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Deprogramming Deficit: A Narrative of a Developing Black Critical STEM Education Researcher

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Deprogramming Deficit

A Narrative of a Developing Black Critical STEM Education Researcher

Monica L. Ridgeway

Abstract

This essay shares a personal narrative from a Black woman STEM education researcher whose experiences living in poverty positively impacted her childhood and provided her with skills and strategies to navigate academia. The author's lived experiences have influenced her social justice research agenda aimed at combating social inequities. Her use of narrative is intended to provide insight for other researchers of color who may share similar experiences with their participants. Ultimately, her goal is to disrupt deficit narratives about communities of color living in poverty, which typically fail to address their systematic disenfranchisement, by providing a counter-narrative and descriptions of her lived experiences with STEM.

Keywords: STEM education, counter narrative, Black students, positionality

Introduction

The purpose of this essay is to encourage scholars of color in science, technology, engineering, and mathematics (STEM) education research to leverage their positionality and lived experiences within communities of color to challenge mainstream education's deficit portrayal of them. Mainstream education has limited understandings and devalues the assets, including sources of support and cultural richness, within communities of color (Yosso, 2005). It is my hope that institutional spaces would be transformed to embrace people of color for who they are and what

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they contribute, influencing people of color to have more positive interactions with institutional spaces that have historically been hostile and unwelcoming (Dumas, 2014; McGee, 2016; McGee & Martin, 2011).

As a critical researcher, I have noticed an extreme contrast between how mainstream education depicts students of color, their families, and communities and how these students would describe themselves (Ridgeway & Yerrick, 2016). These conflicting narratives are problematic because mainstream education research, which is heavily influenced by White, middle class ideologies, forcibly measures communities of color against those White middle class ideologies. Thereby, non-mainstream groups' cultural norms are devalued (Mutegi, 2011, 2013; Seriki, 2018, Walls, 2011; Yosso, 2005).

In addition, the historical and contemporary disenfranchisement of communities of color is often excluded in mainstream understandings and narratives about communities of color (Fránquiz, Salazar, & DeNicolo, 2011). Without contextualization, communities of color can be blamed for their circumstances when there are external factors, including systems of oppression, that create the daily reality in which marginalized groups live (Farmer-Hinton, Lewis, Patton, & Rivers, 2013; Ridgeway & Yerrick, 2016; Ridgeway & McGee, 2018). Scholars of color who have experiences living in poverty can position themselves to tease out the external and internal factors that impact communities of color (Martin & Gholson, 2012). Furthermore, scholars of color may bring forth the joys and cultural riches of their experiences, which can go ignored, unnoticed or uninvestigated by their mainstream counterparts, which in turn would generate more nuanced, anti-deficit narratives about participation in STEM (Fránquiz, Salazar, & DeNicolo, 2011; Walls, 2011; Yosso, 2005).

Marginalization in Higher Education

As I entered college, I had difficulties connecting with the science of the classroom. However, as a young mother who wanted to provide for my daughter, I was encouraged to pursue STEM by a college counselor as a way to do so despite my discomfort. As I pursued my Bachelor's and Master's degree in Geology at a large northeastern research university, I was the only Black person in my predominantly White institution. The few non-Whites who gain access to STEM spaces often experience tokenism (Wingfield & Wingfield, 2014). Tokenism is the celebration of the few Black people who have been permitted to operate in the mainstream environments; it is a visible and surface level effort to demonstrate the perceived openness to embrace Black people by recruiting a small number and encouraging them to assimilate, if they have not already been acculturated (Robinson, 2013; McGee, 2016; Wingfield & Wingfield, 2014).

People who are tokenized can be sought out to participate in many additional activities their peers might not be asked (Wingfield & Wingfield, 2014). For example, on multiple occasions, I was requested for photo opportunities for marketing the

department. I was their most advertised student. The college had a well-circulated paper where my experience was featured. I was even interviewed for the university admissions office's recruitment video. To demonstrate how my image was used for recruitment, consider an image of me holding my twenty-month-old daughter in a mineral and rock laboratory (see image 1).

It is pictures like these that are used to attract and recruit other students of color (Castro, 2014). Today my daughter is twelve years old, and this picture is still circulating. It conveys the message, "If this Black single mother can do it, you can too!" Being showcased in this way caused me to question whether there were other Black people in the program before or after me. Castro (2014) referred to these widely-used marketing practices as operating from a deficit ideology, which assumes that underrepresented minoritized people just do not know about the STEM majors and professions, and they will join once they are aware. Castro warns that these recruitment practices can reinforce beliefs that Black and Brown people do not know as much as their White counterparts. She found that university faculty, who implemented diversity initiatives were often unaware of the historical oppression and marginalization of Black and Brown people. It is unlikely the individuals charged with the task of diversity can even begin to welcome Black and Brown people in White-dominated fields if they do not understand the environment they are recruiting them into (Castro, 2014). If institutions do not move beyond tokenizing the few in the field, we will continue to avoid the real barriers and maintain the status quo by not transforming the space to be inclusive.

In addition to the department celebrating their only student of color, I received a full scholarship as a part of the college's diversity efforts. One of the scholarships was titled "Smart Grant," and it was for underrepresented students in "hard" science majors who maintained at least a 3.5 grade point average (on a 4.0 scale). My peers were aware of my scholarship. Some had even made comments that I received support because I was "a minority," which indicated to me they did not feel I earned financial support. While I did not share my private life with them, I needed the support: although I was working while in school, I was still living in

Image 1

Image of my daughter (Toni) and me



poverty with a small child. Even with support, it was difficult. I worked extremely hard to maintain my academic standing despite the oppressive context. I feared failure since I would lose my funding if I did not perform well.

Because I was underprepared by my high school, I did not have the same academic foundation as some of my peers. Scholars Reid and Moore (2008) found that students from urban schools were more likely to experience underpreparedness compared to their suburban counterparts. Reid and Moore (2008) concluded that students from urban schools need to have access to curricula that aligns with higher education to increase their preparedness. Such as Advanced Placement courses where students in their study felt more comfortable making such a transition. When reading the participant narratives in Reid and Moore's (2008) study, I found their experiences resituated with me and helped me make sense of my experience of being academically unprepared. I did not have the opportunity to take Advanced Placement courses nor were all sciences and mathematics courses offered. For example, I did not take physics and calculus in high school, which were courses required in my college program. This under-preparedness of youth living in poverty is a prime example of the opportunity gap (Milner, 2013). My urban schooling did not prepare me for the rigors of higher education because it was not envisioned that many of us would take such a path. This form of marginalization is embedded within the structure of schooling, and replicates a cycle of social inequality.

Re-shaping My Narrative

Within and across marginalized groups, there are unique qualities and complexities that have yet to be fully investigated in education research (e.g., Walls, 2011). Inter- and intra-group complexities would go uninvestigated which would disrupt the homogeneity they have experienced by mainstream education research. Which can lead to incorrect assumptions about communities with distinct histories and circumstances (Nusbaum & SantaMaria, 2018). The narrative used in the academy, whether in education research or self-narration, should represent communities of color in ways that honor their lived experiences and no use White mainstream norms as the measure. There is cultural wealth and richness within communities of color that academia can learn from to transform to be an inclusive and welcoming environment (Yosso, 2005).

After completing my doctoral program, I re-read the personal statement that I had written while on the job market. I described myself as a product of a teen pregnancy raised in the projects, a high school dropout, and a young single mother. I used these factors to highlight "how far I have come," demonstrating my ability to persevere through the academy. While these descriptions are all true, there are several issues with this self-narrative: they are limited in their explanation and deficit based. However, this is a narrative I have been conditioned to give the academy. It reinforces the illusion that the academy is an equitable environment; that it is fair

and accepting of diverse people. However, this narrative is harmful to myself and other marginalized people. It places the onus of success and navigation on minoritized people while not accounting for how racist policies and practices construct barriers to limit access and participation of non-mainstream people. In addition, the assumptions that underlie the narrative suggest that people of color who do not want to remain in the academy or in their disciplines are somehow inadequate or are quitters. Which problematically uses perseverance as the measure since highly functioning underrepresented people in STEM can leave due to the STEM climate and not their performance.

Research is Subjective

Research is subjective and driven by the researchers' lived experiences (Walls, 2011). These experiences influence the types of questions researchers ask, how they approach inquiries and the interpretation of the results (Walls, 2011, 2017). When the education researchers themselves come from primarily from one racial group (mainly White people) it can impose their views and measures on others while privileging their own culture and racial group. Research has oppressive historical roots in education (Guthrie, 2004). Therefore, research can be a source of tension for researchers who a part of a marginalized group since how they might approach their research and choose questions can be outside of and/or in conflict with mainstream education research practices. As a researcher from a marginalized population, my research interests and agenda can be a strategic act of resistance against mainstream education (Huber, 2016; Ridgeway & McGee, 2018). I can find myself reading mainstream education STEM research about minoritized people and find some of the research to be limited in explanation and focusing on academic outcomes and at the same time neglect factors that lead to the outcomes.

As a Black STEM education researcher, I find challenging mainstream STEM education to be difficult at times because: (1) Black students are depicted as low performing and disengaged science learners (Mutegi, 2011, 2013); (2) Black students' families and communities are devalued and dehumanized (Duncan, 2005; Gholson & Wilkes, 2017; Ridgeway & Yerrick, 2016); and (3) STEM is narrowly defined by and limited to the Western European version, which is constructed by and for White people and negates the historic participation of Black people as creators of STEM knowledge (Bullock, 2017; Le & Matias, 2018; Mensah & Jackson, 2018; Mutegi, 2011). One result of this is people of color are absent as STEM producers in K-12 and higher education curriculum leaving the illusion for both mainstream and non-mainstream students' that people of color are not contributors nor are worthy of discussing (Walls, 2011; Mutegi, 2011). This inaccurate teaching of STEM topics negatively impacts the STEM identities of students of color for a few reasons. It can lead students of color to internalize that negative messaging and question their belonging. In addition, it can negatively reinforce to their mainstream peers

and teachers/faculty to interact with them in ways that create exclusive learning environments. Since the STEM environments they have experienced have not been inclusive of people of color.

Researchers Positioned Within Marginalized Communities

As a Black woman, challenging mainstream education research by conducting research in Black communities can be strongly critiqued (Ladson-Billings, 1995). I can be considered biased as a “native anthropologist” (Narayan, 1993; Ladson-Billings, 1995). Narayan (1993) described traditional anthropologist as one who interoperates a cultural group, but who is typically positioned outside of the culture they are investigating, advocating this unique positioning allows for a deep and “intimate” (Narayan, 1993, p.672) description. However, scholars of color have critiqued this rationale typically used by mainstream researchers to exotify and distort understandings about communities of color and make sense of those cultures using mainstream cultural norms as the standard (e.g., Farmer-Hinton, Lewis, Patton, & Rivers, 2013). Ladson-Billings (1995) argued that, as a Black woman education researcher interested in success stories of Black students, her research would be considered biased or skewed (typically, by mainstream education researchers) since the literature about Black students was inundated with deficit literature. To challenge this literature and the perception of bias, she utilized rigorous research methods to co-construct meaning with her participants so that her interpretation included the voice of the participants. This co-construction is imperative: there should not be one author or a single voice that narrates the “Black” experience as this would add to the homogenizing of Black people.

STEM Is Omnipresent

Mainstream science education literature (like other STEM disciplines) uses deficit language to describe Black students’ academic engagement and outcomes (Battey & Leyva, 2016). This line of literature has led scholars who want to challenge mainstream education research with the additional task to prove that Black students are brilliant (Gholson & Wilkes, 2017; Leonard & Martin, 2013; Mutegi, 2011, 2013; Ridgeway & McGee, 2018) since Black students are most likely to have their brilliance go unrecognized (Berry, 2008; Martin, 2009; Walls, 2011). Scholars have argued that deficit-oriented stereotypes have harmful impacts on Black students, which, in turn, are used as rationales to determine who will gain access to quality STEM experiences and how students’ participation is interpreted (Bullock, 2017; Gholson & Wilkes, 2017). The project of establishing the brilliance for Black students is fraught with danger because that brilliance can be a measure by which to establish humanity and, therefore, identify those thought deserving of opportunities (Gholson, Bullock, & Alexander, 2012). However, other research has

shown that even when Black students are “labeled” as brilliant or gifted (according to mainstream standards) they still face racist policies and practices that limited their participation and create uncomfortable learning environments (Berry, 2008; McGee & Martin, 2011). Gholson, Bullock, and Alexander (2012) cited Martin (2011) call for scholars to not prove that Black students are brilliant, but rather view Black students’ brilliance as axiomatic—it is proven.

Martin’s stance that Black students are brilliant can be applied to science education. Many science education research scholars of color and other equity researchers are left to show Black students can do science. However, I contend they are already doing science and solving problems daily. My concern is that not accepting the fact that Black students are brilliant and operating as such is problematic in science education research. It dangerously overlooks how STEM is already embedded into non-mainstream cultures and that knowledge is omnipresent despite it not being recognizable to mainstream counterparts. I wonder how would STEM education would look in the United States for Black students if they were appreciated for the brilliance they bring to academic spaces and how might those spaces transform to be inclusive of their presence without them having to assimilate.

When I think about those aforementioned possibilities, I reflect back on my childhood experiences living in a government housing project and my science learning in K-12. I wrote a journal entry during my dissertation study about my earlier experiences with science at home, experiences that did not readily connect to my in-school learning (Ridgeway, 2016). Within the entry (August 2015), I focused on the connections that could have been made between home and school.

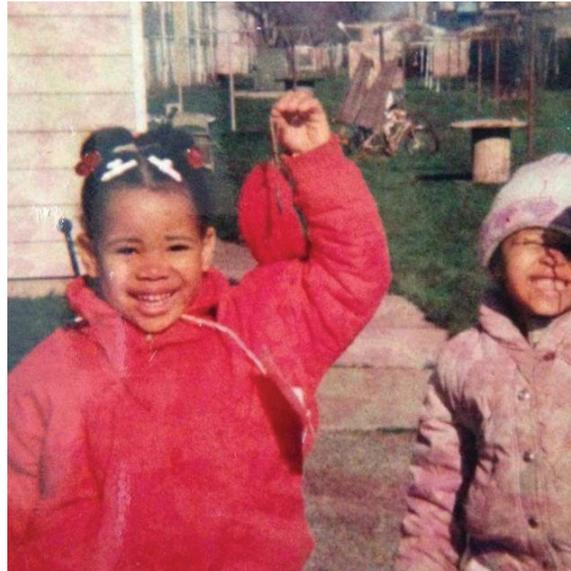
I remember right outside of our apartment door, there was a hole in the concrete sidewalk that was about 5 inches across and 4 inches deep. The hole was the source of much entertainment for me and my younger brother. I would pretend that it was a kitchen pot where I would cook the best mud pies and rock soup (I was creative and innovative). For my brother it was a hiding place for his figurines (my brother was creative and innovative and creative). While I would try to cook, *he would fill the hole with as many pebbles* (geometry experiences with shapes and volume) as he could just to annoy me. *I would then have to use a thin twig as a lever* (real life experience with physics) to remove all the rocks; *it was very tricky* (I was problem solving). Near the sidewalk with the hole there was a bush right outside of our apartment door. *It was always covered in spider webs and had the biggest spiders* (early experiences with making science observations). My brother and I would *become spider hunters* (engaging with nature). Well, we weren’t *really* hunters because my mom said we weren’t allowed to hurt them (parental involvement with science). She said *we were actually in their home* (parent involvement with teaching science). I remember when it would rain my brother, the other neighborhood children, and I would *become rescuers* for the earthworms (engaging with nature). *We knew that when it rained heavily, earthworms would come out onto the sidewalk* (science observation). *We would pick up the worms and put them on the driest grass we could find so they wouldn’t get stepped on* (problem solving in collaboration).

As you can see in Image 2, my god sister (Catrice Huff) and I proudly rescued earthworms (I am pictured on the right).

I share this account to remind the reader that growing up in living in poverty was not a devastating experience: I was a happy child surrounded by family and friends. I always had a playmate. In addition, I had science in my life, and an appreciation for nature. However, as I thought about my in-school science experience, I cannot recall any meaningful and/or memorable connections that were made from my home to school. It was as if they were two worlds that never connected. Also noted in the journal entry above there were many entry points to science that were present within my life that were never intentionally connected in school. The disconnected and disjointed nature of in-school science presents difficulty for students making connections. They can be treated as if they have never made observations or solved problems at home which is inaccurate. They engage in these skills all of the time. It can also leave the impression that science is an elite topic preserved for others, since many times in science teaching instruction starts with the jargon and not actually engaging or enacting in science which can be discouraging and unpleasant for students to continue in STEM fields and majors. As a STEM education researcher, this disjunction between home and school has been influential in how I view science and Black people. When researching and providing support for marginalized groups, it is important that researchers move away from comparing marginalized groups to mainstream standards or seek data that confirms firmly entrenched deficit ideas of

Image 2

Rescuing worms with my god sister



marginalized communities (Gholson, Bullock, & Alexander, 2012). Placing mainstream values and solutions on marginalized communities is an act of oppression that devalues the cultures and ignores the actual barriers to accessing STEM.

My Experiences Influence My Research

At this point, I have shared a few lived experiences that have influenced me as a Black woman STEM education researcher. When I share my personal story in the academy, I have found that it may come across as a story of perseverance; however, such a misrepresentation of my experiences reinforces a negative assumption that only some of us work hard enough to complete degree programs. It is a narrative I am learning to re-tell in an honoring way. Like highlighting the supports I had in my community growing up that influence me as an adult. I believe that the skills I have learned growing up in the projects are attributes that should be adopted in higher education, like true teamwork and a sense of community the idea of working together in solidarity, believing if one of us is “winning” we all are, and there is enough to go around, helping your peers be successful by sharing valuable knowledge, and being concerned with others holistically are just a few. I have been celebrated in many academic spaces for my ability to create spaces where people will come and work together for the purpose of having nurturing academic environments. At first, I found this attention odd because it would be the same things I would do at home. However, this is a skill that I have learned in my early days of bring the neighborhood children together so we can play games for us to all enjoy. Or by my parents not allowing me to leave my younger brother behind so I had to create activities we both enjoyed.

My experiences with living in poverty contribute to my interpretation, approach, and sensitivity to marginalization. I am unapologetic about my love and advocacy for marginalized groups and how it is essential for me to maintain an action-oriented social justice research agenda (Ridgeway, in press). As I am continuing to develop as a critical Black STEM researcher (Martin & Gholson, 2012), I am re-programming myself to push back against deficit ideologies that have been conditioned as normal. It will be an ongoing process for which I do not think there is an end-point since racism is so embedded within the United States and I find it in many areas of my life. This process has influenced me to be reflective and interdisciplinary so my response to racism is complex and evolving.

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