

Cross-cultural mentorships with Black and Brown US STEM Doctoral Students: Unpacking the Perceptions of International Faculty

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Abstract— This full paper interrogates the perceptions of mentoring of international STEM doctoral faculty at US universities. International faculty comprise the second largest STEM faculty population in the US, yet little is known about their perceptions surrounding mentoring. Literature informs on the importance of cross-cultural mentoring which is impacted by various factors especially sociocultural and sociopolitical concerns. As a result of the miniscule number of Black and Brown STEM faculty at US institutions, most US underrepresented racially minoritized students have doctoral faculty mentors who are either White or international. These students are negatively impacted when these cross-cultural mentorships fail to be culturally liberative. A qualitative case study using interviewing as method was employed to better understand the perspectives of international faculty teaching in US STEM doctoral programs. Using inductive constant comparative analysis, the study identified three patterns relative to STEM doctoral mentoring by international faculty: focus on pragmatics, science culture as race and culture neutral, and limited ability to empathize with the marginalization of “the other” in spite of marginalization as international faculty. Three implications were developed based on the findings. STEM doctoral education should reimagine mentoring as holistic, embedded in and accountable to cultural understanding, international faculty should draw on their own experiences of marginalization to connect with and better respond to the needs of racially minoritized US STEM doctoral students and international faculty should engage in anti-racism and anti-Black racism training to become aware of ways in which implicit bias and lack of cultural knowledge infiltrates mentoring practice.

Keywords—STEM, international faculty, racially minoritized STEM doctoral students, whiteness, anti-Black racism, cross-cultural STEM doctoral mentoring

I. INTRODUCTION

The culturally-mediated and always socially constructed practice of science represents the remarkable achievement of

This material is based upon work supported by the National Science Foundation under Grant Nos. 1820536, 1820538, and 1820582. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the National Science Foundation.

XXX-X-XXXX-XXXX-X/XX/\$XX.00 ©20XX IEEE

organized, collective human activity for the millennia, activity which is fundamentally rooted in the basic drive to explore the mysteries of the universe, to make sense of complex phenomenon, to expand the boundaries of knowledge and to develop tools and technologies to advance the quality of life [1, p. 451].

Undoubtedly science has always held a mystic and allure, a mystic and allure that has been captured by novelist like Octavia Butler, movies such as Black Panther and Star Trek, and even in arts with Afrofuturism artists like Sun Ra and George Clinton. Science is a part of our daily DNA as so much of our daily lives involve invention born from taken for granted science-related activities such as baking bread, crossing bridges, or making grass grow. The love of science is found in the thrill of the proverbial light coming on when we discover solutions to problems, devise answers to nagging questions, and simply tinker to see what happens “if” we do this versus that. Curiosity is a natural inclination for many, and curiosity drives science. But it is perplexing that academically and professionally, science in the US is dominated by Whites and Asians, while other groups, African Americans/Black Americans, Latine, Native Hawaiians, Native Pacific Islanders, Native Alaskans, and Native Americans are deemed racially underrepresented in Science, Technology, Engineering, and Mathematics [STEM] by the National Science Foundation (NSF). Are they not curious? Much literature has been dedicated to understanding why these groups remain underrepresented in STEM. This paper explores the perceptions of international higher education faculty in US STEM doctoral programs with regards to their role as mentors as a means of better understanding cross-cultural mentoring within STEM education, particularly with Black and Brown doctoral students.

II. BACKGROUND

There has been a call to diversify STEM in the US by broadening participation. Presently 80% of all STEM doctorates are awarded to White and Asian students, with not

one racially minoritized group considered underrepresented by STEM having more than 9% [2]. The highest is Latine with 8.4 % [2]. International students, the bulk of whom come from Asian countries, earn one-third of STEM doctorates [2]. The call to broaden participation in STEM is a call to eliminate underrepresentation of racially minoritized students [3], [4], [5]. The NSF has a long history of developing and supporting programs aimed decreasing underrepresentation across a variety of domains including, geography, (dis)ability, gender, socioeconomics, and race [5]. Dr. Sethuraman Panchanathan, NSF Director, said “World-class science is shaped by a wide range of perspectives. Our nation needs every person who is interested in pursuing a STEM career to be able to do so” [5, para. 1].

This call dates to 1945 during World War II due to fears that the US would have insufficient numbers of prepared US born scientists entering the workforce to meet the growing demands of a science and technology driven society [4]. As a result of the call made by Vannevar Bush, the National Science Foundation was created. Women were the initial target, then 25 years later, Black Americans, followed by other racially minoritized groups and those “physically challenged” [4]. Continuing to operationalize its charge, the NSF considered the import of how projects it supported impacted larger issues and focused not just on numerical representation but also on “enhancing the quality of education, training, and research to augment and enrich the participation of groups underrepresented in STEM” [4, p. 720]. It moved from a “deficit model”, which engaged in victim blaming to “strengths-based” models aimed at context.

Broadening participation in STEM requires well-informed programming, education and training, socialization, and networking [4]. Citing mentoring research on cross-cultural mentoring and sense of belonging, the NSF arrived at the conclusion that broadening perspectives is required to broaden participation. Vakil and Ayers [1] would certainly agree and would push for more critical assessments of perspectives, calling for a troubling of majoritarian narratives found in STEM education such as STEM is epistemologically universal and STEM benefits all groups in equitable and non-exploitive ways. This troubling problematizes how broadening participation is often framed and “implicated [STEM education] in the advance of neoliberal multiculturalism, antiblackness, colonialism, white supremacy, and militarism in this unique historical moment” [1, p. 450].

This sentiment is also shared by McNeely and K. Husbands Fealing [3] who wrote,

Related discussions (and controversies) have turned, on the one hand, on questions of social justice and of societal equality and equity. However, on the other hand, this situation also has been linked, even more prominently, directly to issues of economic productivity and growth. The presence of a qualified and agile STEM workforce has long been recognized as central to economic growth...and the underrepresentation of minorities, women, and persons with

disabilities in related fields increasingly has been problematized as wasted resources for building and maintaining a talented and innovative workforce [p. 552].

STEM education, in the view of Vakil and Ayers [1], should be billed as a mechanism for remedying structural inequality, becoming more about mitigating racial injustices than benefiting nationalistic aims of maintaining a competitive edge with nation-states and leading the world in STEM workforce development and education. [1] remind that STEM and STEM education are socially constructed. These dominant STEM narratives should compel STEM educators to take a deep, long look at the character and personality of STEM education, from structural and political angles. Broadening perspectives must be deconstructed then expanded with sociocultural and sociopolitical edges.

This more comprehensive approach was undertaken by scholars [3] who advanced the science of broadening participation perspective (SoBP) [p. 555]. This perspective is theory and research driven in that it was developed from a meta-analysis of extant literature. A key foundational takeaway from the literature was,

Underrepresentation of particular individuals and groups has resulted from hierarchical relations and social and institutional barriers to educational attainment and to occupational opportunity and access [p. 554].

There is a need for STEM education to leverage diversity in ways that help rather than hinder underrepresented populations’ access and success in STEM. This requires attention to pedagogy, facilitation, and understanding STEM education is also a social institution [3] entrenched with anti-Black racism, and other sociocultural and sociopolitical challenges reflecting hegemonic normativity and ideology. The SoBP was intentional in this regard by offering a comprehensive, collective approach and understanding of broadening participation that considers factors beyond just numerical representation. It is against this backdrop that the critical component of mentoring is discussed.

III. MENTORING

The practice of mentoring occurs in all fields of practice and is historically discussed and contemporaneously practiced in ways that are true to its origins of a more experienced member of the profession serving as a mentor to someone newer to the field [6]. In 2006 Millett and Nettles [7] surveyed more than 9,000 doctoral students to better understand mentoring, consequently defining mentor as “someone on the faculty to whom students turned to for advice, to review a paper, or for general support and encouragement” [p. 98]. [8] likewise determined that mentoring was a “professional relationship that supports developmental and mastery learning [through] self-efficacy and self-actualization” [p. 137]. The National Academies [9] describes a mentor as “primary research advisor ...who oversees the student’s development as a researcher, and socializes the student” [p. 105], while authors [10] add mentoring is a “professional, working alliance ...support[ing] the personal and professional growth, development, and success” [p. 2]. In most traditional uses of the term, mentoring

is cast as something done for and not with the person being mentored. But other scholarship such as that by authors [11] describes mentor as one who is more experienced and knowledgeable and tasked with “recogniz[ing] their protégés’ strengths and weaknesses, nurtur[ing] their autonomy, treat[ing] them as individuals, capitaliz[ing] on their skills, and creat[ing] opportunities for challenge and growth” [p. 46]. This results in socialization and advancement into the field in ways that build on the mentees strengths while buttressing potential weaknesses. Other authors [12] further state that mentoring relationships should be reciprocal where both accrue benefits, and are advantaged in ways that increase their respective professional success.

Felder [13], who specifically discusses doctoral mentorship, recognized the crucial role of socialization as an aspect of faculty-student interactions, appreciating that much like broadening participation in STEM, doctoral mentorships are influenced by departmental micro cultures, university meso cultures, and society macro cultures. If STEM doctoral mentoring is to be positioned as gateway to career opportunities in STEM, faculty diversity, attention to sociocultural and sociopolitical issues, and collaborative experiences must be present. When broadening participation is approached from broadened perspectives, students are poised to develop self-esteem and competence in STEM thus solidifying STEM identity as one aspect of their identity. Faculty should be prepared to engage with and not for students.

Mentoring is indisputably understood to be core to the success of doctoral students, especially in STEM. This is unfortunate for those who do not receive it. It is widely understood that not all graduate students have access to mentoring as described above [12], [13], even though all graduates tend to benefit from it. Research confirms that like other social practices, mentoring is an academic practice subject to implicit bias which impacts the experiences and success of students. Regardless of how mentoring is understood, racially minoritized STEM doctoral students in the US report having fewer opportunities for quality mentorship [14], [15]. Underrepresented racially minoritized students in the US often report not having strong positive mentoring experiences [14] in part because of issues with racism and/or anti-Black racism. Racism is an issue that globally impacts them, both inside and outside of the classroom [16]. Since mentorship has been framed as pivotal to doctoral student career and academic success as it relates to support, encouragement, and overall matriculation [7], their mentoring experience is an even more prominent factor in their success. Even though they often succeed in spite of, not because of the mentoring they received, a possible rationale for attrition by underrepresented racially minoritized STEM doctoral students is related to faculty mentoring [17].

Much of the literature suggests that mentoring is most effective between same race, same gender dyads, in other words between persons similarly situated. Because of the low numbers of faculty who are racially minoritized and underrepresented in STEM, racially minoritized and underrepresented students have limited opportunities for mentorship with *someone who looks like them*. Consequently, within STEM many find themselves in cross-cultural mentorships given that most STEM faculty are White and Asian and male which are not the demographics

targeted by broadening participation rhetoric. Cross-cultural mentorships occur between individuals who do not share the same identity markers, the most common being race and gender identity. Effective cross-cultural mentoring requires greater intentionality from the mentor to be aware of who they are in addition to who their mentees are and how the differences between them may result in experiencing the STEM academic environment in different ways. It also requires a more nuanced and thoughtful approach wherein mentors understand the simultaneously occurring cultures (micro, meso, and macro) that racially minoritized students navigate in daily [18]. Some attributes of these cultures include dominant, white supremacist ideology which frame what is considered normative and acceptable practices wherein conformity, assimilation, and acculturation are expected.

Scholarship [11] on faculty mentoring evidences that the intersections of culture, race, and gender among others are precarious, dangerous, and fragile. Key considerations for STEM doctoral mentors involved in cross-cultural mentorships are greater knowledge of and sensitivity to the culture and differential experiences of the mentee, and awareness of hegemonic normativity as enacted through policy and procedures as well as their own interpersonal attitudes and behaviors. Researchers [19] provided a bevy of referential material that mentors in cross-cultural mentorships can consult to increase their awareness of the micro, meso, and macro cultures as experienced by their mentee. They noted disenfranchisement, and negative experiences with courses, curriculum, advisors, and mentors. Additionally, the racism experienced outside of the academy inevitably influences mentees’ mental health and wellness which in turn impacts their academic experiences. Cultural responsiveness prompts mentors to better understand STEM educational environments from the perspective of their marginalized mentees. This helps to mitigate the tendency by faculty to collapse the experiences of mentees and avoid working from a universal approach in which all students are treated the same because of the false premise that all students experience STEM environments in the same sociocultural and sociopolitical ways.

Researchers [19] have been quick to call out White faculty for their failure to engage mentoring in more culturally responsive ways, ways that the authors of this paper consider to be culturally liberative. Culturally liberative mentoring requires White faculty to consider the role of their white privilege, their positioning as senior leaders due to their whiteness, and the space occupied by their white voices in establishing and maintaining departmental values and personal practices that further disadvantage their racially minoritized students. White faculty must not only be aware of, but must also act with knowledge of the possession of cultural advantages they and the students who look like them have, and the concomitant dispossession their cross-cultural Black and Brown mentees do not have because they are not privy to the same “systems of privilege” [19]. Intentionality toward dismantling such systems of privilege is a pivotal component within strong mentoring relationships.

The extant literature often describes challenging cross-cultural mentoring relationships between White faculty and Black students but what is reported less often is cross-cultural

mentorships involving US domestic racially minoritized students and international faculty.

IV. INTERNATIONAL FACULTY

International faculty, particularly from Asian countries such as China, India, and South Korea, make up the second largest group of STEM faculty in US [20], [21]. International faculty are any faculty who are foreign-born and/or received their first post-secondary degree in a country other than the one in which they hold an academic appointment [22]. Statistical data on how many international faculty serve as members in US STEM departments is not readily available and is difficult to deduce [21]. However, researchers [20], [21] suggest more than 75% of the total of international faculty at US institutions are in STEM departments. These faculty face many challenges [20]. Some are not unlike those confronting any other faculty, pressure of *publish or perish* in pursuit of tenure, work-life balance, and learning and fitting into the institutional culture, but they also have challenges unique to their international status. These can include navigating the differences between how universities operate in the US versus in their country of origin, and language challenges if English is not their first language. Language and culture can be barriers to successful socialization, success in the classroom, and within the profession more broadly. The classroom can be particularly problematic as they may be perceived as ineffective educators due to their accents, if their name is difficult to pronounce, or if they have different approaches to instruction and classroom management more reflective of their academic experiences in their home country. To make students and faculty more comfortable with them, international faculty may try to reduce their accent, change their name, and become more *Americanized*. They also have potential hurdles with gaining ability to work in the US due to their immigration status. Further depending on the location of their home institution, they may face cultural isolation if they work in an area not populated with others from their home culture [20].

While they may be presented with challenges due to their international status, international faculty may also benefit from their status and their numbers, especially those in STEM from Asian countries. For example, they may be better poised to find community among other faculty from their home county or those with similar cultures as a result of having greater numbers in STEM departments. Additionally, research indicates that there are a number of students, particularly at the doctoral level in STEM, from Asian countries, providing the faculty and students with opportunities to interact with *people who look like them* on a regular basis. A recent report suggests that almost 30% of all STEM faculty and STEM students are foreign-born [23]. This creates space for the faculty and students to communicate in their native language and share cultural familiarity while gaining a support network. They may even have labs with only or majority students from cultures similar to theirs, providing valuable opportunities for international students to have same culture mentoring experiences and for faculty to have peer mentoring from a mentor familiar with their culture.

While some US students may be put off by international faculty, overall their presence is welcomed in STEM departments and by the STEM US powerbrokers who see immense value in gaining skilled researchers who can procure

grant funding and contribute to advances in knowledge. International faculty are seen as valuable to the US economy and standing in the competitive STEM world [21]. Another example of how status may result in benefit is that Asian people are often stereotyped as being exceptionally good in math and science [24] which may position them in their peer community to excel in ways domestic racially minoritized faculty are not. This coupled with the additional perceived advantage of honorary whiteness [25]/ideological whiteness [26] may create more positive work environments. Honorary whiteness is described by [25] in this way.

Asian Americans are a compelling case for the study of racial boundaries because they are the single pan-ethnic grouping that sociologists consistently regard as potentially having attained a racial status as “honorary whites” I use the term *honorary whites* to refer to an intermediate rank in a racial hierarchy that has historically reserved the highest status for whites. Under certain conditions, select non-whites may become socially perceived as honorary whites [p. 790].

Whiteness comes with the advantages of being understood as superior, valuable, and respectable. The idea of ideological whiteness is theorized as connected to anti-Blackness [26]. “Anti-Black racism is a product of Ideological (Ontological) Whiteness, which is the litmus test for determining who and what is inclusive of whiteness; those who do not pass the test are deemed Ideologically Black. Ideological (Ontological) Blackness speaks to ontological determinations — the nature of being and identity — made by dominant hegemonic society ... These determinations are framed with the ideology of white supremacy” [24]. In the final analysis as honorary whites/ideological whites, Asians receive benefits that many Black and Brown people, especially domestic Black and Brown people are not afforded.

V. METHODOLOGY

Using qualitative case study methodology which allowed for study of complex phenomenon [27], this research asked the following question: What are the perceptions of STEM doctoral mentoring of international STEM doctoral faculty based in US institutions? This work was drawn from a larger qualitative embedded multiple case study. Qualitative case study is a method of inquiry that investigates a phenomenon in depth, attending to complexity within its real-world context [27]. Qualitative case study design provides rich thick description particularized for the case and is ideal for exploring social phenomenon. Case studies can “provide rich descriptive data with explanatory power ... that can expose taken for granted understandings of anti-Black racism buried within hegemonic normative structures of higher education” [28]. Cases represent the main units for inquiry that reveal deeper understandings of the issues [29]. The larger study included interviews from various stakeholders participating in a National Science Foundation Alliance for Graduate Education and the Professoriate grant-funded study (NSF-AGEP), including faculty, students, and departmental leadership from three institutions. Institutions included two that were historically white (HWI) and one which was an Historically Black College

and University (HBCU) in the Southeastern region of the US United States. This study represents a cross case analysis of international STEM doctoral faculty from each of the three institutional cases.

Data were collected through semi-structured qualitative research interviews with 18 international STEM faculty, predominately men (only three were women), and a little more than half from Asia, from areas such as China and South Asia. Other areas included Africa, Europe, and South America. These large demographic descriptors are used to preserve anonymity of the participants. Participants represented a range of STEM disciplines including but not limited to engineering, forestry, and mathematics. Interview questions were framed to elicit rich detailed descriptions of the participants' experiences and perceptions, averaging 60 minutes. They were professionally transcribed and analyzed using an inductive constant comparative data analysis process [30]. Inductive constant comparative data analysis is an iterative coding process which generates codes that are constructed from the data. Patterns are then identified through the codes to produce categories, the most salient of which become themes that inform the research questions.

VI. FINDINGS

Three themes were developed from the data: When in Rome – Pragmatic Mentoring; Science as the Big Joker – Science Culture as Universal; One Step in, One Step Out – Mimicking Whiteness.

A. *When in Rome – Pragmatic Mentoring*

This first theme identifies the manner in which the vast majority of international faculty described mentoring, descriptions that aligned with majoritarian STEM narratives. These findings related to the framing by international faculty of the concept of mentoring in terms of pragmatics. There was general discussion of mentoring being broadly understood as helping students successfully matriculate by learning how to conduct and present research and how to be a scientist. The specifics of mentorship were defined for example as talking to students, helping them with the application of coursework in research, aiding students in their career goals, and finding publication and grant writing opportunities. An Asian man HBCU faculty said,

You need to train the students, especially the graduate students, to make them ready for the future, their career, learn all the skills that can ensure their future success. Not only the experimental skills but also their skills for writing, for presentation. Kind of everything. Try to make them ready for their future career, no matter the industry or academy.

This privileging of pragmatic goals was consistently heard throughout all the interviews. A faculty member from Asia at the HWI – Flagship described how he wanted to continue the mentor support of students,

Then also publishing their experiments and results ...[this] is how they interact with the big ... industry and other academic fellows.

as a mentor, that's what my mentor did and that's what I would like to do, make the students go to the workshops,

conferences, be more interactive with other people so that they have a network established by the time they're out of the university and then ready to get into the field of work.

The focus of mentoring centered and prioritized disciplinary knowledge and practice and career development.

About one-third extended their initial description to include, when necessary, considerations outside of academics and career. According to an HBCU man faculty from Africa, "Mentoring for PhD students means supervising their work, without going deep into their private affair[s]" such as financial concerns. The idea of maintaining some level of distance and not engaging or "prying [into] their private life, but in general, always making sure that they're doing okay" was also conveyed by an Asian man faculty at the HWI-Regional institution. These quotes represented the delicate balance of mentorship that hinges on guiding and supporting student research while also appreciating that students do not learn in silos, divorced from real-world concerns. The African professor went on to explain how mentoring should be understood as holistic. It "actually should be kind of not only one plus one equals two, just academics, but also should include other things." This holism that was seen in a few interviews demonstrated a relational connection between the international faculty and their mentees. Relational connections were framed as strategy of sustaining and maintaining academic success.

Another key idea that surfaced related to this pragmatic orientation was a stated valuing of independence and responsibility. This was described by an Asian faculty man teaching at an HWI – Flagship, "[I] would like him or her to be independent in terms of thinking." An HWI-regional woman faculty member from Europe said,

And it's their responsibility to complete things in a timely manner. So that's basically... Just take interest in their own career, because I can give them all the advice I can, but if they don't have the enthusiasm and the willingness to make the best of this opportunity, then it's not a good situation.

Again, perceptions of mentoring as a pragmatic tool for enhancing academic and career success was conveyed through the faculty's identification of goals and traits of their mentees deemed necessary for their mentees' success.

The last aspect of this theme is acknowledgement of preparedness. Several faculty members indicated that they were prepared overall to effectively mentor students but this preparation was due to trial and error throughout their experiences with mentoring. One Asian faculty from HWI-Regional said, "There's lots to learn. Yeah. Sometimes I feel that maybe some skill I don't know, maybe I can do better in some ways, but for me, I think the most important thing is willingness to learn the student. It's the willingness to talk to the student" that guides his mentoring practice. Another faculty at the HWI – Regional said "we rely on ... intuition." Though the majority expressed feeling prepared as mid-career or senior career faculty, they admitted that they would have answered differently earlier in their careers. For most it was years of experience that resulted in development of their practice of mentorship. Another Asian man faculty at the same institution reported, "To tell you the truth we are really undersupported (for mentoring)...I wish

I could always paint a rosy picture, but no this is reality.” International faculty acknowledged that there was a lack of training in departments for mentoring STEM doctoral students, so they were unable to specify the necessary skills to be proficient. In fact, the common responses to the question about training was “no”, “none”, and “no support for mentoring students”.

B. Science as the Big Joker – Science Culture as Universal

Spades is a popular card game in which certain cards are worth more than others. In Spades, face cards (queens, kings, jacks) are usually worth more than spot cards, the ones with numbers except for the ace card that has more value than the face cards. Most who play the game include the joker cards, typically two, designated as the little and big joker. The big joker is the card that has the highest value, it beats all the other cards including the ace and face cards. In STEM doctoral mentoring, science culture is the proverbial big joker as it dominates what and how STEM mentoring is perceived. Science culture is seen as universal and unifying and thus applicable in the same way to all individuals, resulting in the teaching of science culture being the primary foci of STEM mentoring, suggesting that science culture is race and gender neutral.

Nearly all the participants accepted science as having a broad universal culture, therefore their task as mentors was to acculturate students into science culture through the teaching of science fundamentals, fundamentals that were taken for granted as the basics, common, and equally relevant to all. It was this sentiment that guided their practice of mentoring. This theme was constructed based on the lack of discrepant cases. That is, few participants questioned what science was and therefore lacked a critical stance toward what development of STEM identity could look like. The scientist prototype was the same, and students were guided toward it. One Latine faculty from North America responding to the benefits of cross-cultural mentorship said,

different cultures or different ways to be based on the background is not only important like for personal interaction but also even for science. For science, they see, I guess, different way to solve the problems. They have been trained in different ways that gives them different approach to tackle those problems. Now I'm talking more about research problems. Also, the dynamic in the group is important as the mentor, mentee. I mean as a mentor, I think it's really important because you learn a lot from different cultures, there was a professor and he used to talk a lot about that. I mean he is a White American and he would say, "Well if you put a room full of White Americans, they will come up with the same answers to that problem, but if you have a diversity there, there will be a bunch of novel different ideas." I mean just somebody or a group that has been trained in the same background, same ideas, think the same way, yeah. So cross-cultural mentoring is really important. I think it's really important. As a mentor, I don't know if we are all prepared to do that, because again it requires first of all the mentor to be open to that, to be willing to put some effort as I said, to ask the students, to investigate about those cultures.

Few expressed this sentiment which questions the *big joker* and even fewer engaged with critical interrogations of science, its foundations, and its approaches, instead many presented stock, majoritarian narratives of science. These narratives provided the framing for STEM doctoral mentoring. This presumed universalism may limit understandings of how to approach STEM doctoral mentoring in culturally liberative ways.

C. One Step In, One Step Out – Mimicking Whiteness

The emphasis on pragmatics and universalism of STEM was not unlike what we have uncovered in larger case study [31], in which the majority of faculty were White and men, marking the perceptions of international faculty as not much different than their majority White faculty peers. This hegemonic normativity was also demonstrated in how the majority characterized culture. It should be noted that the vast majority of international faculty in this study had never worked with domestic US racially minoritized underrepresented students which undoubtedly limits their perceptions. An Asian man faculty stated when asked about historically racially underrepresented students,

I really don't know how it [mentoring] would be different compared to managing a non-underrepresented minority...I have not worked with those backgrounds or any even... I wouldn't know how different it would be to mentor them versus a non-underrepresented student.

In the interviews, there appeared to be a positioning of culture as being the exclusive purview of the international student population rather than from the context of domestic racially minoritized students. When faculty were queried about preparation in working with underrepresented students to unpack the influence of culture, they sought clarity before responding, “do you include everybody in that minority?” There was an inability to discuss culture noted unless everybody included international students. Similarly, this refrain of expanding who counts as “minority” was further evidenced when faculty described fellow faculty. In the main, most faculty did not have peers in their departments who were from populations deemed by the NSF as racially underrepresented in STEM. One faculty, an Asian man from one of the HWIs, reflected when thinking about the inclusion of racially minoritized faculty,

Oh no, that's another tricky issue. So, if the question is by that strict definition, no, but if we need to loosen up with the standard a little bit then yes. So we do have faculty members from Africa.

In one instance, culture of racially minoritized students was recognized but the faculty member asserted that more attention needed to be directed to the culture of international students. An Asian woman faculty remarked,

So a lot of the STEM discipline graduate students are foreigners from other countries, they're not from the U S, right?No one actually, when they talk about diversity and I've gone to some of the workshops, I know it is all about the minorities, which are US citizens over here. But our big problem in STEM discipline, I can tell you is not just that, it is also cultural from foreign countries.

This emphasis was reiterated by an Asian man from the HBCU,

For example, we have international students from different countries. They do have their culture and I think we should know about this kind of culture We had to talk about their culture and then after that I learned about their culture.

Whereas the culture of racially minoritized students, especially Black US students, was not as visible to some. Some international faculty did not see culture as relevant in those mentorships at all.

An Asian man faculty said,

I don't know. I mean, so those, those are the things that I can probably only speak from my own experience. I directed four [doctoral students], including my current one, I have had five students total. So three have graduated, two current right now. Two of them are American, two are Chinese, one Vietnamese. So when I think back is there that big of a cultural difference in directing them? It's hard to say actually. In terms of how they learn things and how we interacted with each other, I can say I can't see that much difference actually. Maybe it's the nature of our discipline.

A woman faculty from Europe at an HWI-Regional said

I don't see a person separate from their culture, I don't. I wouldn't say culture plays a role because that's individuals. Of course we are because of our experience, [and] what we've been exposed to, which is part of the culture. But I think mentorship is really between individuals.

This statement reveals how faculty tried to disentangle discussions of culture from mentorship. They only saw individuals with individual personalities, limiting their willingness to operate from a sociocultural and sociopolitical context, contexts which have significant impact on domestic racially minoritized students. Another example of attempting to separate culture from individuals when thinking about the role of culture in mentorship relationships is evidenced in this quote.

I am not quite sure those are culture related or they actually more person related. Because sometimes I feel like it's actually person related.

Collectively these conversations highlighted a trend toward minimizing the importance of culture and tendency to be dismissive of or inability to articulate culture as related to domestic students who are racially minoritized.

Perhaps because one of the institutional cases was a Historically Black College and University (HBCU), several interviews pivoted to Black US students when queries about underrepresented racially minoritized students were raised. These queries unearthed what might be construed as anti-Black racism, a phenomenon that results in dehumanizing Black people and negatively viewing Black people and their experiences [32], [33].

Responses often offered an interesting juxtaposition between Black US students and international students. An Asian man HBCU faculty who readily recognized the culture of international students said,

URM [underrepresented minority] students, they have their own ideas, okay? Not like international students [who] can

concentrate on these research projects, but the URM students, because they are domestic students, they have a family here, they have other things. So I just felt that [for] the URM students, you need really to grab them and try to let them be very clear [about] what they need to do.

International students were characterized as serious and focused but Black US students were characterized as distracted and in need of redirection.

In another instance, an Asian man faculty from an HWI – Flagship said,

Underrepresented students, not all, but most of them do not take the same path as other students, because their background in math may be weak. They have the potential, but maybe is not good as others, so their path towards the final PhD is different from the other *classical* students

This deficit framing of Black US STEM doctoral students surfaced also at the HWI-Regional in the response of Asian man faculty in describing a Black woman student,

Her background as compared with maybe other students is a little bit weaker. So, I have to admit that. So when we admitted her within the program of course we tried to help her not only from financial point of view and also from other point of view. For example, maybe we decided maybe kind of like a special program of study for her.

A persistent pairing of US Black STEM students with descriptors of remedial, compensatory, not the “classic” or not as serious of a student when asked about the impact of culture on mentorship provides disturbing insight into the nature of STEM doctoral mentoring for US Black students and perhaps other racially minoritized students. Whether the intent is negative or not, the impact is the same, they are othered and marginalized. The dismissal of US domestic students culture and derogatory framing of Black domestic students were consistent with findings from the larger case study [31] which was comprised of mainly White faculty.

The final dimension of this theme is awareness which highlights marginalization and cultural learning. The interview guide was not designed to interrogate international faculty's experiences with marginalization in STEM doctoral education. However, a small number of faculty discussed this in relation to their perceptions of mentoring with some faculty highlighting the challenges such as presented by their accents, issues with visas, and hypervigilance to avoid miscommunication and misinterpretation of behaviors due to differences emanating from their cultural background and experiences. One Asian man HBCU faculty said,

Sometimes I feel like after meeting, was I too harsh? Right? Did I make microaggression? Those things, I always look back on meetings and [think] what can I do?

Several of the international faculty had expectations of wanting to learn and to be taught about different cultures. Their inquiry into the lives of students was framed as a need to understand.

Some of the cultural aspects of the education is new to me. So what I can do is learn, try to learn and try to be very

careful, very sensitive of cultures... to let's say differences... Understanding culture and learning is very important, and basically I am kind of a student to that.

This faculty, the only Black participant, voiced the sole instance of an international faculty recognizing shared experiences of marginalization as a point of connection with racially minoritized doctoral students. This African HBCU professor described how his learning about the students and their culture allowed him to tap into his working-class background to form a bridge of connection to his African American students. He could see himself in them which he felt positioned him to be a role model and someone his students could relate to. This was the exception. In most other cases, the learning, whether it was formal training, workshops, or life experiences, resulted in further *othering* and simultaneously distancing from their racially minoritized students. Another faculty from the HBCU expressed that his learning about the culture of underrepresented minority students led him to the conclusion that they were “different from other people.”

VII. IMPLICATIONS & CONCLUSIONS

This study interrogated international faculty at US institutions lived experiences of mentoring to better understand how hegemonic normativity was reinforced or inhibited through mentoring practices. Like the research of others [1], this study also determined that a presumed universalism of STEM culture was pervasive and entrenched in the practices of the international faculty. STEM culture and therefore STEM identity was a compilation of knowledge and procedures about science, individually focused and rooted in Western epistemology which values individualism and advancement. These hegemonic norms were replete throughout the *When in Rome- Pragmatic Mentoring and Science is the Big Joker—Science Culture is Universal* themes. These themes demonstrate how narrow conceptions of science culture in the US adversely impact advocacy of holistic STEM doctoral mentoring. When science culture fails to operate with criticality at the micro, meso, and macro cultural levels, it falls prey to being a perpetuator of social and epistemological barriers, barriers that continue to maintain borders of marginalization. If the culture of science prioritized a wider range of social and epistemological positions along with its canons, those responsible for helping to develop students who will assume, alongside other identities, the identity of scientist, would have a broader foundation from which to work. This would be immensely freeing for international faculty who serve as doctoral mentors but feel constrained by the hegemonic status quo. They would be liberated to bring more of themselves into their cross-cultural mentoring practice, creating opportunity for students to do the same, perhaps even recognizing how systems of privilege [19] disenfranchise their racially minoritized students in ways parallel to their own disenfranchisement.

This study found that despite the marginalization often reported in the literature [20], [21] as experienced by international faculty, most did not acknowledge and/or respond with intentionality to the marginalization experienced by racially minoritized STEM doctoral students. Ideological/honorary whiteness [24], [25], [26] may have provided a cocoon of safety and acceptance, while potentially

inoculating them from the marginalization as experienced by living within Black and Brown bodies, even if they also experience marginalization due to international status, language and accents, and bias. The theme, *One Step in, One Step Out: Mimicking Whiteness*, speaks to the ways in which hegemonic normativity dominated international faculty practices of mentoring while at the same time also noting signs of resistance.

Greater intentionality toward recognizing how policy, practices, and dispositions that mimic whiteness, thus reinforcing hegemonic normativity, show up in cross-cultural mentorships would unveil to international STEM faculty that mentoring is a heavily nuanced practice that has important cultural implications. This study suggests contextualized mentorship training experiences specific to international faculty may be needed. There should be opportunity for international faculty to unpack in brave spaces their fears and concerns as well as their joys and triumphs. However, mentorship training should also be a brave space for challenging ideologies that may serve international faculty well because they preserve positioning of ideological whiteness for international faculty, bringing them in close alignment with their white colleagues who also benefit from disturbing power imbalances in the academy. This study encourages greater use of advocacy of cultural practices, and use of lived experiences with marginalization as a means to better serve racially minoritized students. This would position international faculty as students of cultural differences, and scholars of cultural saliency who are poised to be intentional developers of holistic STEM mentorships.

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