



## Mentoring Among African American Women in the Engineering Academy

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# Insights from a Workshop Designed to Foster Intergenerational Mentoring Among African American Women in the Engineering Academy

## Abstract

African American women are among the least represented population among engineering faculty in the U.S., and a demographic that faces unique challenges affecting their retention in the academy. This fact was the impetus for an NSF-funded workshop and research project focused on their unique challenges and strategies that enable them to survive and thrive in the academy. This paper summarizes the outcomes of the Intergenerational Mentoring Workshop held Summer 2019 and aims to equip the broader engineering education community with insights for supporting this endangered demographic. The workshop was attended by 24 African American women engineering faculty who represented a wide range of roles in the academy. The day-long workshop consisted of multiple sessions in which participants shared their insights, challenges, and promising solutions. This paper includes the results of qualitative and quantitative data collected from a focus group with a subset of participants, observations made by an external evaluator, and post-workshop surveys. Preliminary data suggests that all participants agreed that the workshop met their expectations and encouraged them as a professional; and 95% agreed that the workshop was appropriate for what they needed at this point in their careers and that the overall workshop had an appropriate balance of interactive activities to keep them engaged. Finally, 80% of the participants indicated they had clarity as to how to address challenges African American women face. Highlights of the research efforts associated with this project will also be discussed.

**Keywords:** African American, faculty, mentoring

## Introduction

Currently, the United States is facing an acute shortage of scientists and engineers [14] and the President's Council of Advisors on Science and Technology [10] projected that the United States will need to produce 1 million more STEM professionals to maintain our STEM preeminence in a global environment. Students in STEM majors have traditionally come from non-Hispanic White or Asian populations and are also typically male [12]. However, U.S. demographics are shifting, and with this comes an increased need for attracting and retaining students with non-traditional backgrounds. In the U.S., among the students enrolled in undergraduate STEM programs in 2016, approximately 35.5% were women, 6.5% were African American/African American, 10.1% were Hispanic, and less than 0.4% were Native American/Native Alaskan [12]. On the other hand, the U.S. population is 18% Hispanic, 13% African American/African American, and 1% Native American/Native Alaskan, but projections show that by 2060, the U.S. population will be 27% Hispanic, 15% African American/African American, and 1% Native American/Native Alaskan [3]. Due to the changing demographics of the United States, STEM disciplines need to attract and retain students from more diverse backgrounds in order to meet the demands of the nation's future job market and intellectual demands [9].

Despite numerous investments and efforts to diversify engineering at every level of education and the workforce, African American women are among the least represented population in academia. The focus of this work is on faculty. In 2017, ASEE surveyed 338 universities nationwide that have four-year degree granting engineering programs and found that of the 27,412 tenured/tenure-track engineering faculty members, only .52% were African American women [1]. Although this number depicts a dismal

representation, this number actually reflects an increase in the number of African American women faculty members in engineering over time [1].

There are a variety of reasons why diversifying the engineering ranks adds value. Diversity has the ability to either hinder or drive innovation [5,11]. Additionally, given the importance of role models in recruiting and retaining underrepresented minorities, the lack of diversity in the academy influences the representation of underrepresented groups at every other level of higher education. Furthermore, Mondisa [7] found that African American mentors help to develop a sense of community and STEM identity for their mentees, which supports the persistence of minoritized students.

With this motivation in mind, the purpose of this paper is to highlight the most emergent themes of a mentoring workshop designed to inform our understanding of the needs and experiences of African American women in academia. Mentoring is defined as a process in which an experienced person helps to develop a lesser experienced person with professional and personal skills [6]. In the following sections of this paper, information about the workshop and its key takeaways are discussed. This paper concludes with insights on how this work has implications for scholarship and practice.

## **Background**

### *ChocDocs*

In the early 2010s, several African American female engineering PhD students at a large Midwestern university developed a group called the ChocDocs™. During their tenure as engineering doctoral students, these women developed academic and personal relationships that manifested into a sisterhood community. From this community, the women founded an informal support group which they named the ChocDocs™. This group continues on today. As members of this group, the women provide professional and emotional support and encouragement to each other as they navigate their professional careers. Currently, 7 of the 8 original members are tenure-track professors at prestigious universities across the nation and 1 member is currently a PhD candidate and will be graduating soon. While the core group still remains intact, the term “ChocDocs” was adapted to include the broader network of African American female engineering faculty during the proposal development phase of the project detailed in this paper. The primary focus of the project was to host a workshop designed to foster mentoring across multiple generations of African American female engineering faculty.

### *The Intergenerational Mentoring Workshop*

During the summer of 2019, the Intergenerational Mentoring Among African American Women in the Engineering Academy workshop was conducted. The workshop was scheduled contiguously to the American Society for Engineering Education (ASEE) 2019 Annual Conference in Tampa. The full-day workshop was designed to provide a safe space for African American women engineering faculty to come together to discuss challenges and opportunities for supporting their professional development. More specifically, the workshop goals were as follows:

1. Discuss the salient challenges African American women engineering faculty face and brainstorm solutions to resolve these problems;
2. Develop an agenda for addressing the issues they face;
3. Offer support and encouragement for their advancement in the academy and national leadership roles; and
4. Launch a national mentoring network among them to foster ongoing support.

The workshop agenda included a mix of presentations, panel discussions, and interactive discussions led by facilitators. (See Appendix for workshop agenda.) Twenty-four (24) African American women engineering faculty participated. They represented a wide range of roles in the academy (i.e., tenure-track

faculty, research scientists, professional-track faculty, and administrators) and levels of leadership within engineering professional societies. Throughout the day, each session was designed to provide an opportunity for participants to exchange insights and foster community.

#### *Workshop Evaluation and Assessment*

An external evaluator facilitated a focus group discussion among a subset of participants, observed the workshop, and generated a report. Both qualitative and quantitative methods were used to capture and triangulate [2] the participants' experiences—namely via a focus group discussion, observations, and survey. Additional details about each of them will be discussed.

1. **Focus Group Discussion:** Before the workshop began, four engineering faculty participated in a one-hour focus group to share their insights and complete a short 5-question survey regarding their workplace experiences. The questions were designed to expand on the literature about the unique challenges African American women in the engineering academy face.
2. **Observations:** During the workshop, the evaluator and two graduate students documented (a) general description of the setting and participant profile; and (b) highlights from each session. All workshop discussions were recorded and analyzed by two graduate students using thematic coding analysis [4]. Thematic coding involves: (1) data immersion (reviewing of transcripts); (2) coding (adding descriptive labels to parts of the transcripts); (3) theme identification (combining codes into larger categories); and (4) interpretation of the emerging themes [4,13].
3. **Post-Workshop Survey:** The post-workshop survey included 31 survey items separated into three parts. Part I included survey items regarding their overall workshop experience, changes in confidence areas that the workshop targeted, and satisfaction with the workshop. Part II invited participants to rate each of the workshop sessions on the utility of the information shared, its interactive nature, and the presenters. This section also included items about the likelihood of continuing a mentoring relationship with one another after the workshop. Part III included open-ended items about recommendations for future workshops and closed-ended demographic questions.

### **Workshop Highlights: A Discussion on Salient Themes**

#### *Focus Group Insights*

Of the four focus group participants, two were full professors, one was a tenured associate professor, and one was a tenure-track assistant professor. This group profile provided a cross-sectional perspective of African American women in the engineering academy. The following themes emerged from the focus group conversation on ways to address the challenges African American women engineering faculty confront. They are:

- a. Utilize an ecosystem approach to address issues of recruitment, retention, and advancement of African American women in engineering;
- b. Decouple the intersections of race and gender to address issues specific to African American women;
- c. Address microaggressions derived from biased-based perceptions and expectations of abilities; and
- d. Engage courageous and committed leadership within the academy to address challenges faced by African American women in engineering.

When asked to share what they believed was the most pressing issue the engineering academy needed to address with regard to the success of African American women, participants shared several interesting

comments. The primary theme was that if we, as a country are serious about eliminating the need for more diversity, there is a need to focus on an ecosystem approach. An ecosystem approach begins with a view of the entire system and process that connects, recruits, retains, and ensures the success of African American women in the engineering academy. This includes, but is not limited to, resources, networking, creating a pipeline of talent, and mentoring. At the outset, it was conveyed that oftentimes the initiatives and programs for increasing diversity and promoting inclusion do not “trickle down” to the unit levels. Initiatives and programs that begin at the upper levels of the academy fail to meet the needs of faculty at the department and program levels. The ecosystem approach takes into account all aspects of culture at every level of the academy (e.g., senior administration, deans, chairs, and faculty) and all aspects that impact faculty success (recruitment, resources, opportunities, tenure, leadership opportunities, mentoring, and experiences with students and faculty colleagues).

Finally, a critical component of the ecosystem approach that would have a powerful effect on the success of African American faculty is mentoring. Mentoring was identified as crucial to both the recruitment and retention initiatives of an institution. More specifically, mentoring processes and programs should be based on evidence-based practices and include both formal and informal activities. The portfolio of a senior administrator hired to advance diversity and inclusion should include mentoring experience. In addition, women of color should be asked to share their experiences so that mentoring programs support real-life issues to meet their actual needs. In addition, the participants indicated that a mentoring program should help African American female faculty navigate the promotion and tenure process that helps minimize challenges that are experienced primarily by faculty of color.

Another theme that emerged from the focus group conversation was the emphasis on the intersection of race and gender. Although it is a consistent phenomenon experienced by people of color, what appears to be different for African American women in the engineering academy is that when the intersections of race and gender are not decoupled, their experiences are often mis-addressed. Said differently, women's issues that are addressed are primarily focused on White women—leaving African American women's unique needs and experiences misdiagnosed and assumed to have been addressed—resulting in being “mis-addressed.”

Racial inequities occur by lumping together the individual needs of all underrepresented groups. When the number of African American males are hired in engineering—which is already a male-dominated field, the perception is that this issue of race has been addressed. When white women—who, as women, are also an underrepresented group in general—are hired and retained, the perception is that issues faced by women have been addressed. As a result, African American women are left to navigate their own challenges, seek their own resources, create their own communities, establish their own networks, and self-advocate for their own leadership opportunities. The focus group participants indicated that when it comes to gender issues as part of the decoupling of race and gender—there is a clear distinction between how African American women are treated in comparison to white women. For example, one participant shared that she was tutoring one of her white female colleagues when a student saw their interaction. Although, when the African American faculty read her course evaluations at the end of the semester, the student assumed the African American was being tutored and noted it as incompetence on the evaluation.

Experiencing microaggressions is very common among people of color in general, and women of color in particular. Another layer to this phenomenon is the experiences of African American women in the engineering academy. Often perceived as “other,” this group of professionals is often viewed through the lens of “bias-based expectations.” This could be attributed to the small number of African American women in a given engineering department (making them a novelty or intriguing to white colleagues) or white faculty's perception of entitlement. Also, there are interactions which the focus group participants identified as “disrespectful.” These included, but were not limited to, the following: touching their hair

without asking, talking over them during meetings, and students' negative perceptions of African American faculty intellect.

The final theme that emerged from the focus group was the concept of leadership that is brave, courageous, and committed to the real challenges of African American women engineering faculty. The participants recognized and shared that in order to promote diversity for all groups, disaggregating the experiences rather than lumping all underrepresented minorities, takes a lot of courage. With the high potential for pushback and even backlash among white colleagues and challenges to the legality of faculty of color support, leaders must be willing to stand in the space of both uncertainty and commitment and willing to do the following: advocacy, accountability, and engage group-specific strategies.

### *Insights from Observations*

In the following sections, we present the four most salient themes that emerged from the workshop discussions. They include:

1. encountering obstacles and barriers,
2. program participation, STEM engagement, and role models as key to career discovery,
3. support in various forms, and
4. professional development as a community need.

The first theme focused on the barriers or obstacles African American women faculty members face along their career pathways. Healthy work/life balance can be challenging for many students and professionals; however, participants also felt an internal conflict balancing the work they should be doing versus their own personal desires. Individuals also felt there was a lack of understanding of the academy and how it operates. Examples of this includes individuals being challenged with unfair policies, opposition, and poor preparation or instruction during their undergraduate careers. Overall, there was a clear lack of resources and support individuals shared as obstacles that threatened to derail their career paths. Resources and areas of support that were lacking were insufficient lab space, poor advising, lack of writing development, and an overall lack of support for individuals at Predominately White Institutions (PWIs). Lastly, there was a large number of participants that stated their own personal affairs and self-identity created barriers for them in their career. These affairs and self-identity related items included death of family members, challenges from the geographic location of the institution they worked at, change in marital status, personality types (e.g., introversion and extroversion).

Because the representation of African American women engineering faculty is low, there was a sense that in order to increase the number of African American women in these spaces you have to give back to the African American community and pave the way for others. Some women felt an added pressure to support the African American community. However, providing heavy support can be extremely challenging for African American women in the engineering academy trying to navigate this space of perceived inequality. One participant who is a university administrator at a land grant public university gave advice to the participants feeling the urge to be responsible for other African American women's successes. She said, "it is not your responsibility to carry African American women's nation throughout the world." This was part of her making a larger point that it is important for each woman to do their part in helping one another, instead of feeling responsible to carry all African American women on their shoulders.

The next theme that emerged was about African American women engineering faculty members discovering careers through either program participation, STEM engagement, and role models. Many participants discussed that a parent or role model influenced their decision to enter a career in STEM. For some, examples of this influence stemmed from having a mother that was a science teacher, watching their mom fix things around the house, and having role models encourage them to become an engineer.

Many participants also felt that they were needed in this space to help others and create change so that others wouldn't experience the same negative issues they experienced. For instance, one individual felt they received poor instruction and had a challenging undergraduate experience, which led them to a career in teaching. Others shared that they had an interest in saving people in the medical field. Many of the participants engaged in diverse programming or K-12 STEM program engagement. After deciding to pursue a STEM degree, some individuals attended Minority Engineering Programs (MEP), participated in the National Consortium for Graduate Degrees for Minorities in Engineering and Science (GEM), and studied at Historically African American Colleges and Universities to further support their advancement in STEM. Lastly, there were a number of individuals that studied engineering to have a better life than their peers and to not conform to social norms of what an engineer typically looks like. Participants shared examples of being told they could never be an engineer and having to persevere through stereotype threat.

The third theme alludes to the various forms of support African American women received as part of becoming and staying an engineering faculty member. Responses show that individuals were highly motivated by their ability to overcome challenges. These challenges ranged from cultivating relationships with mentors, lack of preparation or engineering knowledge, and learning from past mistakes. Support from peers and mentors was a common response from the majority of participants. Whether these peers were other women, faculty of color, and/or individuals from various academic departments, they all play a huge role in being a support system outside of familial support. Some participants relied on their faith and spiritual connection with God to help them overcome challenges; and some referred to financial support in the form of grants.

Lastly, professional development as a community need was the fourth theme. All participants in this workshop expressed a strong need for the continuation of this workshop or ones like it. Discovering the importance of purpose, passion and preparation was a key thought that a majority of participants left the workshop pondering. The layout of this workshop allowed everyone to highly engage with one another and share feedback. Due to the large spectrum of roles in the room --ranging from Assistant Professors to Deans-- there was a wealth of experience and knowledge in the room. Some participants felt the need to reflect on the things they want out of life, set goals to measure their trajectory, and exercise agency to control their own narratives. Individuals felt strongly about learning that they have a support system in this group of African American women in the engineering academy and felt less lonely. Also, they were not only able to fellowship with one another, but take away resources for discovering their worth, identify opportunities within their career, and receive advice on being appropriately compensated.

At the end of the workshop, participants were asked to provide individual actions that can be taken to inspire the next generation and the collective actions that can address systemic barriers. Participants believed that change should start at the local level and include effective student outreach approaches. Networking is essential and efforts should be consolidated in order to make a larger impact and media efforts. Lastly, African Americans need to invest in existing venture capitalists. Overall, this workshop effectively achieved its goals to discuss the challenges and solutions for African American women in academia, offer support to African American women in the academy, and develop a mentoring network.

### *Survey Insights*

At the close of the workshop, participants were asked to complete a survey regarding their workshop experience. Twenty (20) people started the survey but did not respond to all of the survey items. The number of respondents per survey item is noted throughout the highlighted results. Overall, there were 19 participants who indicated their employment status or rank, and the majority (n=10) were tenure-track assistant professors, four were tenured full professors, four were tenured associate professors, and one was a non-tenure track professor. When asked to share the primary goal for participating in the workshop, the primary reason included networking and establishing relationships, meeting new people to connect

with, and learning how to be a successful engineering faculty member. Other reasons included to mentor others or find a mentor to help with my success. As a result, 100% of the participants either “agreed” (10%) or “strongly agreed” (90%) that the workshop met their expectations.

With regard to general experiences with the workshop, 100% of the participants “agreed” or “strongly agreed” that the workshop encouraged them as a professional. Also, 95% indicated that the information presented was “appropriate for what I need at this point in my career”, and that “the overall workshop had the appropriate balance of interactive activities to keep me engaged.” When asked about their “gain in confidence” in areas important to faculty of color success, participants were asked to rate the extent to which the workshop helped increase their confidence. Using a 4-point Likert scale from “No Gain at All” to “Great Gain,” the majority (67% to 95%) indicated “great gain” or “some gain” with regard to the extent to which the activities increased their confidence in several areas. Finally, the majority of the participants indicated there was either “great gain” or “some gain” in their confidence regarding professional goals (90%), their strengths (85%), how to network (80%), how to address challenges African American women face (80%), and confidence to pursue leadership positions in the academy (67%).

Based on these insights, we recommend the engineering academy foster the development of more mentoring communities for African American women [8]. Results from the surveys revealed that with regard to mentoring, 53% would “very likely” mentor someone who attended the workshop and 21% were somewhat likely. For those who were interested in being mentored, 59% were “very likely” to choose mentoring from someone who attended the workshop and 35% were “somewhat likely” to be mentored. These results indicate that the participants were willing to establish a mentoring relationship with those who were in attendance increasing the likelihood of establishing a network. Moving forward, relevant mentoring opportunities need to be provided for African American women in the engineering academy that seeks to provide support, guidance, and career development. Also, based on the evidence that many of the participants were willing to mentor a workshop attendee, mentoring should be factored into tenure and promotion decisions in the future.

The needs participants were hoping to have fulfilled while at the workshop included: networking with other African American women in the academy, professional development, mentoring opportunities, and strategy development. However, at the end, the most useful items from the participants’ perspectives were connecting with others, having a safe space to talk with other African American women, sharing information, brainstorming, and networking. Based on the needs and feedback for what worked well and future improvements of the workshop, there were a few recommendations to improve future workshops aimed to create community for African American women in the engineering academy. They include:

1. increase the time and duration of the workshop so that networking happens more frequently, and relationships can further develop,
2. have agenda content surrounding the economy to justify further diversity and what is possible if more diversity is achieved, and
3. ensure the agenda is balanced amongst tenured/experienced professionals.

Due to the lack of representation of African American women in the engineering academy it is important to consider how often African American women in this space aren’t able to connect in-person daily. Because this workshop is appended to an annual convening, it could become a recurring event. In the future, it should be extended to two days and include monthly or quarterly check-ins. The first day can be focused on networking activities and the second day can include all the programmatic aspects and working sessions for building intergenerational mentoring. Another recommendation is that there needs to be a workshop session on the economic drivers that justify the need for more diversity, and a subsequent discussion on what groups like these are able to realistically support. One participant suggested that the keynote would be an effective time for delivering useful content. Lastly, it is important to have a balanced



agenda and an even representation of participants' experience on the agenda when there is a wide range of tenure status individuals in the room to ensure everyone is able to get something out of it.

### **Conclusion**

In summer 2019, a workshop was held to foster intergenerational mentoring among African American women in the engineering academy. Three forms of data were collected to understand the participants' experiences and perspectives. The results from the workshop revealed that notable and substantial progress was made toward realizing the workshop's goals. More specifically, the participants were able to discuss common challenges and experiences in a safe space, reflect and brainstorm strategies that they believe will aid in their success, and indicated their intentions/likelihood of participating in a mentoring program. The focus group interview provided the basis of an infrastructure of success that authentically and organically addresses the needs of African American women in the engineering academy which expand the literature on evidence-based practices that broaden participation.

While this paper presents highlights from a workshop focused on the experiences of African American women in the engineering academy, it is connected to a larger study on the factors that promote and impede the career success of African American women across all ranks of engineering faculty. It will result in a blueprint for creating a research agenda focused on broadening participation and ensuring the advancement of African American women faculty in engineering. This work is an example of how scholarship and practice can come together to support the professional development of African American women engineering faculty and other underrepresented groups in the academy.

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## Appendix

### **Intergenerational Mentoring Among Engineering “ChocDocs” Workshop Agenda**

9:00 – 10:15 AM **Focus Group Discussions (Led by External Evaluator)**

10:00 – 10:15 AM **Participant Check-in & Mingle**

10:15 – 10:45 AM **“Welcome” & Chat About Ground Rules**

#### Ground Rules:

- Remember, everyone has something to offer and to gain. (Lean into the goal for this to be mutually beneficial.)
- Acknowledge power dynamics among junior & senior Colleagues. (Let’s try not to let these dynamics sour any of our interactions today.)
- Begin advice with phrases like “from my perspective”, or “in my experience”. (Let’s avoid overgeneralizing and invalidating others’ experience and expertise.)
- Offer (positive) counter-narratives to offset the war stories that may be shared. (The goal is not to leave more upset, disgruntled about our jobs.)
- Offer suggestions for a way forward when leveling a critique.

10:45 – 11:30 AM **“Same Stuff. Different Day” (Experiences Across Generations)**

11:30 AM – 12:30 PM **“If I Could Do It All Over Again…” (Lessons Learned)**

12:30 – 1:30 PM **“Let’s Eat” (Lunch)**

1:30 – 4:00 PM **Solidarity Part I: “Collectively Inspiring the Next Generation”**

3:00 – 3:15 PM **“Woosaaahh” (Break)**

3:15 – 4:00 PM **Solidarity Part II: “We’re in this Together”**

4:00 – 4:30 PM	<b>“Do You, Boo!” (Self Care)</b>
4:30 – 5:00 PM	<b>Key Take-aways &amp; Wrap-up</b>
6:00 – 8:00 PM	<b>“Let’s Eat” (Dinner)</b>