



Understanding the Mentoring Needs of African-American Female Engineering Students: A Phenomenographic Preliminary Analysis

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Abstract

Seeking to improve retention of underrepresented minorities within the STEM fields, we often discuss why these students leave, but spend less time on the measures that support persistence. Research has shown that mentoring is one essential source of such support for students of color. But our current understanding of the role of mentoring or its critical components is incomplete, both in a general sense and for specific populations. For example, the mentoring experiences of undergraduate African American women, especially in the field of engineering, is particularly understudied. To address this gap, the aim of this study is to gain an understanding of how undergraduate African American women in engineering experience effective faculty mentoring.

As a group that lives at the intersection of both African American and female identities experienced simultaneously, African American women's socially defined categorizations provides a unique perspective that can distinctively impact their experiences, including their mentoring relationships. To understand their experiences, we apply phenomenography because of its capability to minimize essentialization and highlight variations within a phenomenon of interest or experience. Fundamentally, this method does not aim to generalize the experiences of all African American women in engineering, but rather to explore the different ways participants in this group experience mentoring relationships. We used student interviews to gather explicit examples of participants' experiences. Here we present a preliminary analysis of the data.

The results yielded preliminary groupings based on variations in context, formation, and tone. These findings suggest that mentors can serve a variety of roles and engage with students in multiple ways. Perhaps more importantly, these roles and engagement patterns can occur across race and sex boundaries.

Introduction

More-so than other post-secondary degree fields, engineering is dominated by both Whites and males, who represent 70% and 82.1%, respectively, of the field¹. In contrast, African-American women, who represent 6% of the U.S. population and 7% of the college student population², as recently as 2009 accounted for only 1% of the 70,000 undergraduate engineering degrees and only 2.3% of the 3,376 engineering PhDs awarded in this country³ - a percentage that remained unchanged in percentage in 2010^{2,4}. The profile is even more troubling at the faculty level where African-American women remain less than 0.5% of the more than 20,000 tenure-track faculty in engineering⁵.

These statistics illustrate that, despite decades of work, engineering education still struggles to recruit and retain African-American women through undergraduate programs and into doctoral study and faculty positions. Among the most frequently identified barriers for these students is a persistent lack of mentors⁶. Research suggests, moreover, that underrepresented engineering students broadly benefit particularly from relationships with mentors of similar backgrounds, or "matched" mentors^{1,7}. That is, African-American women students benefit from mentoring relationships with African-American women faculty. This finding raises two challenges. First, if

matched mentors are vital, the low number of African-American women faculty in engineering creates an infinite loop – too few mentors’ results in too few students who persist into faculty position, which continues to result in too few mentors. Second, and perhaps more troubling, it places much of the burden of increasing the number of African-American women in engineering on African-American women faculty, and does not account for the ways in which all faculty can and should effectively mentor students across racial and gender categories.

To address these challenges, we need a better understanding of both the nature and impacts of diverse mentoring relationships for African-American women in engineering. Importantly, research on identity suggests that neither studies of women nor of African-Americans may not fully account for the intersection of these identities, making research on these two groups useful, but not sufficient. If, as the research suggests, mentors can play a key role in persistence, then we need to better understand African-American female students (AAFSs) mentoring needs. How do matched mentors support African-American women engineering students? What needs do students without matched mentor’s experience? What strategies do they have for identifying other mentors? What support can unmatched mentors provide? By answering such questions, we can better prepare all engineering faculty, regardless of demographics, to provide more effective mentoring to African-American women in engineering, and thus increase persistence for this population. As a first step toward this goal, this preliminary analysis seeks to **gain an understanding of the salient aspects of faculty mentoring relationships that support African-American undergraduate females in engineering**. To achieve this goal, this study addresses the following research questions:

- RQ1. How do African-American female engineering students identify and develop relationships with mentors?
- RQ2. How do African-American female engineering students experience matched mentoring relationships (i.e. with African-American female engineering faculty)?
- RQ3. How do African-American female engineering students experience unmatched mentoring relationships?

To answer these questions, this study employed a phenomenographic approach, interviewing participants at a single institution to understand the mentoring experiences African-American women have as engineering students. Importantly, phenomenography seeks to explore the range of experiences these participants have, allowing for diversity rather than attempting to produce a single monolithic description of “the” mentoring experience of African-American women. Phenomenography offers a tool to systematically account for variation while simultaneously yielding meaningful categories of experience that can inform effective action. This paper presents preliminary findings of this phenomenographic analysis.

Literature Review

Before efforts can be made to improve the numerical representation of African American women in engineering, we must develop a clear understanding of what aspects of their experiences enable them to succeed. As a group, however, these young women are often indirectly left out of the conversation, merged into either “people of color” or “women” in ways that may not directly address their unique experiences or needs.

To address this challenge, the proposed study draws on two bodies of literature: intersectionality and mentoring. This literature provides insights into current research on the experiences of African-American women in engineering, and highlights key gaps in understanding how intersections of identity create unique needs and challenges for students. Note that throughout the following literature review, the scholars cited use a range of terms when discussing racial demographics, including Black, African-American, and people of color. The proposed study uses the term African-American, but the literature review uses the terms employed by the authors of each study.

Intersectionality: Race, Gender, and Beyond in Engineering

As suggested earlier, engineering education has spent considerable time and money seeking to improve the recruitment and retention of underrepresented students. Work on women in engineering, for example, has identified factors such as self-efficacy⁸⁻¹⁰, gendered climate¹¹⁻¹³, and stereotype threat¹⁴⁻¹⁷ as factors that hinder the persistence of minority women in engineering. Researchers have also explored the ways in which women experience collaborative environments (e.g.,^{18, 19-22}) and offer numerous strategies for more effectively supporting women in engineering. Similar issues have been examined among African-American students (e.g.,^{23, 24, 25}), and descriptions of minority support programs abound at conferences such as the American Society for Engineering Education. Such work forms a critical foundation for moving forward, but as the numbers suggest, work remains to be done.

We argue here that a critical component of this work lies in disaggregating the experiences of underrepresented groups to better understand the challenges faced when different identities interact, as is the case for African-American women. Intersectionality provides the key framework for understanding and exploring these interactions. Born out of critical race theory and law studies in the 1980s, intersectionality was coined by legal scholar Kimberle Crenshaw in her landmark 1989 article addressing the discrimination of Black women plaintiffs in several court cases. Crenshaw's theory sought to "contrast the multidimensionality of Black women's experiences, with the single-axis analysis that distorts these experiences" (p. 139). The "single-axis analysis" refers to ways of understanding an individual's identity based on only one dimension: race or gender – an approach that, Crenshaw argues, fails to incorporate the "ways in which race and gender interact to shape the multiple dimensions of Black women's ... experiences"^{27, p. 1244}.

Intersectionality, in contrast, destabilizes the categories of race and gender to allow a more complex analysis of identity and to recognize that, for example, the experiences of African-American women are not a simple composite of the experiences of women plus the experiences of African-Americans. Intersectionality looks at those who find themselves multiply marginalized, particularly by both race and gender, and is "particularly adept at capturing and theorizing the simultaneity of race and gender as social processes"²⁸; in other words, it allows scholars to see both race and gender as socially constructed categories, and to explore the ways in which those social constructions become more complex as they intersect. Developed by feminist scholars of color as a response to the largely white, middle-class feminism of the 1980s, intersectionality came to the forefront as a way to include the interactions of gender with race²⁹. Over time, it became a way to emphasize the qualitative differences in how gender intersects with a range of other social identities as well, including class, culture, and sexuality²⁹. It has

since evolved into a useful approach for understanding individuals who identify themselves with a number of different groups in ways that accommodate both the differences and similarities across groups that influence experiences. We focus here on intersectionality because of its roots in issues affecting African-American women, in particular, and its ability to explore these intersections of race and gender.

In studying engineering, intersectionality is particularly important because African-American women are such a sharp minority that their unique experiences, as noted above, are often elided in studies of larger groups (women, people of color); as the demographics cited in the introduction highlight, African-American women are far more marginalized within engineering, where they represent only 2% of the undergraduate population than within either the larger university environment (at 7%) or the general population (at 6%). With such low numbers, both quantitative and qualitative studies are often unable to capture the experiences of this population effectively. And because, as Crenshaw explains,³⁰ experiences vary by domain, studies of African-American women college students more broadly may not effectively address the domain of engineering, where both gender and race are highly visible minority identities. Moreover, these minority positions are reinforced not only in engineering classrooms at predominantly white institutions, but in popular culture where engineers are generally shown as white men, such as *Apollo 13* (1995), *A Beautiful Mind* (2001), and *Fantastic 4* (2005). African-American female engineers rarely see mirrors of either facet of their identity in fiction or in fact. Unfortunately, limited work exists on this group, but what does exist³¹ begins to highlight the complex challenges African-American women face as they negotiate identities as engineering students and professionals.

Mentoring

To respond to the calls and tap into the talent of African-American women, African-American women must successfully persist in an engineering degree program and into graduate programs. While no single solution will address this need, research suggests that mentors are one very significant component. Work by Lichtenstein et al., notes that “positive interactions with engineering faculty role models can have a significant influence on students’ decisions to pursue graduate study in engineering”³¹, and these interactions may be even more important for women of color. The importance of faculty-student relationships has also been explored more broadly in terms of its impact on student motivation³², learning in situated (problem- and project-based) environments e.g.,^{33, 34, 35}, and graduate education e.g.,^{36, 37}. Similarly, Ong et al.’s 2011 review of the literature found that women felt that “professors played a critical role in making a STEM career a reality”³⁸ for undergraduate and graduate women. Maton and Hrabowski III³⁹ found that interaction with faculty, and particularly minority faculty, in and outside the classroom can decrease the feelings of isolation among minority students and contribute to positive outcomes such as academic achievement, confidence, and persistence.

“Mentoring,” however, is a complex phenomenon, and relevant research encompasses a broad array of studies in both professional and academic settings. For example, D’Abate et al.⁴⁰ reviewed the literature and highlighted eight characteristics central to understanding mentoring relationships: span, direction, object of development, time frame, formality, learning, emotional support, and career progression. Similarly, a meta-review by Eby et al.⁴¹ identified five characteristics of mentoring relationships: 1) relationships between individuals, 2) learning

partnerships, 3) the mentor supports the protégé, 4) both mentor and protégé benefit, and 5) changes over time. There have also been several reviews of the literature on mentoring specific to higher education⁴²⁻⁴⁵. Reviews by Jacobi⁴³, Roberts⁴⁵, and Crisp and Cruz⁴⁴ have yielded similar characterizations to those offered by D'Abate et al. and Eby et al., though all agree that it is difficult to reach a unified definition or a quantitatively validated framework, even within a single domain such as higher education. Mentoring is, however, consistently linked to academic success (e.g. increased GPA), as well as increases in self-efficacy, integration into the community, retention, career goals, intention to persist and much more. While such broad definitions and outcomes provide important starting points for understanding mentoring in engineering education, the guidance mentors offer is not yet sufficiently contextualized to help faculty provide meaningful mentoring, particularly across race and gender boundaries where lack of shared experiences may be perceived as a barrier.

Moreover, questions about who can act as mentor and how unmatched relationships function remain largely unanswered. Much of the literature on mentoring minority women encourages matched mentoring. However, as noted earlier, the low number of female African-American engineering faculty members makes it difficult to provide matched relationships. At the same time, research is split on whether African-American female students need mentors matched by both race and gender. The literature reviewed by Cole and Griffin⁴² suggests that race does appear to be a notable factor in students' selection of mentors. Similarly, Ong and Wright³⁸ argue that matched mentors are especially important to women of color, and work by Blake-Beard et al. shows that the matching of both race and gender in mentoring relations is particularly important to women of color⁴⁶. However, authors like Ellington and Frederick⁴⁷ and Justin-Johnson⁴⁸ found that women of color often seek mentors outside of their gender and racial group in order to adjust to the culture of their discipline. Finally, given the lack of matched mentors, women across races are often encouraged to find multiple mentors, including matched and unmatched, who can potentially meet their needs^{49, 50}.

In short, research on mentoring, and particularly mentoring of underrepresented students in higher education contexts, consistently points to the value of such relationships in students' academic achievement and persistence. Yet this research also leaves unanswered critical questions about how these outcomes can be achieved, what needs mentors meet for specific populations, and how mentoring relationships both within and across boundaries of race and gender can effectively support African-American women in engineering contexts.

Research Methods

The proposed study seeks to address this gap using phenomenography to explore the experiences of African-American women through qualitative methods to address the three research questions:

- RQ1. How do African-American female engineering students identify and develop relationships with mentors?
- RQ2. How do African-American female engineering students experience matched mentoring relationships (i.e. with African-American female engineering faculty)?
- RQ3. How do African-American female engineering students experience unmatched mentoring relationships?

As a preliminary report, this paper presents an initial analysis of the data. Future analysis will be presented in coming works.

Phenomenography

Because this study focuses on understanding how African-American women experience mentoring in engineering programs, we employ qualitative methods designed to elicit and then make sense of participants' beliefs and experiences. In addition, given the intersectionality of various components of identity, as discussed in the Literature Review, we turn to phenomenography specifically for its ability to explore the diverse ways in which individuals experience a given phenomenon – in this case, the experiences of being mentored.

First developed by Marton, phenomenology provides a tool “for mapping the qualitatively different ways in which people experience, conceptualize, perceive, and understand various aspects of, and phenomena in, the world around them”⁵¹. The approach allows researchers to understand the varied conceptions that members of a particular group have about a single phenomenon⁵¹. Importantly, as Ornek notes, phenomenographic researchers seek to explore “how people experience a given phenomenon, not to study a given phenomenon⁵². ”. In this study, the phenomenon being explored is the experience of being mentored as an African-American woman in engineering.

Phenomenography is grounded in the relationship between the participant and the particular aspect of the world under investigation (i.e. the phenomenon) – how the participant perceives and makes meaning of the phenomenon. The sole source of data collection is the phenomenographic interview. In this case, the protocol asked participants to describe how they understand mentoring, the kinds of mentoring relationships they experience, the needs those relationships meet, and the needs that remain unmet. Importantly, allowing the participant to define the phenomenon at the beginning of the interview provides a basis for the subsequent discussion; that is, rather than beginning with one of the many definitions or frameworks for mentoring noted in the literature review, the interview begins with the participant's voice and experiences⁵³.

A second key component of the phenomenographic interview is the use of a specific instance of the phenomenon as the basis for exploration; interviewers typically ask participants to provide an example, and then use that example in the following discussion. Participants thus provide answers based on concrete experiences rather than what they may believe are desired responses⁵⁴. In this case, participants were asked to describe their significant mentoring relationships in some detail. The interviewer then used follow-up questions to develop a richer and more comprehensive understanding⁵⁵. Such depth, we argue, should allow for a much deeper and richer understanding of how the African-American women who chose to participate in the study describe and experience mentoring in their own terms, and allow new or under-explored frameworks to emerge.

Participants

Trigwell⁵⁶ suggests that a sample size of ten to twenty is sufficient for phenomenographic research. Because the total population of African-American women majoring in engineering is

relatively low, the proposed study focused on a single institution with a significant African American female population to allow the opportunity to recruit participants and ensure that the findings of the study are meaningful and representative, while minimizing contextual differences that may arise across institutions. All participants were of junior or senior level in order to identify those who showed high levels of persistence as undergraduates. Eighteen interviews were conducted to ensure that both matched and unmatched mentoring relationships were included.

The research site—a large eastern research university—was the source of all data collection. The institution was selected based on two characteristics:

- Number of African-American female engineering faculty – all sites considered had at least two African-American female engineering faculty to increase the possibility of interviewing participants who had matched mentoring relationships.
- Number of African-American female engineering students – to ensure effective use of travel money, increase the likelihood of recruiting a sufficient number of participants, and minimize potential exposure of participants' identities, the study site had to have at least 30 African-American female engineering students.

(Note that because of the low numbers of both African-American female faculty and students at predominantly white U.S. institutions, we report only minimum numbers here; precise numbers could too readily lead to breaches of confidentiality).

Interviews were conducted during two separate visits; ten participants were interviewed during the first trip, and eight during the second. All interviews were audio-recorded and transcribed verbatim. This paper represents the preliminary analysis of the first ten interviews. The participants covered a range of engineering disciplines, including computer, mechanical, chemical, civil, and environmental. All participants were either 4th or 5th year students. Interviews averaging 60 minutes were semi-structured in nature to explore participant's definition of mentoring, their individual mentoring experiences, and advice they had for other AAFSs as well as faculty on successful mentoring.

Analysis

Data analysis focused on a systematic, iterative review of the interview transcripts. Each transcript was reviewed to identify significant comments based upon the context of the entire interview. Because many interviews described multiple individual mentoring relationships, each relationship was looked at separately. The relationships were then sorted based on variations and similarities in how participants made meaning of the phenomenon.

The process was iterative as quotations from the transcripts were arranged and rearranged to establish meaningful groupings⁵¹ and a definition for each group was created. The trustworthiness of the analysis was established through the use of a secondary coder who was asked to sort the mentoring relationships into groups based on the definitions^{57, 58}. The two coders then worked together to negotiate consensus definitions for the groupings such that each

group was finally characterized by its differences from other categories as well as the similarities among quotations within the group.

Results

The preliminary data analysis yielded three major aspects that seemed to dictate the meaning of mentoring within each relationship: context, formation and tone (Table 1). *Context* reflects the general scope of the relationship, including both its focus and the dynamic between mentor and mentee. *Formation* represents the way in which the relationship was initiated, and in some instances how it was maintained. Finally, *tone* reflects the general attitude of the mentor that formed the basis of the student-faculty interactions. Within each relationship, these three aspects were identified and the relationships were sorted accordingly. Table 1 provides the complete list of groups within each aspect.

Within the aspect of *context*, the scope of the conversation between the mentor and mentee ranged from *career and academic advice without a personal relationship* to *overall well-being*, Table 1. Essentially, there were some relationships in which the mentee and mentor only focused on the academic and career aspect of the mentee's life, while other relationships allowed for discussion about more personal, emotional, and financial aspects. The relationships that included more personal aspects were often reciprocal between the mentor and the mentee. In these relationships, mentors were often willing to share their own personal experiences with their mentees in a somewhat equal exchange.

With respect to *formation*, the ways in which these relationships began were more often than not through informal processes. In essence, the mentee sought out the faculty member as a result of either academic need or perception of relatability. In a few cases, the faculty member was able to see the relation and/or ability to aid a student and explicitly reached out, though more often the relationship results from a more general perceived openness on the part of the mentor. The most commonly discussed formation was during office hours often as a result of an invitation by the faculty during a class session. On the other hand, more formal initiations through assigned relationships (often as academic advisors) were the least-represented in this study.

Finally, the *tone* of the mentoring relationships in this study very much reflected both the context and the formation process. This representation can be better understood through Table 2 where relationships are represented in a matrix, with rows representing formation, columns representing content, and color representing tone.

Within Table 2, each box represents a mentoring relationship, noted by the pseudonym of the participant and the descriptive demographics of the mentor. Many of the participants had several mentoring relationships of different types. The demographics included African-American Male (AAM), African-American Female (AAF), White Female (WF), White Male (WM), Asian Male (Asian M), and Indian Male (Indian M). These demographics are those as identified by the mentee.

Table 1 Major Aspects of Mentoring Relationships

Mentoring Aspect	Description	Groups
Context	The content that was discussed within the relationship	<div style="display: flex; align-items: center;"> <div style="flex: 1;"> <p>Overall well-being</p> <hr/> <p>Role model w/ personal relationship</p> <hr/> <p>Career and academic advice w/personal relationship</p> <hr/> <p>Role model w/o personal relationship</p> <hr/> <p>Career opportunities</p> <hr/> <p>Career and academic advice w/o personal relationship</p> </div> <div style="flex: 0.2; text-align: center; border-left: 1px solid black; padding-left: 5px;"> <p style="writing-mode: vertical-rl; transform: rotate(180deg);">Wide</p> <p style="writing-mode: vertical-rl; transform: rotate(180deg);">Narrow</p> </div> <div style="flex: 0.2; text-align: center; border-left: 1px solid black; padding-left: 5px;"> <p style="writing-mode: vertical-rl; transform: rotate(180deg);">Scope of conversation</p> </div> </div>
Formation	How the relationship was initiated	<div style="display: flex; align-items: center;"> <div style="flex: 1;"> <p>Needed help with class</p> <hr/> <p>Took class & Prof took interest</p> <hr/> <p>Student initiated</p> <hr/> <p>Faculty introduction</p> <hr/> <p>Program/event</p> <hr/> <p>Random</p> <hr/> <p>Assigned</p> </div> <div style="flex: 0.2; text-align: center; border-left: 1px solid black; padding-left: 5px;"> <p>Informal</p> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <hr/> <p>Formal</p> </div> </div>
Tone	The general attitude of the relationship	<p><i>Inviting</i> : made specific contact with the student to encourage to seek them out for support</p> <hr/> <p><i>Willing</i>: showed an openness to know about students personal lives and issues</p> <hr/> <p><i>Inspiring</i>: provided an example of success that students aspired to or appreciated</p> <hr/> <p><i>Conditional</i>: there were limits to the type of support they were willing to provide</p> <hr/> <p><i>Discouraging</i>: negative support was provided</p>

Table 2 Interactions between the mentoring aspects

Tone Key: **inviting**, **open and willing**, **inspiring**, **conditional**, **discouraging**;

Formation		Context	Overall Well-Being	Role Model w/ personal	Role model w/o personal	Career & Academic Advice w/ personal	Providing Career Opportunities	Career & Academic Advice w/o personal	
	Informal	Need help w/ the class	Ruth [AAM]	Ruth [AAM]			Stefani [N/A]		
		Took Class & Professor Expressed Interest		Lisa [AAF]	Toni [WF]& Deborah [AAF]	Lisa [Asian M]	Lisa [AAM] & [WM]		
		Student Initiated							Stefani [Indian M]
		Faculty Introduction		Toni [AAF]					
		Program/Event	Deborah [AAF]					May [WM]	Melissa [AAM]
		Random	Shelly [AAF]						
	Formal	Assigned					Michelle [WF]	Michelle [AAF] & Deborah [AAM]	May [AAF] & Lisa [Indian M]

Discussion

The result suggest several potential answers with respect to the research questions. First, although each relationship began in its own way, most were formed through an informal process initiated either by the mentor or the mentee. Either the mentor or the mentee was able to identify a potential connection and initiate a level of communication that went beyond minimum student-faculty interactions in classrooms. Although the traditional interaction sites –the classroom and office hours –were incubators for these relationships, in each case one person took some additional step or provided indicators that allowed mentoring to occur. These transitional moments will be explored more fully in the next phase of the project and shared with faculty as best practices for building positive mentoring relationships with students. It is worth noting here that students who experienced formal mentoring relationships formed by a third party tended to have a narrower scope in their conversations with their mentors, generally confined to academic or career advice. These findings do not necessarily suggest that such formal relationships are

ineffective, but they may point to additional steps mentors may be able to take to extend the value of these formal relationships for students.

Second, the results highlight some ways in which these students experienced matched mentors in particular. The data indicates that matched mentors can play a number of roles in mentoring AAFs, ranging from encouraging to discouraging and from broad personal concerns to very contingent, restricted roles. That is, the success and value of the matched mentoring relationship is not based on demographic similarity alone; instead, it is linked to the context and tone of the relationship. Thus the variations in matched relationships highlighted here may offer potential explanations for the variations seen in the literature regarding the need for a value of matched mentors.

Third, although some literature postulates that only matched mentors are able to serve as effective mentors, data from this study clear shows that un-matched mentors can also play positive roles in each aspect of mentoring for African-American females in engineering. That is, even in unmatched relationships, mentor and mentee can establish a level of personal connection that sustains the relationship and enables it to meet some of the mentee's needs. The next phase of the analysis will explore variations between matched and unmatched relationships more fully.

Finally, in sorting the mentoring relationships by aspect, patterns emerged across groups, as suggested by Table 2. These results suggest that the formation process plays a significant role in shaping the tone, which in turn shapes the context of the relationship. For example, Lisa's relationship with her AAF mentor was established when the professor took an interest in Lisa in the class. The professor's regular invitations to visit her office hours resulted in a personal relationship in which Lisa was able to share many aspects of her life with her mentor and also look to her as a successful example of an AAF in engineering. In contrast, Melissa's AAM mentor was assigned through a diversity program. Their relationship remained impersonal, with the tone conditional based on Melissa's academic success; the relationship did not encompass other aspects of either of their lives.

As the results of this paper are only preliminary, the implications of its findings are limited at this phase. However, what is of value to faculty at this stage is both the recognition that mentors can serve a variety of roles and engage with students in multiple ways, and perhaps more importantly, these roles and engagement patterns can occur across race and sex boundaries. All faculty are potentially able to provide effective support to African American Females in engineering.

Future Work

The next steps in this analysis involve refining the three aspects and developing summative categories of mentoring relationships using the full data set. These categories will be constructed to maintain variation in experiences but also identify unifying connections in how participants experience the phenomenon. Once the categories are developed, their full definitions will include the aspects that separate them from one another. It is anticipated that the three aspects (context, formation, and tone) identified in this paper will be key in distinguishing the variation between the categories.

Ultimately, then, the aims of this work are to develop a number of practical implications about mentoring relationships between African-American female students and faculty that can serve as informative tools to all faculty about effective forms of mentoring.

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