BOARD # 432: Racial Equity in STEM Education: Unpacking the Experiences of Black Women in STEM

Dr. Tamara Pearson, Georgia Institute of Technology

Tamara Pearson is the Constellations Center for Equity in Computing Deputy Director and Senior Director of Research and Programs at the Georgia Institute of Technology (Georgia Tech). Her work focuses on disrupting the root causes for the inequitable access, participation, and success of historically marginalized communities in computing. Dr. Pearson is the former inaugural Director of the Center of Excellence for Minority Women in STEM at Spelman College. In her two years in that role, she was successful in raising significant public and private funds, including a $5 million grant from Google to develop a data hub highlighting the unique needs and challenges of Black women in STEM, the largest ever grant of this kind from Google, and a $4.2 million Racial Equity in STEM Education grant from the National Science Foundation focused on the undergraduate of experiences of Black women in STEM. Prior to her work at Spelman, she served as Associate Director of School and Community Engagement at the Center for Education Integrating Science, Mathematics and Computing (CEISMC) at Georgia Tech, where she led K-12 school and district partnerships. Dr. Pearson holds a Bachelor of Science in Mathematics from Spelman College, with a minor in Computer Science, and an MEd and PhD in Curriculum and Instruction with a specialization in Educational Technology from the University of Florida.

Dr. Pamela M Leggett-Robinson, PLR Consulting

Pamela Leggett-Robinson is the CEO and Executive Director for PLR Consulting in Atlanta, GA. PLR Consulting is a boutique Program Development, Management, and Evaluation firm that works with organizations and institutions that seeks to address multi-faceted obstacles confronting both historically and presently marginalized groups in STEM environments as well as optimize current STEM programs through management and evaluation. Dr. Leggett-Robinson has more than 15 years of higher education experience which includes STEM academic and student success/support programming, strategic planning, data analytics, and program evaluation. As a PI, she has garnered funds in excess of $3 million dollars from both NIH and NSF for broadening participation in STEM Undergraduate Education and as an Evaluator has worked on large projects with NSF (Big Data, BioGraph), Google CS-ER, and DOD STEM Student Success. Her distinguished record of STEM programmatic success (at HBCUs and PWIs) is well documented in publications and presentations. Dr. Leggett-Robinson's latest publications, "Demystifying Promotion & Tenure: A resource for Black Women" and "Overcoming Barriers for Women of Color in STEM" are resources to assist Black women along their STEM journey. She currently distributes a bi-monthly Overcoming Barriers Newsletter to Women of Color STEM faculty. Dr. Leggett-Robinson holds a Ph.D. in Physical Organic Chemistry from Georgia State University and is a Certified Associate of Project Management.

Dr. Monica Stephens, Spelman College

Dr. Monica Stephens is an Associate Professor of Mathematics at Spelman College.

Dr. Kathaleena Edward Monds, Albany State University

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Project Overview

In order for the United States to remain competitive in the global market, it will need a diverse STEM workforce to tackle social, scientific, and technical problems that impact every aspect of our lives [1]. Unfortunately, despite a plethora of initiatives and a surge of research activity within the last ten years, the number of Black women persisting in STEM disciplines remains low, and in some fields continues to decline [1],[2].

In this paper, we share preliminary findings from our Racial Equity in STEM Education project. Understanding Persistence through the Lens of Interruption: A Framework for Transformation (UPLIFT) posits that the lack of progression for Black women in STEM is based upon continual and progressively more damaging interruptions. Through an exploratory, sequential, mixed methods, longitudinal study, this project develops a conceptual framework for the interruption of Black women in STEM, while elevating the voices of forty (40) undergraduate Black women in STEM at three institutions of higher education (IHEs) in Georgia. The purpose of this framework will be to define interruption, identify constructs of interruption related to intent to persist, and determine the relationship between the domains of power and the experiences of interruption by undergraduate Black women in STEM.

Statement of Positionality

This study is led by a team of Black women scholars. As Black women researchers, we understand that our lived experiences shape the way we approach research and the topics we choose to explore. Our personal and professional connection is broadly contextualized and grounded in our lived experiences of intersectionality. In addition, three of the four researchers have "transitioned" out of STEM. Although the point of transition differs among us, the lasting effects of the transition drive not only our individual research agendas but the ways in which we collect and interpret data. We also understand that it is impossible to identify all the ways our lived experiences impact how we collect and analyze data. However, what some may see as a limitation of our study, we see as one of its strengths.

Research Design

We document the experiences of undergraduate Black women in STEM as they progress from first to senior year, and ground our work in Black feminist epistemologies, which “affirms, rearticulates, and provides a vehicle for expressing in public a consciousness that quite often already exists” [3]. The experiences that Black women have in STEM higher education are similar to those of Black women who enter other traditionally white spaces. With this in mind, our research questions are:

1) In what ways and to what extent is the interruption of undergraduate Black women in STEM reflective of the structural and systemic oppression of Black women in the United States?

2) How do undergraduate Black women in STEM process the phenomenon of interruption in STEM education?

Data Collection

The mixed methods approach that we use to uncover the experiences of interruption by Black women in STEM is consistent with Black feminist epistemologies. Quantitative data is gathered from an annual subjective belonging assessment that uses items gathered from validated models and tools. Qualitative data is collected from a variety of sources including:

1) Reflective journals to gather data on how undergraduate Black women in STEM identify and experience interruptions, through a self-reflective look-back of the semester;
2) Interviews to assess perceptions and experiences of interruption over time as well as changes in intent to persist;
3) Focus groups to share emerging constructs and discuss the evolving definition of interruption with the research participants; and
4) Audio diaries to capture real-time thoughts and feelings around daily experiences and interpersonal interactions.

In addition, the data collection for this project follows an annual cycle allowing for the development of prompts and questions informed by previously collected data.

Data Analysis

Our quantitative findings inform and enrich our qualitative findings. For example, we use the quantitative data to help assign relative weights to the psycho-social constructs in our model. The weights are then used to find overlapping or related concepts in our qualitative data. In this way, our quantitative findings inform and enrich our qualitative findings. In addition, the data collection for this project follows an annual cycle allowing for the development of prompts and questions informed by previously collected data.

Preliminary Findings

Over the course of this project, the most prevalent theme across all three research sites is challenges with mental health. Sometimes these challenges can be attributed to stressors that many college students experience. As one student expressed,

> *I feel like everything's piling up on me and it's taking a toll on my mental and physical health. My body's been weaker, I've lost a lot of muscle that I had before. My mental health is not so well. I've been feeling overall tired a lot of the time, even though I get eight hours of sleep every single night. It's just a lot.*

Feeling overwhelmed from the immense amount of work STEM students must balance is not unique to Black women. However, a unique stressor our participants experience is the pressure to represent Black women in STEM. This pressure often comes as a result of negative experiences with faculty and peers, such as:

> *I really want to work hard to improve my skills and get really good at what I do so that I can show that us Black women can do things just as well and better than others around us.*

But they also shared deeper feelings of pride that would come from successfully completing a STEM degree:

> *I just think that the idea of being able to successfully earn my degree would be a huge accomplishment, not just as a Black woman, but for anyone, but it also shows that Black*

women are capable of accepting these big challenges and just contributing to diversity in the field.

As they move into the final phase of their college experiences, we are interested to dive deeper into the role that the representation of Black women and the need to be strong play in their intent to persist in STEM beyond their undergraduate degrees.

Discussion and Conclusion

Much of the theoretical work on student persistence and departure from college places emphasis on the student, rather than the institution, implying that marginalized students must assimilate into the dominant space, assume the dominant ways of being, and subscribe to and operate in meritocracy and deficit model thinking in order to persist in STEM, leaving the institution unchanged [4],[5],[6],[7]. In addition, the false narrative of meritocracy reinforced by the leaky pipeline metaphor, results in undergraduate Black women in STEM struggling to manage the many common challenges of the transition to college, while also processing racist and sexist experiences [3],[7].

Enhanced participation of Black women in STEM is of ethical imperative, and empowering individuals who would otherwise not be able to fully engage in STEM improves the quality of research and increases our national potential to advance science and solve real-world problems [1]. By unpacking the experiences of undergraduate Black women in STEM, we can better understand how to define interruption, and how these repeated interruptions by peers, professors, and themselves, lead to so many Black women leaving STEM fields.

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