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Exploring the Mentoring Needs of Early- and Mid-Career URM Engineering Faculty: A Phenomenological Study

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Abstract

While mentoring has been identified as a valuable resource in recruiting and retaining underrepresented minority (URM) faculty, little research has examined the difference in mentoring needs of early- and mid-career engineering URM faculty members. As these needs can change as they navigate academia and the tenure process, mentors can effectively provide guidance and support only when they have been identified. The purpose of this phenomenological study was to determine the mentoring needs and activities of early- and mid-career URM engineering faculty who participated in the IMPACT mentoring program and how their needs were met (Moustakas, 1994). The IMPACT program and the associated research were supported by a National Science Foundation Office for Broadening Participation in Engineering award (15-42728 and 15-42524). The Ideal Mentoring Model for URM Faculty served as the theoretical framework and the study included interviews with 11 early- to mid-career faculty who provided an in-depth understanding of the participants' needs and activities. Findings indicate all faculty members seek career development support in navigating the engineering promotion and tenure process. However, mid-career faculty display greater interest in receiving sponsorship and coaching from their mentors, as well as an awareness of the importance of having a network of mentors.

Keywords

Faculty, Mentoring, Underrepresentation, Engineering Professoriate, Phenomenology

Acknowledgements

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While mentoring has been identified as a valuable resource in recruiting and retaining underrepresented minority (URM) faculty, little research has examined the difference in mentoring needs of early- and mid-career engineering URM faculty members. As these needs can change as they navigate academia and the tenure process, mentors can effectively provide guidance and support only when they have been identified. The purpose of this phenomenological study was to determine the mentoring needs and activities of early- and mid-career URM engineering faculty who participated in the IMPACT mentoring program and how their needs were met (Moustakas, 1994). The IMPACT program and the associated research were supported by a National Science Foundation Office for Broadening Participation in Engineering award (15-42728 and 15-42524). The Ideal Mentoring Model for URM Faculty served as the theoretical framework and the study included interviews with 11 early- to mid-career faculty who provided an in-depth understanding of the participants' needs and activities. Findings indicate all faculty members seek career development support in navigating the engineering promotion and tenure process. However, mid-career faculty display greater interest in receiving sponsorship and coaching from their mentors, as well as an awareness of the importance of having a network of mentors. Keywords: Faculty, Mentoring, Underrepresentation, Engineering Professoriate, Phenomenology

A plethora of faculty mentoring programs exist in higher education institutions to address the disproportionality of minority faculty in the engineering professoriate (Turner & González, 2015; Yun, Baldi, & Sorcinelli, 2016; Zambrana et al., 2015). As noted by the National Action Council for Minorities in Engineering (2014), 6.3% of all engineering faculty identify as underrepresented minorities (URM; particularly, African American, Latino(a), and Native American); 8.2% are at the rank of assistant professor, 7.6% at the associate rank, and 4.8% at full professor, yet URMs account for 32% of the American population. Despite the value attached to mentorship, little research has examined the differences in mentoring needs across the professoriate ranks (early-career, assistant professors versus mid-career, associate professors). Awareness of the needs for URM faculty may provide institutions with tools to promote and encourage the careers of this group, an important step in diversifying the profession. Therefore, the purpose of this phenomenological study was to explore the mentoring needs and activities of early- and mid-career URM engineering faculty in the IMPACT mentoring program and how their needs were met (Moustakas, 1994). The mentoring program and concurrent research on the program were sponsored by the National Science Foundation Office for Broadening Participation in Engineering (awards 15-42728 and 15-42524).

The IMPACT program began in Fall 2015 as an innovative complement to career mentorship opportunities for URM engineering faculty via the introduction of a new mentoring and advocacy-networking paradigm, with emeriti faculty serving as mentors (Johnson, 2015; Kram, 1985; Lechuga, 2014). The new paradigm encompassed three domains: (a) career development: emeriti faculty provided guidance in the retention, tenure, and promotion of URM faculty; (b) sponsorship: emeriti faculty created opportunities for URM faculty networking, exposure, and visibility with potential research collaborators, teaching scholars, and grant program officers through the promotion of their disciplinary expertise; and (c) coaching: emeriti faculty shared their wisdom about the discipline and provided professional and personal advice to URM faculty in successfully navigating academic careers. This model moved beyond advisory mentoring to involve networking and advocacy by emeriti faculty uniquely positioned to extend these resources. URM faculty participated in activities designed to bolster their scholarly network by gaining access to the vast insights, greater discretionary time, and advocacy of accomplished emeriti faculty. Incentives for emeriti faculty to participate in the IMPACT program included the opportunity to continue to engage in the discipline by providing professional expertise and by contributing to a more diversified next generation of engineering faculty.

Seven emeriti faculty and 11 URM faculty participated in the IMPACT program, which was three years in length; five URM faculty were early-career (pre-tenure) assistant professors, and six were mid-career (post-tenure) associate professors. Mentees were primarily recruited through the Academic and Research Leadership Network (ARLN), a database of minority STEM faculty; mentors were recruited from a pool of retired faculty at one Research 1 institution that is regularly noted in the top 10 for awarding the most engineering degrees to URMs. The IMPACT mentoring matches were based solely upon shared technical engineering expertise in the disciplines of biomedical, polymer, industrial systems, and mechanical. A phenomenological research design (Moustakas, 1994) was employed to explore the mentoring needs and activities of the 11 URM program participants through in-depth interviews using the Ideal Mentoring Model for URM Faculty as the theoretical framework (Zambrana et al., 2015). The research questions were:

1. In what ways do the mentoring needs and activities differ between the early- and mid-career URM faculty?
2. How could the mentoring needs of URM faculty be better facilitated?

Literature Review

Mentoring by experienced faculty members has been identified as a valuable resource in recruiting and retaining URM faculty, as well as a way in which they receive beneficial career information and support not acquired in informal ways (Chubin, May, & Babco, 2005; Stanley, 2006; Tillman, 2001; Turner & González, 2015; Williams, Thakore, & McGee, 2016; Yun et al., 2016). Formal mentoring programs that include senior faculty members are more successful in meeting the needs of URM faculty (Turner & González, 2015). The most beneficial components of these programs include support in navigating university norms and values, as well as direction and coaching to balance research, teaching, and service responsibilities of a professor (Baez, 1999; Hansman, 2002; Johnson, 2015; Mullen & Hutinger, 2008; Yun et al., 2016). The opportunity to develop professional networks and to connect with other faculty who share research interests and/or backgrounds is another valuable element (Lewellen-Williams et al., 2006; Ockene, Milner, Thorndyke, Congdon, & Cain, 2017; Wadia-Fascetti & Leventman, 2000). Chubin et al. (2005) asserted, the importance of new

URM faculty connecting with URM mentors in their same field, even when the relationships are conducted remotely, due to the scarcity of URM faculty across higher education institutions.

In addition, URM faculty benefit from specific mentoring that provides political guidance related to navigating the "unwritten rules" and expectations for issues of race/ethnicity and gender within academia (Turner & González, 2015; Zambrana et al., 2015). For example, more often URM faculty members, particularly URM women, are asked to participate in extra service activities, as compared to their non-URM counterparts, in order to demonstrate campus diversity (Baez, 1999; Dancy & Gaetane, 2014; Zambrana et al., 2017). Therefore, mentors who can help with navigating these expectations and decisions may foster URM success while developing autonomy and independence in academia, which is supported by Lechuga's (2014) study involving 15 URM STEM faculty.

Many studies have focused on the universal benefits of mentoring for URM faculty, yet few have determined the differences in needs between early- and mid-career individuals. Daley et al. (2011) identified the needs of early-career URM faculty in a longitudinal study that followed their path to tenure. URM faculty who achieved tenure during the study believed their mentor's ability to fulfill their specific needs directly impacted their success. Mentors facilitated the career advancement of their mentees through coaching and sponsorship, provided networking opportunities for further research and collaboration, and helped in navigating the demands of academia. Similarly, Bavaro (1995) found early-career faculty members with less experience needed more clarity and support than their mid-career peers in understanding the procedures and requirements for achieving tenure and promotion. Early-career faculty felt they received insufficient information and guidance from their department chairs and other campus administrators, suggesting senior faculty mentors were a valuable resource in understanding the promotion pathway. Thus, the IMPACT program assigned emeriti faculty as mentors because they could provide mentoring and coaching without the stress of administrative demands.

While early-career faculty cited the need for support in achieving tenure and navigating the world of academia, mid-career faculty desired more individualized support as they focused on attaining full professorship (Baldwin, DeZure, Shaw, & Moretto, 2008; Buch, Huet, Rorrer, & Roberson, 2011; Geisler, Kaminski, & Berkley, 2007). Mid-career faculty felt they were "left to [their] own devices" (Baldwin et al., 2008, p. 50) once tenure was achieved. Thus, they sought more tailored and specific guidance in remaining productive and involved, as well as in demonstrating professional growth at their institutions. Mid-career faculty desired more training and development in areas such as conflict management, personnel issues, and career progression, which became even more complex when issues of race/ethnicity and gender were involved (Croom, 2017). A social network for mid-career faculty to remain engaged and productive also was important, including opportunities for collaboration with senior faculty members, institutional peers, and colleagues at other institutions (Baldwin et al., 2008).

Mid-career individuals in administrative roles, such as department chairs and center directors, identified a need for further mentorship and support in order to understand the intricacies, rewards, and challenges of their positions (DeZure, Shaw, & Rojewski, 2014). They expressed a desire for explicit support due to the steep learning curve of administration, as well as a lack of clarity in all aspects of their roles. URM mid-career faculty also expressed a need for more diversity in campus leadership to ensure role models are available (DeZure et al., 2014). Similarly, Betts, Urias, and Betts (2009) identified the lack of diversity in academic leadership, which can hamper the administrative ambitions of URM faculty, as campus leadership rarely mirrors that of faculty or students. Without clear pathways to leadership, as well as strong professional development, mentors, and support, mid-career faculty members are hesitant to assume administrative roles (Betts et al., 2009; DeZure et al., 2014).

Few studies have addressed the needs of URM early- and mid-career faculty members, and fewer still have been specific to engineering. As Chubin et al. (2005) asserted a diversity problem exists in the engineering profession "from education to workplace" (p. 74). Mentoring has been found to be beneficial in recruiting and retaining URM faculty in other areas of academia; therefore, understanding the mentoring needs of engineering URM faculty is important in order to promote diversity and retention in the field. This study will add to the literature by exploring the specific mentoring needs and activities of early- and mid-career URM faculty in engineering and how their needs were met.

Theoretical Framework

After a thorough investigation of mentoring frameworks, the Ideal Mentoring Model for URM Faculty was chosen as the theoretical framework for this study because it closely aligned with the goals and purpose of the IMPACT mentoring program. Frameworks build upon a foundation of established knowledge, offer logical explanations for the relationships observed, and reveal new understandings of a phenomenon—in this case, the mentoring needs and activities of early- and mid-career URM engineering faculty and how their needs were met. The Ideal Mentoring Model was developed as a result of findings from qualitative research by Zambrana et al. (2015), which focused on the mentoring needs of 58 URM faculty at 22 higher education institutions. Four discrete domains comprise the model: Forging Connections, Providing Scholarly Opportunities, Using a "Hands-On" Approach, and Providing Political Guidance (see Figure 1).

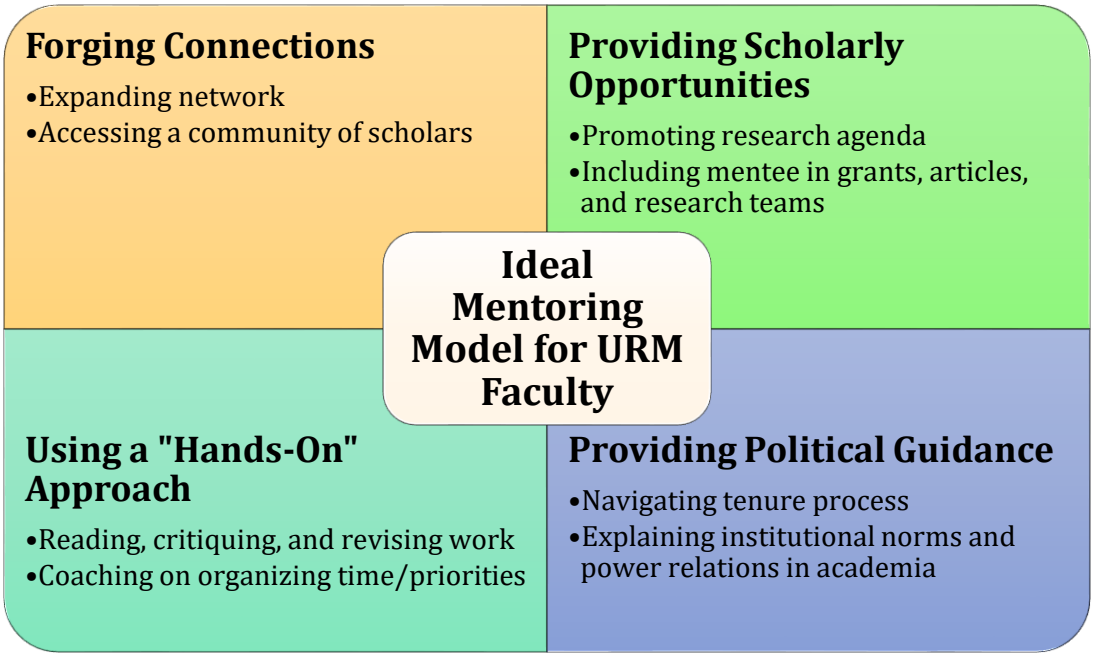

Figure 1. Ideal Mentoring Model for URM Faculty (Zambrana et al., 2015).

Forging Connections relates to the ways in which the mentor assists with networking opportunities for the mentee. The mentor recommends the mentee to other scholars in the field for collaboration, as well as provides connections and access to the mentor's network, or "community of scholars" (Zambrana et al., 2015, p. 57). The second domain, Providing Scholarly Opportunities, is integral to the mentoring process because the mentor promotes the mentee's research expertise and provides opportunities for additional scholarly experiences by

including the individual in grants, articles, and collaborative research teams. Using a "Hands-On" Approach describes the way in which the mentor actively coaches the mentee, to include reading, critiquing, and revising the mentee's grant proposals, articles, etc., and providing necessary feedback for growth. The mentor gives strategic advice for organizing time and priorities as a faculty member, as well as suggestions for publications, service opportunities, and other experiences. The fourth domain, Providing Political Guidance, is related to navigating the promotion and tenure process and understanding the norms and power dynamics in higher education. The mentor provides practical advice and strategies relative to the "unwritten rules and invisible hurdles" (Zambrana et al., 2015, p. 60) of the tenure process, including the institutional political climate.

The framework for the Ideal Model for Mentoring URM Faculty provided insight into the structure of the IMPACT program and the three focus areas of career development, sponsorship, and coaching through offering specific strategies and expectations for a successful mentoring relationship. Each domain directly relates to one of the areas of the program's focus and describes the wide variety of mentoring needs that exist for faculty members. The first and second domains, Forging Connections and Providing Scholarly Opportunities, illustrate the sponsorship focus of the IMPACT program. By providing networking connections and promoting mentee expertise, which are two specific examples outlined in the domains, mentors provide support through sponsorship. The coaching aspect of the program is captured in the third domain of Using a "Hands-On" Approach, while career development activities is encapsulated in the fourth domain of Providing Political Guidance. Each describes how to effectively provide career development, sponsorship, and coaching for success in the professoriate. In addition, the variety of strategies provides further evidence of faculty members' needs and the ways in which mentors can tangibly support them.

Methodology

Research Design

A phenomenological research design (Moustakas, 1994) was utilized to explore the mentoring needs and activities of early-career (pre-tenure, assistant professors) and mid-career (post-tenure, associate professors) URM faculty and how their needs were met through in-depth interviews. Three interview protocols were created to monitor the phenomenon over the course of the IMPACT program, with the Ideal Mentoring Model for URM Faculty serving as the theoretical framework for this study (Zambrana et al., 2015). According to Moustakas (1994), phenomenological designs primarily rely on interviews to capture *what* individuals have experienced and *how* they have experienced it by collecting experiences and stories around particular, concrete interactions and events. The theoretical framework was utilized in creating the interview protocols, in the data analysis procedures, and in considering the implications of the study. The goal of this method was to provide transferability of findings, specifically the potential to transfer the specific findings beyond the bounds of the study to individuals in similar situations (Creswell & Poth, 2017). The interview data enabled the discovery of the faculty members' mentoring needs across the professoriate ranks and how their needs were met through the career development, sponsorship, and coaching activities in which they engaged with their mentors. The research questions were designed to explore broadening participation in the engineering professoriate with an emphasis on enhancing understanding of the mentoring needs and activities of early- and mid-career faculty. The research questions were:

1. In what ways do the mentoring needs and activities differ between the early- and mid-career URM faculty?
2. How could the mentoring needs of URM faculty be better facilitated?

Participants

The 11 URM participants in this study were selected due to their involvement in the three-year IMPACT mentoring program. Mentees were primarily recruited through ARLN, a database of minority STEM faculty, and mentors were recruited from a Research 1 institution regularly noted in the top 10 for awarding the most engineering degrees to URMs. Five participants were early-career faculty (pre-tenure, assistant professors) and six were mid-career faculty (post-tenure, associate professors). Both males and females were represented; all were involved in different engineering disciplines, including biomedical, polymer, industrial systems, and mechanical. The mentees were employed at various higher education institutions across the United States, to include Research 1, Historically Black Colleges and Universities, Ivy League, Comprehensive Research, and Baccalaureate. The mentees were matched with White male emeriti engineering faculty who had retired from the same Research 1 institution. The variation among URM participants is displayed in Table 1.

Table 1. *IMPACT Mentoring Program Mentees*

Participant Number	Gender	Career Stage	Institution Type	Field of Engineering
1	Female	Mid-Career	Research 1	Civil
2	Female	Mid-Career	Ivy League/Research 1	Biomedical
3	Female	Mid-Career	Research 1	Polymer
4	Female	Mid-Career	HBCU*/Baccalaureate	Computer Science
5	Female	Early-Career	Comprehensive Research	Biomedical
6	Female	Mid-Career	Comprehensive Research	Biomedical
7	Male	Mid-Career	HBCU/Comprehensive Research	Environmental
8	Male	Mid-Career	Comprehensive Research	Mechanical
9	Male	Early-Career	Comprehensive Research	Mechanical
10	Male	Early-Career	HBCU/Comprehensive Research	Biomedical
11	Male	Early-Career	Research 1	Industrial and Operations

*HBCU: Historically Black College and University.

Data Collection

Upon obtaining Institutional Review Board approval, all URM faculty were provided with consent forms detailing the purpose of the study and the interview procedures. Three semi-structured interview protocols were administered over a three-year period. The Ideal Mentoring Model for URM Faculty domains of Forging Connections, Providing Scholarly Opportunities, Using a "Hands-On" Approach, and Providing Political Guidance were embedded in the protocols in order to address the study's research questions. The first interview focused on the mentees' expectations and motivations for participating in the IMPACT program, the value they placed on mentorship and increasing their advocacy network, and the ways in which their work habits aligned with their professional goals. The second protocol queried the mentees' mentoring needs as they related to career development, sponsorship, and coaching, the ways in which mentees engaged with their mentors, and how they leveraged their mentoring relationship to actualize their career goals. Finally, the third protocol related to the mentees' perceptions that their mentoring needs were met, how the relationship developed over the course of the program and whether it would continue once the program concluded, and the ways in which their self-efficacy and career motivation were bolstered through program participation.

Adherence to the interview protocols ensured questions were carefully worded and asked in a specific order; probing questions provided opportunities to seek clarification and meaning (Creswell & Poth, 2017). All mentees were invited to participate in the three rounds of interviews to provide multiple opportunities to share how their mentoring relationships developed and shifted over the three years of the IMPACT program, as well as to offer a fuller description of their specific needs over time. Seven mentees participated in each round of interviews and four participated in two, resulting in 29 completed interviews. While each occurred at a time of the individual's choosing, some mentees did not participate in all rounds due to their busy work schedules. The interviews averaged 30 minutes in length, were digitally recorded, and were conducted through a one-on-one process to ensure data were gathered in a systematic manner (Creswell & Poth, 2017). Upon completion of each round, all interviews were transcribed by a third-party transcription service for data analysis. Once completed, the transcripts were reviewed and cleaned for any errors, and all digital recordings were permanently deleted. Transcriptions were stored on password-protected computers accessible only to the researchers.

Data Analysis

A phenomenological approach was utilized for the data analysis of the interview transcripts by focusing on the systematic application of this method for coding credibility and dependability (Moustakas, 1994). The purpose of phenomenology is to discover patterns in the data and to develop a rich description of the essence of the phenomenon under study—in this case, the mentoring needs and activities of early- and mid-career URM engineering faculty who participated in the IMPACT mentoring program and how their needs were met. The four-stage process of phenomenological data analysis as outlined by Moustakas (1994) was followed: epoché, horizontalization, imaginative variation, and synthesis.

In the first stage prior to the interviews, the researchers engaged in the process of epoché in which experiences, beliefs, values, and assumptions about the phenomenon were bracketed out individually and collectively to allow the interviews and data analysis process to be conducted with as little researcher bias and preconceptions as possible (Moustakas, 1994). The researchers are employed at higher education institutions and hold professorship, research affiliate, or administrative positions on their respective campuses. Each are committed to

diversifying the professoriate and have engaged in such efforts through research lines and service endeavors that have advocated for policies and practices aimed at increasing the representation and success of URM faculty within their fields of study. All participated in formal and informal mentoring programs and believe these relationships played an integral role in their careers. Following the advice of Giorgi (2006), bracketing occurred through all phases of data collection and analysis rather than as a one-time occurrence in order to mitigate researcher bias through analytical memoing in which thoughts, ideas, and initial emerging patterns were noted.

In the second stage, inductive, open coding of significant statements was conducted by horizontalization in which all transcripts were read with equal value (Moustakas, 1994). The statements were reduced to those that were non-repetitive and parsimonious and then clustered into initial patterns by combining like significant statements using in vivo codes—the participants' own words. The initial patterns represented the ways in which the individuals consciously experienced mentoring and how their mentoring needs were met. The patterns were synthesized to provide unique textural descriptions for each participant and then amalgamated to create a universal textural description of the phenomenon (Moustakas, 1994).

In the third stage through the process of imaginative variation, the underlying structure of the phenomenon was explicated by addressing the contextual factors and conditions that determined the participants' mentoring experience (Moustakas, 1994). The Ideal Mentoring Model theoretical framework was used as a lens with which to consider a variety of meanings that informed the unique textural descriptions identified during horizontalization. This process is considered an analytical, mental experiment where varying perspectives can be explored (Moustakas, 1994). As with the textural descriptions, individual structural descriptions were first developed and then synthesized to create a composite structural description that attempted to elucidate the meaning underlying the phenomenon.

In the final and fourth stage, the textural and structural descriptions of the phenomenon were synthesized to develop the essence of the phenomenon (Moustakas, 1994). The essence is not to be considered comprehensive or exhaustive since participants' perceptions are situated within their unique contexts and circumstances and by their particular vantage point. The essence of the phenomenon was that early- and mid-career faculty have different mentoring needs based on their immediate career trajectories even though they engage in similar mentoring activities, yet mid-career faculty express a need for a network of mentors.

Trustworthiness

Multiple verification strategies ensured trustworthiness of the findings (Lincoln & Guba, 1985; Nowell, Norris, White, & Moules, 2017). In order to address transferability, thick, rich descriptions with mentee quotations were utilized, and data saturation occurred prior to the completion of all interviews (Geertz, 1973; Patton, 2015; Tierney & Clemens, 2011). Saturation was achieved at the point at which no new significant statements were identified regarding the phenomenon (Creswell & Poth, 2018). Credibility was attained through triangulation of the interviews across participants and time when unique textural and structural descriptions were synthesized into universal descriptions in the data anaysis process (Moustakas, 1994; Patton, 2015). Additionally, interviewing over a three-year period allowed the researchers to member check their findings with participants during interview to add credibility to the findings (Creswell & Poth, 2018). Dependability was accomplished by employing Moustakas' (1994) phenomenological data analysis approach to safeguard consistency in the findings. Through data analysis, the essence of the participants' experiences, specifically their mentoring needs as early- and mid-career faculty and how they experienced the mentoring, was sought (Moustakas, 1994). Additionally, bracketing through the epoché

process with the involvement of several researchers in the data anlaysis process bolstered the dependability of the findings. Confirmability was established by authenticating themes in the early and late stages of the data analysis process (Miles, Huberman, & Saldaña, 2019). Application of these verification methods of establishing trustworthiness mediated the limitation of including participants who self-selected to be interviewed and who self-reported their views and experiences (Lincoln & Guba, 1985; Miles et al., 2019). Those who completed each round of interviews may have been fundamentally different or had a more positive experience in the IMPACT mentoring program than those who chose not to participate fully in the data collection process.

Findings

Three major themes were identified through the phenomenological data analysis approach of the interviews: (1) Early-career faculty desire general mentoring; (2) Mid-career faculty desire targeted mentoring; and (3) A need exists for a network of mentors. While these findings were specific to the participants in this study, the goal of the qualitative phenomenological design was to allow for transferability of findings to individuals with similar experiences.

Theme 1: Early-Career Faculty Desire General Mentoring

The early-career URM faculty described specific mentoring needs within the three IMPACT program domains of career development, sponsorship, and coaching. All possessed certain expectations for the ways in which the mentoring relationship would be of benefit. Career growth and development was the strongest motivation for participation in the IMPACT program, and mentoring needs involved the ways in which the mentors could support the shared goal of earning tenure. Each mentee described the process for tenure, with a firm idea on how their mentor could provide advice on navigating the academic environment and on achieving tenure. For example, as one early-career mentee expressed, "What I hope to get out of this . . . is career advancement, advising that will be frank and honest and really guide me toward tenure." In addition, these individuals desired to learn from their mentors' tenure experiences. One mentee indicated he hoped to learn "the things that [my mentor] did that helped him out, or maybe steer away from some of the pitfalls that he may have tried to do when he first started out." Participation in the program was a way in which all early-career faculty could gain knowledge from those who had walked a similar path. In addition, the early-career faculty expressed a desire for networking opportunities for future research. Additional needs included support in grant writing and tips on strategies to receive federal funding.

Early-career faculty engaged in a wide variety of mentoring activities with their mentors in order to find synergy between their research, teaching, and service duties that would ensure successful achievement of tenure at their institutions. While all engaged in email and phone correspondence with their mentors, early-career faculty tended to communicate more regularly than their mid-career counterparts. The mentees sought feedback and advice on their current projects and next steps to further their careers. For example, one of the mentees commented that "on many occasions" he asked for advice on papers in process and classes in development. In addition, early-career mentees sought encouragement and feedback on whether they were on track for tenure.

One of the most impressionable activities in which early-career faculty engaged with their mentors was making new connections in the field of engineering through their mentors' networks. The new contacts made by one early-career mentee helped to create a conference with several engineering professors and professional engineers in his region. The mentor of

another individual provided the disciplinary industry standards the mentee needed in order to complete a research project. He said, "Without that [mentoring] relationship, I still would have been hunting around . . . whereas my mentor was able to get that [information], no problem."

An analysis of the interviews with the early-career URM faculty revealed that their identified needs and activities for mentoring relationships aligned with the Ideal Mentoring Model for URM Faculty. The descriptions of their needs and desires for a mentoring relationship were captured within aspects of the four domains of Forging Connections, Providing Scholarly Opportunities, Using a "Hands-On" Approach, and Providing Political Guidance. The major goal of the early-career faculty in their mentoring relationships was advice and support for achieving tenure; they relied heavily on the mentors Providing Political Guidance as they navigated the tenure process. However, they also benefited from Forging Connections through the mentors' networks and the Scholarly Opportunities provided. Overall, the early-career faculty depended on the mentors' use of a Hands-On Approach for their needs to be met and to fully benefit from the relationship.

Theme 2: Mid-Career Faculty Desire Targeted Mentoring

The mid-career URM faculty members held very specific ideas on the type of information, support, and guidance they expected as part of the IMPACT mentoring program. All were associate professors with tenure; thus, they shared the goal of obtaining full professor status. While they hoped to generally learn from the experiences of their mentors, they shared more specific needs and desires than those of the early-career faculty. For example, mid-career faculty intended to rely on the guidance of their mentors to demystify the process of attaining full professor since they found it to be more "confusing" than earning tenure. As one mentee described:

> The rat race is a lot faster [for tenure] because you have strict metrics, whereas an associate, it's a little more of a blur in my opinion . . . I felt like I needed someone who was more senior, more advanced, and someone who'd been through academe, who could really provide some insight into what their experience was.

These individuals identified targeted areas of need to achieve full professor status and pursued coaching in this area. Some sought more advice on available opportunities such as professional societies or organizations in which to hold leadership roles, committees on which to serve, and research avenues to achieve their promotion goal. One mid-career mentee desired advice from his mentor "centered around networking . . . and how organizations work, especially professional societies." Others with aspirations for administrative positions desired detailed feedback and coaching regarding their mentors' experiences in administration and campus leadership. One individual articulated, "[My mentor] helped provide me with direction…how to balance administrator roles, but still be an active researcher." Consequently, the requests of mid-career faculty were more specific regarding coaching and advice than the early-career faculty.

Mid-career faculty also expected to grow their networks through participation in the IMPACT program, with particular interest in large-scale research projects that included both national and international recognition. The mentees desired connections, as well as strategies and advice for becoming nationally and internationally "competitive." As stated by one individual, she "sought an advocate, as well as a mentor." One mid-career faculty mentee was able to "make connections with corporate contacts, and I've teamed with another faculty from another institution" through the strategic connections provided by his mentor. All mentees

acknowledged that the gatekeeper role of their mentors in opening doors for them would have been difficult to access on their own.

Mid-career faculty engaged in more targeted activities with their mentors to meet their mentoring needs and expectations. During those interactions, they focused on specific goals and tasks that met their individual needs and appeared more confident and aware of their strengths and weaknesses. They desired explicit advice and help in order to further their career progression. For example, those interested in administration sought guidance in fulfilling their goals. They also explored scholarship opportunities with their mentors to gain national and international recognition. Mid-career faculty also noted the benefits gained from the new connections made within their mentors' vast networks. One mentee leveraged the contacts to collaborate with other engineering professors in his area to bolster a senior engineering course he taught. As a direct result of the connections, he indicated his "students had a much richer experience." Both early- and mid-career mentees had opportunities to attend national and international conferences with their mentors through IMPACT travel awards which helped to forge connections with their mentors networks.

The needs and activities articulated by the mid-career faculty also were described in the four domains of the Ideal Mentoring Model for URM Faculty. However, they expressed a need for more specific direction within the domains than their early-career counterparts. They desired more connections and networking opportunities as described in the Forging Connections domain, although on a national and international scale, as well as attaining the rank of full professor. They solicited concerted advice in navigating that which they viewed as an unclear process, which is captured in the Providing Political Guidance domain. Within each domain of the Ideal Mentoring Model, the early- and mid-career faculty possessed different levels of expectation and specificity.

Theme 3: A Need Exists for a Network of Mentors

At the beginning of the IMPACT mentoring program, both early- and mid-career URM faculty described high expectations for their mentoring relationships, which were captured in the Ideal Model for Mentoring URM Faculty. However, as the program progressed, the reality became evident that one mentor could not respond to all needs, particularly with mid-career URM faculty. While these individuals benefited from the relationships, some frustrations arose when their mentors had different research agendas or had not held the administrative positions the mid-career faculty already held or for which they strived for in the near future. Therefore, the mentors were unable to provide the specific feedback that was sought. It is interesting to note that one mentee articulated this very point. She stated:

> Some people are really good on the grants, some people are really good when it comes to publications, some people are really good when it comes to just general advice, so you're going to need more than one person to fill the gaps.

Another agreed by commenting, "One mentor cannot meet all our needs or help us in our growth areas." This remark introduced other questions: What are reasonable expectations for one mentor? Can one mentor feasibly meet all expectations of a mentee? Should early- and mid-career URM faculty members be matched with more than one mentor depending upon their myriad of needs?

One early-career mentee pointed out that, "although [my mentor] hasn't checked all the boxes . . . of my expectations of a mentor, he has been helpful." Therefore, while not all needs necessarily were met relative to career development, sponsorship, and coaching by their single mentor, the mentees identified areas in which the IMPACT program and mentoring

relationships were beneficial. The majority indicated the advantages of participation included the ability to ask questions and to receive feedback from an individual with pertinent and copious experiences who served as a "fountain of wisdom," as described by one mentee. They also expressed appreciation of their mentors sharing their networks to assist in making connections with researchers at other higher education institutions and at national research labs.

Mentees noted the practical advice shared by mentors relative to creating their own networks, such as ways to generate and develop networking connections, and developing proactive communication strategies with colleagues. In addition, mid-career faculty valued the unbiased feedback regarding career advancement strategies for publishing and securing grant funds. However, when the mentor's expertise was not aligned with the mentee's desires for coaching and support, the mentees believed their needs were unmet. Therefore, the mentors fulfilled only some of the expectations and criteria in the domains of Forging Connections and Using a "Hands-On" Approach, although much was desired in the other domains. From analysis of the mid-career faculty expectations for mentoring, network of mentors would provide additional opportunities to meet their needs in each of the four domains of the Ideal Mentoring Model.

Discussion

Both the early- and mid-career URM faculty possessed high expectations for the IMPACT program and their mentoring relationships. They desired support in the three focus areas of career development, sponsorship, and coaching; however, the principal area of need was career development. The largest difference in the expectations and needs of the early- and mid-career faculty was that the mid-career, tenured URM faculty requested more specific guidance and possessed additional expectations for the relationship, which answers the first research question regarding the difference in needs between the two groups. These findings are consistent with Baldwin et al. (2008) and DeZure et al. (2014), who found mid-career faculty desire more tailored advice and support for their career progression, which aligns with the specific guidance the mid-career faculty in this study desired. They requested sponsorship on a national and international level, as well as specific advice and support in becoming full professors, growing their networks, enhancing their research recognition, and moving into administrative and campus leadership positions. As such, mid-career faculty articulated more specific areas relative to their mentoring expectations.

While the needs of the early- and mid-career faculty were distinctly different, the specific activities in which they engaged with their mentors were similar. The differences were appropriate to the rank of the faculty member, for example mid-career faculty sought national and international recognition opportunities, while their early-career counterparts were not as cognizant of considering this an important activity to pursue. Common activities included specific advice and coaching for career promotion, feedback on research and publications, attending conferences with their mentors, collaborating on projects, and making connections with their mentors' networks. All activities described by the mentees were captured in the Ideal Mentoring Model for URM Faculty, which listed specific undertakings within each domain for mentors to ensure mentees received the desired career development, sponsorship, and coaching.

While one can assume a single mentor should fulfill all domains, this concept is not specified in the Ideal Mentoring Model. Therefore, more than one mentor may be needed to meet all needs of mentees, as a "perfect match" likely does not exist for every relationship, which addresses the second research question of the study. A suggestion that emerged from the interviews was the inclusion of peer mentoring in the IMPACT program, in addition to the mentoring matches with an emeriti faculty member. The mid-career faculty expressed the

desire to make connections with other mentees in the program to collaborate, network, and learn from one another. All mentees were at different points in their careers, and one mid-career mentee remarked that "there's just a lot of knowledge at all levels, so I feel as though there might be more of a tiered system . . . where we can help each other."

Another mid-career faculty member highlighted that the mentees in the IMPACT program who had received tenure had undergone the process much more recently than their mentors; therefore, they possessed timely and valuable knowledge to share with the early-career faculty. These suggestions connect with previous research by Pawley et al. (2014) that found early- and mid-career engineering faculty reported a positive effect on their research, teaching, and service due to their involvement in peer mentoring workshops. In addition, the suggestion for more than one mentor demonstrates the possibility that the IMPACT program could be enhanced by including several mentoring relationships and other faculty-based mentoring programs, as noted by other researchers (Agosto et al., 2016; Chesler, Single, & Mikic, 2013; Driscoll, Parkes, Tilley-Lubbs, Brill, & Pitts Bannister, 2009; Ockene et al., 2017; Thomas, Bystydzienski, & Desai, 2015).

Some mentees chose to take full advantage of the IMPACT mentoring program by informally creating relationships with other URM participants. One mid-career faculty indicated, "the network and peer-to-peer mentoring that I've gotten from the other participants [and] the insights that they've shared that's also been very helpful, . . . the support network, has been pretty impactful." Many participants noted the new connections gained by interacting with fellow mentees were fruitful, from opportunities to bounce ideas off one another to considering ways to partner on research projects with those who hold similar disciplinary expertise to soliciting teaching advice and support.

These findings are consistent with de Janasz and Sullivan (2004), who stated: "Having a network of mentors can provide a protégé with a variety of developers with different perspectives, knowledge, and skills, and who can serve different mentoring functions such as being a role model or providing career-related or emotional support" (p. 264). Therefore, institutions must consider the provision of providing a network of mentors when creating mentoring programs for their faculty, especially URM faculty. This network could provide faculty with the career development, sponsorship, and coaching they need and expect by capitalizing on the strengths and experiences of multiple mentors (Darwin & Palmer, 2009; Wild, Canale, & Herdklotz, 2017; Yun et al., 2016). However, this desire may change as their needs become more targeted with their career trajectory or tenure status. One mentor may be adequate during a particular period in a faculty member's career, depending upon his or her mentoring needs. For example, if one mentor provides the desired advice and coaching for achieving tenure, which was identified by early-career faculty as their main need, the mentees may be more satisfied with one mentor. However, additional mentors who excel in various areas may be necessary at some point, as needs change throughout one's career trajectory. This was true for the participants in the IMPACT program. The early-career faculty were exceedingly satisfied with the mentoring they received from one mentor, whereas the needs of mid-career URM faculty generally were not met by a single mentor.

The opportunity to grow a network of mentors could be beneficial for all faculty members. One implication for the IMPACT program is to include a peer mentoring component since the mentees possess a range of experience and expertise that could be leveraged. Providing intentional and purposeful outlets for interaction and networking among mentees, as well as a one-on-one connection with a mentor, may introduce another dimension to the program. While matching the mentees with emeriti faculty as mentors was a valuable component of the program, formally supporting mentees to make connections among themselves to discover similar career aspirations, research agendas, and experiences may ignite peer relationships that can be fostered to meet additional mentoring needs.

The option of matching mentees with more than one emeriti faculty member also could provide further benefits to the mentoring experience, which may be a more effective mentoring arrangement overall. The mentees in the IMPACT program were matched with mentors based on their technical expertise, although other pairing criteria could exist, such as holding a similar research agenda or prior administrative experience, to enhance the program. Whether individuals are matched with one or more mentors, the Ideal Model for Mentoring URM Faculty provides insight and direction into specific actions for the mentoring relationship to be advantageous and fulfilling (Zambrana et al., 2015). While the specificity within the domains may change, the practical applications and strategies outlined by the Ideal Mentoring Model can be applied in all mentoring relationships. Early-career faculty may welcome a "hands-on approach" in managing their time and determining their priorities, while their mid-career counterparts may feel more comfortable and confident in their ability to proceed on their own. As demonstrated in this study, the domains aligned with the mentees' expectations of their mentors; therefore, using the model as a guide to develop and maintain mentoring relationships could provide both parties with the directives needed to ensure success.

Conclusion

While both early- and mid-career faculty mentees identified career advancement as the most important area of need in their mentoring relationships, the mid-career faculty group possessed more specific ideas of ways in which their mentors could support their career development and pursuit of full professorship. They desired tailored guidance in building national and international networks and recognition, advice for achieving administrative positions, and direction in grant funding. Both groups pursued mentoring activities to support their needs; the most beneficial activities involved making connections and building networks through their mentors. While these findings are germane to the IMPACT mentoring program participants, a subsequent quantitative study of the differences in mentoring needs between early- and mid-career URM faculty could determine whether those differences are on a large scale in the engineering professoriate and whether they extend across disciplinary and demographic boundaries. Nonetheless, findings from this study suggest a network of mentors may provide early- and mid-career faculty with the most valuable mentoring experience and the opportunity for their career development needs to be met more broadly and specifically.

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