

Queer of Color Justice in Undergraduate Mathematics Education

Luis A. Leyva

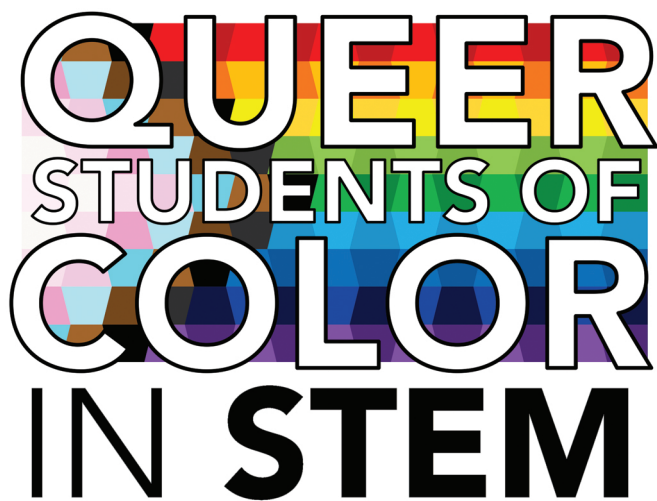


Figure 1. Project logo for the “Queer Students of Color in STEM” study.

Black and Latin*¹ students report racial oppression in undergraduate mathematics classrooms, including isolation, limited opportunities to participate, and underestimated ability due to stereotypes [1, 2, 3]. Intersectional analyses have shown how cisgender women of color navigate

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¹The asterisk in Latin* considers fluidity in gender identities across the Latin American diaspora. The term, Latin*, responds to (mis)use of Latinx as a gender-neutral term originally intended for explicit inclusion among gender nonconforming peoples of Latin American origin and descent.

racialized and masculinized constructions of mathematical ability, such as Latina women pushing themselves to earn high grades for disproving male classmates’ views of them becoming young mothers rather than future scientists [4]. Queer and trans* (QT) students also experience undergraduate mathematics classrooms as exclusionary because their gender and sexual identities are deemed irrelevant or unwelcome in these ‘neutral’ environments [5, 6].

In response to oppressive realities in mathematics classrooms, students with minoritized racial, gender, and sexual identities demonstrate agency and empowerment, such as building peer networks of support and expressing their identities in performative ways (e.g., avoiding use of slang, passing as straight) [2, 4, 5]. However, research has yet to center intersectionality² of mathematics classroom experiences among QT students of color [8, 9]. Filling this research gap is important to generate nuanced insights on features of undergraduate classrooms that promote racial and QT justice for multiply-marginalized populations. My research about the experiences of undergraduate QT students of color in STEM majors adds to this area of needed research.

The present article proposes a guiding vision for undergraduate mathematics pedagogy to promote identity-affirming and equitable learning opportunities among QT students of color. Such a vision, therefore, contributes to developing mathematics classrooms as spaces that advance *queer of color justice* (justice for QT people of color).

²Intersectionality refers to unique forms of agency and oppression that historically marginalized people experience at the juncture of multiple systems of oppression, including racism and cisheteropatriarchy (a system of oppression that marginalizes QT people and cisgender women by upholding misogyny as well as reinforcing heterosexual and cisgender identities as normative) [7].

In what follows, I first lay out a conceptual foundation for my vision by synthesizing prior theorizing of inclusive pedagogies for racially minoritized and QT populations. My pedagogical vision encompasses practices of curricular design, instruction, and student support. Next, I engage findings from my research about the intersectionality of Latin* QT students' experiences as STEM majors, which were presented during my Spectra Lavender Lecture at the 2023 Joint Mathematics Meetings, to illustrate how mathematics pedagogy limited and expanded opportunities for queer of color justice. I argue that such justice is contingent on pedagogy that affirms students' identities as QT people of color and disrupts white cisheteropatriarchy (systemic oppression at the juncture of racism, white supremacy, and cisheteropatriarchy). I conclude the article with implications for practice in undergraduate mathematics.

A Pedagogical Vision for QT Students of Color in Undergraduate Mathematics

Two concepts of inclusive pedagogies in and out of mathematics education provide a foundation for my proposed vision. The first concept is the *liberated mathematics classroom* for justice among Black and Latin* learners [10], and the second concept is *anti-oppressive education* for promoting justice among QT students of color in education [11]. In what follows, I first present each of these concepts. I then apply the anti-oppressive education perspective as an intersectional lens to extend the concept of a liberated mathematics classroom for queer of color justice. In doing so, I propose a set of pedagogical approaches to meet the unique needs among QT students of color as mathematics learners.

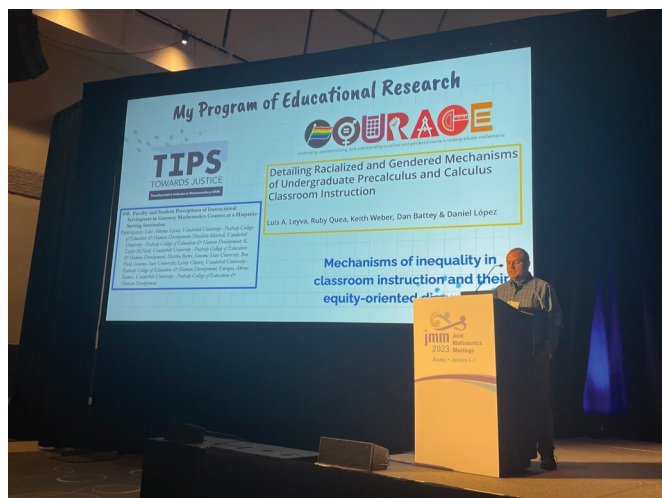


Figure 2. Photo from the 2023 Spectra Lavender Lecture.

The liberated mathematics classroom and disrupting whiteness. Brittany Mosby outlined a vision of liberatory mathematics education for Black and Latin* learners [10, 12]. This vision posits that mathematics learning as a liberatory experience is disruptive of the status quo, collaborative, discovery-oriented, and humanizing for racially minoritized populations. There are six elements of a liberated mathematics classroom: (i) affirming students' cultural knowledge and mathematical intuition; (ii) highlighting the utility of mathematics as a language to understand problems across multiple fields; (iii) encouraging metacognition and agency in the learning process; (iv) engaging students as active cocreators of knowledge and not relying solely on lecture-based instruction; (v) balancing rote, single-skill practice with student discovery and complex, contextualized multistep problems, and (vi) decolonizing content by decentering whiteness, maleness, and Europeaness as well as exposing learners to non-western foundations of the discipline. As summarized in Figure 3, liberatory mathematics classrooms allow students to experience the process of learning mathematics as active, culturally-affirming, freeing of oppressive realities, interdisciplinary, and relevant to social justice efforts.

Mosby's vision interrogates and disrupts dominant forces of whiteness in mathematics education that I have identified elsewhere [13]. The classroom element of affirming students' cultural backgrounds resist ideologies of whiteness that frame mathematics as a socially neutral and cultureless space. Black and Latin* students are relieved of the undue labor of aligning their participation (e.g., behaviors, language use) with white ideals. As a result, their contributions are more readily acknowledged as mathematical and thus have increased opportunities to build positive identities with the discipline. The classroom element of agency in students' learning, including active roles in co-constructing knowledge, disrupts racialized distribution of mathematical authority between educators and students as well as among students in classrooms. Such agency, coupled with another classroom element of decolonizing curricula, empowers Black and Latin* students to critique whose knowledge is valued in mathematics and the racially oppressive purposes that the discipline has served (e.g., wealth disparities). Thus, students are equipped with tools to interrogate whiteness in society, which contributes to solving social problems explored in other fields (e.g., ethnic studies, sociology) that are traditionally left unexamined in mathematics education.

Anti-oppressive education and advancing justice for QT students of color. In the book *Troubling Intersections of Race and Sexuality*, Kevin Kumashiro introduced the perspective of anti-oppressive education that challenges racism and cisheteropatriarchy at the intersections, thus providing

Mathematics as the Practice of Freedom

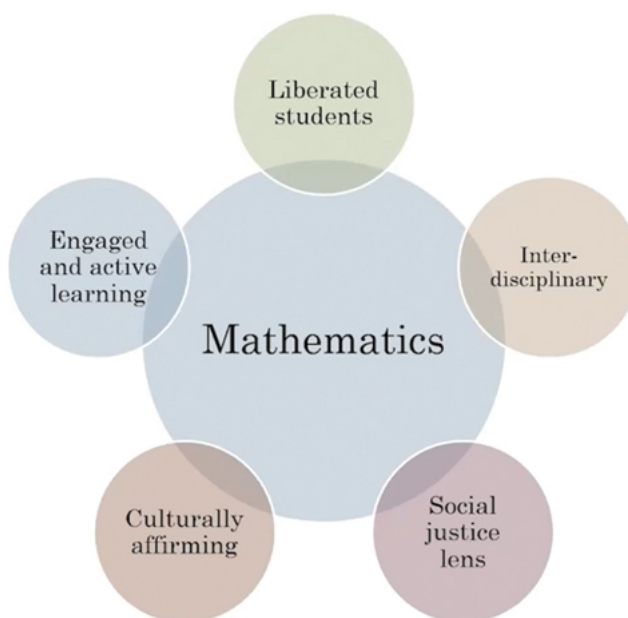


Figure 3. A slide from Brittany Mosby’s plenary at the MSRI Workshop on Math & Racial Justice (2021).

identity-affirming opportunities to learn for QT students of color [11]. This perspective redresses cisheteronormativity in antiracist pedagogies that overlook QT identities, in addition to whiteness embedded in anti-heterosexist pedagogies that decenter QT students of color. Therefore, anti-oppressive education (also referred to as antiracist, anti-heterosexist education) is intersectional by design. There are four pedagogical approaches to anti-oppressive education. The “education for the Other” approach develops spaces of learning where QT students of color experience affirmation and safety for their full identities. Another approach, “education about the Other,” resists partial understandings and stereotypical views about QT people of color, including use of curricular content by and about QT people of color that captures variation in issues of intersectionality.

For the “education that is critical of privileging and Othering” approach, educators increase learners’ awareness of social issues that oppress QT people of color to generate critiques of systems and structures entrenched in white, cisheteropatriarchal ideologies. This approach also creates space for learners to interrogate how they are complicit in reinforcing systemic oppression and empowers them to transform structures for queer of color justice. The

“education that changes students and society” approach encompasses educators entering into self-reflective, repetitive practices that disrupt resistance to traditional ways of knowing and being in the world, thus challenging complicity with queer of color oppression. Kumashiro argues that this approach invites educators into a “crisis” that troubles assumptions about identities, ways of engaging with oppression, and efforts for justice-oriented change. Anti-oppressive educators support students to work through such a “crisis” for themselves via pedagogy that advances justice for QT people of color.

A vision for queer of color justice in undergraduate mathematics classrooms. With the anti-oppressive education perspective extending the race-specific concept of liberated mathematics classrooms to consider intersectionality, I propose three approaches for my vision in advancing queer of color justice through undergraduate mathematics pedagogy:

- I. Empowering educators and learners to interrogate their complicity in systemic oppression as well as use mathematics as a tool for intersectional justice;
- II. Creating an interactional space that QT students of color experience as affirming of their full identities and contributions to mathematical knowledge; and

III. Decolonizing curricula by infusing contributions from QT mathematicians of color and problem-solving opportunities relevant to students' lives.

Approach (I) focuses on instruction, (II) on support, and (III) on curricular design. Figure 2 maps elements of liberated mathematics classrooms (in yellow) and anti-oppressive education (in green) onto my proposed vision.

Later in this article, I share findings from my research about Latin* QT students' experiences that I presented during the Lavender Lecture. These findings depict how mathematics pedagogy expanded or limited opportunities for Latin* QT students to experience support for their intersectional identities. The analysis, thus, serves an illustrative purpose of capturing how pedagogy in undergraduate mathematics can advance or inhibit queer of color justice as outlined in my proposed vision. Such insights inform pedagogy that accounts for issues of intersectionality among Latin* QT students and QT students of color more broadly. In addition, the analysis fills a research gap on inclusive STEM pedagogies for QT students with an explicitly intersectional focus [8, 14].

Queer Students of Color in STEM Study

This section provides an overview of the larger study, titled "Queer Students of Color in STEM" (QSOC-STEM), from which the analysis of Latin* QT students' mathematics experiences is derived. QSOC-STEM explores the intersectionality of experiences among Black, Latin*, and Asian QT students in STEM majors. More details about the study can be found elsewhere [8, 15].

Study context and data collection. The QSOC-STEM team recruited participants across five US universities, including four large, research-intensive, and historically white institutions (HWIs) and a historically Black university. Three HWIs are public and one is private.

One public HWI site received the federal designation as a Hispanic-Serving Institution, and another has a strong record of STEM support for underrepresented groups. The historically Black university is a small liberal arts school with a strong record of QT student support. A total of 60 QT students of color participated, including 25 Latin* participants whose data was the focus for the analysis presented here and in the Lavender Lecture. This study's Latin* sample is diverse in terms of ethnoracial identity (e.g., Costa Rican/Puerto Rican, Mexican, mixed Colombian-white), queer sexuality (e.g., bisexual, gay, pansexual) and STEM major (e.g., computer science, mechanical engineering). Ten of the 25 Latin* participants hold gender-expansive identities, such as female/questioning, nonbinary, and transmasculine.

Participants completed a demographic survey to report their race, gender, sexuality, year of study, STEM major,

coursework, and campus involvement. They also submitted a written autobiography about being QT students of color in STEM, including memorably positive and negative experiences, identity-affirming academic and cocurricular spaces, influential people, and the role of mathematics. Throughout the study, participants kept a journal of events in STEM spaces (e.g., classrooms, study groups) that they experienced as supportive and affirming or unsupportive and disaffirming of their identities. Participants completed an individual interview (Interview 1), group interview (Interview 2), and member check interview (discussed later). Eight group interviews with Latin* QT students were included in the present analysis.

Data analysis. QSOC-STEM explores oppression and agency among undergraduate QT students of color in STEM, in addition to structures and practices that disrupt oppressive experiences. My framework, *STEM Education as a White, Cisheteropatriarchal Space* (WCHPS), presented in Figure 5 guided data analysis. The framework provides researchers with a model for guiding analyses of interplay between systemic forces of racism, whiteness, and cisheteropatriarchy in STEM education, which shape intersectional oppression and agency for QT people of color and other multiply-marginalized groups [8].

Each WCHPS dimension attends to a level at which white cisheteropatriarchy operates and can be disrupted in STEM education. The ideological dimension addresses beliefs, norms, and values that organize educational practices. The institutional dimension explores structural inequities of achievement and participation. The relational dimension addresses interactional forms of oppression, agency, and resistance. WCHPS dimensions are interconnected, allowing the framework to uncover complex ways that white cisheteropatriarchy operates.

Our team completed four stages of data analysis. First, we inductively coded data to flag instances corresponding to each WCHPS dimension in terms of oppression, agency, and supportive disruptions. Next, we synthesized codes in each participant's data set and followed the critical race methodology of counter-storytelling [16] to construct an analytical narrative for each participant. Counter-storytelling challenges or "counters" deficit portrayals of racially minoritized communities in educational research. It centers racially minoritized people's lived experiences as sources of knowledge for theorizing resistance to racism and other interlocking systems of power. Participants' counter-stories capture interplay between ideological, institutional, and relational forces in their experiences.

The third stage of analysis was a cross-case analysis of counter-stories to identify themes of oppression, agency, and supportive disruptions across the intersectionality of STEM experiences. The final stage of analysis was

Pedagogical Approach I (Instruction): Empowering educators and learners to interrogate their complicity in systemic oppression as well as use mathematics as a tool for intersectional justice	- Highlighting the utility of mathematics as a language to understand problems across multiple fields - Encouraging metacognition and agency in mathematics learning - <i>Education that is Critical of Privileging and Othering:</i> Fostering awareness of systemic oppression among QT people of color, in addition to promoting student agency for justice-oriented reform - <i>Education that Changes Students and Society:</i> Entering a "crisis" of self-reflective, repetitive practices that disrupts resistance to traditional ways of knowing and being
Pedagogical Approach II (Student Support): Creating an interactional space that QT students of color experience as affirming of their full identities and contributions to mathematical knowledge	- Affirming students' cultural knowledge and mathematical intuition - Engaging students as active co-creators of mathematical knowledge and not relying solely on lecture-based instruction Education for the Other - Establishing classroom spaces where QT students of color experience affirmation and safety for their full identities - Disrupting interactions and inactions that oppress QT students of color
Pedagogical Approach III (Curricular Design): Decolonizing curricula by infusing contributions from QT mathematicians of color and problem-solving opportunities relevant to students' lives	- Decolonizing content by de-centering whiteness, maleness, and Europeanness as well as exposing learners to non-western foundations of the mathematics discipline - Balancing rote, single-skill practice with student discovery and complex, contextualized multi-step problems Education about the Other - Resisting partial understandings and stereotypes about QT people of color - Incorporating content by and about QT people of color in curricula

Figure 4. Pedagogical vision for queer of color justice in mathematics.

conducting a member-check interview (Interview 3). Member checks sharpened claims from data analysis. We presented participants with written sections of their counter-stories corresponding to each WCHPS dimension and asked them to suggest edits that reflect their experiences more accurately. The team also asked student participants questions to clarify and further elaborate on important ideas in their counter-stories. Thirteen of the 25 Latin* QT students completed member check interviews.

In preparing for the Lavender Lecture and writing this article, I independently completed a fifth stage of data analysis. This stage involved identifying themes from our team's analysis about the influence of mathematics. I identified two contexts (pedagogy and peer relationships) where participants experienced dissonance and resonance with their intersectional identities in mathematics. In this article, I present findings about pedagogy. (I report findings about peer relationships elsewhere [15].) The WCHPS framework shed light on how ideological, institutional, and relational aspects of how pedagogy influenced experiences of undergraduate mathematics as a white, cisheteropatriarchal space. When reporting findings later in the article, I apply my vision for queer of color

justice in mathematics to depict how pedagogical practices in Latin* QT students' counter-stories limited or expanded support for their intersectional identities.

Positionality. Our research team (one faculty member, four doctoral students, ten master's students, and two undergraduate students) are members of the Power, Resistance and Identity in STEM Education (PRISM) Lab at Vanderbilt University. The team has robust social diversity across intersections of race (African American, Black, Latin*, biracial, white), gender (cisgender, nonbinary, transmasculine), and sexuality (demipansexual, gay, lesbian, pansexual, queer, heterosexual, unsure). Most of the team collected and analyzed data from Latin* QT participants.

Rich Milner's framework on positionality in educational research [17] provided a set of guiding perspectives for self-reflection to avoid dangers of approaching our study without being conscious of the influence of our identities and experiences. These reflections avoided the seen danger of not interrogating our respective areas of privilege and oppression. The team adopted an asset-based research approach by making space in the analysis for agency and resistance, thus avoiding the seen danger of positioning participants as powerless victims of

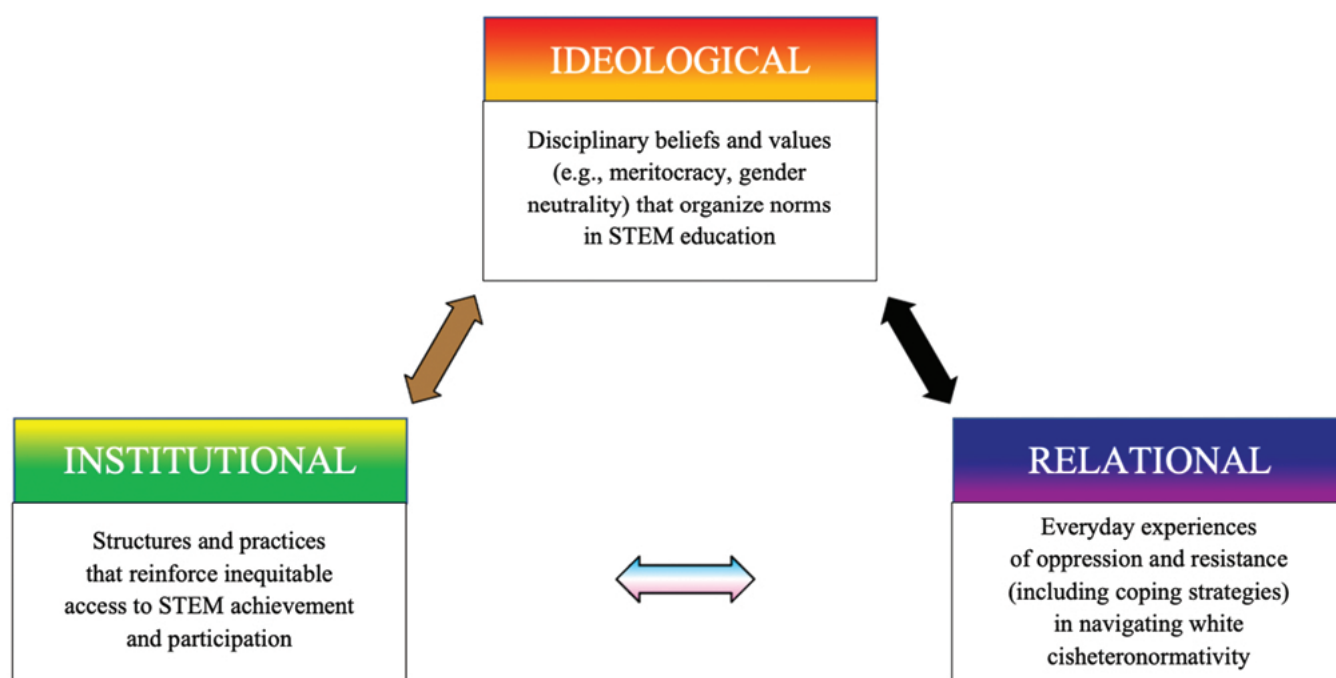


Figure 5. *STEM Education as a White, Cisheteropatriarchal Space* [8].

oppressive systems. To mitigate the unseen danger of misinterpreting participants' sensemaking, we completed interviews and coding in pairs to have multiple perspectives present when collecting and analyzing data. We also completed member checks to strengthen the trustworthiness of our findings. Team members bracketed their lived experiences from those of participants to avoid the unforeseen danger of distorting participants' realities, all while remaining critical of oppressive STEM educational structures and practices through counter-storytelling methodology. I avoided the unforeseen danger of flattening variation in experiences of oppression and agency when reporting findings by looking across two counter-stories. Although this is a solo-authored article, I solicited feedback on early drafts from team members who analyzed Latin* QT participants' data. This feedback ensured data analysis reflects our collective work.

Counter-storytelling Queer of Color Justice in Undergraduate Mathematics Education

This section presents two counter-story cases of how pedagogy in undergraduate mathematics shaped Latin* QT students' intersectionality of experiences as STEM majors. One counter-story case features Jay (he/him), a Colombian-American gay male in his sophomore year as a biology major and on the pre-medicine track. The second counter-story highlights Teresa (she/her), a Costa Rican-Puerto Rican cis bisexual woman in her junior year

pursuing majors in mathematics and economics with a minor in gender studies. Jay and Teresa attended two different HWIs that were both large, public, and research-intensive.

I feature Jay's and Teresa's counter-stories here because, of the 25 Latin* QT participants' mathematics experiences, these two cases were most illustrative of themes uncovered through data analysis. These themes reflect how pedagogical practices (curricular design, instruction, and student support) produced dissonance and resonance with students' intersectional identities. The themes include: (i) the culture of individualism and competition in mathematics; (ii) the influence of racialized and cisheteropatriarchal constructions of mathematical ability; and (iii) mathematics curricula as sites of asociality (i.e., the depersonalized nature of STEM pedagogical and interactional contexts that render identities and social issues as inappropriate and irrelevant [14]). Each counter-story offers a unique account of how a Latin* queer student's experiences of oppression, agency, and support reflect these themes. After presenting the two counter-stories, I conclude with a cross-case analysis using my proposed vision as well as implications for educational practice.

It is important to note that Jay's and Teresa's cases are two examples from a spectrum of ways that mathematics pedagogy shapes intersectionality of experiences for Latin* QT students. These counter-stories, for instance, do not account for unique struggles and agency among Latin*

gender nonconforming students in mathematics, which I explored elsewhere [15]. Jay's and Teresa's cases also depict racialized realities specific to their ethnoracial identities, families' immigration history, and language backgrounds that vary in the Latin* diaspora. Their counter-stories, thus, are intended to serve as illustrative accounts and should not be interpreted as erasing or reducing social complexities in Latin* queer experiences.

Jay's counter-story. Jay's case depicts how pressures of assimilation through instruction, the STEM culture of competition, and stereotypes of mathematical ability presented barriers to support. His counter-story shows his agency to overcome such struggles by way of "play[ing] catch-up" to his peers, forming peer networks of safety, and performative displays of confidence.

Struggles with assimilation. Jay shared dedicating more time to his academics than socializing due to struggles of assimilating to US mathematics education. He reflected on the influence of mathematics on his STEM trajectory, "The idiom that says math here is the same as everywhere else is only partially accurate... People from Latinx and other underrepresented communities are often assumed to have completely normal backgrounds... without taking into account that sometimes we might need extra assistance" (Autobiography). The idea of "normal backgrounds" in Jay's reflection refers to having early experiences of learning mathematics in US contexts. Jay described how, in addition to the progression of mathematical content being more advanced in the US than in his home country Colombia, the written algorithms for different operations (e.g., fraction multiplication) differed. These disparities across national contexts, on top of navigating instruction in English as an emergent bilingual, led Jay to feel pressure to catch up to classmates when learning content.

When you come to US, the levels are just through the roof and it was complicated for me to grasp it. It takes me three times as much to do this stuff... You come here and you have to play catchup. But it's just difficult... The concepts are to an extent different... They're explained differently and they're performed differently to an extent... Having to adapt here, it's difficult. (Interview 1)

Despite the challenges of assimilation, Jay made several efforts to ensure his mathematical success, such as seeking various forms of help (e.g., tutoring), always attending class, and translating class notes to Spanish.

Jay found it challenging to connect with peers on a personal level in mathematics and other STEM courses. The "air of competitiveness" (Interview 1) in the pre-medicine track contributed to this challenge. As a college student older than the majority of his peers and a first-generation

immigrant adjusting to the US context, Jay felt his time for socializing was limited in order to succeed in a highly competitive STEM program.

When you have everything cut out for you, you get to do that... But when there has been some experiences in your life when you're just trying to play catchup to a lot of things, it sucks... Here, I am a little older and I'm still trying to get a social aspect and still have the content of stuff [from STEM courses]. But it seems like in STEM, it's very cutthroat... It's just difficult to create those connections. (Interview 1)

The competitive culture in pre-medicine collided with Jay's struggles as a nontraditionally aged, first-generation student to make peer networks less accessible.

Peer interactions that focused on course content and were less personal, such as groupwork, made Jay anxious. His anxiety stemmed from classmates' perceptions of his academic ability as a student developing fluency with English and who speaks with a Spanish accent. His most memorably negative STEM experience was encountering linguistic racism in groupwork, "I felt excluded or undervalued by some of my peers due to my accent or language insecurity... It was clear that some students did not want to collaborate or work with me, and I felt that my knowledge was being questioned" (Autobiography). This reflection captures how Jay felt vulnerable as an emergent bilingual to being academically underestimated when collaborating in STEM classrooms. Jay shared how, on top of feeling "a little anxious... when [his] English gets a little too fast" (Interview 1) or when he struggles with language translations, the inability to select groupwork partners added to his lack of calm. He further reflected on the negative groupwork instance, "Maybe it's also my anxiety of everything and I had to be [one of] the very, very last ones that was paired up... You got to make it work... [and] do what you can with what you have" (Interview 1). Although groupwork is intended to foster positive peer connections in mathematics and other STEM courses, Jay's insecurity with speaking in English and being undermined made collaboration anxiety-inducing and exclusionary.

Jay also viewed his accent and struggles with verbal communication in English as adding to difficulties in connecting personally with classmates. He described a shift in how peers interacted with him upon hearing his accent, which he interpreted as them being less inclined to engage in conversations unrelated to the class with him.

It's notorious sometimes because when you say something... I don't know if people are trying to be respectful or what, but there's a slight change in attitude of like 'Okay, so we're just here to talk to a specific thing and then that's it.' There's no... 'Oh... where were

you born?’ There’s not that special connection... ‘Oh yeah, I have a friend that was born there.’... But then you see other people, they’re just talking about where they were raised... They went to this high school, it’s the same place. (Interview 1)

Classmates’ evasion of off-task topics in response to Jay’s accent left him with limited opportunities to connect on a personal level. Jay perceived this disconnect as putting him at an academic disadvantage in mathematics and other STEM courses with strong representation of fellow pre-medicine students. He described how the competitive pre-medicine culture resulted in the formation of “cliques” that were exclusive in extending support and sharing resources, “The competitiveness of the... pre-med and all these pre-health tracks... We don’t collaborate if we don’t have to collaborate. And if I’m gonna share my notes, it’s going to be with this group specifically and that’s it” (Interview 3). Linguistic racism decreased Jay’s access to strong peer connections as an emergent bilingual, thus leaving him at the margins of “cliques” in class.

Agency through classroom behavior. To manage the pressures of “trying to fit in a clique” (Interview 3) and secure peers’ academic support, Jay was strategic about his behavior in precalculus and other STEM classrooms to avoid deficit views of his ability. Jay was conscious that, in addition to being academically underestimated for his accent, his effeminate self-expression as a gay male could subject him to being stereotyped as lacking mathematical ability, “Gay people, very feminine gay people, we don’t tend to be good at math. It’s just the stereotypical situations” (Interview 2). He described “not let[ting] people make an opinion” (Interview 2) about his ability based on these racialized and gendered views by withholding participation, “Talk as little as possible in public and sometimes don’t ask the question that you think you need to ask. Wait ‘til the very end [of class] and hopefully you remember your question for your professor” (Interview 3). Another strategy in Jay’s classroom behavior, particularly to evade homophobia, was forming and exclusively interacting with a “clique” of peers with whom he felt safe collaborating. He shared navigating the precalculus classroom in this way.

If somebody is nice to me... For example, my pre-calc class, there’s this girl, she’s from India, sweetest girl ever. And that’s my clique... If I found my safe person, I stay with her and that’s it... I had that person that we can rely on each other to explain each other stuff... I found someone that I related to... We had a good dynamic and I just stick to it. (Interview 3)

In addition to the comfort and relatability that Jay felt with an Indian female peer, he perceived precalculus classmates as safe for collaboration if they seemed to either identify

as queer or signal QT inclusion. Jay described indicators of safety that he sought, “The way they’re dressed, the way that they are social... You just feel it... Just little marks... like a gay flag or something on the backpack” (Interview 3). The inability to readily build peer connections, coupled with navigating stereotypes and the threat of homophobia, made Jay grateful that he found a precalculus peer for safe and productive collaboration, “It was great to have it [his clique] in the class because... I suck sometimes working in teams. But that collaboration part was fantastic for both of us” (Interview 3). Despite this positive relationship, Jay was taxed with undue labor of limiting his participation and finding peer safety to protect himself as a Latin* queer mathematics learner.

Jay also managed deficit views of ability by adopting masculine-presenting behaviors (e.g., speaking in a deeper voice, keeping an upright posture), which he saw as exuding confidence as a student.

Como esa confidence... Uno trata pero a veces no sale. A veces el inglés no sale... En la parte como hombre gay, hasta cierto punto es eso... Uno sabe cuando la gente tiene algún prejuicio contra un hombre que es muy femenino... Si uno nota mucha ‘pluma’ entre comillas... También lo veo en ese sentido... Uno se presenta con alguien y tiene de que ‘Tengo que poner con la voz más ronquita, Tengo que pararme más derecho... Presentarme.’ [Like that confidence... One can try, but sometimes that confidence does not come through. Sometimes, the English language does not come through... On the part about being a gay man, this holds true to a certain extent... One knows when people have some prejudice against a very feminine man... If a man is perceived as too feminine... I also see it from that view. One presents an image of like ‘I need to make my voice a little deeper. I need to stand more upright. Introduce myself]... I want to present that image of my confidence and hopefully that confidence translating [to] being more capable of doing stuff... to avoid them [classmates] to think, ‘He might not be the smartest of them all.’ (Interview 3)

Jay viewed his performative display of confidence coded in masculinity as shielding him from being academically undermined as an emergent bilingual and a gay male with feminine gender expression. He described how growing up in a Latin* household with narratives of machismo shaped his association of masculinity with performances of confidence. When Jay reflected on gendered beliefs in his family, he shared, “El machismo... En la familia latina, el hombre siempre va ser el hombre de la casa y si no,

no eres un hombre [Machismo. In the Latin* family, the man will always be the man of the house and if not, you're not a man.]” (Interview 3). Jay recalled early advice from his parents grounded in machismo that later influenced his embodiment of confidence in STEM classrooms, “Like derechito [stand with upright posture], have a deeper voice y trate de mostrar su confianza... Creo que eso es... lo que más instilaron desde pequeño [and try to show your confidence. I believe that is what they most instilled in me since I was a young child]” (Interview 3). Jay's reflections depict how cisheteronormativity from his upbringing both served and censored him as a Latin* gay male in the mathematics classroom. His parents' advice served to guide strategic displays of confidence to deflect linguistic racism and homophobia in peer perceptions of ability. At the same time, such gendered performances of confidence censored authentic expressions of Jay's identity to appease a white, cisheteropatriarchal gaze.

Teresa's counter-story. Teresa's case shows how asociality in mathematics curricula and instruction separated knowledge production from social realities. There were limited coursework opportunities for Teresa, as a mathematics major, to experience affirmation as a Latin* queer learner and support for her justice-oriented career goals. Teresa's case highlights disruptions of such asociality through pedagogical practices that rehumanized the mathematics discipline [18] and fostered resonance with her identity. Her case also depicts agency as a queer Latina navigating exclusionary and unsafe contexts of participation in 'neutral' mathematics classrooms.

Erasure of identity and social issues. Teresa shared how “most of [her] math classes do not involve discussion of people” (Interview 2) and that “many professors... don't talk about social issues” (Autobiography). She felt dissonance between such asociality in mathematics and her justice-oriented career goals. Claiming that “math is super important for econ” (Interview 1), Teresa picked up mathematics as a major to advance her career goals of addressing socioeconomic disparities in her community and fostering equitable P–12 educational opportunities. She also viewed majoring in mathematics as allowing her to get involved with data analytics and motivate younger generations with shared identities to pursue a similar path, “With math, I don't wanna tokenize myself, but sometimes I'm like, ‘Hey, it would be cool to be involved in data analytics and even potentially inspire someone else to pursue data analytics that's younger than me’” (Interview 1). With social issues unexplored in mathematics, Teresa did not have coursework opportunities to nurture her social justice commitments.

Asociality in mathematics made it difficult for Teresa to ascertain faculty views on social issues. She was able to do that more in economics and gender studies courses, where topics of identity and social justice were common.

Math... is just like, ‘Oh, well, we don't deal with people.’ That's the overarching feeling I get from professors... I think about this a lot compared to my econ and gender studies classes, where we do have to talk about people a lot, and so it's very easy to find what my professors' political leanings are. (Interview 2)

Along with the presence or absence of identity discussions in class, Teresa learned about professors' ideological orientations on social matters through their research, which was more often the case in economics than mathematics, “I can look up my [economics] professors, see what kind of research they do and, usually from that, I can tell where they lie on a political spectrum... But with math, there's no way of knowing” (Interview 1). Teresa's justice-oriented career goals made such knowledge about faculty important.

Teresa saw a contrast between the erasure of social issues in her mathematics major and socially-relevant content in an immersive summer research program at another university (Silver). The program supported students from underrepresented backgrounds to develop research skills and learn about graduate study in mathematics. Teresa's goals of using mathematics for social justice and her minoritized identity were recognized in the Silver program.

We listened to a lot of projects and presentations. Some of them on imposter syndrome... One of them was on gerrymandering... That had an impact on me, because I was like, ‘Oh wait, that could be a route I could take if I wanted to go to grad school in math, that I don't have to abandon the social aspect of a lot of what I want to do... Since it's [the Silver program] geared towards minorities, we're all kind of in the same boat... The imposter syndrome thing definitely resonated with us, so we felt really seen there, and just having mentors who also were very understanding of our situations of not always having the same resources that other people, other demographics in our field have. (Interview 2)

Teresa reflected on learning opportunities in mathematics that would have more readily nurtured her equity-oriented goals, “The [Silver] experience is probably the most salient... We don't have an applied math program [at her university]. We only have pure math. So a lot of the upper levels I took were like topology and it was just basics of topology. We couldn't really apply it” (Interview 3). The focus on pure mathematics in the major precluded opportunities to apply concepts in exploring social issues, which Teresa found inspiring in the Silver program.

Gender studies coursework was a space where Teresa felt more seen in her intersectional identity than in mathematics, “As a gender studies minor, most of the... classes I’ve taken have an intersectional lens and I feel very seen in those spaces” (Autobiography). She contrasted the extent to which her experience as a bisexual Latina was seen as relevant and a source of knowledge between her gender studies and STEM courses.

It’s [Teresa’s identity] relevant to the conversation. A lot of my gender studies courses, we have a lot of discussion, a lot of opportunities to even cite anecdotes, which is not going to be super common in STEM classes. So in group discussion or class discussion, you’d be like, ‘Oh yeah, I know what this author is talking about because I’m bisexual. I’ve experienced that kind of conversation.’ (Interview 1)

Teresa similarly viewed engagement of her lived reality as a bisexual Latina more readily valued in her campus job at the center for social justice than in STEM contexts, “Our programs are backed by research and theory, but we still recognize and see anecdotes as valid. Like we can say, ‘That resonates with me because as a Latina, I had this and this experience,’ and anecdotes aren’t super welcome in STEM environments” (Interview 3). Dominant beliefs of what ‘counts’ as knowledge in STEM, including valorized notions of abstraction and objectivity in mathematics [13, 19], shaped asociality in coursework that made Teresa feel her queer of color identity was irrelevant and unproductive for learning. Such disciplinary values, which are anchored in ideologies of white patriarchy, orient pedagogical practices that often leave mathematics as a product of western colonization uninterrogated in higher education.

Teresa argued that adding more historical perspectives in mathematics instruction can normalize discourse on social issues and allow QT students of color to be seen in their identities. As an example, she called for discussion of how statistics was used to justify racism in the eugenics movement—a topic in her gender studies courses where she felt her identity as a bisexual Latina was affirmed.

The history of eugenics and how it was based on a lot of statistics and how people thought it was scientific. I learned that in my gender studies class instead of my math class, which I thought was weird because I think that should be something that all math majors should learn about... Computer science majors are required to take an ethics class, but something like that for math, I would have appreciated. (Interview 2)

Teresa saw topics of history and ethics in mathematics as socially-relevant content crucial for students in the major.

Although Teresa yearned for engagement of social issues in mathematics, exceptional instances of faculty infusing topics of social power and individual histories felt disconcerting. For example, Teresa described how it “felt really out of place” (Interview 3) when a professor for an upper-level course raised mathematicians’ realities of religious persecution and overcoming misogyny.

I also had another professor... who did make an effort to spotlight women mathematicians that made an impact on the field... He would also talk about if a theorem was named after a person... There was one mathematician... that was persecuted for being Jewish... I appreciate that he even brings stuff like that up because... these names of theorems are real people. I’m seeing a bit more humanness in math, but you can tell it’s rare because the few times I’ve seen it, it felt out of place. (Interview 3)

Discussion of mathematicians’ lived experiences as a pedagogical practice added a humanizing element missing in mathematics courses. Teresa feeling disconcerted with such practices shows how such pedagogical disruptions of asociality, which she valued, were not the norm.

Resistance through femininity. Despite pedagogy reinforcing views of mathematics as a ‘neutral’ space, Teresa viewed classrooms as sites of gendered struggle. Gender played a more central role than her race and sexuality in navigating STEM contexts, including mathematics classrooms, “I’m white-passing. My bisexuality isn’t super obvious in the way I present physically... A lot of my negative experiences when it comes to being in STEM, it’s just me being a woman” (Interview 1). In Teresa’s first year of college, participation in mathematics classrooms, including groupwork, was uncomfortable. She was concerned about “feel[ing] like [her] ability to contribute was automatically underestimated” (Interview 1) along with not “want[ing] to seem too confident” (Interview 1) when presenting ideas. With Teresa’s older brothers encouraging her to participate more actively in class and her ex-boyfriend suggesting that she major in mathematics, she viewed her mathematics trajectory as involving “straight men who seemingly wanted to share their confidence” (Autobiography). Her gendered struggles with participation decreased in upper-level classes where she connected with other women.

Teresa viewed her feminine gender expression contributing to being academically undermined in first-year mathematics courses, “I used to dress very feminine. I would put on makeup and paint my nails and I knew I wouldn’t get taken as seriously” (Interview 2). At the same time, such displays of femininity concealed her bisexuality and protected her from being fetishized as a queer Latina.

I was okay with my bisexual identity being covered by me being feminine because I didn't want anyone to know that I was both Latina and bisexual because that is just a recipe for fetishizing that I didn't want to welcome. . . I wouldn't say I was in the closet. I was very active in queer spaces, but in terms of like in the classroom, I wasn't letting that be known because I didn't want to invite any type of comments or sexualization (Interview 2)

Teresa reflected on how knowledge of her Latina identity based on her Spanish last name already made her vulnerable to being sexualized. She recalled cisgender men in a first-year statistics course making comments like, "Oooh, can you say your last name again? It's so sexy" (Interview 3). Such racialized-gendered sexualization brought Teresa to feel her "comfort comes down to how many cishet, white men are in the room" (Interview 2). To navigate this white cisheteropatriarchal gaze in mathematics, she concealed her queerness to prevent being fetishized as a queer woman of color and avoided interactions with cisgender men, "I also don't talk to cis men in any of my classes. . . I don't want them to know any more about me because that's enough [being Latina]. . . Therefore, [I] hide my bisexuality" (Interview 3). Being mathematically successful as a feminine-presenting Latina was also a form of resistance, "It was almost like a 'F you' because the men that wouldn't take me as seriously, I would do better than them in school and then they would end up having to ask me for help" (Interview 2). Teresa's femininity, thus, was a source of both oppression and agency for navigating first-year college mathematics classrooms as a bisexual Latina.

Rehumanizing disruptions. Teresa accounted for two pedagogical disruptions of asociality that she experienced as rehumanizing mathematics and affirming of her Latin* queer identity. The first disruption, which she described as the "most human interaction [she's] had with a STEM professor" (Autobiography), took place in a calculus class. The professor, a white heterosexual cisgender man, dedicated half of a lecture to recognize his privilege as well as advocate for students who share his identities to do the same and ensure equitable opportunities for classroom participation. In describing a vision for STEM classrooms that affirm QT students of color, Teresa alluded to this moment from the start of the semester.

The one instance I can think of. . . was a cishet male professor who. . . spent the entire half of the lecture just telling all the other cishet white males like, 'Hey, you hold a space of privilege in STEM. Recognize that. Give space to other people who don't hold those identities. . . I make time to have these conversations. It is part of my curriculum that I spend half of this lecture

talking about it because it's so important to me.' Even something like that, I wouldn't mind if it was in every class, every semester. . . I think it's important and needs to be drilled. (Interview 2)

Teresa valued her professor's interrogation of privilege because it expands opportunities for QT students of color to experience classrooms as "more affirming [and] more safe" (Interview 1). She expressed how this moment personally impacted her as a bisexual Latina, "It made me feel like he understood who I was and what I go through as a minority woman in STEM" (Autobiography). Having a mathematics professor who asked white male students to "step back when marginalized people are talking" (Interview 1) potentially allowed Teresa to have her gendered struggles with classroom participation feel seen.

Teresa perceived her calculus professor's instruction overall as rehumanizing mathematics for QT learners of color like her. She recalled the professor taking time during the first day of class to build community and learn students' pronouns, "First day of class. . . He was just like, 'I want you guys to get to know me. I want to get to know you. . . If you have pronouns that you want me to refer to you by, please let me know. I don't want to misgender you'" (Interview 1). When advocating for students to recognize and interrogate their privilege, the professor stated, "This isn't a political statement. This is a human statement" (Interview 1). Such centering of identity notably disrupted asociality in Teresa's mathematics experiences, "None of my math professors, besides him, have ever just stated that during class time—the importance of identity. . . Some professors don't bring it up because they might think gender and race [are] political when it is a human issue" (Interview 1). Teresa saw it valuable for all students continuing with mathematics, including QT students of color, to experience such humanizing instruction in introductory courses, "Especially because he's teaching lower-level math. So if you're gonna go into higher levels, this is how you should start your journey, knowing where you stand and how you can help marginalized communities" (Interview 3). Thus, identity-affirming calculus instruction elevated consciousness for Teresa and classmates about white cisheteropatriarchy in mathematics as well as how educators and students can work to disrupt it.

The second pedagogical disruption of asociality in Teresa's mathematics experience took place in an upper-level course with a queer professor of color. At the start of the semester, the professor shared two video clips he recorded—one with a course overview and another with his self-introduction that was optional to watch. The optional video highlighted the professor's work in mathematics and outside of the field, such as his involvement with a QT initiative on campus and his written work about QT

people of color. When asked about instances of feeling seen as a Latin* queer student, Teresa raised this video.

He had a little 'About the Professor' thing... and he talked about how he worked on [QT campus initiative]... He writes [about queer people of color] and he's my math professor, so I was like, 'Oh, this is amazing. You do things that aren't just math, and you do human things. Not like math isn't human, but you know what I mean—more things that relate to people... He's a very well-respected professor, so it's like, 'Oh, that's a queer person of color doing the damn thing at my school.' (Interview 2)

Learning about the professor's work in the QT community at the university made Teresa "feel safer since the math field feel[s] so dominantly straight and white" (Autobiography). It also made her feel comfortable with talking to the professor about academics and events at the campus center for social justice, where she worked on QT programming. Since Teresa completed this course at the start of the COVID-19 pandemic when classes were moved online, she found it challenging to connect and discuss queer-related topics, "I want to talk to him more about that [his writing about QT people of color], but it just being an online setting makes it really hard... A lot of classes have [online platform], that's very public and I want to have a private conversation... when it comes to stuff like that" (Interview 1). Despite such barriers to out-of-class connections, this course was a uniquely positive mathematics experience for Teresa. The professor noting his involvement in queer activism via the optional video disrupted traditional pedagogies in mathematics that reinforced a separation of the discipline and humanity, "The fact that he mentioned [the QT initiative on campus] still felt good because it felt like he found that an important thing to mention about his work" (Interview 1). Teresa perceived such recognition of queer realities as a way the professor worked to "demonstrate that math is a very human issue" (Interview 3). This instructional practice, thus, rehumanized mathematics and allow Teresa to feel affirmed in her Latin* queer identity.

Concluding Perspectives: A Cross-case Analysis and Implications for Practice

This concluding section applies my pedagogical vision for queer of color justice in undergraduate mathematics (Figure 4) to guide a cross-case analysis of Jay's and Teresa's counter-stories. I structured this analysis in three parts that address each pedagogical approach in my vision—instruction, student support, and curricular design. The cross-case analysis elucidates how pedagogy across the two Latin* QT participants' mathematics experiences limited or expanded opportunities for their queer of color

identities to be supported. I use the WCHPS framework (Figure 5) to elucidate how white cisheteropatriarchy was reinforced or disrupted at multiple levels (ideological, institutional, and relational), which impacted opportunities for queer of color justice through pedagogy. Adding to recent *Notices* discussions of supportive practices for the QT community in mathematics [20], I raise implications for pedagogical practice from my analysis and findings.

Instruction. Jay's and Teresa's cases differed in terms of the first approach in my pedagogical vision—*empowerment of educators and learners to interrogate complicity in systemic oppression as well as use mathematics as a tool for intersectional justice*. Pressures of assimilation that Jay faced as a first-generation, emergent bilingual student through instruction limited access to content. His case reflects educators potentially falling short in interrogating how instruction that assumes English language fluency and prior mathematical knowledge can lead to differential opportunities for success. Applying the WCHPS framework, Jay's counter-story depicts how dominant ideologies that recenter US-based ideas of mathematical success (e.g., communicating in English) framed instruction as an institutional practice tied to inequitable learning for QT students of color.

Teresa's counter-story presents a pedagogical disruption of complicity with systemic oppression going unchallenged, thus advancing the first approach in my vision. This disruption is reflected in Teresa's calculus professor naming his privilege and calling upon white male students to monitor how much space they occupy in class. He modeled critical self-reflection of his social position and empowered students to take action in challenging white cisheteropatriarchy. This instructional instance made Teresa feel seen as a bisexual Latina navigating gendered struggles of participating in class and being sexualized. At the ideological level of the WCHPS framework, Teresa's case exemplifies a pedagogical disruption of asociality in mathematics anchored in ideologies of whiteness and cisheteropatriarchy. The professor's instruction resisted the ideological framing of mathematics as 'neutral' to hold himself and his students accountable in pushing back on queer of color oppression. Such disruption at an ideological level is also evident in Teresa's summer research program experience, where she explored use of mathematics to address issues of social justice (another aspect of my pedagogical vision's first approach). Teresa's mathematics coursework fell short in this pedagogical approach to advance queer of color justice due to absent discussions of identity and social power. She was left relying on outside opportunities like the summer program to receive support for her justice-oriented motivations as a mathematics major. Teresa's experience of instruction in the calculus course as rehumanizing also disrupted

undergraduate mathematics as a white, cisheteropatriarchal space on a relational level. The professor's pedagogy carved opportunities for building community and honoring identities, which Teresa had not experienced in mathematics where her identity as a bisexual Latina went unrecognized.

Jay's and Teresa's counter-stories raise implications for instructional practice about the importance of critical self-reflection among mathematics educators. Faculty must interrogate how their areas of social privilege shape instruction that reinforces inequities of access and disallows QT students of color to feel seen as mathematics learners. Teresa's case depicts the value of infusing social relevance in instruction to empower students' engagement with mathematics for queer of color justice.

Student support. Jay's counter-story illustrates pedagogical shortcomings for the second approach in my vision for queer of color justice—*creating an interactional space that QT students of color experience as affirming of their full identities and contributions to mathematical knowledge.* The unstructured nature of groupwork in mathematics left Jay's limited access to peer support unchallenged. Linguistic racism presented barriers in forming personal connections with classmates, placing him at the margins of "cliques" in class. The pre-medicine track's competitive culture contributed to the hoarding of resources and support in "cliques." As a feminine-presenting Hispanic gay man, Jay navigated racialized-gendered views of his mathematical ability that pressured him to prove his worth as a peer collaborator.

Through the lens of the WCHPS framework, Jay's counter-story shows how mathematics pedagogy as an institutional practice failed to intercept individualism as a dominant ideology in STEM. Competition among students on the pre-medicine track led to the formation of exclusionary "cliques" whose support was inaccessible to Jay due to linguistic racism and homophobia in peer interactions. At the same time, Jay's case depicts agency in managing such individualism by forming his own "clique" in the precalculus classroom to ensure access to peer support. He actively sought indicators of classmates being inclusive of QT people through their dress, behavior, and appearance when determining who might be someone safe with whom to collaborate. Although Jay's strategy of forming his own "clique" provided a safe environment to express himself during groupwork, the silos of peer support and culture of individualism in the mathematics classroom persisted.

Jay's case also captures white cisheteropatriarchy operating at both ideological and relational levels. Intentional choices of behavior, such as withheld participation and displays of confidence coded in masculinity, served to protect Jay from stereotypes of mathematical ability in the

relational space of the classroom as a feminine-presenting gay Latin* man. Ideologies of machismo in Latin* culture, despite being anchored in cisheteronormativity, guided Jay's performances of masculinity to exude confidence and avoid peers' gendered perceptions of his ability.

Insights from Jay's counter-story raise implications for mathematics pedagogy that ensure equitable distribution of student support. Faculty, for example, can adopt norms for forming groups and guiding collaborative interactions that explicitly challenge racialized, cisheteronormative beliefs of mathematical ability. Such norms establish an interactional space that disrupts the dominant culture of individualism in STEM and expands opportunities for competence among QT students of color to be embraced.

Curricular design. Teresa's counter-story illustrates advancing the third pedagogical approach in my vision—*decolonizing curricula by infusing contributions from QT mathematicians of color and problem-solving opportunities relevant to students' lives.* A self-introduction video from a queer professor of color that acknowledged his campus work in the QT community and writing about QT people of color disrupted the silence of queer humanities that Teresa experienced in mathematics. These highlighted achievements also provided temporary reprieve from mathematics as a racialized, cisheteropatriarchal space often unsafe for Teresa as a queer Latina. Through the lens of the WCHPS framework, the video is an institutional practice that disrupted traditional forms of curricular design, which subscribe to dominant ideologies of mathematics as a 'neutral' space.

Learning about faculty involvement in social activism, mathematicians' social realities, and possibilities of using the discipline to solve social justice problems rehumanized mathematics for Teresa as a bisexual Latina. However, these curricular opportunities were so uncommon to the point that Teresa felt disconcerted when she experienced them in class. Even the self-introduction video was optional to watch. Teresa's counter-story raises implications for faculty to provide and normalize learning opportunities where students readily consider connections between mathematics and broader sociopolitical issues. Such curricula allow QT students of color to experience mathematics with relevance to their identities and lives.

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