"A Key to Reducing Inequities in Like, AI, is by Reducing Inequities Everywhere First": Emerging Critical Consciousness in a Co-Constructed Secondary CS Classroom

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ABSTRACT

Part of broadening participation in computer science (CS) is understanding what experiences and identities students bring with them to the classroom and building upon them. Prior work has often achieved this by connecting CS concepts to cultural ideas and practices. Increasingly, however, youth may be encountering sociotechnical and sociopolitical counternarratives about computing, power, and justice, offering new opportunities to connect CS to students' lives. To understand what role these emerging counternarratives have in secondary CS classrooms, we taught a co-constructed high school course to a racially, ethnically, socioeconomically, and gender diverse classroom, framing the course as both a creative and critical introduction to CS, giving agency to students to incorporate critical themes into their learning. We gathered notes, artifacts, and student responses over the course of 6-weeks, and analyzed the extent to which students brought critical themes into their creative work, developing critical consciousness of CS concepts. We found that before there was space for critical conversations about computing, we had to navigate students' issues of trust, positionality, and the broader inequitable systems of education in which the class occurred. Only after navigating those tensions did students feel safe to have those critical conversations. Once they did, they rapidly embraced the counternarratives, structured their learning around them, and used them to build community and support each other.

CCS CONCEPTS

• **Social and professional topics → K-12 education**.

KEYWORDS

Critical consciousness; critical pedagogy; secondary education

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1 INTRODUCTION

Secondary CS education classrooms are not diverse. National surveys in the United States, for example, have shown most of the youth engaging in elective CS learning continue to be white and Asian boys in high socioeconomic districts, and that all other groups across race, gender, and class tend not to have access [33]. These trends emerge from persistent beliefs that CS is not for marginalized youth [28], continued experiences of gender and racial exclusion [23], structural disregard for diverse physical and sensory abilities [2], exclusionary intellectual ideas about what CS is [22], and of course, funding disparities [27].

Efforts to broaden participation in secondary computing classrooms have moved beyond simply enticing more diverse youth into CS, to reimagining CS education in more culturally responsive and sustaining ways [16, 18, 29]. For example, some scholars have woven together topics from marginalized cultures into CS curriculum and professional development [13]. Some have worked to embed ethics in CS classrooms [31]. Others have investigated the experiences of Black students in computing, identifying sources of stigma, identity threats, and exclusion that frequently bar students from persisting in CS [8]. Other efforts have explored student agency, finding that when marginalized students are given space to explore CS, they want to explore it as a tool to resist marginalization and claim "rightful presence" in educational spaces [6, 26]. These efforts not only broaden participation in computing, but also may improve learning for all youth [16, 32]. These scholarly efforts embedded in schools—and the many other teacher efforts throughout formal and informal secondary CS education—point to a future of CS education that centers students' identities, values, and agency.

While culturally responsive pedagogy centers on making space for students' identities, that is not all it centers. In the spirit of Freire's critical consciousness [10], it also stresses engaging students in discussions of power and social justice [11]. Such topics abound in CS, with numerous books [3, 9, 19] and documentaries like Coded Bias [30] revealing the ways that computing is used to amplify and often create new systems of oppression. Discussing these counternarratives about computing, however, is often neglected by teachers, in favor of culturally responsive efforts that center classroom and school inclusion over discussions of broader systems of injustice and oppression [15].

Within CS, there are many reasons why this might be: most CS educators are white, and white educators often struggle to engage

critical counter narratives about race and power [4, 20]; within CS education communities, cultural competency and humility is low [34]; and while long-term teacher professional development can overcome these barriers [12, 15], most professional development focuses on CS content knowledge, not social, emotional, or political topics [21, 24, 25]. Thus, despite the increasing awareness of the interaction between computing, power, and justice, these many gaps in teacher knowledge make it challenging for secondary educators to make space for conversations about these topics.

However, there is another gap that may deter teachers from engaging computing and power: *how* to engage power in CS pedagogy. While prior work in education has explored counternarratives as a tool for equity broadly [17], CS education research has only just begun to explore teaching methods for this learning. For example, Ryoo et al. recently examined three secondary CS classrooms, largely of students from groups marginalized in CS, and found that a significant proportion wanted to use CS for social change, and when they found agency in their classrooms, they expressed that desire in their CS projects [26]. Ashcraft et al. also contrasted two cohorts of girls of color in an informal CS learning program, finding awkwardness around discussions of race and technology that eventually was replaced by two distinct classroom cultures: one of reflection and one of disruption, both emerging from tensions around time pressure, trust-building, and teacher empathy [1].

In this work, we build upon these efforts, asking what place CS counternarratives about computing, power, and justice have in a culturally responsive secondary CS classroom, and what tensions emerge in making space for them? To answer this question, we offered a 6-week high school CS course titled *Creatively Coding a Better Future* to a diverse group of high school students, co-constructing a culturally-responsive learning space at the intersection between creativity and critical perspectives on CS. In the rest of this paper, we describe this course in detail, and the tensions that emerged.

2 METHOD

To examine our research question, we created a culturally responsive and sustaining CS learning space, and then made offerings of creative and/or critical topics, to see how students used their agency to engage them.

2.1 Context

To offer a course, we engaged University of Washington's Upward Bound (UB) program, which is a U.S. federally-funded college preparation program that helps high school students who are low-income and/or have no parent or guardian with a bachelor's degree. There are currently 826 programs in the U.S. The program we worked with serves three urban Puget Sound public high schools and reaches about 125 students per year. The program is free; students receive lunch money and a stipend to attend. In 2021, 79% were both low-income and first-generation immigrants, 50% identified as female, 35% as South Asian, 19% as African, 16% as Asian, 14% as Hispanic/Latino, 10% as Black, 4% as two or more, and 2% as white.

The UB program offers a 6-week summer term, which includes writing and mathematics courses, as well as electives. Students were enrolled in four remote courses that met for 50 minutes 4 days/week. Students expressed elective preferences and the program organizers assigned final electives, balancing course sizes. We offered an elective titled *Creatively Coding a Better Future*, with the course description "*build projects that help us playfully imagine a more inclusive future*." This was students' last class each day, held on Zoom due to the COVID-19 pandemic. All students had school-provided hardware and all coursework was device agnostic, submitted through Canvas. Students could select the platform and language for their projects; most elected to use P5js [1]. There was no video policy for this class and most students left video off most of the time, which was the norm for UB.

2.2 Students

Fourteen students enrolled. Of these, 64% anonymously reported in a demographic survey that they would be the first in their immediate family to attend college. The group was gender diverse: 36% percent described themselves as "male," 45% as "female," 9% as "woman," and 9% percent as "girl." The students were all rising sophomores to seniors reporting ages of 15 to 17. When asked "Are there other demographics or identities that you think would be important for us as researchers to know?" two students responded with the identity of "Muslim," and two responded with queer identities which we've combined under this label for student anonymity.

Students came from local high schools and none knew each other before the summer. Several had outside responsibilities. During some of the collaborative exercises, some students realized they were in the same grade at the same high school, but had never met because the previous school year had been online. Students worked well in groups that an instructor assigned based on interest.

2.3 Course

Unlike many classes, our course did not have a set curriculum. Rather, we centered principles of culturally responsive and sustaining pedagogy [11], co-constructing the course with the students giving students significant voice in what happened each day in class to ensure that class was responsive to their interests, identities, values, and needs. This model was counter to the dominant pedagogy in the other courses in the summer program and in the students' home schools.

Our methods for co-construction generally involved presenting a loosely defined course topic for a flexible period of time, and then asking students about their ideas, preferences, and constraints on assignment requirements, deadlines, and topics. For example, when building a chatbot project assignment, the instructor asked students what they wanted the final project to be and what attributes of the final project they would like graded. The answers to those questions were built into the rubric. After the first unit, students arrived at consensus on the topic of second and third units.

The following course structure emerged. The first unit introduced students to the 2020 State of CS data by code.org [2]. All students explored this data, some students used it to design and code further visualizations for the unit's summative assessment, which was to make a visualization. The second unit examined how AI works and its sources of bias, creating a simple chatbot for the

[1] https://p5js.org
[2] https://advocacy.code.org/stateofcs

summative assessment. For the third and final unit, students worked in groups to explore and research data privacy and its ethical implications. All groups had the freedom to choose how they wanted to present their findings: one made a website to help teenagers protect themselves when browsing the internet, one designed a browser that would provide privacy and transparency to the user, and one explored hacking and current events, and one group explored mental health and social media use in conjunction with data privacy.

2.4 Positionality

The first author was the instructor of record of the course (Instructor 1). She is a white PhD student with 2 years of computing education research experience and 11 years of math, engineering, and CS classroom experience. She chose to teach this course because she wanted to explore counternarratives and help students to build identities as critical computer scientists, believing that students must be allowed freedom to construct their own meaning in their work. The second author was a teaching assistant (Instructor 2), a rising senior in college studying computer science and Spanish studies. She is a Black immigrant and has 3 years of experience teaching computer science in after-school and summer camp settings. She is motivated to understand and create more inclusive CS classrooms where students can think critically about the world around them. The third author is a transgender, white and Asian tenured professor who studies CS education in secondary and post-secondary settings; she did not participate in the class directly, but did help facilitate the first two authors' reflection in weekly meetings. She approached the work as an advocate-scholar, with the goal of understanding the tensions that arise in teaching social justice issues in CS, as well as the goal of mentoring the two first authors on research and teaching.

2.5 Data Collection

We gathered three types of data to observe emergent tensions.

Notes. The first and second authors took daily reflective notes on the course preparation, daily planning, during class, and immediately after each class. They used these guiding questions to help structure their notes: *What was left unsaid by the instructors? What felt challenging? What questions did we not know how to answer? What expectations did not match reality?* These individual private notes helped facilitate ongoing instructor reflection throughout the summer, and acted as an archive of tensions that arose during class.

Reflective Artifacts. The students collectively reflected at the beginning of the course, and at the end of each unit (three times total). Students were broken into groups and asked to individually respond, and then collaboratively compare and contrast. For the first of these activities, at the end of the unit on CS access, they were given the guiding questions: *What have been some challenges you've faced? What are some solutions you've found? What are some ways you experience computer science everyday? What are some ways your experiences are different from your peers? Your adults?* For the second reflection, at the end of the unit on algorithmic bias, they used the guiding questions: *What are some challenges from AI? What are some solutions? How did this unit make you feel?* For the final reflection students and researchers developed the prompts: *What are some challenges with Data Privacy? What are some solutions? How did this unit make you feel? What questions do you still have?*

Pre- and Post-Survey Questions. Students also completed a questionnaire before the class and at the end of the class, answering the questions: *What do you think computer science is (No right or wrong answer)? What impact does computer science have on your daily life? What do you think are the challenges to the field of CS? What do you think is the field of CS doing well? Where do you think the field of CS is failing?*

2.6 Analysis

Our analysis was guided by the arguments of Hammer and Berland [14], who position qualitative thematic analysis as interpretative claims about data, not as structured data for quantification. Therefore, rather than reporting inter-rater reliability analyses and quantities, here we follow the guideline of discussing our analysis process and the interpretative disagreements that emerged in building a shared interpretation.

Our analysis process was as follows. At the end of each week of the course, both instructors examined their personal notes for tensions and themes in relation to CS counternarratives. During the last week of the course, the researchers met to perform an inductive thematic analysis of each of the students' artifacts, in light of their teaching reflections. Disagreements were primarily about classification of emerging themes, they also arose around the tension instructors experienced due to their positionality, and were resolved by discussion. Some themes were tabled until further evidence and data were analyzed. At the end of course, the first two authors used students' end of course reflections to converge toward final theme categorization. Then, on the last day of class, instructors shared the themes, tensions, and observations that emerged with students through a quick presentation. Students were given the opportunity to provide anonymous feedback to the researchers on the observations. Students confirmed that the themes reflected their experiences and perspectives.

3 RESULTS

In our analysis, we observed four emergent tensions: mistrust of agency, making space in oppressive systems, student transitions from consumers to creators, and growth of instructor critical consciousness. Overall, we found that before we could facilitate critical conversations around CS counternarratives, we had to acknowledge and work through many of these tensions to establish a classroom climate where we could have those conversations.

3.1 Mistrust of Agency

The first major theme that emerged in our data was the difficulty students had in trusting that the agency they were given in co-constructing assignments wouldn't be taken away. The instructors perceived that students were expecting a 'gotcha' moment, where they would lose points or fail to meet expectations they did not know about. Part of this was because the co-constructed format of the course was unfamiliar. Initially, students needed to be reassured that we would stick to the expectations that we had established together, like due dates and assignment requirements.

We also observed students expressing pressure to be model students. The nature of the program was to prepare "minority" students for college, which may have created some of this pressure. This required, in part, that the program teach students how to navigate predominantly white spaces. We also observed that students seemed to expect a certain level of difficulty; worrying that their work was not good enough. One student stayed after class every day for the first two weeks, expressing worry that they had failed to turn in assignments. Eventually, the instructor asked what they could do to reassure that they were not missing work, promising to email students without penalty if their work was not received. Other students would often ask for feedback, afraid they did not fulfill the requirements. The instructors would go through each requirement and ask if the student had met the standards for that requirement. Every time asked, the students confirmed that their work did indeed meet that set standard. Upon finishing the assignments, students expressed that they had worked hard, but that it felt "too easy," because they had enjoyed the work. One student even exclaimed "I thought it would be harder".

Over the course of the term, students began to trust the instructors and each other more. After a few weeks, students started to stay after class (online) and build community. "*I just wanted to stay and hangout*," said one student who then launched a group discussion into data privacy. Another student shared that they were bored one day in class. They felt comfortable saying that they were no longer on track, and wanted to know how to engage. Another student showed up early to class with their video on and shared, "*I just wanted you all [the instructors] to see my face. I felt like you should be able to see me.*" She also showed-off her mid-process project because she had debugged something she had been wrestling with; she was proud, and wanted her work and her efforts to be seen, conveying both a layer of trust and vulnerability.

3.2 Making Space in Oppressive Systems

The second major theme to emerge in our observations and reflections was the way that the broader system of education—in this case, the UB program, and educational norms—"crowded out" room for hard conversations about computing and power.

We observed several assumptions larger the program held, each interfering with creating space for student agency and critical consciousness. The program had strict expectations of attendance with consequences that negatively impacted students' ability to participate. For example, one student was about five minutes late to class every day. Each day the student privately messaged the instructor to apologize and ask what they had missed. After a week, the student mentioned that they were late because they were praying. We assured the student they would not be marked late to class and offered additional support. In another case, a religious holiday celebrated by eight of the fourteen students in class fell in the middle of the course. Because the instructors knew many students would be absent, they planned an optional drop-in question and answer time for that day so that no students felt left out. This raised tensions with program leaders, who wanted a "true attendance," and who wanted to define the students as absent.

Expectations around attendance mirrored expectations about "late" work. Students were initially afraid to ask for extensions,

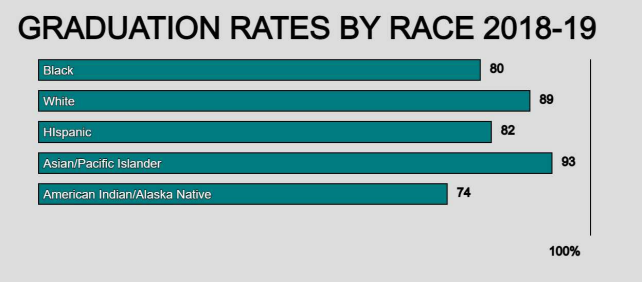

Figure 1: Student visualization of graduation rates by race

because of the norms established in their home schools and other summer courses. In contrast we had explicitly flexible deadlines. One student emailed in the middle of the night apologizing and asking for an extension, others would stay after class and apologize for asking questions. Despite these initial fears, students became more comfortable asking for help and working on their independent projects. Every student submitted all their work before the end of the course, despite the lack of instructor-imposed deadlines.

Gender norms also affected who took up space in classroom learning. For example, in a co-constructed collaborative coding exercise where students were solving a commonly experienced loop problem, the only students who spoke were those who used he/him pronouns. Instructor 1 noted in her reflections, "*Today's class was rough. At one point I let them choose how they wanted to problem solve and they chose a large group collaboration and only he/him voices spoke. Even though our most experienced coder used she/her pronouns. Fascinating.*" Many of the students who were quiet during the collaborative problem who used she/her pronouns sought help often through private chat, staying after class with questions, and in breakout rooms; demonstrating that they were thinking deeply about the material and engaging in personal and creative ways, but it seemed like they did not feel the right to engage and take up public space.

3.3 Transitions from Consumers to Creators

As we built trust and created space for student agency, we observed a shift in students' questions, work, and reflections from one of counternarrative consumers to one of counternarrative creators. Along the way several tensions developed. Students started to criticise systems and started to seek ways to change them. These tensions became more complex as the student's understandings of counternarratives became more nuanced.

3.3.1 Students as Consumers: Visualizations of Access. At first, students were exploring information and material that we shared with them and engaging with data that was relevant. For example, a Black female-identifying student chose to use the data to build a graph that visualized graduation rates and computer science access by race as seen in Figure 1. Other students in the class chose to build visualizations that did not take the data into account, but rather represented themselves and things they cared about: their favorite hobbies, or flags representing their home country.

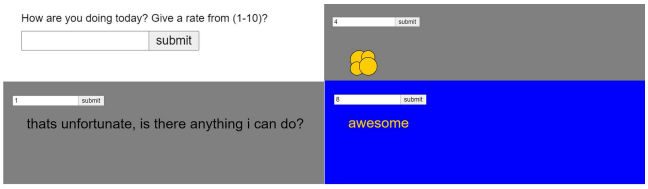

Figure 2: Student chatbot responding to mental health

3.3.2 Students as Questioners: Building a Chatbot. We saw criticism of computing emerge in the second unit, which explored algorithmic bias. Students wrote reflections after engaging with a choice of selected readings, podcasts, and videos about the counternarrative of algorithmic bias. A student reported being surprised about "*how common algorithmic bias is, especially among those who have darker skin complexion.*" Another student wrote,

> *"To think that it could cause harm to marginalized communities isn't surprising but the fact that the people behind this technology don't want to fix it is astonishing. (Although let's be real, it really isn't surprising at all)."*

A guest lecturer with expertise in designing software for children and families and who built a platform for children to explore AI joined us to build quick AI chatbots. Students shared that they saw code as "*using your creativity to build something instead of focusing mainly on the logistics*," and "*doing what you love.*" Students asked the guest speaker how to use code for equity and justice projects. A few students stayed after class to chat more with the guest speaker and her process of building "code that writes code" and asked the instructors, "*How do I create a more equitable intersectional future?*" Students wanted to know how they could use the tools and skills they were exploring and building in class to make a more just world.

Many students also raised questions regarding what needed to be done to prevent algorithmic bias. One student remarked, "*A question that I still have is how do we fix the biased algorithm? Is there a way to fix it, or does it need to be rid of?*" Another student asked "*How quickly can we fix this problem?*" In discussing students' questions, it was evident that they realized the answers were not straightforward. We observed that the students felt pressure to find the answers to questions they were raising. One student reflected, "*What can we do?*" when thinking about what actions they could take as individuals to affect change. Once they saw a problem they wanted to understand it better and expressed a desire to change it.

To grapple with these ideas, many students chose to build chatbots that addressed current systemic inequities. In Figure 2, a student checks in on the mental health of friends: if a friend responded lower on the scale, they would get a response offering help. One response offered a bright yellow "bee." This seemed like an attempt to use what they were learning to start to affect positive change, resisting some of the narratives of bias they were learning.

By the end of the AI unit, students began to realize that combating algorithmic bias cannot be solved overnight, but rather with systemic change. In a discussion after independent exploration about algorithmic bias through watching a movie, listening to Joy Buolamwini's TED talk [5], or reading an article, one student remarked in the chat,

> *"i think a key to reducing inequalities of like, AI, is by reducing inequalities everywhere else first/cause ultimately its humans designing all of these digital systems and basing all of their datasets and machine learning off of existing human systems/so without first breaking down the human systems that cause inequality we'll always be producing machines that reinforce that"*

Throughout the units, students also wanted to know how they could protect themselves from unjust computational systems. During the algorithmic bias unit, a student was troubled that, *"AI can't recognize people who look like me."* Our last unit, data privacy, revealed the students' drive to learn how to best protect themselves and their data in the digital world. After watching each group present their research and designs, one student asked, "*How do you really know who has it, and how do you get them to delete certain information?*" One of the instructors struggled with not being able to provide answers, "*Students are asking how to identify and how to protect themselves – and there aren't easy answers.*" The students were asking difficult questions without answers. They were critically examining the counternarratives of the world they live in.

3.3.3 Students as Counternarrative Creators: Data Privacy. When discussing data privacy at the end of the term, students exercised significant agency, with each group selecting and building a counternarrative of their own to present to the class. For example, one group explored malware and built a strong counternarrative about individual consumer privacy and protection. In one student's reflection they identified that,

> *"The main challenge is that it is very difficult and/or expensive to get genuine data privacy (even then there are tons of snake oil sellers who want to promise you internet privacy, only to sell your data or not really keep it safe in the first place) mostly because of private corporations."*

When this same student was looking for solutions to these problems of privacy they identified some answers like,

> *"Use more private/secure software, invest your time into open source software, avoid using sites that are not private or secure, and fight for political changes in the internet landscape."*

In these presentations, students recognized the need for collective action to change the dominant narrative. Figure 3, for example, shows a student starting to articulate and share ways to protect themselves online.

Another group identified the problems with companies use of social media data, reflecting,

> *"There are some things that can't be deleted if it gets leaked, so be sure to know what you are putting out there."*

This group shared habits and practices to protect mental health when using social media, in specific identifying risks like revenge porn and bullying, noting that,

> *"big corporations aren't really willing to stop selling info about us because they care about profit more than the needs of the people."*

Across the final unit, students began building and sharing counternarratives, surfacing problems, and working to understand solutions. They also deeply engaged in helping each other understand

Figure 3: From a student presentation on data privacy and mental health in social media

the complexities and pitfalls of these narratives, and providing advice and resources to protect themselves. We observed them use the skills they had to communicate these counternarratives and seek solutions. They didn't yet have full solutions to the problems they were wrestling with, but they were taking steps to make changes.

3.4 Instructor Consciousness and Positionality

The last major theme to emerge was that the instructors' own critical consciousness about computing was developing and positional. Below, they each reflect on challenges they faced in bringing their identities and positions to their teaching.

3.4.1 Instructor 1. My positionality, my actions, and what I choose to teach students affected them. When introducing the unit on AI as a white woman, I found myself reflecting, "will this lesson about how AI mis-classifies Black women cause harm to the young Black women in my classroom?" Whether or not I chose to teach this bias would not change its impact. Perhaps learning about it would help explain students' experiences.

I also experienced the tension of not having the answers as the 'expert in the room.' There are not easy answers to give students about how to protect themselves, fight algorithmic bias, improve the state of inclusion in CS, or to protect their privacy and data. The answers that will make a more just world require long term collective effort, which I believe requires collective consciousness. We have to teach these courses with love and care and by making as much space as possible for our students to thrive.

3.4.2 Instructor 2. As a Black Kenyan woman, I often saw my younger self in our students. Although I know how important and powerful it is to teach marginalized students about the ways tech fails them, I was hesitant to do so because I understand how harmful it can be when students are repeatedly hearing the ways society fails them. Instructing this class made me want to do more to combat both systemic racism and sexism in CS. Through developing the students' critical consciousness, I deepened my own. Furthermore, felt the responsibility to be the representation in CS that I craved at their age. I shared the same heritage as one of the students and hearing their excitement about our shared connection made me afraid that I wasn't doing enough to protect them from the dark side of computing.

4 DISCUSSION

Our teaching, observations, and reflections revealed several tensions in teaching CS in a culturally responsive, critical way. First, classroom and school-level structures often directly interfered with creating space for student voice and agency. Second, after we shared counternarratives with students, they engaged, wrestling with tensions about topics of equity, justice, and marginalization, seeking answers about how to take action and to what extent CS itself was a tool for taking action. Third, the two instructors struggled with how to help students with these tensions, uncertain about their own roles and responsibilities in sharing counternarratives and their sociopolitical views of CS.

In some respects, these results mirror prior work. For example, we found similar results to the three recent works engaging CS and social justice [1, 26, 31], revealing a desire on the part of youth marginalized in CS to view CS through the lens of justice and equity. This study builds on these prior works by demonstrating how giving students agency to use these lenses opens new questions about what it means to learn CS through a critical lens, and what it means to take action, especially when teachers themselves are struggling with these same sociopolitical questions. Our work also reaffirms prior work that has shown that for any of these conversations to happen, the broader culture of a school plays a significant role in achieving inclusion [7]. Our results build on this in the context of CS, showing that school culture interacts with content, shaping what critical conversations about CS students feel safe having.

Of course, our work is just one study. The themes that emerged in our observations are likely closely connected to the specific teachers, students, location, and program. The class was also taught entirely online: many of the classroom supports and design activities were limited or unavailable. This was a 6-week course, so relationship building, which we found essential, was limited. The students in the class were also predominantly non-white.

Future work can address the limitations of our work and prior work in several ways. There are countless critical perspectives on CS to investigate, each with their own particular nuances and potential tensions that likely vary by who is teaching and who is learning. Our work points to the substantial need for research on how to help teachers of all identities not only talk about race in diverse classrooms [12], but also about how CS interacts and intersects with race, gender, class, and ability. We also need research on primarily white institutions, where non-white minoritized students might be unduly burdened discussing CS and justice.

Despite the nascent status of this research, there are many implications for practice. Students need to know the truth of the world we are living in, and the dominant narratives of Silicon Valley often omit it. If students are going to be good citizens, they need to identify, articulate, and engage with the counternarratives of the technology that is driving the world we live in. Our research shows that while engaging these topics in culturally responsive ways can bring great uncertainty to the classroom, it can also make crucial space for student values, identity, and voice. Teachers should consider these early experiments as proof that critical CS pedagogy, more than just bringing new narratives and ideas into CS education, is also about making space for youth bring their lives, assets, and interests to their learning.

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