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## **Centering Black Girls: Using Culturally Relevant Pedagogy and BlackCrit to Disrupt Bias in STEM Spaces**

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### **ABSTRACT**

*This study explains how anti-Blackness operates in secondary STEM classrooms through teacher bias and instructional practices that limit Black girls' access and belonging. Drawing on semi-biographical vignettes and our lived experiences as Black women in STEM education, we apply Culturally Relevant Pedagogy (CRP) and Black Critical Theory (BlackCrit) as guiding frameworks. The vignettes show how Black girls are framed by deficit narratives that limit their participation in advanced STEM coursework. Even equity efforts reinforce exclusion without accompanying ideological change. Our analysis reveals missed opportunities to affirm the brilliance and aspirations of Black girls. We argue that CRP must be enacted through relational practice and that BlackCrit is essential to naming and disrupting the structural nature of anti-Blackness in education.*

**Keywords:** Anti-Blackness, Belonging, Black Critical Theory, Culturally Relevant Pedagogy, STEM education

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## INTRODUCTION

We do not dispute that individuals have preferences, whether for a particular brand, style, or color, and that these preferences influence personal choices. Likewise, educators are not exempt from bringing their preferences, assumptions, and expectations into the classroom (Copur-Gencturk et al, 2020; Lomholt, 2025). These inclinations, however subtle, shape how teachers interpret student behavior, engage with curriculum, and enact instruction. However, when discussions shift from personal preference to racial bias, particularly in educational settings, they become politically charged. Why is that?

In education, bias is embedded in teacher cognition, institutional structures, and broader cultural assumptions that shape how knowledge, ability, and belonging are defined (Gay, 2018; Milner, 2021). Whether implicit or explicit, this bias often goes unrecognized, even as it influences student performance, engagement, and opportunity (Gay, 2018; Milner, 2021; Yolcu & Kirchgasser, 2024). This is particularly significant when considering the positioning of Black girls in STEM classrooms. Bias operates not only at the interpersonal level but also through “ordering pedagogies” and “regimes of truth” (Yolcu & Kirchgasser, 2024)—systems of instructional logic that sort students based on their perceived cultural and academic distance from normative ideals, often privileging whiteness, maleness, and middle-class values.

Even the most well-intentioned educators operate within systems structured by bias, which is evident in language, grading, discipline referrals, curriculum, and perceptions of aptitude (Thomas et al, 2025; Hooper et al, 2025; Smeets et al, 2025). Often rooted in unexamined assumptions rather than relationships or cultural affirmation, these expectations produce “pathologized differences”: ways of viewing students not as capable learners, but as deviations from a normative ideal (Kirchgasser, 2018). Equity efforts often default to surface-level solutions, such as adding diverse images to textbooks or highlighting famous Black scientists, without interrogating the deeper beliefs and systems that reproduce inequality (Caron, 2009; Oakes et al., 2006; Ouedraogo-Thomas, 2023; Shields, 2018). These superficial gestures may appear inclusive, but leave foundational power dynamics intact.

This is where Culturally Relevant Pedagogy (CRP) becomes critical, as articulated by Ladson-Billings (1995, 2014). CRP is not merely a teaching strategy but a transformative framework grounded in academic success, cultural competence, and critical consciousness. These goals are achieved when educators reject deficit narratives, value students’ lived experiences, and treat knowledge as co-constructed and culturally grounded (Ladson-Billings, 1995, 2014). Nevertheless, CRP must be more than theory. Its impact depends on intentional teacher actions and dispositions—how educators view students, frame knowledge, and share power in the classroom. These foundational beliefs challenge deficit

narratives and reconceptualize teaching as a culturally grounded, socially responsible act. Teachers who enact CRP view their students as competent, value the communities they serve, and approach knowledge as dynamic and co-constructed (Ladson-Billings, 1995, 2014).

In STEM classrooms, these dispositions become particularly vital. STEM education has long served as a gatekeeper, defining who is considered “smart,” “logical,” or “scientific” in ways that often exclude Black girls through racialized and gendered assumptions about competence (Fan & Popkewitz, 2024; Yolcu & Kirchgasler, 2024). Even equity-focused interventions may unintentionally reinforce racial hierarchies by positioning Black girls and their schools as ‘deficient’ or ‘damaged’, implicitly comparing them to predominantly White institutions framed as models of success. In doing so, such efforts risk portraying Black girls as in need of help rather than as agents of knowledge in their own right (Love, 2023; Sánchez Loza, 2021; Tuck, 2009).

This paper explores how teacher assumptions and actions in STEM classrooms reflect anti-Blackness and how CRP, analyzed through a BlackCrit lens, can serve as a transformative framework to affirm Black girls’ identities, brilliance, and belonging. We argue that CRP in STEM must be understood as both a disposition and a practice. Rather than relying on surface-level reforms, we focus on how deeper ideological systems, particularly anti-Blackness, shape teachers’ beliefs and instructional choices, and how those systems impact Black girls’ experiences in STEM spaces.

## LITERATURE REVIEW

### Theoretical Framework

This paper is grounded in two central frameworks: BlackCrit and CRP. Together, these frameworks offer a lens through which we examine how anti-Blackness operates in STEM classrooms and how teachers can respond through affirming, justice-centered instructional practices. BlackCrit, a strand of critical race theory, was developed to center Blackness and name anti-Blackness as endemic to U.S. society, not just a subset of racism (Dumas & ross, 2016). Rather than viewing Black students as simply marginalized, BlackCrit argues that they are systematically dehumanized and positioned outside of full civic and educational belonging. In STEM education specifically, BlackCrit prompts us to interrogate how curriculum, policy, and pedagogy normalize Black suffering and police Black joy, curiosity, and expression (Morton et al., 2022). Without engaging these structural realities, educational reform risks reproducing the very harm it claims to solve (Dumas & ross, 2016). CRP, first introduced by Ladson-Billings (1995), provides a framework for teacher dispositions and instructional practices that affirm students' cultural identities and academic capabilities. CRP is grounded

in three interrelated goals: academic success, cultural competence, and critical consciousness. These goals are achieved when educators reject deficit narratives, foster reciprocal classroom relationships, and view knowledge as co-constructed and grounded in students' lived experiences.

Although often discussed separately, CRP and BlackCrit are deeply interconnected. CRP offers pedagogical tools for affirmation and transformation, while BlackCrit demands that we address the structural and ideological conditions, such as anti-Blackness, that CRP alone cannot fully disrupt. In this analysis, we employ BlackCrit to analyze the deeply rooted patterns of harm in STEM instruction, and CRP to envision and propose instructional responses that affirm the brilliance and humanity of Black girls.

## **Barriers to Black girls in STEM**

Guided by BlackCrit and CRP, this literature review examines three intersecting barriers that impact Black girls in STEM: curriculum bias, teacher bias, and issues related to identity and belonging. These barriers reflect how anti-Blackness is embedded in the structures and practices of STEM education. We broadly use the term STEM spaces to refer to formal and informal environments where scientific and mathematical thinking is taught, practiced, and valued. We also argue that these ideas must be understood and unpacked to disrupt harm and create opportunities for Black girl joy to be supported in STEM environments.

## **Black Girls and Curriculum Bias**

A common misconception about STEM subjects is that they are culture-free; however, existing literature purports that this is not the case (Joseph, 2011). Contemporary approaches to examining and understanding STEM are primarily shaped by Eurocentric male perspectives (Kolovou, 2023; Joseph, 2011; Mensah & Jackson, 2018). This perspective erases and deprioritizes diverse knowledge systems within STEM. For example, it was not until the 2017 release of the popular movie *Hidden Figures* that many Americans became aware of the extraordinary Black women in STEM whose brilliance was pivotal in putting the first person into space (Allen, 2017). Prior to that moment in history, many STEM teachers taught that space science was solely accomplished by and because of White men. This biased representation within the mainstream STEM narrative contributes to what researchers refer to as the "Whiteness as property" within STEM. Whiteness as property asserts that, like property that can be owned and claimed, STEM has also been claimed and associated with Whiteness (Mensah & Jackson, 2018). Whiteness as property, ideologically and in practice, is the promotion and centering of Eurocentric thinking and knowledge around STEM instruction (Dumas & ross, 2016; Mensah & Jackson, 2018). As a result, STEM texts,

resources, and teaching materials include very few contributions from diverse voices, particularly those of Black women. Curriculum bias has damaging implications for Black girls as it sends an unspoken message that who they are and their ways of knowing are not significant within STEM spaces.

### **Black Girls and Teacher Bias**

Not only does curriculum bias negatively impact Black girls, but Black girls also have to navigate implicit and explicit teacher bias (Emenaha Miles, 2025; Morton et al., 2022). Much research around teacher bias has been conducted among White teachers, as they make up a large portion of the teaching population; however, educators across gender and racial backgrounds have been found to hold negative racial biases more pronounced with respect to Black students (Batchelor et al., 2019; Copur-Gencturk et al., 2020). Teachers' bias towards Black girls is particularly problematic, as it can influence how these students perceive themselves and negatively affect their academic outcomes in STEM courses (Copur-Gencturk et al., 2020). For example, teachers' bias towards Black girls has been shown to influence how they grade them compared to their White counterparts. In a study involving 390 math teachers, researchers found that when given identical assignments, teachers underestimated the math potential of girls compared to boys, with the disparity being even greater for Black girls (Copur-Gencturk et al., 2020). It has also been cited that teachers who hold lower expectations for Black girls may interpret questions posed during instruction not as signs of curiosity, but as a lack of understanding of complex concepts (Campbell, 2012).

Furthermore, studies show that teacher bias results in lower recommendations for high-achieving Black girls for placement in advanced STEM courses (Campbell, 2012; Copur-Gencturk et al., 2020). This gap in recommendations persists even when Black girls perform on par with White students (Grissom, 2016). This finding is troubling, as research indicates that teachers' expectations have a significant influence on students' self-efficacy, academic performance, and STEM identity development (Edwards & King, 2023; Tyler & Boelter, 2008). In the long term, teachers' negatively skewed beliefs about Black girls' academic potential serve to widen, rather than close, the opportunity gaps in STEM participation (Campbell, 2012; King, 2022). Ultimately, these patterns contribute to a reduced sense of belonging and participation for Black girls in STEM spaces.

### **Black Girls, Identity, and Belonging**

It is not enough to simply place Black girls in advanced STEM courses; attending to their socioemotional needs within these STEM spaces is essential.

Teachers who want to support Black girls' academic success in STEM should work to develop inclusionary practices that deepen Black girls' STEM identity and sense of belonging (Edwards & King, 2023). STEM identity refers to students' engagement and self-perception regarding their ability to succeed in STEM disciplines, while belonging refers to the connection students feel to the discipline and individuals within STEM (Milton et al., 2023). Studies have shown that when STEM spaces affirm the lived experiences of Black girls, this has a positive impact on their STEM identity and sense of belonging (Edwards & King, 2023; Milton et al., 2023).

Characteristics of STEM spaces that attend to the unique needs of Black girls include creating opportunities for them to share the intersections of their identity and how these inform their perspectives on and understanding of the world. This can occur in both formal and informal educational settings. For example, Milton et al. (2023) conducted a study to measure the impact of an informal STEM summer camp on the STEM identity and sense of belonging of Black middle school girls. Findings from their mixed-method study show that their participation enhances their confidence, resulting in a stronger sense of identification with STEM and increased the girls' sense of Belonging (Milton et al., 2023). Camps like the one in this study—and other STEM spaces that uplift and support Black girls' identity and belonging—share common characteristics. These include using affirming and culturally relevant resources, as well as providing diverse and relatable representations of who can participate in STEM.

## **RESEARCH METHOD**

This qualitative analysis is guided by BlackCrit and informed by narrative inquiry, using semi-biographical vignettes drawn from our lived experiences as Black women in STEM education. The vignettes serve as both data and analytic lens, illustrating patterns of teacher bias, instructional decision-making, and institutional culture that shape Black girls' access and belonging in STEM spaces. We employ BlackCrit and CRP to select, interpret, and analyze these narratives, with a focus on how structural and interpersonal forms of anti-Blackness influence educational opportunities.

Each vignette is examined through critical analysis using theoretical coding aligned with BlackCrit and CRP. Our approach centers narrative not as anecdotal, but as theorized, lived knowledge that disrupts structural inequities in education. The analysis focuses on how teacher discourse and institutional practices reflect deficit framings, police Black joy, and misrecognize Black brilliance. Each vignette is followed by responses grounded in CRP that affirm Black girls' brilliance and challenge systemic exclusion.

## Positionality

We position ourselves in this work of examining best practices that teachers can adopt to support Black girls better because we, too, were once Black girls whose experiences included being subjected to teachers' lowered expectations, engaging with instruction that was not culturally relevant, and navigating both racial and gendered biases throughout our K–12 education. These lived experiences now inform our motivations as educational researchers, driving our commitment to improving the academic journeys of Black girls like us who continue to face similar challenges. We also bring experience across the classroom, school, district, and state levels, deepening our understanding of how educational systems can either perpetuate or disrupt barriers faced by Black girls in STEM.

### Vignette A: Who Belongs in Advance Level Course?

In the quiet hum of the teachers' lounge, Mrs. Walters cradled her coffee mug, its warmth seeping into her hands as she glanced over at Mrs. Jackson, who was unwrapping her lunch. Their conversation drifted, as it often did this time of year, to next year's advanced course recommendations.

"That Danyia girl in my math class," Mrs. Walters began, stirring her coffee causally, "she just doesn't seem to stay focused. Always asking questions—more than anyone else. I don't remember needing that much prompting when I was her age."

Mrs. Jackson chuckled softly. "Same in science. She's bright, sure—her grades are solid—but she's always cracking jokes with the new terms we learn. And she's constantly playing in her friend's hair during labs. It's like she doesn't know when to take things seriously."

Mrs. Walters nodded knowingly. "Yeah, some of these kids just don't get it. The other day, Danyia told me she wants to be a brain surgeon—but then said she doesn't like math." She raised her eyebrows. "I told her, if you're aiming for college—especially something like medicine—you've got to love subjects like science and math. Otherwise, it's going to be a rude awakening."

Mrs. Jackson sighed, setting her fork down. "It's a shame, really. We do have a great STEM magnet program. But it's not for kids who aren't ready to commit."

They exchanged a look—one of quiet agreement. Without needing to say it aloud, both had made up their minds: Danyia wouldn't be on the list for the advanced track next year.

## **Vignette B: Already Behind Before We Begin**

In the fall of 20XX, we welcomed a new cohort of ninth-graders into our STEM academy. A familiar phrase returned almost immediately: “They’re not ready.” Test scores were low. Few students came with teacher recommendations. Only 8% scored “proficient” in math—all students of color, over half of them girls. Black girls, in particular, were underrepresented in advanced STEM placements. Most were tracked into “foundations” or “essentials” classes for remediation.

Our placement system appeared objective based on one test score and a teacher recommendation. Yet it failed to account for context. Many students came from a feeder school characterized by instability, including the frequent use of long-term substitutes in math and science. Some hadn’t had a certified teacher for a full year. Still, no adjustments were made—no inquiry into access or opportunity. Placement decisions were made for students, not with them. Doing so violated a core belief: we don’t decide if students are ready; we ensure they have every opportunity to become prepared.

Our school is in a district with some of the lowest economic mobility in the country. The state placed our school in the bottom 5% for performance. While Black culture was celebrated through visible displays, such as music, art, and history, those affirmations did not extend into STEM classrooms or expectations. Low performance became an identity. Support efforts emphasized deficiency rather than potential.

By the end of the first quarter, 75% of freshmen had at least one F in a core course. On a block schedule, this meant students were halfway to losing credit. We urgently responded: a Saturday STEM academy, district-approved grading extensions, and credit recovery. These interventions were rapid and resource-heavy. But the focus remained on remediation. That year, we didn’t identify a single gifted student. Our systems emphasized catching up, rather than moving forward, even as students expressed interest in STEM careers. We offered support but not belief, access but not invitation. Looking back, we’ve come to understand that the issue wasn’t just a lack of rigor; it was the absence of recognition. Our systems responded to gaps but failed to cultivate brilliance.

## **RESULTS**

Our analysis draws on Culturally Relevant Pedagogy (CRP) and Black Critical Theory (BlackCrit) to examine how teacher and leadership actions in STEM classrooms shape Black girls’ sense of belonging and access to opportunity. CRP emphasizes academic success, cultural competence, and critical consciousness (Ladson-Billings, 1995, 2014), while BlackCrit centers anti-Blackness as a structural force that positions Black students as undeserving of recognition or rigor (Dumas & ross, 2016). Drawing on both, we developed an

analytical framework to examine how teacher and leadership practices shape the experiences of Black girls in STEM classrooms. Table 1 outlines how CRP dispositions align with BlackCrit lenses, focusing on three key dimensions: self-conception, social relationships, and knowledge construction. This framework guided our analysis, highlighting how Black girls are systematically denied recognition of their intellectual capacity and cultural legitimacy, undermining their sense of belonging in rigorous STEM environments.

**Table 1**  
*CRP Dispositions and BlackCrit Lenses in STEM Classrooms*

CRP Disposition	BlackCrit Lens	Analytic Focus
Conceptions of Self & Others	Black brilliance is misrecognized or denied	Are students seen as capable or in need of fixing?
Social Relations	Black joy is policed; control replaces care	Are relationships rooted in reciprocity or control?
Conceptions of Knowledge	Black epistemologies are excluded	Is student knowledge centered or silenced?

*Note.* CRP = *Culturally Relevant Pedagogy*; BlackCrit = *Black Critical Theory*.

These lenses guided our interpretation of STEM practices, using two central questions:

1. How do teacher actions and assumptions in STEM classrooms reflect anti-Blackness, and how does a BlackCrit lens help identify and disrupt these patterns?
2. What practices, informed by CRP, emerge from classroom and institutional interactions, and how do they support Black girls’ belonging and affirm their identities in STEM spaces?

**Vignette A Analysis**

When examining the statement, “I don’t remember needing that much prompting when I was her age,” through the lens of Black Crit, we see the teacher’s White cultural norms being used as a measuring stick to assess the behavior of the students in her class. The unspoken message is that the student’s questioning to gain further understanding reflects academic shortcomings, rather than curiosity and a desire to learn more. We also see hints of frustration in response to students’ questioning; instead of being welcomed, anti-Blackness presents itself in the idea

that Black students should just comply and not question (Morton et al., 2022). We argue that because of implicit anti-Black biases that exist in STEM spaces, Danyia is not seen as a brilliant Black girl, but rather as a problem that needs to be fixed. Despite both teachers acknowledging that Danyia is an academically capable student, they enact anti-Black bias in determining that she was not worthy of engaging in rigorous STEM coursework. These outcomes echo existing literature that states Black girls are least likely to be recommended for advanced STEM courses compared to their non-Black counterparts (Campbell, 2012).

A deeper analysis of Vignette A also illustrates attacks on Black girl joy. Through the lens of Black Crit, Black joy is deeper than simple emotions of happiness—it emerges when teachers intentionally create spaces to foster and celebrate excitement and curiosity within Black girls (Milton et al., 2023). The fostering of Black joy could have been supported if the teachers in Vignette A had recognized the student's creativity when she used humor to make a personal connection to the academic terms she was learning. In addition to teacher actions that worked against Black joy, we also observe missed opportunities to enact CRP within the STEM classroom. At the heart of CRP is the idea that students' lived experiences should drive instruction. Therefore, we argue that the teachers in Vignette A missed an opportunity to create activities that allowed students to take academic content and make it their own. For example, the comment, "...but she's always cracking jokes with the new terms we learn," highlights a moment that could have been used to encourage students to question and play with STEM content. This engagement could have been deepened with exploratory questions such as: What does this word remind you of? Do these words sound strange or unfamiliar? Do they make you laugh or spark curiosity?

Leaning into students' engagement with STEM content in this way supports their sense of belonging, as it communicates that their approach to and understanding of the material is valued. It also opens the door to new classroom activities that provide students with a more relatable and meaningful knowledge of STEM concepts. In Vignette A, if the teacher had leaned into her creative play with academic content, their actions would have better aligned with the dispositions required for engaging in culturally responsive practices. This was a missed opportunity to make meaningful connections between students' values (e.g., humor, family, community, etc.) and academic content.

In summary, this seemingly casual conversation between two STEM teachers is fraught with undertones of how anti-Blackness can impact Black girls' academic outcomes and sense of belonging in STEM spaces. To move beyond these harmful effects, we argue that support for Black girls in STEM cannot be reduced to performative gestures or culturally themed content. It must involve the meaningful enactment of CRP, with a focus on deepening one's critical consciousness and raising awareness of how and why anti-Blackness appears in STEM spaces. Through the lens of Black Crit and culturally attuned teaching

practices, educators can actively disrupt deficit-based framings and instead foster a sense of belonging. By examining how teacher actions are shaped by deeper ideological systems—and how these systems influence the implementation of CRP—Vignette A illuminates the complexity of educational equity and the necessity of grounding it in culturally affirming pedagogies that center the brilliance and humanity of Black girls.

## **Vignette B Analysis**

This vignette reveals how anti-Black thinking can persist beneath the surface of equity-driven reforms in STEM education. While educators acted swiftly in response to concerning academic data, launching Saturday academies, extending grading windows, and providing credit recovery, these interventions were ultimately situated within deficit-based narratives. They centered remediation without recognition, positioning Black students, particularly Black girls, as needing repair rather than deserving investment.

From a BlackCrit lens, the school's placement practices and response strategies reflect how antiblackness structures opportunity as something Black students must prove themselves worthy of, even in systems that claim to support them. Despite student expression of STEM interest and ambition, the denial of gifted identification is not merely a failure of identification, but a reflection of how Black brilliance is rendered illegible within dominant evaluative norms. Black girls were not just overlooked; their potential was systematically unrecognized and unimagined. Anti-blackness positions the Black child as ontologically outside the realm of recognition, i.e., the uneducable subject in an anti-Black system (Dumas & ross, 2016; Hartman, 2007).

The school's approach also reproduces the logic of neoliberal reform, where quick technical solutions (e.g., intervention blocks, extended grading portals) are implemented instead of structural critique or epistemic transformation. These fixes respond to outcomes (e.g., failing grades) without interrogating the institutional conditions that produce them, such as the reliance on a single test score for STEM placement, the invisibilization of instructional disruptions, and the absence of student voice in decision-making.

Although not stated in the vignette, high-yield instructional strategies, such as cooperative learning, mastery learning, and feedback, were implemented schoolwide. These were selected to support reteaching approaches. Thus, from a CRP standpoint, teachers attempted to meet students' academic needs, but fell short of fostering cultural competence or critical consciousness. While there was recognition of disparities, there was little evidence of culturally responsive instruction that affirmed Black students' lived realities, nor was there disruption of the low expectations embedded in STEM gatekeeping. Students expressed aspirations in engineering and medicine, but were deferred or redirected rather than

affirmed and equipped. The absence of co-constructed learning opportunities, particularly in STEM, reflects how CRP was interpreted through an academic lens, rather than as a relational, political, or transformative pedagogy.

In short, the vignette illustrates how leadership and teacher actions, though urgent and well-intended, reflected the very systems of exclusion they sought to mitigate. Black girls remained positioned as ‘behind,’ ‘at-risk,’ or ‘not ready,’ and the school’s institutional response affirmed those positions rather than radically reimagining them. The foundational dispositions necessary for CRP to be effective were lacking. What was needed was access to remediation, the disruption of antiblack assumptions, the affirmation of Black girl brilliance, and the creation of sovereign educational spaces where readiness is not earned, but presumed.

Notably, a sustainable ideological shift was not achieved. During a school-wide professional development session on bias and curriculum, discussions continued to be productive, focusing on general strategies for addressing bias in the curriculum. However, when the topic shifted to privilege, resistance surfaced on a day when both the principal and I were off campus. A veteran White teacher, seen as a spokesperson for many White staff, pushed back, saying teachers were being “blamed” for inequities they didn’t create. Others echoed this, citing their decision to work at a majority-Black school as proof of their commitment. The reaction reflected discomfort with seeing oneself within systems of power. For CRP and BlackCrit to take root, schools must pursue pedagogical reform and ideological transformation. Equity work risks staying surface-level: responsive in appearance, unchanged in structure, without confronting how whiteness resists discomfort.

### **Cross Vignette Synthesis**

Across both cases, Black girls were framed as lacking. They were either too distracted, too playful, or not yet ready for advanced STEM opportunities. These narratives, whether embedded in casual teacher talk or formal placement systems, reveal how anti-Blackness operates subtly yet systematically in shaping access, recognition, and belonging. While teacher or leader actions appeared neutral or well-intentioned, they ultimately upheld exclusionary norms. These findings align with the calls of CRP and BlackCrit scholarship to address inclusion, structural harm, and the need for liberatory, Black-affirming educational spaces in STEM.

## **DISCUSSION AND CONCLUSIONS**

This study examines how teacher practices can reinforce or disrupt deficit narratives, utilizing Black Critical Theory (BlackCrit) as an analytical lens and Culturally Relevant Pedagogy (CRP) as a pedagogical framework. Through two

semi-biographical vignettes, we explored how teacher actions and assumptions in STEM classrooms reflect anti-Blackness. We identified CRP-aligned practices that support Black girls' sense of belonging in secondary STEM spaces. While schools may adopt well-intentioned interventions aimed at promoting equity and student success, these efforts are often undermined by unexamined logics of anti-Blackness, deficit thinking, and superficial reforms. The vignettes demonstrate that Black girls' belonging in STEM is not solely shaped by performance or access, but by teacher beliefs, institutional norms, and cultural logics that determine who is seen as capable, worthy, and brilliant. Addressing STEM inequities demands more than technical fixes—it requires a radical reimagining of who is valued in classrooms and how Black brilliance is recognized, nurtured, and affirmed. We argue that actors across STEM education, e.g., teachers, school leaders, and policymakers, must move beyond technical fixes to confront how curriculum and instruction explicitly sustain exclusionary norms. Until we accurately define these systemic issues, as this study seeks to do, we cannot dismantle the structures that uphold anti-Blackness in STEM.

While our paper is grounded in BlackCrit and CRP, we also recognize the significant contributions of Black Liberatory K–12 Science Education (BLKSE) to the discourse on anti-Blackness in STEM. Although not used as an analytical framework in this study, BLKSE (Morton et al., 2022) informs our understanding of how racial bias shapes STEM learning environments. Additionally, it highlights the importance of justice-centered pedagogy rooted in CRP and BlackCrit. As such, we urge educators to enact teaching practices that explicitly disrupt anti-Blackness, affirm Black girls' identities, and expand their access to rigorous STEM opportunities. One way to do this is by integrating BLKSE into STEM teacher professional development and in-service training. This integration should intervene directly in current practices by affirming Black student autonomy and equipping teachers with curricula that dismantle whitewashed narratives and center the contributions of Black women in STEM. These insights point to urgent implications for practice, particularly in how STEM classrooms and systems can evolve to center Black girls' brilliance, autonomy, and belonging.

## IMPLICATIONS

Drawing from these findings, we identify key practices and policy shifts that can support the creation of Black-affirming STEM spaces. To build truly equitable STEM spaces, educators and school leaders must move beyond viewing Black girls as problems to be fixed. Instead, they must affirm their brilliance, curiosity, and aspirations as valid expressions of STEM potential. This begins with redefining the concept of “readiness.” Placement decisions often rely on narrow indicators, such as test scores, behavior, or teacher perceptions, shaped by white,

middle-class norms. Schools must presume readiness and design structures that reflect high expectations for students.

Furthermore, we call for intentional efforts to address the socioemotional needs that support Black girls' sense of belonging in STEM. This includes developing teacher training that deepens critical consciousness, centers Black joy, and incorporates students' lived experiences into instructional practice. By centering lived experience, critical consciousness, and Black joy in instruction, teachers can help create inclusive learning environments where Black girls thrive. Deficit narratives must also be confronted, especially those embedded in teacher talk and institutional practices. As Vignette A illustrates, Black girls' curiosity or cultural expression is often misread as distraction, leading to exclusion from advanced STEM tracks. Vignette B illustrates how even equity-driven interventions can perpetuate anti-Black norms if they fail to prioritize recognition and a sense of belonging. Equity cannot be achieved through reactive solutions alone; it requires deep examination of how whiteness shapes school culture, discipline, curriculum, and definitions of excellence. Without disrupting these foundations, even well-intended reforms risk reproducing harm. CRP must be fully enacted by affirming identity and cultivating critical consciousness.

Ultimately, schools must prioritize centering the voices and agency of Black girls. They can start by auditing placement practices, offering ongoing professional development on anti-blackness, and creating spaces where Black girls help shape STEM programs and curriculum. Thriving STEM spaces require more than inclusion—they demand transformative justice, where belonging is not granted, but presumed.

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