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Pathways to institutional transformation at HBCUs: recommendations from HBCU Black women STEM Faculty

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Abstract

Black women STEM faculty at historically Black colleges and universities (HBCUs) experience many barriers to promotion, tenure, and the attainment of leadership positions. Institutional transformation is essential in addressing these inequities. However, there is a lack of literature that addresses the pathways for institutional transformation at HBCUs. The purpose of this paper is to share Black women STEM faculty from HBCUs recommendations for institutional transformation. Interviews were conducted with fifteen Black women STEM faculty at HBCUs. Findings revealed several themes including the need for: (1) institutional accountability and oversight, (2) investment in the representation of Black women in faculty and administration ranks, (3) leadership training and opportunities, (4) increased support for research scholarship, (5) opportunities for internal and external mentorship on scholarship and tenure, and (6) expanding student support services. Based on participants' reflections recommendations are offered to facilitate institutional transformation that supports the advancement of Black women STEM faculty at HBCUs.

Keywords Institutional transformation · Black women · STEM faculty

Introduction

Institutional transformation occurs when fundamental, intensive and far-reaching changes to policies, procedures, and values transform the institution to better serve its constituents (i.e., faculty, students, staff, and administrators) (Fox 2008;

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Morimoto et al. 2013). Higher education institutions including historically Black colleges and universities (HBCUs) face a myriad of internal and external pressures that necessitate adaptation. HBCUs were established, over 180 years ago, to address historical inequity in access to higher education for Black Americans because admission was denied to them at White institutions (Evans et al. 2002). Presently, there are 107 HBCUs that serve 228,000 students of all races and ethnicities. HBCUs are defined by the Higher Education Act of 1965 as any historically Black college or university that was established before 1964, whose principal mission was the education of Black Americans.

The mission of an HBCU is to provide educational opportunity and access, perpetuate pride in Black culture, and offer a synergy that focuses on interdisciplinary intellectual training and skill development for future employment and Black American advancement (Darrell et al. 2016; Jackson and Nunn 2003; Patterson et al. 2013). Furthermore, HBCUs are more likely to enroll and serve low-income, first-generation, and academically underprepared college students for whom access to higher education is paramount. The most recent data available from the National Center for Education Statistics (NCES) indicates that across 99 out of the 107 HBCUs 56% of full-time faculty members were Black, 25% were White, 2% Hispanic, and 10% Asian. By comparison, on the national level in 2011, 79% of full-time faculty were white, 6% black, 4% Hispanic, and 9% Asian or Pacific Islander (de Brey et al. 2019). National faculty data is not aggregated at the level of race, gender, and discipline, therefore, it is difficult to assess the number of Black STEM faculty based on these criteria. Although we can surmise that based on the low number of Black students completing doctoral degrees in STEM disciplines they are underrepresented in faculty ranks. Consequently, it is particularly important to understand Black women STEM faculty experiences and recommendations for institutional transformation.

The literature on institutional transformation, at HBCUs suggests that student recruitment and retention measures, fund acquisition, and fundraising should be used as metrics to observe institutional change (Kezar and Posselt 2019). The development of faculty career trajectories has been recommended as a way to achieve sustainable institutional transformation for HBCUs (Montgomery et al. 2014). For example, individual development plans are useful to promote professional growth and goal achievement. The purpose of this paper is to go beyond individual-level intervention and to uncover recommendations of Black women STEM faculty at HBCUs for institutional transformation. This examination is critically needed because Black women enter the professoriate at HBCUs anticipating to be welcomed, mentored, and valued differently than at Historically White Colleges and Universities (HWCUs) unfortunately this is not often the case (Authors under review).

Institutional transformation is essential for Black women STEM faculty advancement

Institutional transformation is essential to maintain the relevance and longevity of institutions of higher education. Black women faculty deserve an institutional

culture that promotes equity by establishing organizational structures that facilitate their attainment of leadership positions that empower them to shape their university. Specific barriers that Black women faculty experience at HBCUs include challenges related to lack of funding, burdensome teaching and mentoring loads, taboos about speaking out against the administration, and lack of organizational trust (Baskerville et al. 2008; Guy-Sheftall 2006; Hubbard and Stage 2009; Kim and Conrad 2006; Mack et al. 2010). Additional barriers include a lack of sense of belonging within their STEM field, lack of diversity in leadership ranks, and lack of support systems (Alfred et al. 2019).

Research demonstrates that institutional transformation in higher education is a non-linear process and requires senior administrative support, collaborative leadership, robust design, staff development, and visible action (Kezar and Eckel 2002). These strategies culminate into organizational sense-making, which is a collaborative and reciprocal process where individuals seek knowledge, assign meaning, and act on decisions made (Kezar and Eckel 2002). Institutional transformation is expected to positively influence the culture of an organization and should be intentional (Keup et al. 2001). Scholars have advocated for using an institutional transformation approach to eliminate barriers and enhance support for Black women in a way that encourages institutions to share responsibility for addressing the myriad of challenges that these women experience. The development of faculty career trajectories is a recommended focus of sustainable institutional transformation for HBCUs (Montgomery et al. 2014). Central components for sustainable STEM diversity and the foundation of institutional transformation include faculty engagement, empowerment, and reward (Whittaker and Montgomery 2014). This type of institutional transformation is accomplished through an integrative synergistic model that involves institutional interventions and institutional policy changes (Whittaker and Montgomery 2014).

Intersectional identities and Black women STEM faculty

For Black women STEM faculty, the intersection of their race and gender results in experience institutionalized sexism and racism that are not always distinguishable and may exist in tandem (Patitu and Hinton 2003). Therefore, institutions have a responsibility to address sexism and racism to eliminate their negative effect on the career development of Black women faculty (Morimoto et al. 2013; Stepan-Norris et al. 2011; Zurn-Birkhimer et al. 2011). Although, HBCUs have a history of activism and challenging racist policies nationally and in their local communities this energy has not translated into challenging racist and sexist institutional policies (Jean-Marie and Lloyd-Jones 2011).

For Black women STEM faculty institutional sexism and racism can manifest as marginalization, lack of support, and lack of opportunities (Turner 2002). In our context, we define marginalization as issues, situations, or circumstances that result in women being placed outside realms of power and influence at their institutions (Patitu and Hinton 2003). Examples include exclusion from meetings and lack of access to resources and opportunities for collaboration with senior researchers. Such

experiences can result in feelings of isolation, alienation, and decreased productivity (Patitu and Hinton 2003; Turner et al. 1999). These issues are not only important for Black women faculty but also for the students they serve. Most HBCUs have predominantly Black and female student populations; however, Black women faculty make-up less than a quarter of STEM faculty at HBCUs (Mack et al. 2010). This imbalance in representation between faculty and students in STEM disciplines can create high demands on women faculty being sought out for mentorship and support by undergraduate and graduate student women (Bonner 2001).

Structuration theory, systems of oppression theory and institutional transformation

Findings will be contextualized using the theory of structuration which states that reciprocation between human actors and organizational structures enables or constrain action, coupled with constructs of organizational identity, and provides a lens to examine institutional transformation (Giddens 1979; Giddens 1984; Giddens 1991). The model explaining this theory focuses on elements of strategic transformation, which include: the agent of transformation, organizational structure, unacknowledged conditions, shared beliefs and organizational identity, the link between identity and action, the link between action and structure (see Fig. 1). These elements explain organizational differences in terms of organizational identity and the recursive relationship between agents and structure (Sarason 1995). The model of strategic transformation provides a framework for discussion of institutional transformation that must begin by considering the input of the Black women STEM faculty. Their recommendations can build the knowledge domain for agents to enact change.
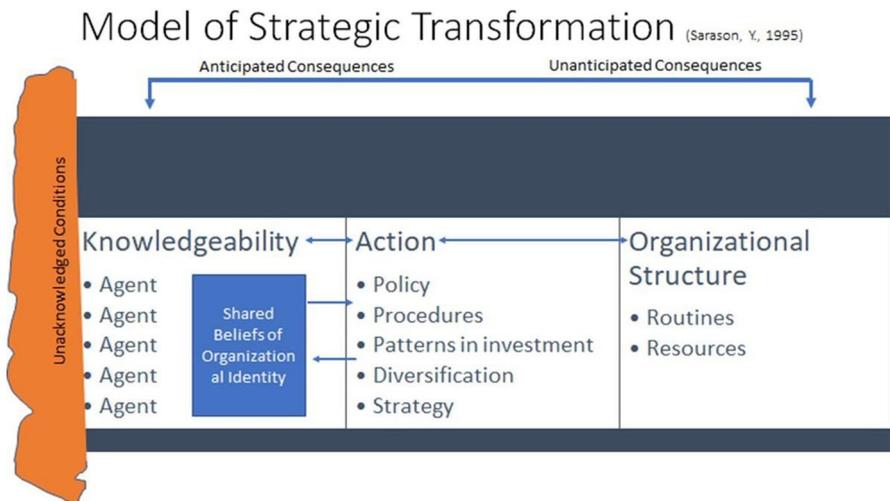

Fig. 1 Model of Strategic Transformation

We situate their experiences from the lens of the systems of oppression theory. This frame allows for contextualization within multiple systems of oppression including racism and sexism (Shaw et al. 2019). The systems of oppression theory recognize three key dimensions that occur at the individual, institutional, and symbolic levels (Collins 1993). At the individual level, our understanding of the ways we participate in institutions is influenced by experiences related to our gender, race, class, or other identities. At the institutional level, institutions such as higher education are structure in ways to maintain power and privilege or confer subordination. At the symbolic level, the impact of ideologies in rationalizing and reproducing hierarchies is acknowledged (Collins 1993). The symbolic dimension of oppression includes language, symbols, images, brands, and messages. This strategic transformation frame is designed to assist organizations in understanding the "how" of organizational change and "why" the change is in a particular direction. While resistance is an expected part of institutional transformation, given time, an organization should witness changes in reward structures and decision-making strategies that are more inclusive.

Why Black women need their institutions transformed

In this study, we focus specifically on Black women faculty to address the nuance of their intersectional race and gender identities and how it impacts their workplace experiences. When women are the minority in work settings gender-based bias is magnified (McGinn and Oh 2017). Moore (2017) elaborates on hierarchies' Black women must navigate in the academy which suggests that obstructed access to information about informal barriers to tenure is juxtaposed against high status and privilege within the larger societal structure. When the workplace is higher education, the disparities expressed by Black women are unique and personal to their experience in this privileged and marginalized space. The intersection between class and gender are also apparent in the workplace through unwanted sexual advances. Some research shows that sexual harassment enforces both informal and formal social hierarchies and social exclusion for the violated individual (Lopez et al. 2009).

Black women are overrepresented in non-tenure track positions. In 2015, according to the National Science Foundation, women of color faculty accounted for almost 12% of faculty in STEM occupations with Black women accounting for 1.6% (NSF 2015). Although non-tenure track positions vary across institutions, at many HBCUs, these positions offer limited opportunities for advancement and limited opportunities to serve on committees that influence institutional practices. Moreover, these positions often require high teaching loads or service commitments that make producing the type of scholarship necessary to compete for tenure track positions challenging. Some scholars have asserted that strategies such as mentorship and in particular mentorship from women of similar gender and race, when implemented in isolation, employ a "blame or fix the women" approach (Mavin 2006; Smith et al. 2012). The "blame or fix the women" approach has been critiqued because it requires additional labor (e.g. mentorship, attending training) for individuals that

describe that many of their challenges stem from high amounts of labor (e.g. high teaching loads, high service requirements) (Smith et al. 2012).

Minimizing these barriers could increase the presence of not only Black women faculty but students as well. Furthermore, the STEM fields must increase the representation of Black women faculty at HBCUs to positively impact diversity and excellence for faculty and students in academia (Towns 2010). For instance, research has shown that the increased presence of women in leadership positions results in benefits for other female professionals, for example, women are less likely to leave an organization and more likely to be promoted when they have higher proportions of same-sex supervisors (Cohen and Broschak 2013; McGinn and Milkman 2013). Specifically, institutions should embrace the diversity of talent that Black women faculty bring to the campus in support of their diverse learners and scholars (Carroll 2017).

To provide some context to the positionality of the authors, we are tenured and tenure-track Black women faculty and administrators at a Historically Black College and University (HBCU). The team also includes our interviewer who is also an adjunct faculty member with expertise in conducting qualitative research. Our areas of specialization include social psychology, leadership studies, microbiology, and public health. Therefore, the purpose of this paper is to offer recommendations from Black women STEM faculty to leaders and researchers of higher education on ways for HBCUs to engage in effective institutional transformation.

Methodology

Qualitative methods were used to better contextualize participants' lived experiences. Data collected from participant responses to open-ended questions were analyzed for emergent themes. Our specific research question was what do Black women STEM faculty at HBCUs recommend as pathways to promote institutional transformation?

Participants

Participants consisted of underrepresented Black women, both non-tenured, tenure-track, and tenured faculty, at the rank of assistant, associate, and full professor. Faculty were from several different HBCUs; we did not collect names of universities to maintain participant confidentiality. We collected demographic information (e.g. rank, discipline) using a separate link to protect the identifiability of our participants. Due to the low numbers of Black women faculty in STEM, we wanted to ensure that participants could not be identified using their demographic profile. The external interviewer did not have access to participant demographic information. There were a total of 15 participants including 5 non-tenure track, 6 tenure track junior faculty, and 4 tenured senior faculty. Twelve of the participants were in STEM disciplines and 3 participants were in STEM Social and Behavioral Sciences disciplines. NSF defines STEM fields as mathematics, natural sciences, engineering, computer and

information sciences, and the social and behavioral sciences—psychology, economics, sociology, and political science. All participants were Black women faculty at HBCUs (see Table 1).

Procedure

We implemented a purposeful sampling frame to recruit participants (Suri 2011). Our graduate assistant conducted a systematic search for Black women STEM faculty on HBCU websites across the nation that included the disciplines recognized by NSF as STEM (science, technology, engineering, and math) and SBS (social and behavioral sciences) disciplines. A database of email addresses was created and recruitment flyers were sent via email. Potential participants were also asked to forward the flyer to others that meet the eligibility criteria.

Participants followed the link on the recruitment flyer to complete an eligibility questionnaire to determine their eligibility to participate in the study. Those who were deemed eligible provided a phone number to be contacted by the external interviewer. The interviewer initiated contact via text message to identify a convenient day and time for the interview. All interviews were recorded and conducted via phone. Informed consent was obtained verbally before the interview began. Interviews lasted approximately 50–80 min. After the interview, participants were sent a link through text messaging to collect a mailing address to receive their $50 gift card incentive for participation.

Measures

This study consisted of fifteen semi-structured interviews. Participants responded to interview questions adapted from the Life Story Interview Approach (McAdams 1995) to elicit participants' descriptions of their career journey, perception of support, perception of equity/inequity, recommendations for positive procedural and

Table 1 Rank, discipline, and race of participants

Rank	$N = 15$
Non-tenure track	5
Tenure-track junior faculty (assistant, associate)	6
Tenured senior faculty (assistant, associate, full)	4
Discipline	
STEM (Chemistry, Biology, Physics, Astronomy, Technology, Computer Science, Information Science, Engineering, or Mathematics)	12
STEM Social/Behavioral Science (Psychology, Sociology, Economics, Geography, Political Science or Anthropology)	3
Race/ethnicity	
Black/African American	15

policy change, and visions for the future. The Life Story Interview approach was used to garner collective narratives to give context to the person's whole life, not just their career, and facilitate holistic perspectives of Black women's careers. More relevant information related to the experience of inequity is gathered when the focus is moved from the specific wok context by asking participants to use a situational and life-related lens (McAdams 2008; McAdams and McLean 2013). Additionally, the open-ended semi-structured questions were designed to identify strategies participants' used to overcome barriers including institutional sexism and racism, and recommendations for institutional policies and procedures that promote equity.

Data management and analysis

An experienced, professional transcription service transcribed all audio files verbatim and redacted any identifying information before analysis. The exchange of audio files and electronic versions of transcripts between research staff and the transcription service took place on a secure, password-protected server. Transcripts were then verified through two independent research staff and finalized when all relevant edits were made to the document. Transcripts were organized and labeled according to pseudonyms created by the interviewer.

NVivo 12.0 qualitative software was used for the organization and analysis of the qualitative data. Qualitative themes and codes for interview data were developed through a deductive approach. Themes were compiled into a codebook that detailed the code mnemonic, a brief definition, as well as a full description of inclusion and exclusion criteria. Each transcript was independently reviewed by two members of the research team who developed and applied codes to the text. Any new codes interpreted during the analysis of transcript data were added to the codebook and applied to subsequent transcripts. The codes were audited by a third reviewer to determine that the text applied to each code was appropriate. Precautions have been taken to ensure that the participants' statements included in the results section preserve authenticity. Findings including themes and quotes were shared with participants for their feedback.

Results

Participants' recommended pathways for institutional transformation

In this study, Black women STEM faculty from HBCUs provided responses that reflected their vision for a transformed institution. The most common themes included the need for: (1) Institutional accountability and oversight, (2) Investment in the representation of Black women in faculty and administration ranks (3) Leadership training and opportunities (4) Increased Support for research scholarship (5) Opportunities for internal and external mentorship on scholarship and tenure, and (6) Expanding student support services

Institutional accountability and oversight

Participants spoke to the need for institutional investment in, and commitment to, equity in policies and practices including hiring, tenure, and promotion. Participants noted a culture in which Black women faculty, and others, were fully aware of deeply rooted inequities in their departments and the university as a whole, yet stated there was no governing body available to submit these reports of inequities. One participant spoke to the need for leadership, those in administrative positions, to "see themselves" as part of the very culture that creates these inequities. Leading sustainable transformation efforts at their institution requires awareness of one's contributions to inequities within the institutional culture. Participants also suggested heightened administrative accountability as it pertained to these efforts, including metrics and strategic plans:

> "Take a look at the gender inequities that exist on our campus. Put into place some type of plan for beginning to think about how more women can be hired or a leadership program for women…[this will facilitate women] faculty to move up the ranks or into higher administration." (Tamara)

In other research, it has been found that Black women faculty at HBCUs mentioned pay, teaching load and service-related inequities as barriers to advancement, however, the most commonly mentioned inequity mentioned among participants was tenure and promotion (Authors under review). Many respondents spoke to the need for transparency and equity in this process. Despite having established goals for research, publication, and teaching, many felt there was a set of "unwritten rules" that led to a culture that favored the promotion of their male counterparts. Many participants mentioned exceeding goals related to research and publication, but felt they were held to different standards that led to them being "stuck" in associate level—or contract—positions. Further, given the confidential nature of tenure and promotion meetings, participants felt there was no recourse to report concerns related to fairness and equity in policies and procedures:

> "These meetings are confidential. So, you can't really say what's going on… [if] you're in the meeting and you tell them, 'Well, last year when we did so-and-so, you voted this way. And this year this person has a lot more, and you are really giving them a hard time…' there's nowhere to report inequities to. Because it's a confidential meeting. So, you're not supposed to discuss anything outside of the confidential meeting." (Sue)

For those who did speak out, the consequences included potential isolation or retaliation, further cultivating a culture of silence in which those in power continued to promote themselves:

> "Because it's always the silence of the majority that allows other people to move forward…people have seen others get backlash for speaking out. And those who are self-promoting usually have the audience of the people in charge. And they self-promote—they've promoted themselves, so they're looking good to the people who are in charge, and you know—the kind of this "one

hand washes the other" approach. And so if you confront that person, then you're really confronting that whole group. They all have the same voice." (Sue—this was in context to pay, but speaks to leadership too)

Additionally, participants indicated that senior faculty and administrators need more in-depth and concrete training to examine how their biases impact decision making.

Training beyond surface-level issues—more reflective: "Hey, maybe I have done this. Maybe I have done this [been biased]." It takes more energy for the brain to question your beliefs than to just keep going along with those beliefs." (Sue)

Investment in the representation of Black women in faculty and administration ranks

Participants also spoke about institutional commitment to the recruitment and retention of Black women faculty and the larger implication of this representation in diversifying the STEM workforce. Many of the participants spoke about the advancement of the STEM field as a whole and the role HBCUs have consistently played in contributing to the diversity of the current STEM workforce, but highlighted unique diversity challenges within HBCUs. For example, many noted a shift in the demographics of recently hired faculty—many of whom were White males or females—and a sentiment that HBCUs "…don't encourage diversity because they [think] the white male is the best at everything…" (Ericka). One participant noted HBCUs need to explore the creation of a dedicated role (or office) to ensure diversity in representation:

"What would be interesting is [when] a historically Black college or university think[s] of itself needing a diversity officer. To me, that seems appropriate in the administrative wing of a university." (Tina)

Participants noted this lack of commitment to diversity as part of a "negative future" or the reason they would leave their current institution.

"If I saw the college was becoming less diverse, I think that would be a condition to leave. If I saw them to be disproportionately supportive of White males versus minorities, that would be an issue for me…if I saw that and it was blatantly obvious, like, "Okay, no this is not the place for me." (Ericka)

Participants felt the larger implication would be a continued struggle to recruit the best faculty and students of color, ultimately [undoing] the very efforts designed to diversify the STEM workforce. Many noted this challenge as a shift that could change the dynamics of the institution as a whole.

"…we have Black women faculty that attract students from other disciplines where they are not happy with current faculty. I think [not having them there] would just have a trickle-down effect to recruitment and retention of students and also staff. Over time it would just change the dynamics of the institution. I think we've seen that in other disciplines on campus." (Tina)

"Probably if I saw that the department was becoming less and less diverse. What I have seen in the past five years [is] more females coming in. Not Black females, but I see more females…and if I saw them to be disproportionately supportive of predominantly white males versus minorities… if the leadership seemed to be biased in that way…that would definitely be a condition for me to leave." (Ericka)"

"I think a positive future would involve my having a seat at different tables. I'm not as concerned about positions and titles…but I don't think at any time anyone at the institution—or even nationally is thinking about, "How do we increase the health workforce…someone needs to say, 'We need to have 'School X' [an HBCU] at the table…because we know that they are a large producer of students who go into this industry." (Marilyn)

Leadership training and opportunities

Participants spoke to the need for structured mentorship and leadership opportunities as part of their development as STEM faculty. Some participants discussed their desire for mentoring and leadership training. One respondent spoke of her institution's priority to support and nurture "faculty of the future", and felt this was a missed opportunity for her institution to focus on leadership development for existing faculty. In addition to formal opportunities to support faculty, some felt academia should have a culture of informal support for faculty as well.

"There should be clear guidelines so that things like this don't happen. And there should be practices that send a message to everyone so that the morale of the faculty is positively impacted. So they say, "Wow, our leaders are looking out for us." (Sue)

"I think there have been several opportunities for Black women at my institution to enter leadership positions…but I do not think there is enough support (for) leadership development. I don't think (we) know what that means." (Marilyn)

"Oh, there is a science behind it. There is a science behind working with staff members, supervising staff members" that you kind of learn intuitively. But why do you have to learn that intuitively? If people have already figured it out and can train you on it. Rarely have faculty members been trained for that sort of skill set. I think we acquire it along the way, but I think we still do ourselves a disservice by not seeking out those opportunities." (Marilyn)

"…we thought [resources] could be used to help faculty members on the junior level and associate level and the resources were taken to help people in the executive level instead. And it was squandered…the money was targeted to help the junior faculty and the faculty…so the resources were taken and redirected to help people in the executive positions…Yeah, I know I'm angry about it because that's not why you're in a leadership role. You're not in a leadership role to take for yourself." (Sue)

Provisions of administrative support for research scholarship

Participants spoke of the need for institutions to prioritize faculty support, including the provision of administrative support, making sure information is properly and adequately disseminated to everyone ("sometimes men just get more opportunities than women" (Angela)), and supporting Black women faculty pursuits of competitive funding and research.

> "I was preparing to submit a grant, and there was only a certain number that could go out of my institution. And other people were in positions of power, and I think that they selected the people that they wanted versus looking at merit. So, in my opinion, they undermined my intelligence in regards to not really paying attention to the work, but paying more attention to who they were trying to push forward…it was very discouraging in regards to wanting and desiring to do more, being far more selective in regards to strategies for advancement." (Angela)

Participants also mentioned being encouraged to apply for less for competitive, or smaller, external research grants, and being limited in their access to receiving monies after being granted awards:

> "My contract stated that my start-up funds would come from varying departments. When it was time for me to actually have those funds my chair said that she no longer had those funds available and was just not willing to reach out to the dean…or the provost with regards to accessing these funds that she promised that are in my contract so that they have to—or at least they were supposed to fulfill. And so, that was just really disappointing." (Adah)
>
> "They have quite a few. So, there's some things I think that our division of research does very well. So, they have workshops on proposal writing. They have workshops on how to develop your budget. You can get one-on-one sessions to have someone review your proposal. They also have one-on-one—depending on what type of funding you're trying to get, whether it's from NIH or NSF—they have someone who comes in and can work you through the different components of your proposal. They have that. They also have program officers who come through that, from time to time, can talk to faculty with regard to how to develop your proposal in such a way that you meet the goals of that particular funding agency. How to get your IRB, all of those things. They have workshops for different things of that nature to really help someone get off the ground with regards to their research." (Tamara—great example of what to do)

Opportunities for internal and external mentorship for scholarship and tenure

The desire for mentorship was a common theme among participants, particularly in the context of scholarship and work-life balance. Participants spoke about the need for institutions to offer formal mentorship opportunities for junior faculty as they

navigated the challenges of the academy, including establishing research labs, balancing course loads, and seeking out competitive funding opportunities. Most suggested pairing junior faculty with one or more senior faculty who were established in their careers, who had successfully achieved tenure to help support junior faculty advancement in the academy.

> "I think junior faculty are just still trying to navigate so much…especially at HBCUs…[junior faculty] are usually loaded up with classes to teach….and placed on committees. So, they're trying to navigate. I think we need to assign more than one mentor to the junior faculty member, and allow that junior faculty to grow and to choose, right? So, you don't have to do everything your mentor says, and the mentor has to allow the mentee to make that choice. But, I think there needs to be more reaching out from diverse groups towards the women of color. (Sue)

Some participants received mentorship outside of their current institutions from graduate school, postdoc placements, or professional affinity groups for women of color (e.g., STEM Women of Color Conclave). While some participants stated their mentors are typically women of color, others noted interpersonal and professional synergies that lead them to seek mentorship from individuals who are not women of color. Regardless of mentor race and gender, participants felt it was important that their mentors understand their identities as Black women, mothers, wives, and professors, and perhaps most importantly, as collaborators. One participant stated that while she may not be able to find someone who has "completely walked in [her] shoes yet, she could "put them all together and learn." (Lelani) She went on to state the importance of "lessons learned":

> "They may not have been successful, but they traveled the road and they understand what you are talking about. That has probably been the most challenging for me—being married, having a family, being very active in my family, and then the expectations to perform and write and go to all those meetings—I couldn't find myself. I kept finding women who had never been married, children are grown and gone, or husband engaged in his work." (Lelani)
> "Having a male mentor can be helpful logistically. But in terms of emotionally processing things that have to do with being a Black woman specifically, they wouldn't necessarily have experience with that." (Wanda)

Another participant expressed that no one mentor knows everything about all aspects of your career. Therefore, the focus should be on seeking an array of mentors that can assist with your specific needs.

> "Just because you have a formal mentor or something doesn't mean that they know everything about everything. And so really seeking out people who fulfill what you need, the need for them that you have without them feeling like you're a burden. You know, and if you diversify the type of mentorship that you're looking for from them, then it kind of spreads out the weight of how much you're asking them to do. So, they'd be more likely to continue helping you." (Ray)

"I just personally feel more comfortable in terms of the breadth of conversations that I'm willing to have and the depth of the breadth, if that is a relationship that kind of formed on its own. I don't devalue a formal mentoring relationship. I think it could be very helpful for some neutral kind of experience. You know, 'What's the specific tenure process at a university?' But I think, for me, if the relationship developed on its own, I think the breadth of topics I'm willing to discuss and the depth for each of them would probably be deeper than one that started as a part of some university program. (Vivian)

Expanding student support services

Participants spoke about the importance of institutions developing an infrastructure that supported the development and growth of the next generation of scientists, faculty, and scholars in STEM. Many of the recommendations included a need for institutional funding to develop the capacity of their students as the future leaders of the STEM workforce. When referencing the need of HBCUs to invest in their students, participants noted the need to "[train] students doing research in a manner that is excellent" to benefit the entire nation. In addition to financial barriers, participants felt the difference in research capacity between students enrolled at PWIs and HBCUs, was attributed to the provision of support services that included much of what current WoC faculty offered in addition to their paid teaching, research, and service workloads (i.e., advising, writing, counseling). Many participants noted the need for infrastructure that offered dedicated offices and staff to meet student needs.

Discussion

Findings from this study suggest that Black women STEM faculty feel that there are several areas HBCUs can focus on to create institutional transformation. Specifically, they recommend (1) instituting mechanisms by which administrative leadership is held accountable, (2) investment in the hiring and hiring of women faculty, including appointment to administrative ranks, (3) providing leadership training and opportunities for women faculty, (4) establish administrative support for research scholarship, (5) building opportunities for internal and external mentorship for scholarship and tenure and (6) expanding opportunities for students, specifically student research opportunities. These findings align with researchers' recommendations to honor and recognize the importance of current institutional values, myths, metaphors, and symbolic boundaries throughout the change process (Keup et al. 2001; Simsek and Louis 1994).

Our participants highlighted the importance of institutional leadership acknowledging that bias exists and the need for them to be willing to develop policies and procedures to reduce bias in hiring, tenure, and promotion. A clear leadership-driven vision for success is key to institutional change. For institutional transformation to occur accountability should be ingrained in every policy and procedure (representation, tenure, support, research, students). Administrators should seek ways to make "invisible rules" visible, transparent, and inclusive.

Leaders should create a mechanism to ensure that equity is embedded (top-down) with oversight. These changes are key for the recruitment and retention of Black women faculty members. Institute policies and processes that make it promote providing support based upon merit over supporting those you just prefer to work with. Also, leadership should value *current* Black women STEM faculty and invest in increasing their representation on HBCU campuses.

This investment includes access to and funding for leadership development programs. As well as, increase the likelihood of appointment to leadership positions. Leadership development should include a true plan for leadership succession within departments and colleges. While Black women faculty are more likely to engage in service activities, men are more likely to "code" service tasks as obtaining skills for future leadership roles. Women should receive the same perception for their service to the university. Participant thoughts on the need for diversity may mean a need to include faculty in discussions to define what diversity means at the institution. If the institution is attempting to meet external expectations for diversity and faculty have a different view there will be a clash between faculty and administration.

A social justice and equity-based model for shared governance recommend that university leaders use approaches to support an institutional transformation that includes faculty voices in the development of procedures and policies to address the inequities such as those mentioned by participants like gender inequity in STEM faculty positions, lack of transparency in the tenure and promotion process, and implementation of structures that take account of adherence to new equity-based procedures and policies (Kezar and Posselt 2019).

The establishment of administrative support for research scholarship will address the need for infrastructure to promote and sustain research capability. Institutions should strategically build research capacity that will facilitate writing and submission of fundable grants, as well as, support for grant administration once funded. This capacity should be supported at all levels including university, college, and department levels. Participants also mentioned the importance of mentors that understand the culture, climate, and realities of their career. Most HBCUs have been heavily focused on teaching and learning to train future Black professionals for entering the workforce. However, some are moving from a primary focus on teaching to an increased focus on research and scholarship. This has created a divide in that senior faculty tend to be more teaching-focused, thus, institutions need to put strategies in place to maintain excellence in teaching while building research capacity by matching faculty members with teaching and research mentors. Teaching is integral to the mission of the institution and as participants indicated for investment *in the future* STEM workforce.

Taken together the findings from this study also support the interplay between structural constraints created and sustained by those in power and the influence of multiple agents on the institutional structure. The structures are resources and routines that recur and their existence is considered virtual. However, the structures cannot exist without the agents. In their entirety, the structures make up the social system within which the agents navigate. These faculty shared that the support needed to become change agents can and should be built into the routines

and resources. They acknowledged that institutional cultural norms prevented them from obtaining some of the necessary support.

Conclusion

Faculty in this study shared that some "agents", meaning those in power, helped to build up and transform them while other agents did not. The agents are perceived as "purposeful, knowledgeable, reflexive and active". The agent's power is causal and influential; however, research shows the agent's power can be stripped if their ability to influence change is damaged in some way (Haslam et al. 2010). As actions are taking place there will always be conditions unacknowledged and unanticipated consequences will arise. Unacknowledged consequences of institutional transformation for these faculty include the need to connect on a personal level with a mentor that understands what it means to be faculty at an HBCU and a woman in the world in general.

Several components unapparent in the traditional model of institutional transformation are revealed by this study. The "invisible rules" at an institution and their influence on the intended change are missing from the traditional transformation model. The implications for not acknowledging these invisible rules could lead to the intended change being inhibited or not implemented. The voices of women faculty make strong contributions to parts of the model and address the model's limitations. The road to institutional change may not be a smooth process, some tug-of-war between the old culture and the new culture will be evident in negotiations for transformation. This struggle may inhibit the ability of all agents to understand and share beliefs about the identity of the institution. However, institutional transformation should build in focus on 'young or institutional disruptors' and create space for those voices to contribute to the routines, resources, policies, and processes of the institution at large. Institutions could be missing meaningful and transformative ideas if they are only interested in maintaining the culture of the old. The "shared beliefs" of the organization should include those of the disruptors.

Data availability Due to the nature of this research, participants of this study did not agree for their data to be shared publicly, so supporting data is not available.

Code availability Due to the confidentiality of this study code for data cleaning and analysis is not available.

Declarations

Conflict of interest The authors declare that they have no conflict of interest.

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