

NAVIGATING THE WHITE SPACE OF MATHEMATICS: LESSONS LEARNED FROM MATHEMATICS TEACHER EDUCATORS OF COLOR

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As critical race theorists would remind us, those most impacted have the greatest insight to create change. This paper applies a critical race theory framework to explore the leadership experiences of two African American and one Latinx American mathematics teacher educator and how they address issues of race, racism, and (in)justice in teacher professional development. Data analysis from semi-structured interviews, publicly available webinars and podcasts, and other published materials from the educators (eg. articles and books) reveal how they engaged teachers to attend to issues of race and racism by challenging persistent masternarratives about mathematics and mathematics ability; centering on counternarratives on the cultural identities and mathematical understanding of students of Color; and engaging in community-based pedagogies to promote coalitional resistance.

Keywords: teacher educators, social justice, professional development, equity, inclusion, and diversity,

Critical race theory (CRT) has seen steady growth in use as an interpretive lens to analyze and challenge racism in K-20 context and policy (Ladson-Billings & Tate, 1995; Solorzano & Yosso, 2002; Tate, 1997). Yet, a gap exists in applying CRT in the field of mathematics education and the actions mathematics teacher educators must take to address racial and social (in)justice in teacher professional development. Martin (2019) discussed this point in his critique of the silence of anti-Blackness and white supremacy logic in the politics of mathematics. Gholson & Wilkes (2017) builds on similar claims to highlight the prevalence in mathematics education of racial scripts which divide, sort, and stratify, along a caste hierarchy placing whites at the top and Black at the bottom (Wilkerson, 2020).

As educators, scholars, and community organizers with deep commitments to equity and racial justice, our work is situated by the impact of a legacy of educational injustices (Ladson-Billings, 2006) in which the mathematics education system must be reimagined. We draw on CRT as it specifically acknowledges racism as endemic and actively confronts white

supremacy within mathematics education. We extend and apply this framework to chronicle the paths of mathematics educators of Color whose scholarship addresses the racial challenges thrust upon teachers and learners of Color and the gatekeeping nature of the mathematics discipline. Specifically, this study explores the leadership experiences of two African American and one Latinx mathematics teacher educator and how they address issues of race and racism in teacher education. Data include semi-structured interviews, publicly available webinars and podcasts, and other published materials (eg. articles, books) to answer the research question: What knowledge can we gain from the stories/narratives of mathematics educators of Color as they explore their experiences in, with, and for creating professional development that attend to race, racism, and racial justice in mathematics education?

Study findings reveal the ways in which educational histories, cultural and ancestral roots, the students served, and current equity leadership informed their perceptions and engagement with racial justice. Our paper raises questions to the field about how we understand social justice leadership in mathematics education and support current and aspiring leaders of Color who seek to promote racial equity in their work.

Theoretical Framework and Literature Review

Our project is motivated by pressing issues in mathematics education: 1) longstanding racial injustices that have come to the fore in U.S. society and mirrored in mathematics education (Gholson & Wilkes, 2017; Martin, 2019), 2) mathematics teachers and teacher educators are majority white, while serving a disproportionate number of students of Color (deBrey, et al, 2019); and 3) mathematics serving as a gatekeeper to nearly all aspects of success. As such, we are interested in interrogating and disrupting the role mathematics education plays in perpetuating white supremacy. With few exceptions (e.g. Battey & Leyva, 2016; Martin, 2015, 2019), the literature has not significantly examined how whiteness and white supremacy culture function in mathematics education (see Martin, 2015, 2019). We draw on Critical Race Theory (CRT) (Ladson-Billings & Tate, 1995) to interrogate aspects of whiteness in mathematics classrooms, schools, and the education system. CRT has its origins from Critical Legal Studies, developed in the mid-1970s from the work of legal scholars of color, such as Derrick Bell, Mari Matsuda, and Kimberle Crenshaw, interested in investigating and transforming the injustices that were brought about due to issues of race, racism, and power in our society (Delgado & Stefancic, 2001). Although CRT began in legal studies, it expanded to other disciplines, including mathematics education. Within the field of education, CRT scholars (Davis & Jett, 2019; Solorzano & Bernal 2001) outlined several key tenets which inform our research methodology, including (a) centrality of racism; (b) intersectionality and anti-essentialism; (c) commitment to social justice; (d) voices and counterstories; and (e) interdisciplinary perspectives.

Centrality of Racism

The first tenet of CRT is the notion that racism is not a random, isolated act of racist individuals; rather, racism is a normal feature and embedded within systems and institutions. According to Delgado and Stefancic (2001), racism “is the usual way society does business” (p.7). Mathematics education by design has a legacy of systemic epistemicide of communities of Color—the erasure of knowledge systems, including languages, experiences, and interpretations of the world, and ways of coming to know and understand—through exclusion from its functions, curriculum, and pedagogy (Yeh et al., 2021; Louie, 2017; Martin et al., 2010).

Intersectionality and Anti-Essentialism

CRT recognizes multiple identities – race, class, gender, sexuality, ability - and their positions within intersecting relations of power. According to Delgado & Stefancic,

“intersectionality means the examination of race, sex, class, national origin, and sexual orientation and how their combinations play out in various settings” (2001, p. 51). Identities are not fixed; anti-essentialism acknowledges the fluidity and constant shift of cultural identities within an oppressive system (Gillies, 2021). While our society and mathematics education are often organized along binaries (e.g. right or wrong, math smart or not, innate or social), CRT scholarship sees the complexities required to examine and abolish systems of oppression. For example, racism and ableism are interwoven in mathematics education, in which mathematical “smartness” is an ideological system that perpetuates whiteness and serves as a tool for stratification (Yeh et al., 2020; Leonardo & Broderick 2011). Ability is commodified and seen as property; success is measured in terms of achievement of numerical target, and such data are used to construct and constitute some students as “mathematically smart” while simultaneously constructing and constituting others as “not-so-smart,” deficient, or learning dis/abled (Yeh, et al., 2020). CRT tenets of intersectionality and anti-essentialism challenge these binary systems and instead seek ways to counter these paradigms that uphold inequities in education. In challenging these definitions, we are not only incorporating intersectionality and anti-essentialism but challenging dominant ideologies themselves.

Commitment to Social Justice

CRT is about empowerment. Anzaldúa (1987) refers to the term borderland consciousness, the ways of knowing and being Peoples of Color produced in multiple and often contradictory physical, social, and political spaces. Their worldviews as students and educators of Color include homegrown ways of knowing as well as western epistemes. These approaches empower educators and students of Color in that they recognize the advantage of having insights into the experiences of the Oppressed and the Oppressors and can reveal the cracks that support social change (Anzaldúa, 1987; Collins, 2000; Davis, 1990; hooks, 1989). Our work here is to attend to and leverage the multiple ways of knowing mathematics educators of Color to offer recommendations for ways to take action for social justice.

Voices and Counterstories

Dr. Mari Matsuda (1987), one of the legal practitioners from the original movement, argues that the work of justice must center on the voices that have been left out. Matsuda refers to them as “voices from the bottom,” Anzaldúa (1987) calls them “mestiza,” and hooks (1990) advocates for using these excluded voices to produce transformative knowledge. Counternarratives build from the belief that communities of Color hold deep resources and ways of knowing and being that are particularly important in disrupting colonial ideologies pervasive in mathematics. Yet, much of these rich and collective ways of knowing and being have not yet been made visible. It is through centering the voices of communities of Color to offer historical accounts, interpretations, and cultural practices as resources to question and challenge dominant narratives.

Interdisciplinary Perspectives

CRT scholarship challenges ahistoricism and the unidisciplinary focus of most research analyses. It is predicated on analyzing race and racism in both historical and current contexts from an interdisciplinary or transdisciplinary approach (law, sociology, education, psychology, ethnic/gender/disability studies, etc.) which is needed to better understand the systemic nature of racism and white supremacy. For example, few scholars explore mathematics as an agent of carceral state; yet, violence is enacted through institutionalized policies, such as school disciplinary practices that offer brutality, suspension, expulsion, and detention often occurs in STEM classrooms (Bullock & Meiners, 2019; Gholson & Wilkes, 2017). An interdisciplinary

perspective recognizes, interrogates, and then disrupts systems of violence and trauma experienced in and beyond mathematics classrooms.

Method

Critical Race Theory served as our methodological framework. We understand that race is a sociohistorical and political construct, created to empower whites and oppress people of Color; as such, we use counterstorytelling (Delgado and Stefancic, 2001) to capture experiences in discussion and praxis that attend to race, racism, and racial justice. This study includes one African American male math educator, one African American female math educator, and one Latinx female mathematics teacher educator in which their self-selected pseudonyms are Francis Cox, Etta Falconer, and Katherine Johnson, respectively. The criteria for participant selection included the following: 1) self-identification as an educational leader of Color; 2) extensive experience (20+ years) as a classroom teacher and mathematics instructional coach; and 3) research and teaching that focuses on examining the ways education intersects with issues of race, equity, and justice in communities that have historically been, and continue to be, underserved by schools (e.g. Black, Latinx, Indigenous, or immigrant populations).

Attending to story, theory, and praxis, the data sources include three semi-structured, in-depth interviews (roughly 1 hour each), three publicly available webinars and podcasts (1 hour each), and other published materials written by the participants (e.g., articles, books). Analysis began with the webinar and podcasts. For the webinar and podcasts, we created an accompanying transcript. Each transcript was divided into talk segments, where each segment represented a central idea the interviewee focused on during a posed question or activity. At least two of the seven members of the research team coded and categorized each webinar and podcast through a critical race analytical lens and tenets of CRT (e.g., centrality of racism; intersectionality and anti-essentialism; commitment to social justice; voice and counterstories; and interdisciplinary perspectives) as well as from the K-12 and higher education scholarship on racialized experiences of teachers and students of Color cited in the literature review. Example codes included definitions of mathematics, racial hierarchy, transformational resistance, intersectionality, and color blindness. Coding allowed us to categorize the data into overall themes as codes that were repeatedly used across the three cases, which were then placed into overarching themes. After the research team member coded the podcast/transcript, coding was discussed by the research team of seven for agreement. Disagreements were resolved through discussion. After coding each educator's podcasts and workshops, we interviewed three of them. Interviews were about 60 minutes each. Interview questions began with:

1. What should mathematics instruction look like when it centers on the mathematical brilliance of Black, Indigenous, Latinx, and multilingual students and their communities?
2. How do we support the creation of school systems or structures for teachers to have the school-wide support to implement and learn equitable practices in math ed?
3. Most of our workshop consultants are white mathematics teacher educators, what resources would help them to be able to authentically engage in racial justice work?

Interviews were transcribed and analyzed using the same codes as described above. Triangulation of data allowed us to gain a better understanding of the experiences of the three educators. We used publicly available podcasts, webinars, interviews, and published articles as methodological procedures to triangulate the data.

Results

In our analysis, we surfaced three major themes: All three educators of Color discussed the need to situate mathematics education within broader societal contexts and the need to challenge white masternarratives that position mathematics and mathematics ability as singular, individualistic, and ahistoricized. They described their own and students' cultural identities and understanding and its connection to mathematics teaching and learning and the need for coalitional resistance to disrupt whiteness in mathematics teacher education.

Challenging Persistent Masternarratives.

All three mathematics teacher educators described specific ways in which mathematics education itself functions as a white space in historicized context, naming the contemporary forms of institutional, structural, and everyday racism in the here and now rather than just the past. Specifically, they called to rethink what constitutes mathematical knowledge and what constitutes knowledge production in mathematics education. In his interview, Francis highlighted the need for mathematics teacher educators to explicitly shift away from the white frame:

I would say that it should look the same or similar as when it centers on the mathematical brilliance of white students right, so it should have examples and images of people that reflect their culture and the contributions that people from their history and culture have made to the field of mathematics, it should include examples that also reflect students that are African American, Latinx, Indigenous, multilingual students.

In the quote above, Francis highlights that racial equity work in mathematics teacher education requires us to examine critically whose histories, cultures, and experiences are centered in mathematics curriculum and the ways in which whiteness is made hegemonic as it is positioned as the normative and communities of Color as the exception. He further explains that,

Looking at mathematics from a kind of diverse Black perspective, there's a book called "The Crest of the Peacock: the Non-European Roots of Mathematics." Now [it] does get into some pretty heavy mathematics, at some point, you know so it's not for the faint of heart right, but you know I think anyone can [at] least engage in it to get an idea to dispel the myth that you know mathematics is a European invention and endeavor right? That it is a human endeavor right? Rochelle Gutiérrez says mathematics needs people, just like people need math mathematics right and, and I think we've moved too far away from that notion that mathematics is a human endeavor that all humans engage in right, whether they realize it or not.

All three math educators explicitly called to broaden curricula, classroom environments, and school cultures to explicitly attend to the voices, perspective, histories and experiences of communities of Color. In the webinar led by Francis Cox and Etta Falconer, the workshop opening mathematical task asks participants to match the professions of Black dentists, Black professional athletes, Black doctors, and Black lawyers to "the corresponding number of Black professionals in the United States". The opening task explicitly attended to participant bias and public narratives around Black professions.

During the interview, Etta Falconer stated, "representation really does matter. So it's important that you make sure that all students can see themselves reflected in the curriculum." Every mathematical task and student vignette used in the professional development workshop focused on the agency and identity construction of Black youths and the ways in which social structures mediated their mathematical identity formation.

Cultural Identity and Understanding.

The mathematics educators used storytelling to center on the experiences of communities of Color and as examples to generate action. Both Katherine and Francis began interviews sharing their mathematics experiences as students and teachers in which their experiences shaped their work and commitments. As a student, Katherine “felt dehumanized in class. I felt invisible. I use the word invisible when I talk about my schooling” and Francis worked in “neighborhoods that had experienced poverty and other kinds of trauma, and, you know, large numbers of students who have been underserved.” While their experiences could be viewed as “challenges”, their stories testify to the normalization of such experiences for children and teachers of Color AND the strength and resilience communities of Color developed.

They saw themselves in the students and teachers of Color they served.

All three educators talked about the importance of developing mathematics learning experiences that shift from damaged based narratives to student strengths by building from their cultural identities and understandings. Katherine in a podcast interview talks about the importance of recognizing the brilliance of children and embedding their culture in the mathematics classroom:

So we expect that all students are brilliant. That's a mindset issue. We talk about growth mindset. This is more than that. This is knowing that all students and believing that they're brilliant, and they bring knowledge, mathematical knowledge into the classroom, right. So that's one of the pieces. The other piece is also bringing that cultural competence, right. I'm caring enough about the math that you're doing, and I want to learn about it. And, and I want to share the math that I do, too, you know. We talk about real world math all the time. It's really not real world, many of the problems that we see in books are contrived. Real world math is the math that kids are actually doing with their families. And so, how do we tie that into the standards and bring those into the classroom, like my colleague [anonymized] said, as tasks, as activities, because that's going to build students' cultural competence. And I think sometimes it brings, well, I know it brings the community together, cause the more I know about Maura, Joe, and Stella, the better I get to perform as a student, because now I know how they best understand math, what they care about, the math they do in their everyday life

Katherine in a webinar describes how she was able to learn more about her students and what they brought into the math classroom by having them draw their own multiplication array, pulled from their families and family experiences. In particular, she gives the two following examples:

One is about a student talking about his uncle and how they played baseball and his array was a 3 by 10. And then another student who actually was a multilingual learner and talking about her Vovo, and how they may visualize the tacos together in Brazil.

Similarly, in their workshop and interviews, Etta and Francis centered on stories of Black students to expose, analyze, and critique the racialized reality of Black youths in mathematics education. Etta described an experience where she felt challenged by a female student, and some of those challenges stemmed from her strengths being directed at Etta. Instead of conceptualizing it negatively, Etta reassessed these as strengths. During her interview, Etta shared her thinking out loud, “How can I leverage that? How can I leverage that strength, that leadership and tenacity

that she has in mathematics?” The counterstories used followed a similar format of centering on the standpoint of Black students, critiquing unfair practices and ideologies, and pointing to possibilities and actions.

Coalitional Resistance

All three educators discussed the importance of organizing forms of learning for mathematics teachers and students that provided new identity pathways where people work together to critique, re-imagine, strategize, design, and re-make how they can engage with the mathematics and each other. The community was identified as a site for learning, organizing, and activism. A central theme is the importance of community responsive pedagogies in which mathematics educators must begin by learning from the community to develop curriculum and pedagogy responsive to community needs, strengths, and contexts. Francis explicitly attends to this during his interview when he shares a story how teachers were wary of having community members come to the educators' homes even though the teachers visited the community members' homes.

It's a two way street. Right? It's like we want, you know, the community to come into the school, but we don't want to go into the community, you know? I remember in the teacher education program at UCLA, they really were encouraging the teachers to do home visits...And they have this meeting afterwards, and you know this gathering and after gathering the parents asked the teachers if they could come visit their home. And the teachers were often, “Wait, whoa wait a minute,” right. And so you know we want, we, it seems like we only want this relationship to be one way right. We have, it has to be doable by, it has to go in both directions right, we have to be willing to go out into the community and into and find out what are the, the the assets.

During the interview in which Katherine was asked to share ways to create school systems or structures to implement and learn equitable practices in mathematics education, she shared:

So when we talk about dismantling racism, the way we do that is to humanize all of our neighborhoods and our kids by bringing them there. Like our teachers need to come out of the schoolhouse and really go into places. There's so much to be learned, actually, seeing and learning and listening and then not talking. Don't talk, just ask questions and listen.

During a teacher professional development workshop, Francis stated, “And our definition of expert is anyone who can contribute to the knowledge of the group. Therefore any one of your students can be an expert, given the opportunity.”

In the quotes above, Katherine and Francis describe how connecting to and learning from students' and in communities are critical to countering masternarratives of who and what mathematics is and for and who can be seen as the experts and teachers of mathematics. This also includes challenging masternarratives in teacher professional development in which the mathematics educator or consultant are seen as the expert to professional learning spaces in which the mathematics educator begins by learning in, for, and with the school teachers to move towards collective action. For example, in a podcast interview Francis talks about his PD practices.

Anytime that I write a grant with a school or a district, or you know, get a request from a school to do professional development with their teachers, one of the first things I want to

do is meet with the teachers themselves, or represent, representatives of the teachers to find out, what are their concerns? What is it that they want? What is it that they need, right, so I think that's the most, because teachers want to feel important.

Discussion

As critical race theorists (Davis & Jett, 2019; Dixson & Rousseau, 2005; Matsuda, 1987) would remind us, those most impacted have the greatest insight to create change. In this paper, we extend and apply this framework to chronicle the paths of mathematics educators of Color whose scholarship addresses the racial challenges thrust upon teachers and learners of Color and the gatekeeping nature of the mathematics discipline. What knowledge can we gain from the stories of the three mathematics educators of Color as they explore their experiences in, with, and for creating professional development that attend to race, racism, and racial justice in mathematics education? All three mathematics educators of Color discussed the need to situate mathematics education within broader socio-political contexts and the need to challenge white masternarratives that position mathematics and mathematics ability as singular, individualistic, and ahistoricized.

As we think of creating culturally sustaining spaces for students and teachers of Color, we are also reminded to consider how mathematics teacher education is supporting mathematics educators of Color. School administrators and leaders in the United States are disproportionately white. As a field, we need to consider the practical, on-the-ground support provided to in-practice and in-preparation leaders of Color. Dr. Patel's (2017) notion of token or incremental inclusion is helpful. How much of current equity efforts are mere window dressing and token change? For example, having a lone teacher leader of Color assigned to an all-white equity committee or to expect collaboration simply by putting a group of educators and families in a room, without acknowledging that the same hierarchical power dynamics responsible for long-standing inequities will quickly reassert themselves. How often are we socializing nondominant students and educators into norms, expectations, and agendas that have been set without their perspectives or input?

As mathematics educators and education researchers, we are trained in academic spaces in which Western intellectual culture is espoused as "objective science". When whiteness and white supremacy serve as the marker of what is considered normative and excellence, there is a deep need for unlearning and relearning of the possibilities to engage with students, teachers, and communities in more ethical ways. These activist-educators have taught us powerful lessons about historical injustice as well as community resistance, cultural practice, and ethical responsibilities that should fundamentally shape how we approach mathematics teacher education and research. This necessitates an examination of the mathematics teacher education system and the ways it reproduces racial injustice. Particularly in devising practices, structures, and policy interventions to address racial (in)justice, CRT calls for considering unintended consequences of proposed remedies, addressing intersecting policies and structures, and acting intentionally to ensure that harm is not further replicated within our mathematics education system.

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