2023 Annual Conference & Exposition
Baltimore Convention Center, MD | June 25 - 28, 2023
The Harbor of Engineering Education for 130 Years
ASEE
Paper ID #38577

Integrating Participatory Methods in the Study of Equity and Inclusion

Dr. Kristen Moore, University at Buffalo, The State University of New York

Kristen R. Moore is an Associate Professor in the Department of Engineering Education at University at Buffalo. Her research focuses primarily on technical communication and issues of equity, inclusion, and social justice.

Matilde Luz Sanchez-Pena, University at Buffalo, The State University of New York

Dr. Matilde Sánchez-Peña is an assistant professor of Engineering Education at the University at Buffalo – SUNY where she leads the Diversity Assessment Research in Engineering to Catalyze the Advancement of Respect and Equity (DAREtoCARE) Lab. Her research focuses on developing cultures of care and well-being in engineering education spaces, assessing gains in institutional efforts to advance equity and inclusion, and using data science for training socially responsible engineers.

Qiuxing Chen
Dr. Anne M. McAlister, University of Virginia

Anne M. McAlister is a Postdoctoral Associate in the Department of Engineering Education at the University at Buffalo. Her research focuses on engineering identity, social justice, and equity with the goal of broadening ideas about who engineers are and what they do in order to empower students to tackle the big issues in today's world through engineering. Dr. McAlister has a PhD in Education and a MS in Systems Engineering from the University of Virginia. She has a BS in Chemical Engineering from The Ohio State University.

Courtney Burris
Ms. Jada Vanessa Mowatt, Department of Chemical and Biological Engineering, University at Buffalo, The State University of New York

Jada Mowatt is a PhD student in the Department of Chemical and Biological Engineering at the University at Buffalo. Her research focuses on PFAS' ("forever chemicals") adsorption in the environment and remediation strategies. She also has interests in promoting diversity, equity, and inclusion in science, technology, engineering, and math (STEM) fields.

©American Society for Engineering Education, 2023

Integrating Participatory Methods in the Study of Equity and Inclusion

Abstract

Researchers and practitioners across engineering programs have committed many resources (time, money, etc.) to understand the experiences of multiply marginalized and underrepresented (MMU) students in engineering. The methods used to capture these experiences vary: from deep, qualitative research with low numbers of participants to large-scale quantitative methods like sense-of-belonging or campus climate surveys. Critical and Black Feminist methodologies suggest that research in equity and inclusion that involve MMU students must carefully consider the impact of the research on the participant, taking care not to re-traumatize students through the experience of participation and honoring student experiences through ongoing participation and feedback loops. Equitable practices in the execution of engineering education research projects are essential to drive the positive change we envision making in the engineering culture.

This paper presents a methodological innovation our research team used to study equity and inclusion in a way that was both generative for our research purposes and also responsive to the need to prevent harm. Drawing on Starr and Greisemer's theory of "boundary objects," our semi-structured interviews and focus groups were anchored in iconographic depictions of the university, asking students to interact with the graphic through a traditional participatory urban planning method. These approaches shift the power relationships traditionally established in interview settings and allowed student participants to shape the direction of their interviews and storytelling.

In this paper, we first describe the central ethical and justice challenges to soliciting and engaging BIPOC students in research about their experiences. After describing the goals of the study, we explain two key strategies that allowed us to address these challenges in our data collection: 1) Use of boundary objects to elicit participants narratives, and 2) the integration of participatory urban planning methods.

We show sample data sets to explain the ways our methods provided opportunities to learn more from students, to gain a comprehensive understanding of student experiences across sites of work, and to protect students in meaningful ways.

Introduction

Conducting research that involves students is fraught with ethical and justice concerns: are the students being coerced? Are the students worried that they'll be punished for something they say? Will students feel pressured to participate? These questions are amplified when the students at hand are from marginalized and minoritized groups and when those students are asked to speak about their experiences within the classroom. Scholars across engineering education have built projects that report out on student experiences, and all of these implicitly or explicitly suggest that ethnically and racially minoritized (ERM) students experience trauma throughout their experiences as students. McGee (2018), for example, explores a whole range of experiences for Black and Brown students in engineering, including enduring racial stereotypes,

powerlessness in their experiences of racial injustice, and limited exposure to other STEM professionals and professors who look like them. In her afterword and concluding remarks, she argues for afrofuturism and makes a number of recommendations for STEM educators working to diversify the field and build it more equitably. She describes a world wherein "POC [who] are trying to learn and practice in [STEM] fields are frequently alienated and dissatisfied" (p. 118). Her description and her book-length discussion emerge from Black and Brown student experiences, collected through a range of methods and methodology and consistent in the realities that "racialized experiences often caused stress, strain, academic, performance anxiety and doubts about their qualifications" (p. 57). This is the frame from which we authors proceeded when we designed, enacted, and participated in the study we describe here.

Our study sought to understand the experiences of Black, Indigenous, People of Color (BIPOC) students *so as to* shape future initiatives in the school of engineering where we authors work and study. Author 1 is the chair of the justice, equity, diversity, and inclusion (JEDI) initiatives, and when asked how to best use resources, they responded, "Best to ask the students. They know what's happening. And they know how to fix it." Yet this charge, to ask BIPOC students what has happened to them and how to fix it, came with concern that the students we engage with might be further traumatized by our study, coerced into telling their stories, or harmed by the process of moving from data collection to decision-making.

This article, authored by a coalition of researchers and participants, explores the objectives and impacts of the research methods used in this study. As a methodological exploration, we focus less on the findings and more on the study design as a methodological approach to addressing and preventing harm in the academy. We begin by articulating the need for methodological innovation and adaption in studies that are concerned with equity and inclusion. Then, we describe our participatory design methodology and the ways the researchers on this paper aimed to develop a safe and protected environment. We conclude not with data but with a reflective results section that involves researchers and research-participants in making knowledge about the effectiveness of participatory design in meeting its aims for both protecting participants and collecting data.

Before moving on, we want to clarify the two author positions: some of us are researchers and research designers: we weren't participants in the study—we just designed the study, collected data, or analyzed data. Others of us are participant-researchers—we were participants in the study who joined the study team at various moments in the study: at the point of data collection, data analysis or paper authorship. We do not disclose which of us is a participant-researcher in order to protect the participants: at this stage, we haven't all made choices about how we want to proceed professionally; as such, disclosing our status could be potentially harmful.

Why does Equity and Inclusion Research Require Methodological Innovation and Adaptation?
For critical and feminist* methodologists, any research design that involves participants requires a particular ethic of care (Sullivan, Behar, Hill Collins). The best practices for person-based research creates imperatives that protect the participant from harm; that honor participant stories,

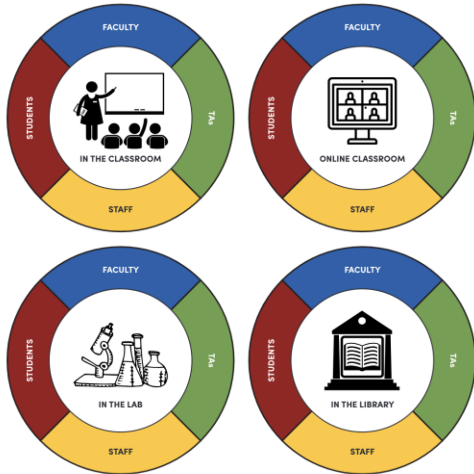
voices, and positionalities; and that engage in critical, participant-centered reflexivity in order to determine how a study ought to be designed. As person-based researchers, we authors align ourselves with these critical methodologies and, further, with decolonial methodologists who remind us that *all* research projects are imbued with power imbalances likely to exploit or harm participants. After all, the researcher has power over the participant and shapes their stories in written accounts and publications.

Strategies for addressing these power imbalances are relatively limited. Reciprocity is one suggested practical step for researchers, particularly when reciprocal acts are driven by the participant. Cushman (1998) describes, as an example, reciprocity with community members that included taking them to the DMV, helping them complete complicated forms, and other errand-like acts that met *their* needs. At the heart of calls for reciprocity in research [and in this context, we would add, at the heart of feminist and activist methodologies] is a recognition/assertion/insistence that research involves building relationships among humans. At a basic level, research is about understanding other people, their lives, and their experiences. As researchers, we asked for admittance to our participants' lives, thoughts, and experiences, and our participants opened their lives to us in sometimes surprisingly intimate detail (Powell & Takayoshi, 2003, p. 399). Walton and Hopton (2018) reported out that in studying VAVA, an organization seeking to respond to agent orange victims, having heart (more than any other forms of reciprocity) drove their approach to working with community members. Organization members ameliorated the desires of the victims, and that priority also drove their research. This focus seemed impractical, as it focused on gifts, stories, and ceremonies that wouldn't have normally been at the center of their research. But it was central to the success of the project, including the design of reciprocity mechanisms.

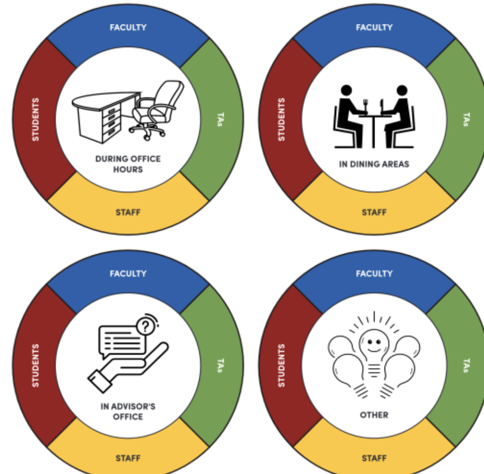
Another strategy, member checking, aims to engage participants in the review and approval of research documents. Member checking is a method for strengthening the validity of qualitative findings, or ensuring that the participant agrees that the findings are accurate. In member checking, participants are given an opportunity to comment on the findings, whether in writing or via an interview. Rather than giving participants the raw transcripts to review for accuracy, member checking involves providing research products such as major findings, themes, or case analysis to the participants to determine if participants feel that these research products are accurate (Creswell & Creswell, 2018, P. 199-200).

Often, the methodology drives the way a research design responds to power imbalances. Here, we distinguish between method and methodology to clarify that method might be seen as the action versus the methodological approach, which is the ethic behind choices in the research design. Although positivist approaches to research design call for an objective lens, critical methodologists agree that research enters into an already existing context and is conducted by decidedly *un*objective researchers. This, as Lather (1992) articulates, means that no research is truly sterile or devoid of perspective. Instead, researchers should "come clean" about their positionalities, admit their perspectives, and account for it in their design. This is in line with mehtodological trends to identify positionalities and, more recently, to articulate equity and activism as part of the end goal of the study. In this way, we join Martin et al (2022) as they "imagine an entire community of researchers engaged in methodological activism (Ong, 2005; Zuberi and Bonilla-Silva, 2008) where research methods are purposefully used to empower

marginalized populations and enact social change" (p. 81). This paper considers participatory design as one such approach that might empower ERM students and then uses participatory authorship to question its effectiveness.



Iconographic Poster, Number #1



Iconographic Poster, Number #2

Why did we plan Participatory Design and Boundary Work? And what did it look like?
Participatory design (PD) is a methodology that emerges from initiatives that sought to democratize design processes in Scandanavia. Both a research methodology and a design activity. This research project emerged from a central goal: to design equity and inclusion initiatives that were (at least in part) designed by and with students—with a particular focus on the experiences and values of students traditionally marginalized by the academy. When we see the academy and the discipline of engineering as designed both materially (by buildings and resources) and discursively (by policies, procedures, and daily discourse practices in the classroom), it's easy to see how it is designed by faculty and administrators rather than students. And, further, it is designed for the success of particular kinds of students (typically straight, white, able-bodied men). This participatory design project sought to involve students in the design of JEDI initiatives, to allow their experiences to shape both *what* the JEDI committee focuses on and *how* we use our resources. As Spinuzzi describes, "Although participatory design draws on various research methods such as (ethnographic observations, interviews, analysis of artifacts and sometimes protocol analysis), these methods are always used to iteratively construct the emerging design, which itself simultaneously constitutes and elicits the research results..." (p. 164).

In our research project, we sought to understand how best to design initiatives with a particular focus on understanding what sites should be focused on (classrooms? Laboratories? Office hours? Gathering spaces?) and what populations to engage (TAs? Faculty? Staff? Other students?). These narrow design parameters were used to elicit narratives and stories about both positive and negative experiences, or as the researchers put it to the participants, places where and people who made students feel like they did belong and could be successful versus places and people who made students feel like they didn't belong or couldn't be successful.

Participatory design is used in a range of disciplines and design processes, but in our research project we pulled specifically from an urban planning approach called community mapping. Community mapping is traditionally used to synthesize a community or city's impressions of a geographic location. Community Engagement Toolkit explains the approach this way: "Maps and photographs of an area or specific location are used to illustrate how people view their area: what they like or dislike or improvements they would like to see." An initial activity of community mapping asks for community members to identify places that are positive or negative, and then uses these identifiers to generate conversations about both *why* these dots are negative or positive and then how they imagine improving. Archer et al (2012) describe this process as a community mapping process that allows members of the community to determine site location. In this case, dots can be used to determine *where* a building should be built.

Amsden and VansWynsberghe (2005) used this kind of community mapping process to create criteria for a community health center, using maps to engage members of a youth population in decision-making. As participatory action researchers, they adopted community mapping because it aligned with five key values or aims of their research:

1. Establishing an environment of trust (362)
2. Creating an empowering space (362-363)
3. Setting a Clear Focus (363)
4. Creating an open space (363)
5. Encouraging Collaboration (363)

These five values reflect our objectives in integrating a community mapping and participatory design methodology into our project. We assumed that our student participants (like the youth Amsden and VanWynsberghe engaged with) were seldom invited to shape the design of programs or engage in bottom-up critique. We created an iconographic mapping in lieu of a community map as an invitation to discuss/critique the whole gamut of places and people that comprised their experiences in the [engineering school].

The iconographic map (see Figure 1) functioned much like a community map in urban planning or community engagement projects. Like design studies in urban planning, the iconographic map established a focus for our conversations with students. Our objective was not *merely* to understand how they did or did not experience a sense of belonging in the school: we wanted to connect their stories to decisions that will shape the future of the university. As such, we adapted the community mapping methodology for our purposes: rather than offer students a map with every office on campus, for example, we simply put an icon of an office on the map, to indicate that offices and office hours, as a site of student experiences, might be a location that deserves attention.

Using dots and the map focused the stories in two ways: 1) it prompted students to be specific int their descriptions of experiences and 2) it allowed us to collect data about places even if students chose not to describe the incident. We aimed to empower students to physically dominate the map, to make it theirs, to tell the story of their experiences in the school visually first and then linguistically later in follow up discussions. As a result, the data from the project tells a story about how the school should focus its resources, and we are using the data to design the next phases of our JEDI initiatives.

Our central *design* questions for the design of JEDI initiatives were: 1) what locations should be prioritized in our initiatives? 2) are there particular groups or populations we should be working with to address change? and 3) what specific action items do students suggest might be take in particular locales and with particular populations?

Participant and Researcher Reflections (rather than Results)

In preparation for this paper, two concerns emerged: first, the research designers (which include just two of the authors on this paper) wanted to verify how and if our objectives were reached and second, we wanted to do so in a way that offered participants a voice in reflection but also protected participants from self-identifying. Because a number of participants joined the research team as participant researchers, we opted to engage in a reflective debrief as a team. Although not all members of the team could participate, a number of participant researchers were able to meet to discuss the objectives, how and if they were achieved, and what might have been accomplished through the methodology design.

Our objectives for integrating community mapping and participatory design align with the values presented by Amsden and VansWynsberghe (2005). Thus, we have organized the participant and researcher reflections into six areas: 1) establishing an environment of trust, 2) creating an empowering space, 3) setting a clear focus, 4) creating an open space, 5) encouraging collaboration, and 6) critiques and next steps.

Establishing an environment of trust

This line of work requires a basis of trust between researcher and participant to allow for honest and vulnerable conversations to take place. In the planning of this participatory design and community mapping activity, it was integral to establish an environment of trust before participants even made the decision to be involved. We aimed to establish trust in two ways, 1) by involving facilitators who have a history of involvement in diversity, equity, and inclusion initiatives on campus and in their research, and 2) participants were given a choice in how they would be involved.

Although we'd hoped that the activity itself would also engender trust, the activites seemed less important than the actual humans facilitating the research—at least for the participant researchers involved in this paper. All of the participant researchers had existing relationships with one or more of the researchers or facilitaors. In our debrief, one of us participant researchers admitted, "I don't know if I agreed to it until...after I looked up [Author 8] and I saw like her actual research and I saw that like she was actually doing stuff. So I don't think it would matter if it was a grad student or whoever, like as long as I knew like they were actually about it..." The decision to participate, then, was less about the topic and the options than it was about trusting that the researcher was actually committed to doing the work. And even in cases when the participants didn't know one of the researchers, they knew the other: "I knew that like if this was something that she supported, then it was a safe space ultimately."

In this way the researchers were able to "borrow trust" from a known and trusted individual in the community. These sentiments echo Rose et al (2018): trust is valued over all and we can see that it is directly linked to the participants feeling of safety in the space and their willingness to engage. Once they decided to participate in the study, they were given a choice as to how they

wanted to engage, either via focus group, interview, or small, self-selected grouping. This proved to be an effective mitigation of anxiety or concern—though not necessarily a trust activity. The decision to join a one-on-one or focus group seemed to emerge from the same nervousness. Ultimately, this demonstrates the need to provide participants the power to choose how they are most comfortable participating.

Creating an empowering space

Creating an empowering space is about validating lived experiences and the knowledge we can glean from them. The participants are experts in their own lived experiences and that expertise is valuable, a sentiment which was shared at the onset of the focus groups and interviews. It was reiterated to the PRAs in the debriefing session as well, as their expertise as participants was invaluable to understanding whether the participatory design method outlined here achieved the goals we set. To further cultivate an empowering space, the participants needed to be fairly compensated for both their time and expertise, which is often overlooked when organizations. Historically, the burden of equity and inclusion work and teaching universities about the need for buidling equity and inclusion has been placed on the shoulders of BIPOC faculty, students, and staff; often this burden comes without compensation and without reciprocity. Thus, the pay for the time students committed to the project was central to reflecting our values.

One of the more surprising things we learned in the debriefing is that the intent behind the research (to make change versus documentation) could be an empowering factor as well. For example, the PRAs were under the assumption that the focus groups and interviews were merely about data collection and documentation as opposed to being used to take action within the engineering school at the university. Despite the language in the ad that said, “We want to know what you’ve experienced,” the participant researchers admitted that they “didn't know what would come of it. I knew it was for a publication. It would be data, but I guess I didn't know if it really would count essentially...would change even like come...Would it just kind of be like documented and then close the book and that's it?” In response, one of the authors who led the debriefing session shared a story about reporting faculty for inappropriate remarks and said, “I don’t know if that matters.” And then one of the participant researchers affirmed: “It does, it does. Because when there's so many people who would be in your position, [who] wouldn't say that. That also like gives them an okay to think that's like normal because silence is like agreeing with it sometimes. I feel like that's one of the biggest things is silence.”

In other words, participatory design research is empowering when it aims to actually design and redesign a system. The initial recruitment documents kept the advocacy motivating the researcher in the background, but clarifying the actions that the data could drive might have gone even further in empowering the participants.

Setting a Clear Focus

A central purpose of community mapping within urban planning and public engagement is to focus public commentary and allow for key locations and ideas to emerge from a large data set. As we developed our methodology, we also aimed to produce a set of data that could clearly drive the design of the JEDI’s initiative. As such, our community mapping approach sought to learn specifics from students. As collaborators, we researchers and participant-researchers agree

that the guided dots and iconographic map met this goal. One participant-researcher reflected that the methodology "helped guide the conversation and maybe helped me like visualize certain places" throughout the course of the interview or focus group. As we reflected, participant-researchers agreed that the stories might have been different, less specific to place, and less detailed without the mapping and the dots. The process "just gave you like really solid, um, like solid specific questions. So you weren't all like, blurting everything out," as one of the participant-researchers reflected.

For us, that's important: the focused data is imperative for creating arguments about how we use resources for JEDI initiatives. We collectively imagine what an interview that just talks randomly about microaggressive experiences might look like, and we agree: it would be different. Better? Maybe. There were times that the whole approach felt a little overwhelming. As if there was a correct answer. One of the participant-researchers reflected on this. "I feel like I might not have always had an answer for like, every like section necessarily, but I definitely did have like certain opinions on like, TAs and like from professors and like, even like peers in our class, like in my classes that weren't always like totally respectful to me as like a black woman. So I feel like it was a good activity, but I didn't always feel like I had like a good, like an answer." In this way, the grounding nature of the maps and its specificity might have had the opposite effect: sure, it was specific. But it might also have suggested to the participants that they needed to "fill in" all the dots.

Yet, as we begin the next phase, taking the data and moving it into workshops and action items for faculty and leadership, we remain glad that we have the data organized this way, around the people and places most likely to need attention, correction, and intervention from an equity and inclusion committee. We wanted to cast a broad net, to be sure we had a comprehensive view of the school. And as one of our participant-researchers articulated, "It kind of helped me to not like, think so narrowly, like trying to like broaden like my memory, if that makes sense." It does make sense to us. In short, the methodology did help spur particular stories, and there were lots of stories to tell. So from a data standpoint, it's good to have grounded data to present to "higher ups" and decision-makers as we work to design and redesign initiatives, polices, procedures, and practices.

Creating an open space and encouraging Collaboration

Throughout the course of the study, the researchers engaged in a range of design set ups: focus groups based upon participant availability, focus groups based upon participant relationships, and interviews. When we engaged potential participants, they were able to choose how they wanted to speak with researchers, and some ended up participating in focus groups. These were primarily the sites of collaboration and openness (not interviews), and as we reflect, we find some limited evidence of this—and an important lesson, too.

As we reflected, we agreed that the focus group offered participants an opporutnity to collaborate. One participant-researcher reflected on this: "Sometimes someone will say something and you're like, 'Ooh!' I like that it brings up like another memory...like you are kind of bouncing off of like ideas and other people's experiences." We saw this happen a number of times in focus groups: one participant nodding and then commenting; another interrupting to say how and if they'd had similar experiences. Participants agreed that TAs needed to be trained,

because they were simply not equipped to intervene when they observed students behaving in microaggressive ways; or, participants nodded along as they described the ways that some faculty refused to look at them or engage them seriously.

But we also learned a lesson in the development of our focus groups that seems obvious (in hindsight): when the identity of the participants appears (or is) vastly different, creating a collaborative, open space is a challenge. The participant sampling relied on student self-identification at enrollment: we invited anyone who enrolled as a BIPOC student to participant. Yet when the focus groups were scheduled using availability more than any other guide, the makeup of the groups were troubling. We often had only one male participant among all women; we often had one woman who had white skin privilege (despite their BIPOC status). As we know from a range of scholars (for example, Zakaria 2022; Schuller; 2021) and public intellectuals (Cottom, 2019; Seales, 2019), the presence of a white(-appearing) woman can signal trouble for Black women and other women of color. And the presence of men can also signal trouble for women. Despite our commitments to intersectionality (see Author 1, 2019; Author 1, 2021; Author 8, 2021), this confluence of identity created an opportunity to observe the impact of difference on groups of ERM students.

In debriefing, we discussed this reality, and one of the Black women on the team noted, "Personally, like if I were to go into a focus group and it was about like this specific research topic, yeah. I wouldn't take it as serious or I would just be questioning the actual research that you're doing. If I walked in, if it was for justice, equity, diversity, inclusion, and I saw a white woman there, and I don't know what the man was, but I just know I would personally be questioning it and I don't think I would be as honest or as like a hundred percent truthful." This seems super obvious, of course. And the strange make up of the focus groups made the initial research team (which was comprised of three women: one white, one Black, one Latina) pause to consider how and if we might be more intentional both in the design of the participant focus groups and also in the design of the research team.

And as we debriefed, the reality of the impact of race on the design of the study (any study) was further illuminated. One of us asked whether the race of the researcher matters. And, of course, the answer is yes—but with big caveats about coming clean and being straight about biases. So initially, yes: "off the bat if I don't know anything about them" it can be an issue. In other words, it doesn't matter how participatory your methodology is, if you're white and trying to study race, prepare to lay your cards on the table. In the debriefing, participant-researchers on the team acknowledged that "if it was a white woman hosting the study, I feel like I'd probably like have to like get to know them more to know like if they actually like are an advocate, you know what I mean? Like, or like an advocate for the, cause if it was like a black woman, I'd probably feel more comfortable at like, at the very start, right?" Right. What seems obvious is that, as another participant researcher noted, white women need to be "really upfton with her biases" and "self-aware" if they're going to do this work.

The takeaway here is that: yes. We have an opportunity to create openness and collaboration in our research design. But participatory design can't subvert the systems of oppression we're entering into. We need more than an engaging study design: we need methodological activism, open advocacy, and a Black Feminist commitment to engaging lived experiences and dialogue *as researchers.*

CONCLUSIONS, TAKEAWAYS, & NEXT STEPS

The debriefing session with the participant researchers provided us with a second opportunity to involve the participants in the design process as we evaluate is effectiveness. Though the critiques of the PD and community mapping method were minor, they suggested an ineffectiveness of the dot activity, however this ineffectiveness does not equate to a hinderance of the story-telling. Participant researchers reported that the iconographic mapping helped them to organize their stories, but it did not drastically impact the stories they chose to tell. "The most important part is literally just the content. Like the, the maps that's cool [and] all. Like that's great to have like clear, positive, negative experiences, but... the physical mapping out, I feel like that's kind of secondary." Another takeaway from this reflection session is the importance and impact of intention setting at the start of a student's involvement, especially when the intention is to influence action. It helps to build trust between the researchers and participants and creates a more empowering space.

Participatory design offers participants and researchers a mechanism for both creating meaningful design choices and collecting a range of data types. In this paper, we haven't reported out on the data we collected, but we have highlighted the ways our participatory design methodology and community mapping research enabled us to subvert traditional research relationships. As importantly, we identified limits and holes in the assumptions that other authors make about the democratizing features of participatory design. Fundamentally, we suggest that participatory design has potential to empower participants, and we agree that this kind of empowerment is imperative if we're going to conduct research that focuses on BIPOC students. But participatory design is limited in its ability redress the inequities and systemic oppressions that plague our academic spaces.

References