

# **Anchoring STEM Education Research in Black Feminist Epistemology**

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*Traditional STEM Education Research and Black Feminist Epistemology represent contrasting paradigms in how education researchers produce and understand knowledge. As Black women STEM education researchers, conducting research on the undergraduate experiences of interruption by Black women in STEM (UPLIFT project), we acknowledge and prioritize our own subjectivity, personal experiences, and standpoints in the research process. This paper discusses how we commit to anchoring our STEM education research in the methodological principles of Black Feminist epistemology.*

**Keywords:** Black Feminist Epistemology, STEM Undergraduate Education, Black Women STEM Education Researchers, Research Methods

*We are both the colonized and colonizer, marginalized by the academy yet using the resources and tools of the academy to write about our own communities and, even more intimately, our own lived experiences. - Sophia Villenas (Villenas, 1996)*

Historically, qualitative methodology aimed to remove the background and biases of the researcher during data collection and analysis. Data presented from this “objective” standpoint were considered the most valuable and trustworthy (Sutton & Austin, 2015). Moreover, researchers were expected to mitigate personal views, believing that objective data collection was attainable and preferable. As a result, academic writing discouraged the use of first-person pronouns, favoring third-person language to emphasize objectivity. The 1990s saw increased use of feminist and critical theories, and by the 2000s, a shift toward research that acknowledged the undeniable relationship between researchers and participants, as well as more reflexive and interpretive approaches, occurred (Givens & Jeffries, 2003; Jones et al., 2021).

## **STEM Education Research**

STEM education research shares similarities with general education research in that it aims to investigate and analyze various aspects of education to improve understanding and practices within the field. However, STEM education research diverges from education research due to its subject-specific focus (Salinger & Zuga, 2009).

The term "STEM" refers to science, technology, engineering, and mathematics. Given the National Science Foundation's (NSF) role in creating the concept, its definition often serves as the standard for what fields fall under the STEM umbrella (Salinger & Zuga, 2009). It is important to note that STEM encompasses various fields with specific sub-disciplines, leading to multiple definitions and STEM education research foci. This complexity underscores how our definition of STEM can shape broader discussions regarding representation in these fields. Thus, depending on how "STEM is conceptualized can ultimately be a defining characteristic of how related discourse" and STEM research is put into practice (Williams, 2024, p. 80).

## **Epistemology**

Epistemology constitutes an overarching theory of knowledge (Harding, 1987). It investigates the standards used to assess knowledge and points to how power relations shape who and what is believed and why. Epistemology is also concerned with the relationship between the researcher/practitioner and the knowledge gained (Moore, 2005).

Traditional epistemological approaches in STEM education research are often grounded in positivism or constructivism, emphasizing objective reality and the pursuit of universal truths through empirical observation and analysis (Cohen et al., 2018; Creswell & Creswell, 2017; Fosnot & Perry, 2005; Pascale, 2011). Over the past years, the culture of STEM education research has evolved towards a more inclusive and supportive framework recognizing and addressing the diverse needs of students and towards a focus on improving participation and success rates among underrepresented groups in STEM disciplines. As such, epistemological approaches have also shifted to include interpretivism and critical theory, emphasizing the importance of understanding the subjective meaning of social phenomena from the perspective of those experiencing it, and the examination of power structures and social inequities within the STEM culture, respectively (Denzin, 2005; Pasque & Perez, 2015, Pascale, 2011).

## **Black Feminist Thought**

Black Feminist Thought (BFT) builds on theoretical traditions, including Afrocentric philosophy, feminist theory, Marxist social thought, critical thought, and postmodernism (Collins, 1990). It is grounded in the premise that "African-American women have created an independent, viable, yet subjugated knowledge concerning our own subordination" (Collins, 1990, p. 13). BFT "consists of specialized knowledge created by African-American women which clarifies a

standpoint of and for Black women,” and it encompasses theoretical interpretations of Black women’s reality by those who live it” (Collins, 1990, p. 22). BFT intentionally centers the voices of Black women and emphasizes the importance of including the thoughts [works] of various Black women researchers [thinkers] to avoid monolithic assumptions and promote an inclusive and diverse representation of experiences and viewpoints (Collins, 1990). Furthermore, BFT seeks to empower Black women and advance social justice concerns as a counter to oppression and subjugation while acknowledging the power of intersecting oppressions based on race, gender, class, sexuality, national origin, and other factors (Collins, 2000).

### **Intersectionality**

As with BFT, intersectionality is frequently used in STEM education research concerning Black women (Sanchez, 2019). While BFT is positioned as an epistemological standpoint, intersectionality is described as a paradigm or interpretive framework for explaining social phenomena (Collins, 2000; Williams, 2024). Intersectionality examines how systems of oppression, such as racism, sexism, and classism, interact to shape marginalized groups' experiences. Intersectionality offers a Black feminist criticism about the treatment of race and gender as “mutually exclusive categories of experience and analysis” (Crenshaw, 1989, p. 139) and situates Black women as knowledge creators whose voices are suppressed or ignored due to their social locations (Collins & Bilge, 2016; Crenshaw, 1989, 1991). Within the STEM research context, intersectionality is employed to examine how various systems of oppression interact to create unique race and gendered experiences for Black women in STEM (Malcom et al., 1976; Williams, 2024).

### **Black Feminist Epistemology**

Critical epistemologies value the role of the researcher's position. BFT and intersectionality emphasize the importance of Black women conducting research about Black women because of its unavoidable impact on data collection and analysis (Collins, 2000). However, epistemologies that approach research from personal/political standpoints, honoring multiple, possibly conflicting, positionalities, are often seen as lacking rigor and reliability (Cho & Trent, 2006; Patterson et al., 2016). As such, definitions of rigor and reliability have been and continue to be highly debated, leaving research by and about Black women to fit the dominant paradigm or challenge the current practices within the educational research arena (Cho & Trent, 2006). Patterson et al. (2016) remind us that “traditional methodological approaches are often ‘based on the values, interests, and views of oppressive power holders,’ which makes it the responsibility of researchers utilizing Black feminism to demystify the value of subjective theories and methods” (p. 59). This reminder provides the foundation for anchoring our STEM education research in Black feminist epistemology.

This paper explores the data collection and analysis processes utilized by our team of Black women STEM education researchers—four academic researchers, four graduate researchers, and five undergraduate researchers—during an exploratory, sequential, mixed methods, longitudinal study on the experiences of power imposition and its impact on forty Black undergraduate women in STEM at three higher education institutions in Georgia. In this paper, we discuss the following: 1) our rejection of objectivity; 2) the significance of holding space for both participants and ourselves; 3) understanding, embracing, and leveraging our positionality; 4) acknowledging the influence of group positionality; 5) engaging in slow research; and 6) disrupting traditional team power dynamics.

Through our rejection of objectivity, we commit to making multiple truths visible, incorporating the interests and values of participants as a collective, and creating opportunities for self-definition for the participants. We constantly confront the complexity of the implications of our identities (professional, race, gender, socioeconomic), the ways they intersect (creating feelings of insiderness), and the conflict (revealing feelings of outsidersness) in our research role. Furthermore, we acknowledge the influence of group positionality, the value of allowing for slow research, and the necessity of disrupting power dynamics throughout the research process. Although our study employs mixed methods, this paper focuses on the qualitative component of our research project.

As we began thinking through and implementing our data collection and analysis processes, we were confronted by the complexity of understanding “the other” when one is “the other” while trying to maintain objectivity (Groves, 2003). Realizing the impossibility of completely removing our identities as Black women in STEM, we employ reflexive and interpretive approaches in an effort to value our positionality as Black women in STEM educational research and uphold the methodological principles of Black Feminist epistemologies:

1. A focus on interpreting and making sense of participants’ experiences, meanings, and interpretations rather than striving for objective truth (Jones et al., 2021);
2. Acknowledge our own perspectives, biases, and positions within the research context, leading to a more reflexive approach that considers the researcher’s influence on the research process and findings (Collins, 2000);
3. Acknowledge that knowledge is constructed through social interactions and interpretations, rather than discovered through objective observation (Creswell & Creswell, 2017);
4. Critical examination of our own assumptions, biases, and positions throughout the research process and being transparent about our perspectives may influence the interpretation of data (Pillow, 2003); and
5. Examination of power dynamics, social inequalities, and the role of ideology in shaping knowledge production with an aim to uncover and challenge dominant discourses and power structures (Harding, 2004).

### **Rejecting Objectivity as a Goal of Research**

As we began to discuss our data collection and analysis processes, we found ourselves continuously returning to a discussion of objectivity and where, if at all, its place would be in our project. These discussions allowed the research team to explore individual and collective objectivity, acknowledge our privilege, and express concerns about conducting interviews while simultaneously managing our bias and educational trauma. Multiple meeting discussions underscored the importance of showing up in the research space as Black women intellectuals. This underscoring ensured that our work centered the participants' voices and experiences. As part of our data analysis process, we consistently examined our thoughts and feelings (individually and collectively) around being Black women in STEM and sought to construct knowledge through the lens of Black Feminist Thought and intersectionality.

It is important to know that our research team consists of Black women—four investigators, four graduate researchers, and five undergraduate researchers. Our connection is broadly contextualized and grounded in our lived experiences of intersectionality in higher education (Collins & Bilge, 2016; Crenshaw, 1989, 1991). For the investigators, our experiences are profoundly shaped by our individual journeys within the STEM field. Our educational trauma encompasses the cumulative impact of anti-Blackness, systemic racism and discrimination, gender bias, and stereotype threat encountered while pursuing a STEM degree.

Although each began an academic path in an undergraduate STEM program, three of the four investigators eventually transitioned out of STEM at different stages. Specifically,

- Two left STEM during graduate school before completing a master's degree.
- One transitioned out during a faculty appointment (from associate to full professor).
- One remains in STEM and holds an associate faculty appointment.

Although not all of the graduate or undergraduate researchers have undergraduate degrees or are majoring in STEM, each has experienced some level of educational trauma due to her sheer existence as a Black woman in higher education.

This commonality of educational trauma shapes not only our individual research agendas but also our methods of data collection and interpretation. For instance, we choose to use audio diaries as a data collection method to capture the real-time thoughts and feelings around the complexities of individual and collective identities and the social dynamics experienced by our participants—Black undergraduate women in STEM (Bowleg, 2008; Narvaez et al., 2009). By employing audio diaries, we provide our participants with opportunities we lacked as undergraduates—such as space and time for emotional expression and reflection, control over our narrative process, and the power to articulate our thoughts and emotions in our own words and voices. Because the recording experiences are close to the time they occurred, it helps to preserve the context and immediacy of their experiences, thus leading the team to uncover valuable insights into how the participants' experiences and perceptions changed throughout their academic careers (Collins, 2000; hooks, 1989).

Through ongoing discussions of audio diary data analysis, we examined our individual objectivity, or lack thereof, and surfaced concerns about managing our biases and assumptions stemming from our experiences of educational trauma caused by anti-Blackness, systemic racism and discrimination, gender bias, and stereotype threat in higher education (Hernández & Harris, 2022; Shalka, 2022).

We came to understand that the established expectations of researcher objectivity were in conflict with the ways we show up and occupy space in STEM educational research. We cannot and do not wish to hide our identities, and because we are Black women, we are uniquely positioned to understand our participants' experiences of being silenced, overlooked, and marginalized. Therefore, we decided to approach data collection as an opportunity to hold space for our participants and ourselves.

### **Holding Space for Our Participants and Ourselves**

Holding space is more of a practice and concept used in coaching settings rather than in the academic field of qualitative research. Its importance is evident as it integrates three of the eight core competencies, making it fundamental to the coaching profession (Passmore & Sinclair, 2020). A value that permeates in the Gestalt coaching model is that the coaching client is regarded as a whole and healthy person with respect to their environmental conditions, and the coach creates a safe, non-hierarchical space (Pearce, 2019; Siminovitch & Van Eron, 2006). Holding space in coaching is situated in presence, that is, being present for conversation flexibility and honoring what is coming up in the moment (Reid, 2020).

The practice of holding space (for both the participants and ourselves) is valuable in our research process for several compelling reasons:

1. Holding space creates an environment where each participant and research team member feels safe, respected, and non-judged. For participants, these feelings are more likely to provide authentic responses, enhancing the data's validity (Holloway & Galvin, 2016). For the research team, holding space leads to richer, more nuanced conversations around the data. Thus, considering the data from multiple perspectives allows for more nuanced analysis by encouraging each team member to consider and explore the data from multiple angles and perspectives, reducing the likelihood of biased interpretations (Baldwin, 2013, Glesne, 2016).
2. Holding space emphasizes understanding participants' perspectives and experiences from their own viewpoint (Creswell & Poth, 2018). It encourages a reflective approach for both participants and research team members by fostering deeper insights and understanding. Researchers who practice holding space can engage in honest self-reflection, critically examining their preconceptions and biases and how they might influence the research process (Finlay, 2002).
3. Participants are more likely to engage fully and provide detailed accounts when they feel their voices are valued and heard, thus, leading to more comprehensive and engaged data

collection (Patton, 2015). The same is true for research team members when discussing data analysis. In addition, holding space reduces anxiety and discomfort, encouraging participants (i.e., research team members) to express themselves more freely, which is vitally important when dealing with sensitive or personal topics (Gordon, 2020, hooks, 1984).

4. Holding space respects the participant's dignity and agency, aligning with ethical standards in qualitative research that emphasize treating participants with respect and care (Israel & Hay, 2006; Orb, Eisenhauer & Wynaden, 2001).
5. Trust is crucial in qualitative research to obtain honest and in-depth responses. Holding space helps build a strong rapport between researchers and participants, facilitating a more open and trusting relationship (Glesne, 2016). By holding space, researchers demonstrate empathy and understanding, which can lead to richer data as participants feel genuinely cared for and understood (Seidman, 2013).

Black Feminist epistemology promotes holding space for narrative-telling by humanizing visibility, empowering womanhood, and unapologetically uplifting Black women's voices (Clemons, 2019). It encourages closing the gap between participant and researcher through authentic dialogue where participants feel heard and valued (Collins, 2000). This dialogue also allows Black women to convey their knowledge claims through narratives of their lived experiences.

While no specific research citations directly combine Black Feminist epistemology and "holding space," these concepts are interconnected in creating inclusive and empowering environments and focusing on the importance of voice (i.e., clients or participants). An additional commonality is that both call for the consideration of the individual and the collective behaviors brought into the space that may be culturally embedded and maintained consciously and unconsciously (Fareed, 2014). According to Walker (2021):

"Holding space for someone means taking the initiative, without any prompting, to be empathic to another person's situation or circumstance and making time for that individual to do whatever is needed for them, like voicing hurt, anger, or another strong emotion, and receiving whatever they need to communicate in a way that is supportive and nonjudgmental." (para.2)

Interviews and focus groups where participants are asked a series of back-to-back questions yield top-of-mind responses from participants (Peredaryenko & Krauss, 2013). In keeping with the practice of holding space, we included intentional pauses without vocal interruption after each question to allow participant reflection. We acknowledged our discomfort in the pause but are committed to holding the space so the participants could process and respond when ready. We also allowed ourselves permission to verbally acknowledge and discuss ways our experiences mirrored those of our participants throughout the interviews and focus groups. More importantly, we

intentionally closed the gap between ourselves and the participants by taking on a more active role in the discussion and making contextual values apparent.

Based on the aforementioned framings for “holding space,” we pull together five focus areas for accomplishing the act of holding space in our research: centering marginalized voices, creating inclusive and safe environments, challenging the idea that academic ways are the only valid forms of knowledge, encouraging authentic dialogue, and establishing an interconnectedness.

1. **Centering marginalized voices:** Our research project focuses on the experiences of Black undergraduate women in STEM, using data collection methods that center the participants’ voices, such as interviews, focus groups, audio diaries, and reflective journals. Throughout data collection, during interviews and focus groups, we engage in critical reflexivity to continually question and challenge our own biases and assumptions. This ensures that our follow-up questions are not harmful or judgmental. Specific to interviews and focus groups, participant sharing centers their voices, helps to ensure they feel heard and valued, validates their perspectives, and highlights specific issues they face as Black women pursuing STEM degrees. Graduate researchers conducting interviews receive training to practice active listening, holding space for the expression of thoughts and feelings, and creating an environment of trust and respect that encourages honest and open dialogue.
2. **Creating inclusive and safe environments:** Inclusive and safe environments for participants during interviews and focus groups are created by sharing personal information about ourselves at the beginning of the sessions. Instead of only providing professional details, we intentionally share a few personal facts. These introductions are a part of the interview and focus group protocols to help build rapport and trust. By including personal introductions, we create a more relaxed and trusting atmosphere, encouraging participants to feel more comfortable and open during the discussions.
3. **Challenging academic ways of knowledge:** We challenge traditional academic knowledge by combining rigorous data analysis processes, such as coding, recoding, and identifying themes and sub-themes, with the diverse perspectives of our team members. This combination allows us to thoroughly examine the data, interrogate long-held assumptions, and propose alternative interpretations. The integration of these methods with diverse viewpoints grounds our work from a focus of “fixing” Black women in undergraduate STEM majors to understanding and addressing the systemic issues that are affecting them.
4. **Encouraging authentic dialogue:** We encourage authentic dialogue with participants by fostering environments of trust, respect, and validation in the interviews and focus groups. In both, we ask questions to further explore their experiences. We establish connections with participants through both humor, empathy, and moments of silence. Within our team, we foster authentic dialogue by sharing our undergraduate experiences and by questioning and challenging prevailing narratives and assumptions that creep into conversations, based upon our individual academic positions.

5. **Establishing interconnectedness:** For participants, interconnectedness is established by having the same Co-PI facilitate all focus groups and having graduate researchers assigned to each institution conduct all interviews. Furthermore, interconnectedness is accomplished through validating and sharing findings during the focus groups (fall semester) and opportunities for continued dialogue during interviews (spring semester). For the research team, interconnectedness is achieved through regular reflection during weekly, monthly, and quarterly meetings and in data analysis discussions that emphasize the individual and collective experiences of Black women in higher education.

Through the aforementioned five focus areas, we challenge data analysis traditions and yield a greater understanding of knowledge validation and a higher standard of data accountability (Oduro, 2022). Because we are Black women, we are uniquely positioned to understand being silenced or not heard. For this reason, we value holding space for the participants along with mastering the logistics of collecting qualitative data.

### **Understanding, Embracing, and Leveraging Our Positionality**

All forms of research are framed and anchored by the researcher's positionality: the dynamic ways an individual is defined by their social identity dimensions (Maher & Tetreault, 1994; Settles et al., 2020). For example, researchers decide who to talk to, the questions participants are asked, where the research occurs, how participants' voices are used, and where to publish research results. In short, researchers control the process, and their positionality impacts every aspect of data collection and analysis (Clemons, 2019). Acknowledging positionality allows researchers to identify the lens through which they interpret the world and interrogate the research process. Embracing positionality is more than simply recognizing it exists. It is the awareness that some aspects of our positionality are fixed (i.e., gender, race, age, and ethnicity), while others, such as lived experiences, are more fluid, subjective, and contextual (Chiseri-Strater, 1996). In this project, we intentionally integrate fixed and fluid aspects of our positionality. The fixed aspect is highlighted through discussions about cultural identity and shared experiences, such as attending an HBCU or being a Black woman in STEM, regardless of the institution type. The fluid aspect is reflected in our recognition that our experiences in STEM and higher education are influenced by the interplay of multiple identities and social factors, as well as our evolving perspectives shaped by these lived experiences. Integrating fixed and fluid aspects of our positionality, including self-reflection, bias management, and embracing different forms of knowing, enhances every aspect of our research process.

As Black women researching Black women, centering our positionality means understanding and empathizing with the lived experiences of those we are studying. For us, there is often a careful balance that must be struck between the privilege of understanding, which comes from being a part of the same racial and gender community, and an over-reliance on finding meaning in the data from connection to personal lived experiences (Groves, 2003). We must

consistently explore our assumptions, biases, and values. We acknowledge that our construction of knowledge is intrinsically tied to our identities, and we consistently interrogate our thoughts and feelings, individually and collectively, as we seek to understand our participants' experiences as similar to and different from our own.

We make space for positionality in our coding process by acknowledging our insider privilege through the qualitative process of memoing (Birks, Chapman, & Francis, 2018). Each coder is expected to provide rationale, and memo notes whenever a data point triggers a memory or in any way causes them to question whether their personal experience is influencing their interpretation of the data. Beyond mitigating unintended bias, this process encourages each team member to continuously reflect, acknowledge, and examine their views, values, and beliefs so we can be clear regarding when and how our positionality has influenced our findings. Building from our wisdom through self-reflection and mitigation of our thoughts and feelings, we arrive at new knowledge.

### **Acknowledging the Influence of Group Positionality**

We also acknowledge and embrace our group positionality. Although all members of our research team are Black women, we are a multi-disciplinary, intergenerational, and cross-academic level team. Therefore, our group identity, and, thus, our group positionality is complex. Group positionality requires two-way sensitivity of each researcher on the team (D'Silva et al., 2016). Just as we honor the lived experiences of the research participants, we must hold space for each team member's ethics, personal integrity, social values, and research proficiency.

Through our weekly, monthly, and quarterly meetings, our team enters the research space knowing we may have collectively similar lived experiences to the participants but cannot assume their thought processes, feelings, or responses necessarily align with ours and our lived experience. In each meeting, we identify preconceptions brought into the analysis that represented past personal and academic experiences, unsubstantiated beliefs, and assumptions about participant responses. We spend time uncovering the differences between what we interpret as true, based on our biases, and what is actually present in the data. This process doesn't always result in changing assigned codes but does allow us to add another level of understanding to our analysis. Through this process, we consciously take steps to avoid allowing our group (or individual) positionality to take voice, agency, and power from our participants.

For instance, during our analysis of participant's reflective journals, the theme of belonging emerged. As we reviewed their accounts of feeling disconnected, we couldn't help but reflect on our undergraduate experiences and struggles with belonging. These discussions, enriched by our collective positionality, provided valuable insights into the theme. The discussions allowed us to draw parallels between our undergraduate experiences and the participants, contextualizing their challenges within the specific institutions and ensuring our interpretation of the participants' feelings were not oversimplified. Moreover, our group positionality fostered an

environment of shared learning around individuals' feelings of belonging (or lack thereof) based on their unique backgrounds and academic contexts.

Despite all members of our research team being Black women, our group's positionality is complex. Yet, this diversity enriches the research process by integrating multiple viewpoints and leads to differing interpretations and understanding of the data. Since we have dismissed the goal of objectivity and embrace the idea that researchers bring their own perspectives and experiences to the research process, we rely heavily on insights from our undergraduate researchers. The undergraduate researchers often face the same challenges as our participants and can provide real-life context to data that might otherwise seem disconnected. Remaining open and encouraging to the voices of our undergraduate researchers and every member of the research team is a key component to better understanding our research participants, and leveraging their experiences helps to confirm our codes.

There are also times when we pause during our discussion of data to regain our composure, as a participant's response can sometimes trigger past trauma in research team members. Instead of dismissing the trauma and moving forward to the next code, we unpack the trauma and determine how, once again, our experiences inform our data analysis. We then revisit the data point to question the appropriateness of the code selection. That is, was the code selection based on *what we were actually seeing in the data* or *what we were inferring from the data* based on our personal experiences? Through interrogating our thoughts and feelings, we better understand how our lived experiences within STEM influence our data analysis and how to acknowledge, yet mitigate, the unintended influence of our positionality on the analysis.

### **Allowing for Slow Research**

Another way of addressing the challenge of positionality is by engaging in *slow research*. As with holding space, this process adds significant time to data collection and analysis to understand the impact of our individual and group positionalities (Banda, 2018; Ranganathan, 2020). Allowing this extended time, termed "slow research", reminds us that creating knowledge versus reporting information requires quality, critical examination of various types of data to ensure the methods used are well-designed, and the conclusions drawn are reliable (Adams et al., 2014).

While *slow research* could be interpreted as stagnation or lack of progress, in the context of Black Feminist Thought, slow research is about power and autonomy in how Black women researchers use their time and intellectual labor (Banda, 2018; Grandia, 2015; Martell, 2014; Mountz et al., 2015). Banda (2018) describes the importance of slow research:

“ ‘slow research’ emphasizes the need for thoughtful, ethical, and comprehensive research that respects the complexity of the subject matter, the voices of those being studied, and how we engage with one another; it shifts the dynamics so that we have the capacity to choose the pace we work at without (fear of) repercussion from the 'powers-that-be', and

without defamation of our character, work ethic, and commitment to rigorous research.”  
(para.6)

The *slow research* approach ultimately contributes to a deeper and more meaningful understanding of the issues and experiences at the intersection of race, gender, and other social identities; it is well-aligned with Black Feminist Thought epistemology, which encourages researchers use of dialogue and reflection to assess knowledge claims and consider the interplay of various forms of oppression and privilege through a more deliberate examination of how social identities intersect and influence the experiences and outcomes of Black women (Clemons, 2019; Collins, 2000). We utilize slow research in our data collection and data analysis.

### **Data Collection**

An example of how we have incorporated slow research is in our data collection timeline of audio diaries, reflective journals, interviews, and focus groups. Although all collections capture participant thoughts and feelings, collection at multiple points within the semester and across semesters—audio diaries throughout the semester (fall and spring), reflective journals at the end of the semester (fall and spring), interviews at semester mid-point (spring) and focus groups at semester mid-point (fall)—allows us to refine our questions and methods based on ongoing analysis. This approach ensures that the research evolves in response to what is being learned and to changes, developments, and patterns in participants’ thoughts and behaviors at different time points. In addition, our timeline allows both the research team and participants to engage in ongoing reflection. We can revisit and revise our interpretations, while participants can reflect more thoroughly on their experiences through saved audio diaries and journal responses.

### **Data Analysis**

The development of our research framework exemplifies the concept of slow research. Significant time and attention during the regular quarterly sessions, monthly leadership meetings, weekly team meetings, and in-person leadership retreats have spawned in-depth discussions and continuous revisions dedicated to ensuring that the perspective being developed accurately communicates these women’s experiences. This process aims to be thoughtful, comprehensive, and reflective of participant voices, capturing how they interpret and respond to their experiences, rather than merely presenting the researchers' interpretations.

Our detailed data analysis process is also representative of slow research. It involves extensive coding and recoding to capture all nuances, guided by a flowchart outlining data types, transcription and import guidelines, and roles of primary and secondary coders. By revisiting the data multiple times to refine codes and themes, we continuously reflect on and refine our findings, while interrogating our biases and assumptions throughout the analysis.

Lastly, we involve our participants in the analysis process by inviting them to validate our findings during a focus group held each fall semester. At the beginning of the focus group, a research team member presents the findings and solicits feedback from the participants. This slow research approach ensures that our analysis accurately reflects the participants' meanings and experiences, rather than imposing our own interpretations or perspectives.

For us, embracing our positionality, fixed and fluid, while simultaneously engaging in slow research involves a deliberate, thoughtful, and ethical approach to research methodologies that values a deep commitment to addressing the complexity of Black women's experiences and allows us to engage with the participants and their data more robustly and authentically.

### **Disrupting Traditional Team Power Dynamics**

Power dynamics exist within any research team, and they are often designed to be hierarchical, with principal investigators at the top and undergraduate research assistants at the bottom (Berger, 2015). These power dynamics determine how work is distributed and who is deemed worthy of having a decision-making voice. Principal investigators traditionally exert their professional status as the authority. Black Feminist methodology requires attention to the relationship between power and knowledge, requires attention to power in the process of conducting research both from the perspective of participants and that of the researcher, as well as the continued examination of the researchers' specific power and privilege (Alinia, 2015; Hesse-Biber, 2007).

To disrupt these traditional roles, each PI reflected on their role within the research group while considering how their power, privilege, actions, and decisions may impact other group members. We then implemented several strategies for each team member to feel engaged in the project in a way that showcased their value to the overall team. This strategy has fostered a collaborative, respectful environment and a more cohesive research group. Through self-reflective interrogation, we examined the relationships, structures, and behaviors that would influence decision-making, communication, and overall interactions within the group.

Frequently in a research group, the PI or Co-PI is the primary driver of all portions of the research project. Although there are overarching roles and responsibilities for the PIs in our research team, the graduate and undergraduate researchers also share the responsibilities of data collection, data analysis, and dissemination with the PIs. There are considerable conversations over what we are seeing or not seeing in the data and what we should disseminate. Our undergraduate researchers have presented themes from the data analysis that are both insightful and creative. These themes are now the foundation for two proposed publications and exhibit yet another way we have dismantled traditional power dynamics within a research group.

Beyond traditional hierarchical power dynamics, power (im)balance(s) can also exist between relatively equal individuals where it can be difficult to notice due to the multiplicity of interconnected roles and positionalities (Nader, 2011). Some team members might dominate discussions, while others might hesitate to speak up. As our project focuses on undergraduate

Black women, creating a space for our undergraduate research assistants to share their unique perspectives and experiences without fear of judgment was vital. Initially, undergraduates were called on and asked to share their thoughts at each team meeting. As time has progressed, we are seeing that they share more openly and freely without prompting. The meetings are now structured as discussions amongst all team members. Instead of the PIs presenting updates from each site, the graduate and undergraduate students present and lead discussions, which shifted traditional views regarding who has authority and where knowledge comes from. By centering the voices and ideas of our undergraduate and graduate researchers on this project, we not only boost their confidence, self-esteem, and research prowess, we cultivate a research team that rejects the hierarchical limitations of who and how one performs research.

Despite our efforts to address power dynamics within the research team, we still face challenges and limitations. For instance, while graduate and undergraduate researchers participate across all data collection and analysis levels, there are ongoing challenges in integrating them into the dissemination process. Similar to traditional research power dynamics, the Co-Principal Investigators maintain primary authority over research projects, impacting dissemination strategies, target audiences, and publication decisions. Despite their valuable contributions, this hierarchical setup can marginalize graduate and undergraduate researchers (Katz & Martin, 1997).

Furthermore, we recognize the need for enhanced mentorship strategies to support our graduate researchers in navigating dissemination, nurturing skill growth, and fostering skill development (Paglis, Green, & Bauer, 2006). While we ensure due credit for all contributors in all publications and presentations, we also recognize the importance of fostering an inclusive, collaborative environment where our graduate researchers, if inclined, actively participate in dissemination decisions and practices.

### **Concluding Remarks**

*I am a product of intellectual tradition which until twenty-five years ago did not exist within the academy. Like patchwork in a quilt, it is a tradition gathered from meaningful bits and pieces. My (our) tradition has no name, because it embraces more than womanism, Blackness, or African studies, although those terms will do for now. – Barbara Omolade (1994)*

Traditional STEM education research and Black Feminist epistemology represent contrasting paradigms in how education researchers produce and understand knowledge. Although STEM research practices have evolved to include interpretivism and critical theory, we are fully aware of the tensions Black women STEM education researchers face in managing a methodological process that centers their intersectionality and positionality, while also honoring and holding space for the unique lived experiences of both themselves and their participants.

As Black women grounding our research in Black Feminist epistemology, we grapple with the aforementioned tension. However, we recognize that this tension, combined with the complexity of our dual role as both “colonized and colonizer” within STEM education research,

places us in a privileged position. It equips us with a research aptitude to understand and empathize with the STEM experiences of our participants through methodological processes that not only inform research questions, data collection, and analysis but also lead to more inclusive, meaningful, and transformative research. More importantly, our privilege empowers us to intentionally commit to and uphold methodological practices of data collection and analysis that center our role as researchers, acknowledge, embrace, and leverage our positionality and intersectionality, engage in slow research, and allow for differentiating power dynamics within our research.

Reflecting on Patterson et al. (2016), which emphasizes that “it is the responsibility of researchers utilizing Black feminism to demystify the value of subjective theories and methods” (p.59), we unapologetically commit to anchoring our STEM education research in Black Feminist epistemology, upholding its tenets, and embracing our identity as Black women STEM education researchers.

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