount of contact?

Methods

Research Design

A cross-sectional survey design was utilized to provide a quantitative description of the efficacy of the IMPACT program from the participants' perspectives (Fowler, 2009). The survey allowed for a descriptive examination of opinions on the mentoring and advocacy-network paradigm, with special attention upon the quality of the relationships and the mentoring activities.

Survey Instrument

An online 35-item survey was developed for this study to gather opinions on the quality of the mentoring relationship; the mentoring received; the career development, sponsorship, and coaching activities engaged in; as well as the quantity of contact (Fowler, 2009; Sue & Ritter, 2012). The survey was based upon prior interviews in which participants were asked to share the mentoring and advocacy-networking paradigm activities planned in their mentoring matches. The survey was closed-ended with a mix of factual, categorical response options (Yes/No) and opinion, continuous response options (Likert-scales). The survey included an item on rating the quality of the individual relationship on a Likert-Scale of Below Average to Excellent. Additionally, the survey included four domains and corresponding individual statements on a Likert-scale of Strongly Disagree to Strongly Agree: (1) the mentoring relationship, (2) career development activities, (3) sponsorship activities, and (4) coaching activities.

Data Collection

Upon obtaining Institutional Review Board approval in October 2016, all IMPACT participants were invited to complete the survey. The survey completion window was open for one month. The purpose of the survey and the instructions were provided at the beginning of the survey, which required approximately 15 minutes to complete.

Participants

Ten of the 11 early- through mid-career URM engineering faculty completed the survey, as well as six of the seven emeriti faculty. The participants were involved in various engineering disciplines, such as aerospace, biomedical, chemical, industrial systems, and mechanical. The

mentees were both female and male, with over half at the Associate Professor rank and the others at the Assistant Professor rank. All were employed at higher education institutions across the United States (Research 1, Historically Black Colleges and University, Ivy League, Comprehensive Research, and Baccalaureate). All seven emeriti professors serving as mentors were White, male, and retired from a Research 1 university.

The quantity of contact was gathered categorically and is displayed in Tables 1 and 2. Seven mentees reported contact with their mentors less than once per month, while three indicated at least once per month. All mentors reported contact less than once per month. The majority of communication occurred by email, followed by phone. Participants shared that most contact occurred spontaneously but found that planned communication was more useful. Last, the majority of mentees and mentors reported that the frequency met their expectations.

Data Analysis

A descriptive analysis of the survey data was completed to report the results. IBM SPSS Software was used for data screening, descriptive reporting, and disaggregated exploration. Data screening efforts demonstrated the data to be normally distributed and the outlier responses of “not applicable” were removed from the analysis. Inferential analyses were not possible at this stage due to the small sample size.

Results

Quality of their Mentoring Relationship

Mentees generally rated the quality of their mentoring relationship between average and good. However, when the mentee data was disaggregated by amount of contact, mentees with contact less than once per month reported the quality of their relationship as slightly less than average; those with communication at least once per month reported the relationship to be nearly excellent. Table 3 illustrates mentee responses on the quality of the mentoring relationship overall and by the amount of contact with mentors.

Mentoring Domain

In most cases, mentees agreed that their mentor was approachable, was an active listener, answered questions in a timely manner, provided constructive feedback, and had sufficient time to support the mentoring relationship. Yet, on average mentees disagreed that their expectations for the IMPACT program had been met, that they were in regular contact with their mentor, that their mentor benefited from the relationship, or that they utilized their mentor’s expertise. Those who were in contact with their mentors at least once per month shared more notably positive opinions on each measure of the mentoring relationship than those in contact less than once per month. Table 4 shows mentee opinions on the mentoring relationship domain overall and by the amount of contact with mentors.

Career Development, Sponsorship, and Coaching Activities

Mentees reported the most engagement in coaching activities, followed by career development and sponsorship. In the coaching domain, mentees agreed that their mentors shared information on their career successes and pitfalls, as well as provided new insights on an academic career and advice on academic career norms. In the career development domain, mentees agreed that their

mentors provided advice relative to university committee work, as well as formal and informal expectations on promotion. In the sponsorship domain, mentees noted agreement that their mentors grew their professional networks. Yet, mentees disagreed that their mentors provided mentorship and support across most areas of the career development, sponsorship, and coaching domains. The trend in higher ratings of mentees in communication at least once per month continued across the domains. Table 5 provides mentoring and advocacy-networking activity responses by mentees overall and by the amount of contact with mentors.

Discussion and Conclusion

Survey results demonstrate that IMPACT participants who had regular, planned contact rated the quality of the mentoring relationship and the mentoring received stronger than those who did not. Promising components include mentors being rated high in approachability, active listening, answering questions in a timely manner, providing constructive feedback, and having time in which to mentor. Clearly, all mentoring matches would benefit from established guidelines of regular contact in order to facilitate success of the mentoring and advocacy-networking paradigm. If this were to occur, mentees could maximize the assistance they seek toward promotion and mentors could maximize their desire for continued engagement in the field.

Additionally, survey results note that participants engaged in coaching activities at a higher rate than career development and sponsorship. The most often cited activities included advice on university committee work, information on formal and informal expectations on promotion, and discussions on career successes and pitfalls. While mentees found this information instructive and helpful, their foremost desire was to grow their professional network so they could cultivate research collaborators and gain access to federal grant officers and high-profile journal editors. Despite differences in activities across the domains, career development, sponsorship, and coaching were critical areas of mentorship desired by URM faculty (Cawyer, Simonds, & Davis, 2002; Johnson, 2015; Lechuga, 2014; Zellers et al., 2008). These results coincide with much of the mentoring literature establishing that URM faculty socialization and successful tenure and promotion processes are bolstered by senior faculty mentorship (Berk, Berg, Mortimer, Walton-Moss, & Yeo, 2005; Johnson-Bailey & Cervero, 2003; Mullen & Hutinger, 2008; Stanley & Lincoln, 2005; Turner, 2003). It is clear at this point that the IMPACT project has the potential to influence the engineering faculty ecosystem by providing a new paradigm with which to support and to engage diverse faculty through inclusion of the often-overlooked resource of emeriti engineering faculty.

Data Tables

Table 1
Mentee Responses for Quantity of Contact by Percentage

Contact Questions	Never	Less than Once per Month	Once per Month	More than Once per Month
How often are you in contact with your mentor?	-----	70%	20%	10%
Types of Communication	Phone	Email	Virtual	In Person
In what ways do you communicate?	25%	63%	6%	6%
Frequency of Communication	Planned	Spontaneous	Both	
How do your contacts occur?	30%	50%	20%	
Which is most useful?	60%	40%		
Expectations of Communication	No	Yes		
Does this frequency meet your expectation?	20%	80%		

Table 2
Mentor Responses for Quantity of Contact by Percentage

Contact Questions	Never	Less than Once per Month	Once per Month	More than Once per Month
How often are you in contact with your mentee?	-----	100%	-----	-----
Types of Communication	Phone	Email	Virtual	In Person
In what ways do you communicate?	33%	42%	8%	17%
Frequency of Communication	Planned	Spontaneous	Both	
How do your contacts occur?	20%	40%	40%	
Which is most useful?	60%	40%		
Expectations of Communication	No	Yes		
Does this frequency meet your expectation?	40%	60%		

Table 3

Mentee Responses for Quality of Mentoring Relationship by Contact with Mentor

Quality Questions	Overall	In Contact Less than Once per Month	In Contact at Least Once per Month
How would you rate the quality of your mentoring relationship?	2.40	1.86	3.67

Note: The results are reported as an average on a scale of 1 to 4 (1 = below average; 2 = average; 3 = good; 4 = excellent).

Table 4

Mentee Opinions on the Mentoring Relationship Overall and by Contact with Mentor

Questions	Overall	In Contact Less than Once per Month	In Contact at Least Once per Month
Mentoring Domain	2.97	2.70	3.46
My expectations for the IMPACT mentoring program have been met	2.78	2.50	3.33
I am in regular contact with my IMPACT mentor	2.56	2.17	3.33
I believe my mentor has benefited from our relationship	2.00	1.83	2.33
I have utilized my mentor's expertise	2.89	2.83	3.00
My mentor is approachable	3.50	3.29	4.00
My mentor is an active listener in our conversations	3.29	2.75	4.00
My mentor answers my questions in a timely manner	3.13	3.00	3.67
My mentor provides me with constructive feedback	3.43	3.25	3.67
My mentor has enough time to support our mentoring relationship	3.17	2.67	3.67

Note: The results are reported as an average on a scale of 1 to 4 (1 = strongly disagree; 2 = disagree; 3 = agree; 4 = strongly agree).

Table 5

Mentee Mentoring and Advocacy-Networking Activity Responses Overall and by Contact with Mentor

Questions	Overall	In Contact Less than Once per Month	In Contact at Least Once per Month
Career Development Domain	2.42	2.29	2.81
My mentor provides advice about advising students	1.83	2.00	1.50
My mentor provides advice about university committee work	3.29	3.00	3.67
My mentor provides me with teaching strategies/resources	2.50	2.75	2.00
My mentor has helped me develop stronger grant submissions	2.20	2.33	2.00
My mentor and I are collaborating on research	1.57	1.40	2.00
My mentor provides advice about publication outlets	2.22	2.00	2.67
My mentor provides me information about formal expectations for promotion	3.00	2.60	3.67
My mentor provides me information about informal expectations for promotion	2.75	2.20	3.67
Sponsorship Domain	2.13	1.99	2.22
My mentor has recommended me for awards	1.88	1.80	2.00
My mentor has recommended me for invited talks	2.00	2.00	2.00
My mentor and I have attended a conference/seminar together	1.88	1.80	2.00
My mentor has grown my professional network	2.88	2.33	3.00

My mentor has served as an intermediary with journal editors	1.88	1.80	2.00
My mentor has introduced me to potential research collaborators	2.25	2.20	2.33
Coaching Domain	2.66	2.31	3.24
I exchange professional confidences with my mentor	2.75	2.40	3.33
My mentor provides advice about academic social norms	2.75	2.40	3.33
My mentor has told me about his career successes	3.00	2.80	3.33
My mentor has told me about his career pitfalls	2.63	2.20	3.33
My mentor has provided me new insights to an academic career	2.75	2.40	3.33
My mentor has provided advice on strategies to balance my workload for promotion	2.25	2.00	2.67
My mentor has provided advice on administrative pathways	2.50	2.00	3.33

Note: The results are reported as an average on a scale of 1 to 4 (1 = strongly disagree; 2 = disagree; 3 = agree; 4 = strongly agree).

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