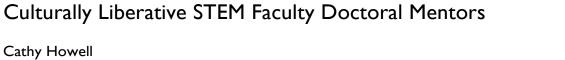Kansas State University Libraries

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Reimagining Doctoral Mentoring: Toward the Development of Culturally Liberative STEM Faculty Doctoral Mentors

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Abstract

Using anti-Black racism and critical capital theory, this paper highlights findings of a meta-analysis based on research products developed from a qualitative multiple embedded case study of STEM doctoral mentoring and argues for the development of culturally liberative doctoral mentorship.

Keywords: STEM doctoral mentoring; culturally liberative mentoring; critical capital theory; anti-black racism; mentoring and adult education

Using an anti-Black racism (Dumas & ross, 2016) and critical capital theory (Bancroft, 2016) lens, this paper describes findings from a qualitative, multiple embedded case study research project on STEM doctoral mentoring and how these findings call for the development of culturally liberative doctoral mentors and practices in STEM. We are arguing for decolonizing the practices, mindsets, and worldviews of doctoral mentors so they can take a non-deficit, humanity-rooted approach to mentoring racially minoritized students who are systemically underrepresented in STEM, the Black, Latine, and Native American students, and see them in their humanity as whole beings with vibrant cultures, rich histories, and intellectual excellence reflective of their cultural wealth (Yosso, 2005).

Mentoring is indisputably understood to be core to the success of doctoral students, especially in STEM. It is widely understood that not all graduate students have access to mentoring (Felder, 2010), even though all students tend to benefit from it. Racially minoritized STEM doctoral students in the US report having fewer opportunities for quality mentorship and not having strong positive mentoring experiences (Chavous et al., 2018). Representation is a large component of evaluating and assessing growth and progress of academic programs efforts toward equity and inclusion. Cabay et al. (2018) suggested the loss in representation presents a continued minimization of "diverse perspectives and availability as role models for future scientists and engineers" (p. 2). But our analysis suggests greater representation may have little to do with the continuation of career and academic success of racially minoritized doctoral learners within the STEM field. Representation in and of itself is not sufficient to ensure success. Research confirms that like other social practices, mentoring is an academic practice subject to implicit bias which impacts the experiences and success of students. Since mentorship has been framed as pivotal to doctoral student career and academic success, their mentoring experience is an even more prominent factor in their success. Even though racially minoritized students often succeed in spite of, not because of the mentoring they received, research shows that effective mentoring is a value-added attribute of the STEM doctoral experience. It stands to reason that a possible rationale for attrition by underrepresented racially minoritized STEM doctoral students is related to faculty mentoring (Merolla & Serpe, 2013).

Literature Review

When considering the doctoral journey, degree attainment is only one measure of success in relation to students' preparedness and productivity when they enter the workforce (Syncox et al., 2017). Mentoring has been found to help lead students to be faculty and/or leaders within industry, but mentoring is only one initiative when examining the full picture. The lack of a unified definition of mentoring is unsurprising due to the vast differences in academic disciplines, as well as the differences in roles, and expected outcomes in doctoral education, especially in STEM. Jacobi (1991) has been widely cited for noting the absence of a "widely accepted operational definition of mentoring" that makes it difficult to discern specified aims such as student success (p. 505). Moreover, "the term 'mentor' conjures up widely varying mental models" of what mentorships truly look like (McGee, 2016, p. S234). A traditional model of the mentor-mentee relationship can be understood as structured or as part of experiential learning within the educative process that promotes doctoral development from an experienced faculty member to a protégé student scholar (Anderson et al., 2013). These structured processes lend themselves to at times a uni-directional knowledge transfer between mentor and mentee following a more traditional, banking model (Freire, 1970) of education and mentoring. Minoritized students may benefit from informal structures that allow for greater socialization and communal dimensions of the relationship to flourish (McCoy et al., 2017) as relationships are an innate part of the doctoral mentoring experience. In understanding the relationship dynamic, there is an undergirding premise of trust that may not be readily engrained for minoritized students. For racially minoritized students, higher education's claim of being progressive in addressing issues of race and oppression is viewed as inauthentic as institutional and societal structures are saturated with racial inequities that extend into critical interpersonal relationships distrusted by minoritized students due to past experiences (Brown & Grothaus, 2021). This mistrust is a double-edged sword as it serves as an insulating or protective factor while simultaneously being an impediment to engagement in academic relationships that could aid in the professional development of minoritized students (Brown & Grothaus, 2021; Johnson-Bailey & Cervero, 2004; McCoy et al., 2017). Mentorship in this paper is defined as "a professional, working alliance in which individuals work together over time to support the personal and professional growth, development, and success of the relational partners through the provision of career and psychosocial support" (National Academies of Sciences, Engineering, and Medicine, 2019, p. 186), suggesting the relational dyad, the mentor-mentee relationship, is contextual and mediated by culture, power, paradigms, and other relational factors. Thus, individuals perceive mentoring differently depending on their cultural and racial identity (McGee, 2016).

Theoretical Framework

This paper draws on anti-Black racism (Dumas & ross, 2016) and critical capital theory (Bancroft, 2016) to focus on anti-Black racism that permeates STEM doctoral mentoring and interrogate how the convergence of US structural inequalities, economic and social capital, and racial identity create a deficit STEM educational system and mentoring for underrepresented racially minoritized STEM doctoral students. Bancroft (2016) suggests that inadequate attention is paid to race in discussions of mentoring and proposes Critical Capital Theory, an "integration of critical race theory, forms of capital, and fictive kinship" (p. 1319) that "places social and cultural capital and the ability to form an array of fictive kinships within STEM doctoral programs as core" (p. 1330). Anti-Black racism is a theory of Black racialization that speaks to implicit negative bias toward Black and Brown people in which there is an assumption of white supremacy and acceptance of Black inferiority and lack of humanity. This lens centers and builds on the social capital relationships, ways of knowing, experiences, and knowledge of STEM doctoral students, reframing them from a non-deficit perspective. Taken together, these

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frameworks provide philosophical anchors for analyzing contextual experiences in STEM doctoral learning.

Methods

This paper is a meta-analysis drawing on five qualitative and mixed-methods research studies (Douglas et al. 2021; Merriweather et al., 2023; Merriweather et al., 2022a; Merriweather et al., 2022b; Merriweather et al., 2022c) stemming from an embedded multiple case study on STEM doctoral mentoring. Qualitative meta-analysis allows for secondary analysis that may lead to enriched understandings of the phenomenon (Levitt, 2018). Each study was part of a National Science Foundation (NSF) Alliance for Graduate Education and the Professoriate (AGEP) funded program. The guiding research question guiding these studies was what are the perceptions and experiences of STEM doctoral program stakeholders? We were part of the research team for the overarching study.

The qualitative data included semi-structured interviews and focus groups that explored the faculty and students' understanding of mentoring and their related experiences as a mentor/mentee. The overarching study had three case institutions located in the Southeastern region of the United States: two Historically White Institutions (HWIs) and one Historically Black College and University (HBCU). The embedded cases included in this meta-analysis were (1) international STEM faculty (18 international STEM faculty, 15 men, 3 women; Merriweather et al., 2022a); HBCU STEM faculty and students (9 HBCU Black STEM doctoral students–6 women and 3 men; Merriweather et al., 2022c); STEM doctoral students from a single HWI (32 STEM doctoral students with the majority being White and female; Merriweather et al., 2023); STEM doctoral faculty and students at a single HWI (14 faculty and 9 URM students for individual interviews and 32 students for focus groups; Merriweather et al., 2022b); STEM faculty who served in leadership positions from an HWI (6 STEM department heads and 3 graduate program directors; Douglas et al., 2021). The qualitative data were analyzed using an inductive constant comparison method (Douglas et al., 2021; Merriweather et al., 2022a; Merriweather et al., 2023) and narrative analysis (Merriweather et al., 2022b; Merriweather et al., 2022c).

Two studies (Merriweather et al., 2022b; Merriweather et al., 2022c) were mixed methods, so they included a quantitative survey component. The quantitative data for both the faculty (n = 103, Merriweather et al., 2022b) and student survey data (n = 137, Merriweather et al., 2022c) both utilized the Mentoring Competency Assessment (MCA) developed by Fleming et al. (2013). The faculty survey also included an adapted version of the Cross-Cultural Counseling Inventory-Revised (CCCI-R) (LaFromboise et al., 1991; Suffrin et al., 2014), which was adapted to relate to mentoring instead of counseling. Therefore, students responded based on how they perceived their mentor's competency, and faculty responded based on the perception of their own competency as a mentor. Survey analyses included descriptives and non-parametric analyses.

The faculty self-reported mentoring competencies areas did not vary for most of the items when completing the adapted MCA, meaning for most faculty no difference was found in how they supported their racially minoritized doctoral student mentees (Merriweather et al., 2022b). However, when comparing STEM faculty survey results to the STEM doctoral students' results, STEM faculty mentors may not be as aware of how to support their minoritized and marginalized mentee students (Merriweather et al., 2022b; Merriweather et al., 2022c). This is similar to the findings from the interview and focus group data discussed below. The qualitative data (Douglas et al., 2021) also showed that faculty had muddled understandings of mentoring as they failed to distinguish between mentoring and advising; this led to ambiguity about their roles as mentors (Douglas et al., 2021). This for some could be attributed to their lack of knowledge about mentoring and for others their belief that "research trumps mentoring" which suggests that

mentoring was undervalued in importance by some faculty (Douglas et al., 2021). Given that only 20% of faculty indicated they received mentor training (Merriweather et al., 2022b), this is not surprising.

With regard to the students, there were no differences found across institutional types when comparing HBCU and HWIS (Merriweather et al., 2022c), however, when descriptively examining the two main subgroups at the HBCU, domestic racially minoritized students had lower total mean scores than their international counterparts (Merriweather et al., 2022c), suggesting international students are more satisfied with their doctoral experience. The quantitative findings were supported by the interview and focus group data. The qualitative findings included things like underrepresented racially minoritized students, particularly, Black doctoral students are not satisfied with their doctoral experience as they find themselves conspicuously absent in STEM education both as students and faculty and at the same time invisibilized even though they are hypervisible as lone representatives for minoritized people (Merriweather et al., 2022c). For Black doctoral students, their race matters in doctoral mentoring, and they want it acknowledged in their mentoring relationships much like the need expressed by the doctoral students in general in this case study for their faculty mentors to recognize and acknowledge their diversity and uniqueness, including their racial and gender identity, interests, etc. (Merriweather et al., 2023).

Discussion and Conclusion

The themes constructed from the meta-analysis focused on three broad areas: (1) the collective mentoring experiences and perceptions of STEM doctoral students in general calling for intentionality and recognition of students' uniqueness by faculty mentors (Merriweather et al., 2023), (2) the deficit-oriented mentoring experiences of Black doctoral students at HBCUs that were not so different from HWIs (Merriweather et al., 2022c), and (3) the mentoring approaches and practices of doctoral faculty, including international faculty (Douglas et al., 2021; Merriweather et al., 2022a; Merriweather et al., 2022b) privileging a hegemonic science identity rendering race and gender invisible that strongly point to the need for effective faculty development around mentoring (Merriweather et al., 2022b), in particular better training around culturally responsive and liberative mentoring for underrepresented racially minoritized students (Douglas et al., 2021) by domestic US faculty as well as international faculty.

The meta-analysis revealed that regardless of whose perceptions were being explored, greater cultural awareness with respect to identity constructs such as race and gender was absent. STEM doctoral education is constructed such that humanity is lost in the name of science, rendering cultural identity markers mute and thus the need to address them. Awareness and attention to humanity would contribute to an emphasis on mentoring practices wherein positive interactions and responsiveness within STEM doctoral mentor relationships are predicated on humanity. Culturally liberative is a philosophical ideal rooted in humanity with a specific eye toward cultural markers such as race. To understand it, one must understand the terms "culture" and "liberative." The term culture is difficult to define succinctly; however, the implications of disregarding nuanced and contextualized understandings of culture are too great to be ignored, especially since understanding of culture permeates all "institution[al] types and pathways to STEM credentials" along with informing students about the acculturated "standards, expectations, and their belonging" (National Academies of Science, Engineering, and Medicine, 2016, p. 60). Liberative, according to IGI Global (n.d.) is understood as "any theory, action, or effort contributing and related to bringing justice in the world. It requires one to intentionally and actively change the status quo to bring positive change to result in justice" (para 1). Development of impactful STEM doctoral mentors requires the creation of true inclusivity and equitable climates which in turn necessitates a culturally liberative mindset. Culturally liberative mentoring would

focus as much on wholistic stability as it does pragmatic concerns to elevate the quality of experiences for those racially minoritized while dually addressing systemic issues. This paper offers a beginning step toward reimagining mentoring from a culturally liberative mindset.

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