CHAPTER TOPIC/TITLE:

Learning Communities as a Driver for Humanizing STEM: Cultivating Authentic Conversations about Anti-Racism in Introductory Biology Pedagogy using Duoethnography

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MANUSCRIPT:

Introduction

In order to change the culture of education and research practices in STEM, systemic change must occur. To do this, we propose that the STEM community should begin to acknowledge and replace the culture of white supremacy by (1) authentically interrogating and acknowledging that a culture of white supremacy exists in STEM; (2) increasing representation of women, racialized groups, and minoritized identities of sexuality and/or gender; (3) including culturally responsive training for student affairs professionals, faculty, and administration; and (4) including other ways of knowing and showcase scientists, scientific issues, and science that is inclusive of, supports, and benefits previously underrepresented communities (Callwood, et al., 2023, p. 1; Yao, et al., 2023). Finally, successful completion of this work requires humanization of the STEM community through development of relationships, as well as the reflexive examination of the historical underpinnings of science culture. One way to do this is through the creation of communities of practice, or learning communities, that allow for space and time to explore, interrogate, and discuss these issues to develop strategies for transformational change.

Shifting away from false notions of objectivity in STEM

It is important for science educators to reflect on the ways in which our education system has ill-prepared its students to understand and engage with issues of social injustice, both during their years of school and once they are in their careers. Science courses can be notoriously content-focused, prioritizing walking students through a predetermined canon of existing facts rather than cultivating the thinking process that

led to them. On the surface, it appears that there is no dominant ideology or culture within the STEM community because Western science methodology is purported to be empirical, apolitical and objective. There is an expectation that scientists leave their intersecting identities–race, ethnicity, gender, sexual orientation, religion, socioeconomic status, culture, disability status– at the door the moment they step into the classroom or conduct research, because these identities are considered irrelevant in the STEM community (Nardi, 2021). The only identity recognized as being present is that of being a neutral scientist (Nardi, 2021). This has allowed for the biases of scientists to influence their research avenues and findings, leading, at its worst, to the egregious underrepresentation of the full diversity of humans in medical studies, exploitation of the bodies of people from socially subjugated groups, and perpetuation of false 'race science' and eugenics movements (Washington, 2006; NIH, 2022).

Because of the false notion of objectivity, neutrality, and absence of ideology in STEM, conventional curricula often ignore the role that science has played, and the ways science has been misused, to provide evidence for and to exacerbate social disparities. This pedagogical philosophy, called 'scientism' (Stenmark 1997), often leads to science classroom environments, pedagogy, and curricula that do not focus on making connections among students or connections between course content and the students' lives. Perpetuating or promoting the false notion of objectivity in STEM can also lead to a sense of exclusion, especially for minoritized students who do not see themselves represented in the dominant culture of science or higher education. Science pedagogy needs to expose students to aspects of existing racial inequity that are currently missing from curricula in the U.S. Without that exposure, our classrooms and institutions may perpetuate a citizenry unaware of or resistant to the reality of white supremacy and racial inequity embedded in our societal systems. In addition, it is imperative to have a working understanding of what it means to be antiracist. Being antiracist includes the recognition and dismantling of racist policies and institutional structures that lead to racial inequity **(**Kendi, 2019).

Training STEM faculty for inclusive and antiracist pedagogy

Unfortunately, most STEM faculty in the United States are trained to view science as purely empirical and apolitical, leading to the conditioned act of simply "teaching the facts." STEM faculty are rarely trained to acknowledge, let alone discuss how to mitigate, the inequities present in scientific practice or to emphasize the power that science has to be a driver of societal change toward equity. When instructors are uncomfortable with difficult dialogues involving race, it can lead to silence, inadvertent dismissal, or invalidation of the experiences of students of color, which can have negative cognitive, emotional, and behavioral consequences for these students (Wing Sue et al., 2009). Color-evasiveness, the active avoidance of acknowledging racism as driver of inequity, is pervasive among STEM faculty (King et al.,2023) and this mindset can lead to deficit mindsets and reduced assumption of responsibility for addressing issues of racial inequality in their institutions (Russo-Tait, 2022). Even white faculty who are identified by colleagues as anti-racist allies express their perception of barriers to fully engaging in antiracist work at their institutions, due to perceived lack of institutional support or threats to job security or promotion. White faculty also must face internalized struggles about their White identity, as well as recognize and leverage White privilege in

a productive and non-performative way (Philips et al 2019). Training and support are required to help STEM faculty acknowledge their privilege and biases, develop comfort and skill with facilitating difficult dialogues around race, and transform their pedagogy toward promoting equity and antiracism (Leonard & Woodland 2022; Sue et al., 2009).

Robust teacher professional learning communities, a specific kind of community of practice that meets regularly and over a sustained period of time, are a critical lever for professional development for antiracist and equity-focused pedagogical approaches. For such communities to be inclusive and successful, norms should be set for respectful engagement and discourse among group members, and to set a climate for bravery and openness to explore potentially uncomfortable aspects of our own biases, outlooks, or past practices as we work toward change (Leonard & Woodland 2022). They are more than simply a discussion group or learning circle. Instead, learning communities tend to be an intensive experience in which members develop ground rules for interactions, including prioritizing empathy for each other to focus on difficult topics (Cox, 2004). Members must commit to being mindful of each other's visible and invisible identities, to deeply listening, and to communicating and collaborating in a way that shares power and fosters consensus through shared discussion (Smith-Keiling et al., 2020). With trust established, communities can then engage members in self-reflection about how their own intersectional identities influence their experiences in society and in their STEM journeys, and about how their experiences carrying privilege and power influence their mindsets, biases, and decision-making in their professional roles (Leonard & Woodland 2022). This self-reflective work is foundational to transforming educator mindsets and dismantling oppressive systems that operate in our institutions and the STEM departments that we work in (Pitts 2020**,** Leonard & Woodland 2022). Additionally, by providing a long-term professional development experience, these communities can provide opportunities to articulate social justice-focused theories of praxis. These in turn will guide reflection and action in teaching for collaborative design and piloting of curricula that prioritize thoughtful and sustained systemic shifts toward antiracism and equity (Bondy et al., 2017; Leonard & Woodland 2022; Miller et al 2022). These professional communities can be successfully conducted in an online format, which was critical during the COVID-19 pandemic and has continued to be a valuable modality to allow for participants from diverse geographical locations to engage with each other (Kerkoff et al., 2002; Miller et al 2022).

Statement of Purpose

In this study we present a retrospective debrief of a learning community of college biology professors who were exploring how to define and implement racial equity-focused practices and content in introductory biology curricula. The purpose of this qualitative duoethnography is to discuss the journey it has taken to develop our understanding and frame of mind that led us to teach disciplinary content with embedded anti-racism. Through our polyvocal discussion we are countering the outdated notion of science as objective and that science teaching needs to be void of humanity. We are also countering the narrative that there is one right way to discuss issues pertaining to diversity, equity, and inclusion. Polyvocal approaches allow for enriched discussions that center the nuances of varied personal and institutional contexts (Anila, 2017). Therefore, the presentation of this learning community is done in

a polyvocal fashion that showcases the voice, experience, and perspectives of each of the individual researchers who participated. We will explore how the learning community provided an opportunity for discourse with each other to interrogate anti-racism and its place in undergraduate introductory biology, and for self-reflection about how the cultures that we were raised in influence our outlooks and actions.

Methodology

Context: Group Formation & Learning Community

Our learning community work spanned from winter of 2021 through spring of 2024. Our group consisted of five college biology professors from a range of institutions, including R1 and regional comprehensive four-year university, community college, and liberal arts college. We ranged in career stages from Assistant and Associate to Full Professor, and during the span of our collaborative work, community members also held such academic administrative positions as Associate Dean, Department Chair, and Unit Head for STEM and Health Sciences. All individuals had been engaged in self-education about race and anti-racism, as well as dedicated to implementing active and inclusive teaching practices in their courses.

Our group formed organically from a subset of members that participated in a reading group organized by the Society for the Advancement of Biology Education Research (SABER) to discuss Dr. Ibram Kendi's book How to Be an Anti-Racist (Kendi, 2019) together in 2020. Some group members had also previously worked as research collaborators. Our five-member learning community coalesced to prepare a proposal for the Spencer Foundation entitled **The Impacts of Anti-Racist Practices in Gateway Introductory Biology Courses**, focused on development and implementation of antiracist and equity-focused practices in gateway courses for biology-related majors. Following grant submission in January of 2021, the group met for monthly Zoom discussions of the **Seeing White - Scene on Radio** podcast, which explores the history and meaning of whiteness in America. When grant work commenced in October 2021, we continued to meet monthly, discussing scholarly articles to inform our definition of anti-racist teaching in introductory biology [Link to reading list]. We leveraged our discussions to create a guiding framework for development of curriculum modules that could be used to add an anti-racist lens to introductory biology content, with the aim of humanizing STEM and encouraging students to engage in ongoing self-reflection related to one's social positioning. During this journey we explored anti-racism (the practice of actively combating racism) (Kendi, 2019), fugitive pedagogy (educational practices developed during the time of slavery by Black educators to foster skills that help students confront systemic racism) (Givens, 2021), and emancipatory pedagogy (teaching practices developed by Brazilian educator Paolo Freire that encourage students to challenge oppressive systems and social injustices) to develop an in-depth, shared understanding about the historical racism that is part of the educational system in the United States (Friere, 1968). Due to the nature of the topics, our discussions often delved into very personal experiences as a result of our varied backgrounds and life experiences. Through this learning community, we developed a trusting group of colleagues that explored our own social positioning and its impact on our outlooks and roles as educators.

Our Duoethnography Approach

Based on our learning community experience, we chose to analyze our process using the duoethnography approach. Critical duoethnography is a collaborative, inquiry-based qualitative research method that uses dialogue between two or more researchers in which they contrast views and perspectives and develop a critical lens to explore social phenomena and commonly held beliefs (Lawrence and Lowe, 2020; Mulvihill & Swaminathan, 2022). More specifically, one tract of critical duoethnography focuses on examination of a common problem or shared interest with a social justice lens using dialogical exchanges that emphasize deep listening to advance pedagogy towards transformational learning (Mulvihill & Swaminathan, 2022). In addition, critical duoethnography requires a high level of self-reflection, because one's self-perceptions can affect how the data are interpreted (Mulvihill & Swaminathan, 2022). Such self-introspection often includes the examination of the researcher's identities as they relate both internally and externally to the context of the research project itself.

In contrast to most research methodologies that aim for the researchers to be objective, this approach encourages the researchers to acknowledge their identities, social positionalities, and life histories, as they provide counter-narratives to the dominant narratives and commonly held beliefs (Lawrence and Lowe, 2020; Sawyer & Norris 2013). Each researcher's voice is individually presented to acknowledge how they leverage "self as research site," reflecting on their embodied experiences, juxtaposed with conversations with research partners, to construct and reconstruct their conceptions (Lawrence and Lowe, 2020; Sawyer & Norris 2013). This "dialogic" research process is deeply reflective in nature and requires a trust among researchers to ensure that all share and dialog openly and honestly. The central feature of the duoethnography process is dialog as a data source, a mechanism for analysis, and the boundary within which meaning is created, all within the same process. Duoethnography, in other words, encourages embodied research because it involves the development of deep, reflexive relationships among the researchers which allows for interrogation of difficult topics such as antiracism while simultaneously creating a space for collaboration (Hummel & Toyosaki, 2015). Participants in the dialogue must be open to '*currere*'- defined as a process by which, during dialog and self-reflection, new meanings or paradigmatic lenses evolve as a function of the conversation itself. When interpreted through the lens of critical duoethnography, currere can also be understood as a way to incorporate connections between participants because they involve "a person's identity construction, life history, academic experiences, and their process of socially reconstructing meaning" (Mulvihill & Swaminathan, 2022, p. 48). Most notably, these lenses are likely to not have become apparent had each participant been interviewed separately instead of collaboratively. Through the community-based interrogation of identity we unveil cultural influences that may not have been apparent, thus leading to a change in the lenses used for making meaning (Mulvihill & Swaminathan, 2022).

Our dialog included three conversations, each focused on a general question with specific suggestions, as listed below. These conversations were recorded via Zoom, and transcripts were obtained.

Conversation 1: How did engagement with the antiracist learning community influence your personal anti-racism journey?

- What elements of our process were valuable/impactful?
- Discuss the group formation process and format of meetings
- Reflect on discussions that took place and takeaways
- Note valuable discussion material and why it was impactful
- What is important when building an antiracist faculty learning community

Conversation 2: How did you use the learning community and personal antiracism journey to reimagine introductory biology in your context?

- What shapes our outlooks/approaches to anti-racist teaching?
- What does anti-racist teaching in undergrad bio look like for you? How does this conflict with what we are told undergrad biology teaching should look like? How do we reconcile any disconnect or conflict of values?

Conversation 3: What does it mean to be a structural disruptor in education?

- How does this work intersect the need for structural change in higher education?
- How do our institutional settings influence our ability to effectively catalyze change?

We followed these three conversations with a fourth analytical conversation in which we engaged in post reflexivity through dialogic reliability (Wiant Cummins & Brannon, 2021). In other words, we discussed our individual thoughts and analyses of the three conversation transcripts. Each participant read through the transcripts prior to this fourth meeting, and the meeting time was focused on an exchange of ideas and reinterpretation of our own impressions of the conversation.

Data Sources

The data sources used for this duoethnography were recorded conversations and learning community documents that represent the collaboration and experiences of the research process. Three one-hour-long group conversations were recorded over Zoom, using the research questions as prompts. A video of the Zoom conversation and a transcript of the closed captioning were recorded and saved for each session and annotations were added to identify speaker contributions in the transcript. In addition to Zoom recordings, a detailed timeline of group meeting dates, agendas and discussion notes was prepared as a data source.

Identifying themes

Each author read the transcripts individually, and engaged in personal post reflexivity to identify the major themes that they each took away from the recorded conversations. Those themes and any associated subthemes were shared in a cloud-based document so that each person could view others' themes before the analysis meeting. During the analysis meeting, themes were discussed and further explored to give participants an opportunity to articulate definition of themes and to identify areas where themes overlapped or needed clarification. From this conversation, the authors

agreed on three major themes that have emerged from the process of dialog we undertook as a way of fostering development of more nuanced understandings of the issues under consideration. The three themes will be discussed in the next section.

Results

We each had our own entry point to the journey, engaging in individual self-reflection and approaching anti-racist work in our institutional roles. This is reflected in our positionality statements, which are presented here.

Positionality Statements

Stephanie Blumer: I am the great-granddaughter of Jewish refugees from Europe and Iraq, and experienced anti-semitism, xenophobia, and misogyny - within my own family as without - as the daughter of a queer mother and Arab father in Southwest Ohio. Lack of knowledge about neurodivergent students experiencing intrafamilial violence resulted in an early fear of learning. My commitment to education arose from having survived complex trauma and being a first-generation, low-income student seeking safety and independence. I now work to understand and contribute trauma-informed practices that holistically nurture students' humanity and success, facilitating scientific literacy and catalyzing educational equity in the community college setting.

Bryan Dewsbury: I am an academic of Afro-Caribbean descent. My lived history has allowed me to both understand, live, and experience marginalization in the United States, but also create some intellectual distance between my life's experience and my professional goal to address related challenges. To this end, I aim to continue bridging my diverse approaches with my personal experiences in the world to be part and parcel of making science education more equitable.

Melissa Haswell: I identify as a cisgender, heterosexual white woman who was raised in rural mid-Michigan on a small family farm and a father who also was a unionized worker at General Motors. Our family had financial ups and downs which led to times of both privilege and need, but we always had food on the table. I first recognized my identity as white while learning about the American Civil War in 6th grade. Having little experience with people of color except for the one Black student in our school and the summer migrant workers from Mexico, I became very curious about other races and cultures. During my undergraduate coursework I took several classes on racism and as I progressed into my graduate studies, I was inspired by bell hooks, Paulo Friere, and Parker Palmer to study the systemic barriers to higher education for marginalized groups and inclusive teaching practices. I continue to listen and learn as an educator and a community college administrator to better understand Eurocentrism and racism as structural influences on higher education and STEM.

Tess Killpack: I am a cisgender, heterosexual, able-bodied white woman. Being raised in a wealthy Midwestern family I was socialized to have blinders to the realities of racism and wealth inequality in America and to my numerous unearned privileges. I grew up in a well-resourced home in a suburban neighborhood, and my family paid for

high quality childcare, grade school education, and extracurricular activities. Because of the generational wealth that I inherited, I was able to attend the private liberal arts college of my choice, graduate debt-free, and pursue a career path that gave me personal fulfillment without having to prioritize financial stability for my family. My path as an educator has opened up my antiracist journey and I have been working to educate myself. My desire to create equitable learning environments led me to start deeply examining my identities and biases, to learn more about the influences of white supremacy, racism, and classism in perpetuating inequity, and to consider the impacts that all of this has on policies, course decisions, and student experiences in my role as an educator. I have experience teaching science at a high school, an R1 university, and a prestigious women's college. I currently teach at a regional comprehensive university that serves a diverse population of smart and driven students, many of whom come from low-income families and who are the first in their families to go to college. I teach primarily introductory biology to first-year students who want to be Biology or other STEM majors.

Lisa Urry: I am a cis-gendered, heterosexual, able-bodied white woman who has gradually come to understand my own privilege and the systemic exclusion of others from many opportunities and spaces. As a second-generation college student whose parents grew up in poverty, I was taught to appreciate education, justice, and fairness. The O.J. Simpson trial occurred when my children were in a day-care run by African-Americans; I saw the discrepancy between what parents of color and white parents thought. Since then, I have sought to educate myself about the racist systems that prevail in this country and to do whatever I can to change them. I carried out my graduate and post-doctoral work at R1 institutions, then taught in a small liberal arts college for women with a strong, meaningful commitment to social justice for 27 years. Our demographic was 58% students of color and about 50% gender non-binary. Our college merged two years ago with an R1 university, and we legacy faculty are trying to continue the social justice mission in a much larger context. I have had various administrative positions, including Department Chair and, more recently, Unit Head for STEM and Health Sciences. During my teaching career, I have sought to stretch my understanding of what it means and the work it takes to welcome all voices to the table and ensure they are heard and empowered.

Themes

As described previously, our analysis identified three themes that emerged from our conversations and thoughtful reflections. These are described below, with supporting quotes from the transcripts of our four recorded conversations.

1. Doing the work: The process is the product

We established this learning community to discuss books, articles, and podcasts, and then to work collaboratively on a scholarly curriculum design project to create anti-racist modules for use in introductory biology courses. However, reflecting on the value and enduring nature of our community, we recognized our ongoing learning and growth

from engaging with each other and the value of the process itself, which we saw was the "product." We recognized the importance of being uncomfortable, vulnerable, and open with each other, empathizing with each person's place in their own journey in a non-judgmental way. We created a space that enabled us to bring our whole selves to the conversation. Furthermore, by interrogating how we showed up ourselves, we created a means to understand how we might begin to accept others when they show up from wherever they are at, just as we do. This cultivated empathy within ourselves and among group members. We found this process to be invaluable, both personally and collectively, and we are interested in exploring how we can facilitate creation of such learning communities. Selected quotes relevant to these conclusions are included below.

[Tess] *I think there are many people who would like to link into a community like the one that has been cultivated here. The seed of this community was from this crisis point, a time of racial reckoning in the United States following George Floyd's murder by police and it also was a time of social isolation of COVID-19. And the popular "How to Be an Anti-racist" book was published at the time, which helped facilitate us coming together and giving a framework for talking about these ideas and issues. What ended up happening was that we spent our time digging pretty deeply into ourselves, unearthing some sort of half formed thoughts, figuring things out and hearing each other out. And I think that moment in time was really conducive to that. Could this community be replicated now outside of that intense moment in time? How would you get that depth and that profound work now? If someone wanted to start a community like ours now, what does it take?*

[Lisa] *Partly it's not guaranteed that if you start something, you'll want to continue it, but the only way to find out if you can have something like a community like this where it's very valuable is to try it. And what I was going to say was, I wonder if sometimes it's just a call to action that's needed, like a statement that, "Are you feeling like there's unfinished work here that has kind of been fading? One thing you could try if you feel that way, if you feel like there's this latent desire in yourself to go further with this work, given that you can see it's fading in the public eye, you should think about forming this kind of group." And this is a value of what we did in recording our conversations and our organic process that might inspire people to do the same thing.*

[Tess] *Thanks Lisa, that's helpful. This idea of forming a group and letting the self-work unfold. I'm wondering, if this was a group of folks assembled by or from my institution, if it would very quickly go to "How can we show that we are on the right side of things?What program do we want to build? What statement do we want to publish on the website?'... skipping over the marinating, and discussing and openness, and just*

going right to making a product.

[Lisa] *Our process was maybe the most important product in some ways, right?*

[Melissa] *I was just thinking the same thing, Lisa, really us documenting what we did, I think is the key to our learning and growth.*

[Stephanie] *I was thinking about what a great defense it is to just start doing. Marinating is uncomfortable. It can be really uncomfortable. So I think if you're just, "okay, let's build a program." Informed by what, right? Like, oh, but "we can fix this." Informed by what? As I'm listening, I'm hearing a couple of other themes. Tess, you're asking, "How could this be replicated?" and I'm wondering if it requires some agreement that, first of all, there's a shared commitment and a shared mission? There's an agreement of being vulnerable with each other and an agreement to model that. Both of those seem like important ingredients in addition to documenting it all. But also, I keep hearing about how transient some of these groups are. I also feel a key piece is, if it's not a group like this where we are "doing the work" to think about this every day, to try to act upon it every day, it may not thrive. Antiracism isn't fashionable. It's not a trend. People are dying, people are still struggling and suffering. That's not a fashion statement, first of all. And the need for the commitment remains and is always there. So that's the impetus: to keep meeting is to keep doing the work itself and to of course get the support.*

[Lisa] *It can be really uncomfortable. It became safe for us, but, the best advice my daughter ever gave me was to never try to avoid being uncomfortable. I feel like there probably is a lot of feeling that these kinds of conversations would be uncomfortable. Cause you really do make yourself vulnerable and you express where you think you haven't done well or whatever. You can't fear doing that.*

[Melissa] *I also learned that this is a journey, in that we just need to support each other and anybody that tries to do this work shouldn't be shamed. Giving people grace and not pushing people away, I've tried to be more mindful of those kind of things, when I'm doing work with colleagues. They may have beliefs that I don't agree with, but we can come to a point where we agree that it's for the benefit of students. And I can get them to see that that's our main goal, our shared goal. And, sometimes I think we want to dismiss a person because they've done or said one bad thing. But you're being exclusive when you do that too, and not understanding where someone is genuinely coming from. Because it doesn't bring people in, it pushes people out and if we want to continue this work we can't do that by creating our own exclusionary practices because we think we're better at doing this work than others.*

[Bryan] *For me, one of the things that I felt got modeled here that, maybe selfishly, is really important for me, is, in terms of what we are trying to do, right? So we've been using these words "the work", right? So, "what is the work? How is that defined?" And then I can take a stab at a definition that the work is to teach and behave and engage with society in a way that brings people in, that creates opportunities for people to be their best selves including our own vulnerability, our own humility. So that shows up in teaching, but it also shows up in just how we treat people, right? And so, part of "the work" is really thinking about how you do, beyond this group of 5, or beyond whoever your ingroup is, how do you get people who are sort of outside of that, to see the work as necessary for their own engagement in society. But if engaging people means you're in attack mode, then it not only activates their defenses, and it is also a little disrespectful of the work that they may have been trying to do. Almost acting as if it doesn't matter. And where I think our approach is valuable is this whole notion of "journey." So, in the same way, we're going into our classroom and running equity-focused curriculum modules and not making assumptions about where students are, and because we're not making assumptions, we have this whole process to get them to understand 'This is the class we're trying to create, this is the way we want to talk to each other, these are guideposts, we don't make assumptions about each other.' Even though we signed up for this book group, even though we stuck with it, it's important for us to be out front and transparent about 'Here's where I'm comfortable. Here's where I'm not. Here's what I know. Here's what I don't know, right?' And the extent to which that nuance about everybody being just such a different place on this whole journey towards their own understanding of equity, there needs to be a system that allows for that, right? And to me, that's what this is. That's the thing you wanna market. How can you create a space like that?*

[Lisa] *Yeah, and I take that point really deeply. I think that it's almost human nature to make assumptions. But the things that you learn when you don't make assumptions, or even if you do make assumptions and then you dig deeper and try to find out what you learned, you're often very pleasantly surprised. Or you know when you really dig into somebody's story, it's the same thing as students, when you really learn student stories you realize that they have these whole lives and that's part of what they bring to the classroom and yeah, I think that was a big learning here.*

2. A humanized learning community illustrates the benefits of humanizing the classroom and our professional activities

We explored how centering humility, empathy, and humanity in our learning community led us to engage with each other and the process in a way that broke down

norms from traditional collaborative scholarly endeavors and in our science classrooms. Engagement in biology and biology education research can often include a focus on proving expertise, upholding exclusive ‘rules of entry’ and using research products to advance one’s prestige. In our process, we challenged those norms by talking about our own shortcomings and areas where we had grown or wanted to grow. Creating comfort with vulnerability allowed us to acknowledge our ongoing learning, and, in effect, to gain confidence in carrying out the work of infusing our teaching with antiracist content. Relevant quotes are as follows:

[Melissa] *I think I’d been dabbling in this before the pandemic. And I didn't really realize what I was doing and how important it was until I started with this group. As we went through this work, it gave me confidence as I learned more about the history of science, and even more the history of this country, that I can incorporate those aspects into my classes and show the students how positionality really does cloud how scientists do things and that there's other ways of thinking about life in general, and then also how I could bring in some of the social issues and bring up how we can use science to solve social problems. I think that being in this group really helped solidify the path I was already on, but I had no one to work with on it, and so I was always a little bit leery. This really gave me that boost to continue.*

[Lisa] *I had expressed things about race and racism in the classroom before, but I was kind of unsure about whether they were good to bring in or not. For example, talking about ways the medical establishment has really abused people of color, I was worried about retraumatizing students of color. You know, it's hard to bring these topics in because we're not really talking about sociology or society, we're talking about biology. But I feel like it is really important to think about the applications of biology, and, on the other hand and really importantly, we have to consider how what we talk about lands on students. Their experience in the classroom is really important, and that's I think something that is helped by some of the conversations we had.*

[Tess] *I definitely don't feel like I would have had the confidence to talk about race and racism in my biology class if not for the work that we did in our discussion group, to just have a chance to continually practice talking about whiteness, about race, about racism. I have been grateful that this has been a place of love and openness rather than correctiveness while I’ve been on my journey to learn more about our country’s history and present, and the realities that have been systematically removed from my education and omitted from my cultural upbringing. I feel like I’ve been on a constant unfolding journey, and continue to learn and relearn based on the people I interact with and the contexts that I'm overlaying my unfolding knowledge on. To Lisa’s point, I think that's something that is important, to make sure that when incorporating content about race*

and racism into my teaching, that it does come off in a way that's meaningful and that the connection to the biology is clear, but also that I honor the weight of these topics, you know, it can be a heavy thing.

[Bryan] *Yeah. It was interesting, Tess, and I think Lisa, one common theme, I guess, from what I'm hearing and from what you both said is the confidence and the comfort to engage in those discussions. I think that is certainly something that is maybe under-discussed in equity work, that if you are speaking about experiences that you didn't have, how do you do that in a way that's authentic?*

[Lisa] *I was thinking, and it is a very simple idea: We can't know what we don't know, but it's our responsibility to do whatever we can to find out. And I think that was kind of a common mission of all of us.*

[Tess] *I like that.*

[Stephanie] *For me, going through this I changed first before I even hit the classroom because I was super uptight about talking about these things. I was scared I was going to make a mistake. And that doesn't create a space where students feel like they can make a mistake. I feel like being in this group helped me calm down because I knew this was important work that I wanted to do, but I don't believe I was doing it effectively.*

[Bryan] *That's one of the things I would say I've enjoyed about this group is, yes, we wanted to come together, process, debrief, discuss tough things, go back and forth, feel safe with each other. But in doing that, it actually got away from reading topics and moved more into like, what does it mean to be human with each other? What does it mean to be vulnerable and admit this is where I am on this issue? "I know I'm not there yet." "I know I have things to learn." "I know I'm weak here but I'm strong there." Like, you want a place where you could do that. And I guess to the extent that's both a journey and a goal, that's the love I want to see. That to me is why I still enjoy doing this kind of work because when I see people willing to share in that kind of vulnerable engagement, that to me is a mark of something good is happening. And that to me is not about racism or anti-racism. That's about really finding who your in-group is. Right, that's about prioritizing that person across your Zoom screen or that person across your classroom, their well-being, right? Over some notion of who should be in power or whose knowledge is more valued.*

We also realized that by bucking norms of exclusion, and instead prioritizing relationships and holding space for each other's humanity, we created a space where community care led to decreased resistance to admitting rough edges and committing

to growth. By holding space for our whole humanity in the learning community and prioritizing relationships with each other in our collaboration, we came to more fully understand the parallel importance of attending to humanity in our professional work and in our classrooms. We realized that this led in many ways to our reconsidering how we project or uphold our authority in the classroom, and instead for us to share more of our personal selves or express more intentional care for our students and colleagues:

[Tess] *There was a lot of open-heartedness, and willingness to share about everyone's contexts, both personally and professionally, during our meetings together. We were able to acknowledge with each other the institutional constraints that we're working within and the frustrations within our professional lives. I found it to be extremely cathartic and it continues to be. Looking back at this time period that we've met together, there were institutional or job title changes for some of us, but also a lot of personal life happening – various illnesses and medical diagnoses among ourselves and our family members, births and deaths of loved ones. Those experiences were shared and inserted into our conversations and in our emails and in our communications. And that's not always the case in my departmental or committee meetings or with other research groups that I work with. And it felt like it was a really enriching aspect of our community journey together.*

[Lisa] *Yeah, you know, just doing the personal check-ins at the beginning of each of the meetings, it made it really clear that we all cared about each other. And that just makes you more willing to talk about difficult things, difficult conflicts that you have or a sense of resistance in yourself. I remember that in the early days with our meetings together I could feel this kind of resistance in me, stemming from the long-standing comfort with being the authority in the classroom and realizing that you have to give that up, but it's not necessarily easy to give that up. There was this feeling inside me, of resistance. And, it definitely eased a lot during the process of our conversations, which was a really helpful thing for me.*

[Bryan] *I definitely saw the community influence as modeling the kind of interaction we wanted to have in the classroom with our students. Like, "This terrible thing happened this week. My dog died. I couldn't read the assigned reading." "That's fine. But let's talk about your dog though because we can see that means a lot. And that's what actually needs processing now. Not the reading, right?" That's what community is.*

[Lisa] *This group has been an example of experiential learning, where we all learned that caring about each other leads us to feel open about talking about difficult things. It is a safe space–but it's also not like we're only talking about safe things. We feel safe to talk about difficult things because we know we care about each other. And that*

experience of going through this group is kind of what Bryan said, that it makes you organically learn that the right way to do it in the classroom is to establish that same human atmosphere.

[Stephanie] *You know, as we're talking, I'm thinking about medicine. And how the mind and body have been separated in Western medicine. And what I'm hearing from everyone else, and what it really made me think about, is that I feel like we're trying to do what I'm hoping continues to happen in medicine, bringing the mind and body back together. And we've had this separation from humanity in science education, and this is true in professional life too. We're not permitted to bring our whole selves to work. And I didn't think about it until you all mentioned that, but I am way more vulnerable with my students now. And I feel like it is that we are starting to bring the two things together, our humanity and our work. And until you said that I hadn't really thought about how that was showing up in my classroom too. And how that's changed me.*

[Melissa] *So it's hard for me, a little harder as an administrator. I get so wrapped up in my work, and in this work, that that's all I think about. I have been focused on my role and the authority in it. Now that I'm in my third year I'm trying to get more vulnerable about sharing more personal aspects of myself with the faculty I work with. I think you need to do that because you build a relationship and then they trust you. I feel like I've built up a good trust and relationships with them which helps to get this work done.*

[Lisa] *Yeah, I have shared really difficult things with my students. I've done it a few times. I often receive the feedback that students think that I am, I don't know what the word is, it's not intimidating, but it's maybe dismissive when people ask questions. And it's probably because I get excited about the subject and I just want to give them all the information so they can kind of understand it. But I tell them at the beginning of the class that my daughter told me I have a harsh tone in my voice and that I'm really trying to work on it. And that if they ever notice that, they should really let me know and I would appreciate it, and – just to know that I am working on it. That was a really hard thing to do, because when I started teaching I really felt like it was important to establish some type of authority in the classroom. And so it really took me, it's really been an evolution over time, you know for me of being more and more vulnerable in the class, and I still I'm not successful all the time, but I think that does make students feel more comfortable.*

In further discussing our learning community, the factors that contributed to its value as well as its persistence, and the impact it has had on each of our antiracist journeys, our conversations revealed that the 'norm-breaking' nature of our community

process contributed to more meaningful scholarly collaboration than a typical individualistic, outcome-focused scholarly approach:

[Tess] *I think kind of zooming out and reflecting on what we did in our learning community, we also broke down a lot of norms about how research is conducted. All of us are trained PhDs, we're trained in the norms of science and research, which often have an underlying sentiment of competition and focus on a product or discovery, like "Oh I've got a good idea, I'm going write it up and publish it as quickly as possible so I can get academic credit for it" and there was none of that here. And also those norms of singularity that can sometimes surface, for example -, there can only be 'one best perfect anti-racist educator pinnacle,' or even gate-keeping about who should be talking about this or who has the right to share. I think norms broke down in this community and I think that was also really beneficial to our scholarship. So it's kind of interesting to see how a similar cultural outlook that we've talked about for our classrooms is how we operated here in this space. It feels pretty radical in that way too. It's like we're working within this system of scholarly education research, we wrote the grant, we're doing the research project, but we're also pushing the bounds of what should be happening in that space, I guess. So that's been really cool.*

[Melissa] *I love that observation. We prioritized nurturing a community. We weren't competing for anything. We were truly collaborative in this project.*

3. Institutional change and non-conventional leadership approaches

Our discussions and analysis of our small, introductory biology-focused learning community process led us to reflect upon the need for structural change of our broader institutional systems. We discussed how institutional change can feel slow, and at times frustrating, but that maintaining a sense of positivity can help to stay focused on what is possible. We discussed how tapping into communities of colleagues and also the humanity of potential collaborators in change can help to overcome the inertia and lead to more cooperative efforts.

[Bryan] *I actually try to kind of backward design from "What would all this look like if it weren't a problem?" That mentality is important for me, because I worry sometimes that it is so easy in the current framing to get attached to all the darkness and all the problems, or the things that have been a consequence of that thinking, that we lose sight of or are unable to articulate what this should and could look like if our imaginary scenarios were to come true. And just as a personal anecdote, I'll just tell you, I couldn't do the work I do if I didn't think that way. It'd be too emotionally draining, it would be too tiring. And so I only have the energy to get up and think about this stuff because, like*

Langston Hughes said, right? "I dream a world…"

[Lisa] *I like that. I think that's a really good point. It's easy to kind of get lost in focusing on the problems. It's important to keep an eye on the light at the end of the tunnel.*

[Tess] *I think "finding my people," getting the feel for who I really wanted to partner with to try to make some changes on campus, has been really critical for staying positive, and I feel like that takes time. And it can be in places that are not necessarily with your colleagues. For example, we got a faculty learning community together from different STEM departments this year. We specifically wrote in the call for participants that it would be a positive space. We were specifically seeking people who wanted to come and have constructive, productive conversations and discuss ideas for curricular and programmatic solutions – and it was fantastic.*

[Stephanie] *Oh, that sounds great. Sometimes I feel alone in this work and I keep seeking community to keep doing it. And part of it is I wonder if having to teach so full time at the community college and not being more engaged with research might lead to that sense of isolation. So being able to meet with all of you, it provides that oxygen in such a way.*

[Lisa] *I feel like for me, this group has definitely provided that support – it's a safe place and it's a protective place and a place of solidarity that really helps you keep your balance in the face of what appears to be this big wall of institutional change.*

[Melissa] *Yeah. I think that these types of learning communities, this group especially, has helped me tremendously to have this outlet to talk more in depth, in a more thoughtful discussion, and it has definitely led me to develop more expertise, though it is not always seen or honored in my current role. It's a bit lonely, as you all know. But being the administrator when you're trying to disrupt tightly-held past practices and beliefs of how Higher Ed should be, like thinking it is supposed to be only for the elites. So I think if I didn't continually remain positive for the most part and think about moving forward and what* ***could*** *be, then I wouldn't be able to get anywhere.*

[Lisa] *I think faculty these days are generally feeling very tired and overwhelmed. And I can see every little extra thing that gets asked to do, it's almost like a self-protective knee jerk response to say no. But Melissa, do you feel like you're making progress, institutional-type progress?*

[Melissa] *Yes, it's very slow, but yes.*

[Stephanie] *I'd be surprised if it were fast given the amount of inertia that institutions insist on.*

[Melissa] *We did, since I started, begin to include belonging, equity, diversity, and inclusion in faculty yearly evaluations. I have to show evidence that the faculty member has done something related to DEI and we do have projects that they are required to do. So that's a good structural change. But sometimes the changes are very surface-level. You know, so it's still getting people motivated that I find to be the hardest part. But I think to do that, the way that I have found success, is to build relationships, which I think is kind of what we've been trying to do with our pedagogy in our intro bio project. Building the relationships and humanizing the process and interactions is the key. So I talk with people individually, finding out 'what are your likes and dislikes' and 'how can I get you to see that this change is a good thing?' and connecting with them to find things that they like and want to do that are related to helping students.*

[Lisa] *Yeah, that's a really good point about this idea of humanizing. You know, humanizing the interactions so it's not a battle between two forces, but it's actually a conversation between people, right?*

In discussing structural disruption, we reflected upon how, within our own institutional roles we can demonstrate leadership, particularly in some ways that may fall outside the norms of what leadership traits and approaches traditionally look like on campus. We discussed how structural disruption can mean engagement with initiatives or being intentional in our daily work as educators and administrators, but it also can come from prioritizing our own needs and not over-extending ourselves or saying 'yes' to every opportunity presented that relates to advancing equity.

[Lisa] *I want to say to you Melissa, you know, we are doing these things in our classrooms and I'm in an administrative position but I'm not dealing with what you're dealing with. I don't think that institutional change would ever happen if it weren't for what you're doing as Dean. It's so important. And I hope you don't get burned out, because, you know, work like what you're doing is absolutely necessary to change the system.*

[Stephanie] *It's really frustrating to feel like you're one of the only people who's doing work for real without just talking about it. And I really admire you, Melissa, for sticking that out. And I mean, faculty themselves may be first gen and from low-income backgrounds, or be neurodiverse or experience racism or other discrimination. And it makes it tough for faculty to manage all that in the realm of the work that we're talking about. It's that we want to help students who have various identities, but as faculty, we*

don't get support around much of that from a structural and policy standpoint, and so it makes it really tough to stick to it long term and do this. And so I feel like being a disruptor for me means that I need a coat of armor to stay emotionally level and safe doing this because it can feel really unsafe. But also, professionally, not "tooting the horn" can feel unsafe.

[Tess] *I feel like your point, Stephanie, about setting up really clear boundaries about how much of ourselves we give is just so critical, because, I mean, teaching in itself can feel like a bottomless well, there's always approaches or course materials that could be better, there's always more connection that could be made, there's always more student follow-up that could happen. If we're not careful to shore up ourselves, we will be utterly depleted. I feel like adding in this really intensive work to shift institutional cultures is a slippery slope. And I agree with you. There are initiatives on my campus or in my research communities that in name are aligned with the change I would like to see, but I don't volunteer for them, for reasons similar to the ones you've outlined. Sometimes it feels like my time is more valuable focused on my classroom or in conversation with my support communities than on an official committee or initiative that is by name the "shiny solution" to DEI.*

[Stephanie] *That's part of the learning too. We're learning that you may have to go off-road in order to do this. And through our learning community, and hearing this right now, I realize that sometimes I've needed to off-road, meaning not do the committee. Do it in the classroom and share it out through, for instance, a lunch-and-learn or something. That type of off-roading.*

[Melissa] *Sometimes people don't see me speaking up a ton at meetings all the time, so they think I'm not a leader. But I'm doing all this leg work. I can tell you that my division has done a lot of work on the projects, and I have made I think a lot of inroads. Instead of simply speaking up, I take action doing things, in networking and getting the little coalitions together. Because I do want to help and support faculty, and I know what they're doing and what they're going through, and they appreciate that. So I think that's a form of leadership that doesn't really get attention because you're not doing these big things that get the accolades like the more grandiose actions do.*

[Stephanie] *That's just it! I'm busy doing the work, you know? Not like, talking about it.*

[Melissa] *Right! I want to just do things and network and get the little coalitions together and then have that spread.*

[Bryan] *That reminds me of back in the civil rights movement with SNCC, the Student*

Nonviolent Coordinating Committee. One of the challenges that they had was that they were trying to disrupt this notion of what leadership meant because up until they existed, leadership was MLK…You had to be out there and charismatic and have the rhetoric. And what SNCC was saying was 'No no no, the person who drove people to the voting booth, that's leadership. The person who cooked food for the voting registers, that's leadership.' And to the theme of the question about, you know, disrupting internally, how leadership is construed on campus kind of matters in terms of what's possible.

[Tess] *The idea that we work towards transformation but through incremental means and from the inside feels really empowering to me. It connects to what Bryan was saying about SNCC, and that, in your present role, you do the work to slowly chip away at the systems that need to be dismantled. From my realm as a faculty member, I can push the agenda. But that has to come with real consciousness of the systems that I work in, and how my identities intersect, and who is going to be picking up on the things that I'm pushing. The classroom is the place where I have felt most empowered because it's my domain. I can build the community that I want, I can prioritize inclusivity and equity and now I'm working on anti-racism in that domain. Then gradually as I gain confidence and internal recognition from colleagues that these are good things, or that there are positive outcomes at that smaller scale, then I can take it a step further and a step further. I think it legitimizes the incredibly important role we have as educators. I think by virtue of working at the institutions where we do and dedicating our lives to working with students, that's an incredibly powerful place to be, and then as much as we can sort of move up from the inside is where some transformational change can happen.*

[Bryan] *I wanna lift up that in Higher Ed, leadership tends to get defined in one very narrow way, right? And that means you become a Chair, you become a Dean, you become a Provost. And I feel in different ways everybody in this conversation has shown leadership. This is this more sort of grassroots, right, I" have a contribution to make" type of leadership, right? So, yes, Melissa became an administrator. Yes, Lisa was called to help her institution at a time of crisis, Yes, I'm an Associate Director of something. But even the conversations you have with a colleague, even the ways in which you spread the message of what you do in the classroom – I would like to write about that. One of the ways to do this kind of work is not to wait for somebody who is university-appointed to do this. I mean, yes, they have their role, and yes, they have a big role to play, but, leadership is, ways in which you can be an example.*

[Lisa] *So you're talking about grassroots leadership.*

[Bryan] *Correct, because one of the benefits and reasons why you do that is because you want everybody to feel that they can be part of the solution. You don't want people to feel like they need to become this higher person to then make change, right? The little things you can do is a part of leadership.*

Conclusions:

In writing this duoethnography, three themes emerged. First, while we started by asking how the experience had enhanced our personal anti-racist journeys, the emergent theme was that the process we undertook together as a learning community was, to us, the most valuable outcome in our quest to engage in anti-racist actions. We learned that building trust, caring about each other's lives, understanding that each person follows a unique path, believing the best of each other, and supporting each other's journeys in a non-judgmental way allowed us the necessary openness and vulnerability to make significant progress in our personal anti-racist and social justice journeys. Moreover, this trust and vulnerability enabled us to examine our own social positioning and its impact on our work in the classroom.

Second, while thinking about how we used this process to reimagine introductory biology, we realized through our dialogic analysis that our experience in the learning community could be directly applied in the classroom. By seeing our students as human beings who come to us from diverse backgrounds, resources, and experiences, caring about them, assuming their best intentions, and being open with them about our own journey and hopes for the classroom community, we believe we can establish common ground for a productive, heartfelt learning experience that retains high standards and academic rigor. Furthermore, in acknowledging the humanity of our students, we are hopeful that we can engage in conversations that advance the notion of equity, systemic change, and the value of encouraging all voices.

Third, while considering the idea of structural disruption in education, we arrived at a re-examination of what true leadership means. We see the value of doing the work and realizing change in small, incremental steps, whether externally recognized or not. Being a member of our group helped us grow as individuals, and the group's support bolstered the decisions of several of us to take on new professional roles. During our 3-year process, we came to view ourselves as leaders even as we are still works-in-progress ourselves, and we recognized the merit of persistence. Institutional change can feel slow, but seemingly imperceptible shifts will make a big difference in the long run, and grassroots leadership can be a most powerful force for change. There is value

in recognizing and centering our humanity and that of others in our work, and we have experienced firsthand how our commitment to antiracism and equity can contribute to meaningful change for our students, colleagues, and communities over time.

Our process, diagrammed in the figure below, greatly benefitted all of us in our journey toward establishing and nourishing humane, equitable environments in our classrooms and elsewhere in our lives, both professional and otherwise. We found this process invaluable in all the ways we have described and encourage others to explore forming similar communities.

Figure 1. Summary of community learning process as experienced by the research team.

From this experience, we have identified a list of potential ideas for moving forward with our learning community.

- Propose learning communities that result in academic products be recognized as a scholarly endeavor for P&T.
- Provide guidelines on how to model FLCs foregrounded in humility.
- Define specific strategies we used to facilitate co-learning before creating modules so that members of FLCs have a shared understanding of the frameworks and scholarship that informs this work.
- Examine the impact of a human-centered, anti-racist, overlaid approach on student learning, self-efficacy, sense of belonging in STEM and higher education, and belief that students' actions can affect positive change.

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