



Developing Deeper Student Mentoring Relationships: Black Engineering Faculty Translating their Mentee Experiences to Students (Research)

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Abstract

This research paper explores how Black engineering faculty translate their mentee experiences to develop deeper mentoring relationships with their students. While faculty mentoring is heralded as playing a vital role in advancing the careers of faculty, promoting equity in higher education, and ultimately diversifying the professoriate (Johnson, 2016; Zambrana et al., 2015), little is known about how faculty use their own experiences as mentees to inform their faculty-student mentoring relationships. Thus, this phenomenological study (Moustakas, 1994) explores how seven Black engineering faculty developed deeper student mentoring relationships due to serving as mentees in the Increasing Minority Presence within Academia through Continuous Training (IMPACT) mentoring program. The IMPACT program paired Black engineering faculty with primarily White emeriti faculty for career-focused mentorship, networking, and advocacy. Moustakas' (1994) four-stage process of phenomenological data analysis was employed to examine three rounds of interview data: epoché, horizontalization, imaginative variation, and synthesis. Two major themes emerged inductively relative to how the Black engineering faculty translated their mentee experiences with their students: (1) Vulnerability opened the door to personalized support; and (2) Authentically leading on equity, diversity, and inclusion. Thus, the phenomenon's essence was: As a result of serving as mentees in the IMPACT mentoring program, Black engineering faculty formed deeper mentoring relationships with students through vulnerability, personalized support, and authentically leading on matters of equity, diversity, and inclusion. These findings reveal the ripple effect on the student-faculty relationship when faculty engage in quality faculty mentoring programs. This study is sponsored by a National Science Foundation INCLUDES Design and Developments Launch Pilot award (14-44500). The preferred presentation method is a traditional lecture.

Introduction

While faculty mentoring, in which senior faculty mentor early-career faculty, is heralded as playing a vital role in advancing the careers of faculty, promoting equity in higher education, and ultimately diversifying the professoriate (Johnson, 2016; Zambrana et al., 2015), little is known about how faculty use their own experiences as mentees to inform their faculty-student mentoring relationships. Thus, this phenomenological study (Moustakas, 1994) explores how seven Black engineering faculty developed deeper student mentoring relationships because of serving as mentees in the Increasing Minority Presence within Academia through Continuous Training (IMPACT) mentoring program. The IMPACT program paired Black engineering faculty with primarily White emeriti faculty for career-focused mentorship, networking, and advocacy. Mentees were primarily recruited from the Academic and Research Leadership Network, a database of minority STEM faculty; the mentees mainly selected their mentors, but none held a previous formal relationship, nor were any located at the same institution. The mentoring matches were based on the specified goal of the mentee, such as moving into a department chair role or seeking grant-writing support, but not disciplinary or demographic markers as is the traditional mentoring match rationale. Expectations were set from the start for the mentoring matches to engage with one another at least once per month, and all reported

doing so. The research question guiding this study is: What are the ways in which Black engineering faculty utilized their experiences as mentees to inform their mentoring relationships with students?

Literature Review

While there is a solid body of research on the benefits and positive effects of mentoring for faculty in higher education institutions, little is known about how faculty use their own experiences as mentees to inform their faculty-student mentoring relationships despite the research noting faculty satisfaction with their own mentoring has the most significant positive result on student success (Sneyers & De Witt, 2017). McCloughen et al. (2013) found mentors often mentor the way they were mentored, which means effective and non-effective mentoring experiences have long-term effects on how mentees mentor in the future. Thus, it is not surprising that mentoring motivations and practices evolve through mentors' careers (Bettis et al., 2019; Blake-Beard et al., 2021; Lunsford, 2014; McBride et al., 2019). Faculty motivations to mentor range from a desire to help develop the upcoming generation of scholars (Southern, 2007; Tran, 2022), to improve their reputation (Duntley-Matos, 2014), and to transform institutional norms (Ruiz-Cantisani et al., 2021). A recent study by Ruiz-Cantisani et al. (2021) specifically examined why Latinx women in STEM become mentors and found they desired to foster women's resilience in the discipline, contribute to and impact others, and raise attention to the STEM gender gap.

Research indicates quality faculty-student mentoring relationships are predicated on clear goals and expectations, agreement on roles and responsibilities, frequent communication, flexibility, appropriate and honest feedback, and similar interests and values (Atkins et al., 2020; Birkeland et al., 2019; Brody et al., 2016; Bruner et al., 2016; Fuentes et al., 2013; Gershenfeld, 2014; Nora & Crisp, 2007; Smith, 2007; Tran, 2022). For this to occur, authenticity, transparency, trust, and vulnerability must underpin the relationship (Fries-Britt & Snider, 2015; Ruiz-Cantisani et al., 2021). The formality of engaging in a faculty-student mentoring relationship must be taken seriously by the university and highly valued to demonstrate real benefit to students and the institution (Birkeland et al., 2019; Blake-Beard et al., 2021; Smith, 2007; Thomas et al., 2007). Institutions that provide mentor training inclusive of developing cultural competence, empathy, and humility around equity, diversity, and inclusion are deemed more successful (Fries-Britt & Snider, 2015; Stelter et al., 2021). Additionally, a focus on mentor self-examination is critical to success, including self-reflection, standardized assessments, peer support, and critical feedback opportunities (Blake-Beard et al., 2021).

Student mentoring is considered a high-impact educational practice (Kuh, 2008) that serves as a valuable resource for students to receive practical advice, guidance, and socialization opportunities that are difficult to acquire through informal means (Crisp et al., 2017; Crisp & Cruz, 2009; Davidson & Foster-Johnson, 2001; Johnson, 2007; Nora & Crisp, 2007; Schreiner et al., 2011). Students who receive high-quality mentoring have lower attrition rates, higher grades, increased self-efficacy, greater help-seeking behaviors and general well-being, and better-defined academic, career, and personal goals (Berardi et al., 2020; Crisp et al., 2017; McCreary & Miller-Perrin, 2019; Tsui, 2007). Researchers agree that mentoring is particularly crucial for the persistence and success of students of color, especially for those in science, technology,

engineering, and mathematics (STEM) disciplines where often they are underrepresented (Alvarado et al., 2021; Christie, 2013; Davidson & Foster-Johnson, 2001; Stelter et al., 2021; Thomas et al., 2007; Tsui, 2007). Mentoring, which includes elements of academic support, psychological/emotional care, goal setting, professional networking, social connections, and role-modeling, is particularly salient for students of color who may find it challenging to navigate the bureaucracy and “hidden rules” of higher education institutions (Fuentes et al., 2013; Quaye & Harper, 2015; Thomas et al., 2007; Wallace et al., 2000). Relatedly, Mondisa et al. (2021) find STEM mentoring ecosystems are needed to improve the recruitment and retention efforts of students of color in STEM, which requires mentor training, funding, cultivating synergies, and assessment and accountability.

Methodology

Research Design. A phenomenological research design (Moustakas, 1994) explored how Black engineering faculty translate their faculty mentee experiences to develop deeper mentoring relationships with their students. The goal of phenomenological research is to capture and convey the experiences and stories of individuals around specific interactions and events to stimulate the transferability of findings to others (Creswell & Poth, 2017). The research question of this study was: What are the ways in which Black engineering faculty utilized their experiences as mentees to inform their mentoring relationships with students?

Participants. Seven Black engineering faculty who participated as mentees in the IMPACT mentoring program were recruited to participate in this study. The IMPACT program paired Black engineering faculty with primarily White emeriti faculty for career-focused mentorship, networking, and advocacy. The program intended to serve as an innovative strategy to complement a constellation approach to mentoring as the emeriti faculty were charged with supplementing, not supplanting, existing mentoring relationships. The inclusion of emeriti faculty also served as a pathway for retirees to continue to make meaningful contributions to the profession and to capitalize on their greater discretionary time while leveraging their wealth of experience in academe. The mentee sample comprised one female and six males ages 30-54. The mentees’ ranks spanned Assistant to Full Professor and represented various engineering disciplines such as aerospace, chemical and biomolecular, civil and environmental, manufacturing technology, mechanical, and public policy. All are employed at Doctoral Universities with Very High Research Activity, commonly known as R1 institutions (Indiana University Center for Postsecondary Research, 2018). The pseudonyms and demographics of the participants are displayed in Table 1.

Table 1. *Study Participant Demographics*

Participant	Gender	Rank	Discipline
Desirae	Female	Assistant	Civil/Environmental Engineering & Engineering Public Policy
Jefferson	Male	Assistant	Mechanical Engineering
Jordan	Male	Assistant	Mechanical Engineering
Ken	Male	Assistant	Chemical and Biomolecular Engineering
Carson	Male	Associate	Mechanical Engineering
Wiley	Male	Associate	Manufacturing Engineering Technology
Miles	Male	Full	Aerospace Engineering

Data Collection. Per Institutional Review Board approval, all participants were provided with a consent form detailing the purpose of the study, interview procedures, and safeguards to protect anonymity. Three sets of interviews averaging 45 minutes in length were conducted; they were digitally recorded and administered one-on-one through web conferencing or phone. The use of multiple interviews allowed for member checks to be included naturally during data collection, which provided a successively deeper understanding of the efficacy of the mentoring relationships and the ensuing effect on participant mentoring relationships with students (Lincoln & Guba, 1985). The interview protocols explored current mentoring relationships; mentoring needs, goals, and preferences; how the relationship progressed; the value of aligning mentee goals with mentor expertise; participant benefits; how the racial identity of the mentees influenced the nature of the mentoring relationship; and the sustainability of the relationship.

Sample questions pertaining to this study include:

1. How have you benefited as a mentee in the IMPACT program?
2. Have your thoughts on mentoring changed as a result of participation in the IMPACT program? How so?
3. What are the ways in which engineering academia may need to change to ensure broad participation in the discipline?

It was essential to build rapport with the participants to effectively explore these topics to ensure they felt heard, respected, and valued. Ideally, the interviews felt natural and free-flowing, with the interviewer serving as an active listener. The recordings were transcribed by a third-party service and permanently deleted once reviewed and cleaned.

Data Analysis. Analysis of the interview data was conducted utilizing a phenomenological approach. The systematic application of this approach allowed for coding credibility and dependability by discovering patterns in the data and developing a detailed description of the phenomenon under study (Moustakas, 1994). As Moustakas (1994) outlined, the four-stage process of phenomenological data analysis was employed to examine the interview data: epoché, horizontalization, imaginative variation, and synthesis.

The first phase, epoché, occurred throughout the study as the researchers bracketed their individual and collective beliefs, values, assumptions, and experiences of mentoring in academia. This phase is integral to researchers taking an open and honest look at themselves to account for and mitigate potential researcher bias and data misunderstandings that could interfere with the data collection and analysis processes. Epoché requires researchers to refrain from considering their lived experiences as absolute. Instead, they critically examine how their unique experiences influence their interpretations of the world, specifically the phenomenon at hand (Moustakas, 1994). The researchers associated with this study are employed at higher education institutions and hold professor, administrator, and graduate student research positions. Each has participated in mentoring programs, both formally and informally, and firmly believes they are products of quality mentorship. They seek to pay the support, connections, and guidance they have received forward as they consider how their mentoring experiences influenced their educational and career trajectories.

The second phase of data analysis utilized inductive, open coding of significant statements through horizontalization, as all transcripts were read with equal value (Moustakas, 1994). The statements were parsimoniously reduced and clustered into initial patterns through the successive

combining of similar significant statements. The initial patterns indicated broad categories in which faculty leveraged their own IMPACT mentoring program lessons learned with their students. For example, many faculty members shared that they discussed the George Floyd trial and verdict with their mentors and led similar conversations with their students. Additionally, some communicated that they gained tailored insight from having one-on-one conversations with their mentors, so they transitioned from group meetings to one-on-one meetings, facilitating stronger relationships with their students.

In the third stage, imaginative variation was used to clarify the underlying structure of the phenomenon by addressing the contextual factors and conditions that determined how the participants discussed how they translated their faculty mentee experiences with students (Moustakas, 1994). For instance, it was essential to understand the value attributed to vulnerability with participant mentors and students. Moustakas (1994) considers this process an analytical, mental experiment to explore a variety of perspectives. The fourth and final stage involved the identification of themes and the holistic synthesis of the phenomenon's essence (Moustakas, 1994). Two major themes emerged relative to how the Black engineering faculty translated their mentee experiences with their students: (1) Vulnerability opened the door to personalized support; and (2) Authentically leading on equity, diversity, and inclusion. Thus, the phenomenon's essence was: As a result of serving as mentees in the IMPACT mentoring program, Black engineering faculty formed deeper mentoring relationships with students through vulnerability, personalized support, and authentically leading on matters of equity, diversity, and inclusion. The essence is to be considered limitless, universal, transferable, and formulated in the context of the participants and mediated by the researchers (Moustakas, 1994).

Trustworthiness. The trustworthiness of the findings was established by using multiple verification strategies (Lincoln & Guba, 1985). Thick, rich descriptions and participant quotations were utilized to foster transferability (Patton, 2015). Credibility was achieved through successive interviews and interview triangulation (Creswell & Poth, 2017; Patton, 2015). Employing Moustakas' (1994) phenomenological data analysis approach safeguarded the consistency of the process and product, which ensured credibility and dependability. Bracketing throughout the data collection and analysis phases of the research and the involvement of multiple researchers also bolstered the dependability of the findings. Following the guise of Patton (2015), the themes and essence of the findings were authenticated in various stages of the data analysis process to establish confirmability.

Limitations. The study purposefully exposed researcher bias through the epoché process, but we cannot absolve ourselves from its potential influence on the findings and interpretations. We are all employed at higher education institutions, and while only three of the seven authors possess an engineering background, we all believe strongly in the benefits of mentoring and the vital role it often plays in the fostering of care for others and career advancement; therefore, the data were approached from both an outsider and insider perspective which may have prejudiced the study's conclusions. Additionally, we are involved in the IMPACT mentoring program as program designers or social science researchers, so our closeness to the project could have clouded our ability to be neutral on the mentoring experiences shared by the participants.

Findings

For the participants in this study, their experiences as mentees in the IMPACT program provided practical strategies and tools to implement in their faculty-student mentoring relationships. They spoke of mentoring students in their research laboratories, through formal and informal advisement, and during coursework.

Vulnerability Opened the Door to Personalized Support. Each faculty member shared instances of where their mentoring relationships with students changed due to their involvement with the IMPACT mentoring program. The concept of vulnerability—a willingness to emotionally expose oneself by being open and taking risks—was replete throughout the interviews. For their own mentoring experiences as IMPACT mentees, faculty realized that being open and vulnerable within a mentoring relationship creates a more beneficial and successful partnership. Jefferson shared:

I learned the importance of being my authentic self...vulnerability is like something that can be hard to give up right because once you give it out, you can't take it back...it drives home the need for me to think about it in my mentoring relationships with students...[my mentor] helped me to think more about the ways I'm giving back and meeting my students where they are.

He described how he shifted student meetings from focusing solely on research deliverables to their lives outside of the lab, which led to “seeing my students in another light.” This allowed students to share personal concerns and school-related issues as they felt more comfortable and cared for in this mentoring relationship.

Relatedly, Carson commented that his mentor helped him realize that he needed to move from only group student meetings to one-on-one meetings to offer more individualized support. He said:

Now I have ad hoc student meetings online, and they join me when they need to, and I give them as much time as they need, and I feel like it's better for me, and they seem a little a bit more motivated. I've learned that in a large group setting, you may not want to share too much...you don't want to explain why you didn't get the work done because something's going on with your mom or that you're failing a class.

These new insights were directly credited to their IMPACT mentoring experience, in which they met one-on-one with their mentors and had the opportunity to discuss professional and personal matters within the relationship. Mentees learned the value of having one-on-one conversations with mentors genuinely interested in their growth and development, which they sought to imitate with their students in meaningful ways.

The idea of “meeting students where they are” came up in several interviews. Wiley stated, “this program made me approach my students a little differently. This semester I'm finding myself in grading, providing more guidance with a lot more flexibility and empathy.” Akin to Wiley, Jordan said the “value of having a relatable mentor” led him to consider how he could be a more relatable mentor to his students and learn more about them. Miles shared that as a result of his mentoring relationship, he has thought more about the distinction between mentoring versus sponsoring, “I've been looking for opportunities to be more of a sponsor for my students...we can't just bring people to the table, we need to mentor them, sponsor them, champion them, and

create the space for them to be successful.” While all the participants agreed that engineering is a rigorous field of study that requires commitment and dedication, they found themselves developing a greater appreciation of the student experience and extending more grace and understanding about their role in meeting student needs than they previously had due to their mentee experience.

Participants found that students followed suit and opened up about their frustrations and stresses as they began to reveal more of their personal lives. Jefferson discussed how a student whose parents were in India during the height of the COVID-19 Delta variant outbreak was struggling to stay focused on his studies, “I appreciated his willingness to trust me with that personal knowledge, as I’ve become more personal with my students, they’ve become more personal with me, and it seems to be working.” He attributed his ability to be “open, intimate, and transparent” with students to his mentor, who modeled that behavior with him. Meanwhile, Desirae and Ken alluded to the danger of having a “student-first approach” because it often leads to disproportionate advising and mentoring loads as students gravitate to “accessible mentors.” And while they did not shy away from this role, they found it led to inequitable workloads with faculty of color bearing the brunt of meeting student needs and no consequences for faculty who shirk this responsibility.

Authentically Leading on Equity, Diversity, and Inclusiveness. Participants found themselves more comfortable discussing equity, diversity, and inclusiveness with students due to their IMPACT mentoring relationship. IMPACT mentors were selected to mentor not only for their ability to aid in their mentee’s career goal achievement and their renowned status in their respective field but also due to their commitment to the over-arching goal of the IMPACT program, which was to aid in the career success of Black engineering faculty. Thus, mentors were charged with centering the racial identity of their mentees in the context of their mentoring relationship. This charge led to frank and direct conversations about race and its intersection with power, privilege, and oppression in and out of academia. While how this occurred differed among the mentoring matches, all but one participant reported race was a fundamental component of their mentoring relationship. Miles said:

[My race] was integral and often shaped the conversation [with my mentor], especially since we started in the middle of the George Floyd killing, and so we talked about him and what it meant for us and US society... We talked about it in the context of my leadership and how that would affect the way I led, and how my experience might look different than his experience. His sharing that and his perspective was helpful for me to think more deeply and critically about the way I lead and want to lead.

The participants spoke of these conversations as empowering and inspiring, as many shared that these conversations then occurred with students.

Open dialogue on these matters led many participants to discuss how race influences their lives with their students. Jefferson noted:

[My mentor] gave me the confidence to talk about my career and my struggles, racial tension, and social justice in a way... I had never shared how these issues impact my daily life and existence. And so openly talking with him about that gave me the confidence now to even talk with my colleagues and students about these things.

Participants also discussed how they began to highlight the inequities in academe with students. Desirae talked about how historical exclusion has led to underrepresentation in engineering, “students need role models that tell them, ‘hey, you can be a successful grad student, you can get this doctorate,’ and when there’s nobody there that looks like them those conversations just don’t happen.” Carson indicated that racial/ethnic underrepresentation in engineering leads to a narrowed disciplinary curriculum, “we need to think about diversity in our teaching, most of the fundamentals of engineering are based on Western knowledge, based on a European-centric views of science and engineering. A broader worldview perspective would be good for students.” Having the safe space to converse with their mentors engendered an enhanced comfortableness in doing so with students.

Discussion

This phenomenological study (Moustakas, 1994) sheds light on how faculty use their own experiences as mentees to inform their faculty-student mentoring relationships. Each participant discussed how their mentor’s commitment to the mentoring relationship led to them rethinking their mentoring approach with students, which led to deeper student mentoring relationships. The faculty members were able to identify which strategies and experiences led to a more effective mentoring relationship for them as mentees, which they “paid forward” by implementing the said strategies in their faculty-student mentoring relationships. Two major themes emerged inductively relative to how the Black engineering faculty translated their mentee experiences with their students: (1) Vulnerability opened the door to personalized support; and (2) Authentically leading on equity, diversity, and inclusion. Thus, the phenomenon's essence was: As a result of serving as mentees in the IMPACT mentoring program, Black engineering faculty formed deeper mentoring relationships with students through vulnerability, personalized support, and authentically leading on matters of equity, diversity, and inclusion.

These findings reveal the ripple effect of quality faculty mentee experiences on the student-faculty mentoring relationship, which coincide with and extend the scarce literature on this topic (Bettis et al., 2019; Blake-Beard et al., 2021; Lunsford, 2014; McBride et al., 2019; McCloughen et al., 2013; Sneyers & De Witte, 2017). For instance, the value of shifting from group meetings to one-on-one meetings led to faculty offering more customized support to their students. The opportunity to develop a more personalized approach facilitated a deeper relationship. What was found is that quality mentoring begets quality mentoring. As noted in previous research, vulnerability was a key leadership trait for mentors to possess to facilitate open and communicative mentoring relationships (Fries-Brit & Snider, 2015; Ruiz-Cantisani et al., 2021). Additionally, fostering self-reflection, particularly around equity, diversity, and inclusion, by the mentees led to greater introspection and benefit to those they mentor, as noted by other researchers (Blake-Beard et al., 2021; Fries-Brit & Snider, 2015; Stelter et al., 2021)

Implications. This study illustrates critical implications for higher education institutions, mentoring program designers, and faculty mentors and mentees. An essential component of the IMPACT mentoring program was the onboarding for the mentoring matches. Onboarding included setting clear expectations for the roles and responsibilities of both parties and co-developing a mentoring plan that required articulation of the mentee’s career goals and the planned mode and frequency of communication. These requirements led the participants to

understand the nature of their relationship early on, which promoted a deep connection from the start. How the mentors demonstrated care and commitment prompted mentees to do the same with their students as the mentees experienced the benefit personally and sought to replicate it. Thus, higher education institutions and mentoring program designers must implement onboarding, check-in, and reflective experiences with mentoring program participants to ensure mutually beneficial partnerships that result in benefits beyond the mentor and mentee. Furthermore, it will be valuable for institutions to provide training on effective components of quality faculty-student mentoring relationships so mentors are aware of what steps they can take to help create a more successful mentoring experience for all parties. Last, the concerns voiced by Desirae and Ken on how faculty who serve as dedicated student mentors often experience disproportionate workloads are well-documented in the literature, but little action has been taken to address this in the academy.

Future Research. A fruitful area for future research involves studying the art and science of mentoring and how mentoring practices evolve. As Lunsford (2014) indicated, how do “mentors, tormentors, and no mentors” affect how faculty mentor students? Are there appreciable differences in the student mentoring practices of faculty who received high-quality versus low-quality mentoring as students and faculty? Are there distinctions based on faculty rank? Might post-tenure faculty have greater experience and time to foster quality mentoring relationships with students, or does faculty personality dictate student mentoring approaches? It would also be prudent to understand how students perceive their mentor’s approach to mentoring and the benefits and drawbacks they accrue from contrasting approaches. As nearly all the mentors were White, with one being South Asian, it would be noteworthy to study how their prompting around issues of race was interpreted as empowering to the Black mentees. Finally, a greater unpacking is needed of how a student-centered approach to mentoring and advising impacts faculty workload, particularly regarding women faculty. While all the participants began to embrace this approach, only two commented that this increased their workload as more students were drawn to them.

Conclusion

This phenomenological study (Moustakas, 1994) provides a deeper understanding of the ways in which faculty use their own experiences as mentees to inform their faculty-student mentoring relationships. There is a shortage of literature on how mentors utilize their experience as mentees to craft their practice as mentors. Through an inductive data analysis approach, the phenomenon’s essence was as follows, as a result of serving as mentees in the IMPACT mentoring program, Black engineering faculty formed deeper mentoring relationships with students through vulnerability, personalized support, and authentically leading on matters of equity, diversity, and inclusion. Although the findings of this study are specific to the IMPACT mentoring program mentee participants, the goal of phenomenological research designs is to promote the transferability of findings to others with similar experiences, so we encourage conversations regarding the applicability of these mentoring ripple effects to students.

Funding Acknowledgement

This research is sponsored by a National Science Foundation (NSF) INCLUDES Design and Developments Launch Pilot award (14-44500). Any opinions, findings, conclusions, or recommendations are those of only the authors and do not necessarily reflect the views of the NSF.

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