Engaging recently incarcerated and gang affiliated Black and Latino/a young adults in designing social collocated applications for mixed reality smart glasses through community-based participatory design workshops.

Richard Martinez
richamm1@uci.edu
University of California, Irvine
USA

Kurt Squire
ksquire@uci.edu
University of California, Irvine
USA

Figure 1: Participants of the Homeboy Art Academy unboxing Oculus Quest 2 devices obtained by the researchers through a grant to foster lasting community engagement and support learning beyond co-design engagements.

ABSTRACT

Involving Black and Latina/o communities early and often in emerging technology design can make innovation more democratic, address bias, and reduce harm against these marginalized groups. To the best of our knowledge, no work has examined how recently incarcerated and gang affiliated young adults conceptualize mixed reality (MR) use for social collocated scenarios based on their everyday interactions and meaning-making. To explore this topic, we used a design-based implementation research (DBIR) and community-based participatory design (CBPD) approach to elicit social-technical insights grounded in the personal and critical perspectives of these youth. We find participants frequently grounded design ideas as embodied design elements to surface intangible and invisible qualities such as emotions and reflections on lived experiences, namely criticizing institutional structures that have maintained exclusionary practices against them. We discuss how DBIR and CBPD can uncover larger societal issues impacting marginalized communities through emerging technology design, and we contribute design recommendations for social collocated interactions in MR.

CHI '24, May 11–16, 2024, Honolulu, HI, USA

ACM ISBN 979-8-4007-0330-0/24/05
https://doi.org/10.1145/3613904.3642895

CCS CONCEPTS

• **Human-centered computing** → **Empirical studies in HCI**.

ACM Reference Format:
Richard Martinez and Kurt Squire. 2024. Engaging recently incarcerated and gang affiliated Black and Latino/a young adults in designing social collocated applications for mixed reality smart glasses through community-based participatory design workshops.. In *Proceedings of the CHI Conference on Human Factors in Computing Systems (CHI '24), May 11–16, 2024, Honolulu, HI, USA.* ACM, New York, NY, USA, 17 pages. https://doi.org/10.1145/3613904.3642895

1 INTRODUCTION

The innovative process of creating, breaking, and failing has been afforded to the privileged who overwhelmingly have been white, educated, and male [27, 60]. Extending the opportunity to marginalized populations can generate new ideas that have yet to be explored and incorporate more inclusive designs addressing persistent issues of equity and inclusion within design engagements [56]. The urgency and importance of including recently incarcerated and

gang-affiliated Black and Latina/o perspectives in design is underscored by studies that highlight the need to democratize innovation, address issues of bias, and reduce harmful outcomes for historically marginalized groups [85, 105, 108]. Nearly 2 million people are currently being impacted by incarceration in America, and millions more have been affected in the past. This urgent situation also profoundly affects the families who continue to rely on technology in their daily lives [90].

Technologies sustain discrimination through biased designs that assume particular user qualities, intentions, and perspectives or misaligned implementations whose use cases run counter to the needs of Black and Latina/o users [10, 16, 17, 33, 43, 58, 69, 137]. While only a handful of studies have interrogated systemic inequities in technology design and innovation, the HCI community has been slow to take bold, direct action. More research must urgently join these few critical voices advocating for marginalized communities by scrutinizing *"who gets to innovate"* within emerging technology domains and protesting the exclusion of populations on the fringes of society from design engagements [10, 13, 28, 30, 33, 43, 127]. A growing body of research draws attention to the urgent need to integrate Black and Latina/o perspectives into design, as the continued marginalization of these groups highlights the imperative to democratize innovation, tackle systemic bias, and prevent further harm perpetuated by technology design [85, 105, 108]. Moreover, incorporating the perspectives and lived experiences of Black and Latina/o youth impacted by the judicial system provides an additional critical lens to emerging technology design. Examining their insights can expose broader societal inequities and problematic conventional design practices that disproportionately affect communities of color [128]. We examine community-based participatory design (CBPR) and design-based implementation research (DBIR) to center the voices and lived experiences of recently incarcerated and gang-affiliated Black and Latina/o youth within the emerging technology domain of socially collocated interactions in mixed reality (MR) as a means to do so.

CBPR and DBIR frameworks can help align technologies within existing cultures, and value systems and uncover implicit realities these communities face by centering their voices, lived experiences, and direct input into design engagements [13, 57, 128, 132]. Mixed reality (MR) combines real and virtual elements in physical spaces, registering 3D objects that interact with their physical surroundings in real-time [5, 121]. We leverage the emerging technology domain of MR for several reasons: (1) designing for socially located interactions beyond enablement and the latest developments in multimodal (i.e., head & eye-gaze, speech, voice, biosignal, and gesture inputs) and immersive interactions have opened up a unique and unexplored area for investigating the impact of technology on face-to-face connections [42, 106]; (2) marginalized community involvement in design engagements focused on emerging technologies is sparse and rare within the HCI community [12]; (3) and finally spatial computing will evermore become algorithmically governed and integrated into our physical world. Therefore, inclusive approaches to ensure that coded biases don't help shape the social world are imperative [4, 62, 81]. Centering marginalized voices is vital for addressing issues specific to disenfranchised communities, allowing self-determination in technology futures, and providing opportunities to contribute socially, economically, and politically to these design spaces [113, 132].

To address these research questions, we conducted participatory design workshops with 15 youth aged 18–25 to reveal new interaction models for socially collocated MR applications. We worked with the Homeboy Art Academy, a nonprofit gang rehabilitation and re-entry program based in Los Angeles that provides trauma-informed and culturally competent asset-based arts education to recently incarcerated and gang-affiliated youth. The youth conceptualized several mock MR applications through storyboarding, low-fidelity prototyping, and bodystorming activities. Unlike the academic research community (see [63]), these youth were relatively unconcerned about privacy. Whether through interactions with the state, the judicial system, or private entities, these youth assumed constant surveillance.

Further, youth were persuaded that *"big technology"* already had access to their geospatial location and communications. These youth were more concerned about how their physical bodies were constructed and presented to the outside world. Furthermore, they wanted to leverage MR technologies to advance their creative pursuits, mainly to display, publish, and promote their creative works. They also wanted technologies to connect them more authentically with others in their lives, their immediate community, and the world beyond. Further, participants valued experiences that authentically engaged them emotionally with others so that they could interact more deeply through technologically mediated experiences.

2 RELATED WORK

2.1 Technology Design with Black and Latina/o Communities

The perspectives of Black and Latina/o communities are largely left out of speculative and emerging technology design; this is especially true for recently incarcerated and gang-affiliated youth who are rarely if ever, viewed as subject matter experts[50, 88, 135]. Instead, within the HCI community, this population, in particular, has primarily been the subject of studies seeking to enhance predictive policing models or are portrayed as something to "catch" [7, 117]. At the vanguard of using HCI to empower people of color, Black and Brown women scholars like Dillahunt, Mengesha, Erete, Benjamin, Smith, and Cruz have made substantial contributions to engage marginalized racial groups and understand their technology needs [9, 29, 33, 43, 91, 119]. Mounting interdisciplinary examinations urgently seek to address the systemic discrimination and inequities confronted by disenfranchised Black and Latina/o populations through fostering active participation and equitable partnerships with these marginalized groups themselves. Beyond one-sided inquiry, these deepening collaborative engagements empower underrepresented communities to have a voice in diagnosing and tackling the complex prejudices perpetuating their societal sidelining. This shifting, partnership-based approach recognizes that historically excluded communities must have agency in the work that aims to alleviate pre-existing biases embedded within technological design processes [34, 55, 78, 116]. We risk further marginalization in digital landscapes by not accounting for these realities, integrating these groups' lived experiences and perspectives, and elevating participant's tacit knowledge as expertise. We

also restrict chances to disrupt the structural characteristics of technology design that underpin the detrimental and material impacts on historically neglected groups [9, 44, 58, 102].

When accomplished authentically, early, and often, methodologies like community-based participatory research (CBPD) and design-based implementation research (DBIR) center participants as the agents of change, taking into account their lived experiences contextualize in community histories, practices, and cultural values [8, 23, 24, 36]. These research approaches are conducted in real-life settings outside of academic labs or contexts and explore factors contributing to the success and failure of design engagements. In addition, they inform our understanding of complex nuances that may be overlooked, creating actionable insights to guide designers and community members in informing potential interventions and programs.

By bringing together perspectives from marginalized communities into co-designing and speculating on emerging technologies and innovation, researchers have begun to highlight critical tensions [49, 76]. Namely, while seeking to center marginalized views, these critical co-design engagements also risk inadvertently reinforcing existing power imbalances [38] and exploiting design insights without providing equitable benefits to the community partners [26]. Collaborating with Black and Latina/o youth to design social MR applications provides an excellent opportunity to explore and analyze cultural and social elements that may influence potential use cases. These engagements also help provide opportunities to expose youth to design skills while considering the views and experiences of these young individuals in real-life situations, contributing to the social and technical dimensions of the devices being designed [59, 68].

Participatory design (PD) sessions, when implemented from a community-based and assets-based perspective, can serve as both a method and model - to inform technology design while building youth's technological understandings [35]. PD activities and the artifacts generated are the units of analysis, informing one another while contributing to a more holistic understanding of social-technical design dimensions that impact their use. In other words, PD workshops engage youth in new technology design, and the insights gained from youth's lived experiences also inform the design of the technology itself [40]. More interdisciplinary work must be done to account for marginalized communities' realities in technology design and use.

2.2 Community-Based Participatory Design and Design-Based Implementation Research

Researchers have used CBPD to engage Black older adults to envision equitable health outcomes [57], to build equitable mental health tools for teenage Latinas [132, 133], and have convened workshops to discuss engaging with Indigenous communities to build AI tools to preserve language and discuss privacy concerns [62, 81]. Unlike traditional participatory design methods, community-based research engagements seek to center the participants as collaborators for political and local change [130]. Similar to DBIR is using educational and social action elements to align research outcomes localized to a particular set of challenges and needs within the community, which may include educational needs [1, 66, 67]. CBPR practices position participants as the authorities on their own lived experiences, an approach vital for co-designing with marginalized youth, like those recently incarcerated or gang-affiliated, whose self-determination has long been stripped by judicial systems disregarding their holistic contexts and backgrounds. Centering these participants' expertise sketches a path forward for research, uplifting their voices and agency within a society that has primarily cast them aside [115, 129].

Design-based implementation research (DBIR) is a methodological toolkit from the learning and educational technology sciences to understand learning and develop curriculum in naturalistic contexts [8]. DBIR engages a diverse group of stakeholders in designing a program with the potential to succeed and then study its impact. Distinct from traditional design research, DBIR pursues practical outcomes, technologies, and organizational change with communities using research and theory pragmatically. A critical focus of DBIR is to center the *"messiness of real-world practice"* and the variables of the context in which the research is taking place as a critical element that shapes the practical outcomes of what is constructed [8, 92]. In other words, through an iterative process, DBIR can be used to uncover how emerging technologies are used in real-life scenarios outside the laboratory or traditional academic contexts. Incorporating understandings of social circumstances and in-situ realities can impact technological design and tangible products, better-aligning systems to community needs and value systems. We use these design practices to focus on Black and Latina/o youth's reflections on mixed-reality smart-glass devices, examining their cultural identities and practices in collocated scenarios. Further, we aimed to understand how these youths envision using technology to enhance socially collocated interactions within their cultural values while exploring the future technological affordances of always-on and fashionable smart glasses.

2.3 Mixed Reality Design with Youth and Collocated Technologies

Although there are few researchers within the HCI space at the forefront of advocating for Black and Latina/o communities [9, 13, 30, 34, 43, 105], few studies have focused on the demographic group of gang-involved and recently incarcerated youth. No studies have specifically examined co-designing for social collocation within mixed reality environments [64, 70]. Design engagements with youth in this space primarily focus on obtaining specific educational or technical outcomes [65, 73, 134] rather than centering youth voices and experiences. Milgram and Kishno coined *"mixed reality"* in 1994 to describe displays that combine virtual and physical worlds on a continuum between real and virtual environments on opposite ends of the spectrum [96]. With the emergence of advanced mixed reality (blended environments) smart-glass technologies, there is a renewed focus on how individuals embrace these tools in social settings and technologies' role in enhancing collocated interactions [3, 31, 46, 85, 106, 114]. However, Olsson highlights shortcomings, such as insufficient studies conducted with demographic youth groups, inadequate emphasis on wearable tech, and insufficient utilization of design-based research techniques to resolve intricate issues [106]. Olsson et al. note that there are limited comprehensive reviews or clear definitions of this newly

emerging topic, underscoring the need to explore these emerging technologies from youth perspectives [106].

Design-based research with MR for diverse youth has focused on the intersection of identity and place [74]. Mobile devices enable portability, social interactivity, context sensitivity, connectivity, and individuality, and MR applications benefit from leveraging these unique affordances [74]. Using the underlying metaphor of *"the world as a game board"*, Squire [2012] describes how MR can simulate and overlay data onto the physical world to understand environmental issues, gain historical perspective, or visualize sociological patterns not readily apparent[122]. Martin et al. [2013] distinguish between place-based and place-agnostic MR applications to capture how applications can deepen user's experience of a particular place (as with a historical tour of the Boston Freedom Trail, reliving historical events such as the Dow Day Protests at the University of Wisconsin-Madison, or engaging in future scenario planning, as in the Saving Lake Wingra [87, 122]. MR can also juxtapose a particular place with a fictional universe, as with Pokemon Go, Harry Potter, Wizards Unite, Ingress, or even educational applications such as Environmental Detectives [74, 123]. Opportunities to remediate social networks on top of physical reality exist but must be explored. However, opportunities exist to address youth interests more directly by creating new MR experiences based on activities indigenous to urban youth interests, arise through participatory design methods, or include a higher degree of authoring than currently supporting. Thus, our work presents a unique opportunity to include the voices of a primarily overlooked demographic population in an emerging research space early and often while also understanding the socio-cultural configurations of emerging technology in situ.

3 BACKGROUND

In this section, we describe the research site, the organization we have partnered with, and the local neighborhood it is situated. We aim to frame the relevance and implications of the study, provide contextual information to illustrate the practical challenges of implementing CBPD, and provide insight into the local political, economic, and social backdrop of our work.

3.1 Social Context: Boyle Heights, East Los Angeles, California

The neighborhood where this research takes place is transforming rapidly as technology and media industries expand into warehouse districts that traditional manufacturers have abandoned over the last 40 years. More developers seek to build massive projects in the area because of its location and proximity to the city's center. Historically, Boyle Heights has seen significant demographic changes from many immigrant and ethnic groups as a result of lax discriminatory and racially restrictive covenants dictating where Jewish, Russian, Black, Japanese, Central American, and Mexican families could live [104]. After World War II, many affluent families left for the suburbs, resulting in a rapid influx of Mexican and Central American immigrant families who previously could not afford to live in the area. Boyle Heights is home to about 200,000 people within a 6.5 square mile area, is among the most economically disadvantaged and youngest (median age) neighborhoods in Los Angeles, and risks displacement as these companies enter the area [97].

Most households reported speaking a non-English language as their primary language at home, and the neighborhood's median income is below Los Angeles City's average income distribution, one of the poorest in the county [131]. Culturally, the neighborhood has been the center for many political and civil rights movements influencing policy for the city and the nation at large [124]. Boyle Heights has one of the city's highest concentrations of public housing. Furthermore, the neighborhood is one of Los Angeles' most violent policing districts, with over 33 gangs in the area forming *"at least 66 unique rivalries"* [11]. This area's political, economic, and cultural realities negatively impact the technological skills, quality educational opportunities, and, ultimately, the overall employment readiness of individuals. Thus, opportunities to speculate, envision, design, and develop within emerging technology domains remain limited for this community and others facing similar realities[57]. Although restricted access to these opportunities remains, communities like Boyle Heights are the cultural production and export epicenters from which dominant and affluent communities benefit [71, 82]. For example, as with the case of the popular video game Fortnight, accused of stealing popular dance moves from Black artists and not compensating them[75].In other words, Black and Brown low-income communities are politically, socially, and economically excluded from technology design engagements yet, dominant and affluent groups exploit their culture for profit.

3.2 Site Description: Homeboy Art Academy - Art Gang

We designed this study with a trauma-informed arts center that serves under the umbrella of a larger community organization, Homeboy Industries, that offers wrap-around services to formerly incarcerated and gang-affiliated people. Homeboy Industries provides social services via social enterprises, including a bakery, cafes, screen printing, electronic recycling, solar panel installation, and the newly formed arts academy. Further, the organization also provides whole care, wrap-around offerings including case management, domestic violence counseling, education, legal, mental health, solar panel training, substance abuse, tattoo removal, workforce development, GED tutoring, prison diversion, and social re-entry services, and even alternative high school programs for youth aged 18 and below. Participants at the art academy engage in a paid *"Art Gang"* apprenticeship where students learn multimedia art skills and are involved in various trauma-informed arts interventions.

Fabian Debora served the Homeboy community for more than a decade before establishing the arts center to use art as a method for transformation and healing, impacting youth from similar backgrounds after years of substance abuse, incarceration, and gang affiliation. As an extension of Homeboy Industries, the art academy initiative seeks to actively engage, support, and listen to individuals emerging from cycles of incarceration and gang membership. By providing access to cultural arts programming, transmitting cultural knowledge, and fostering safe spaces, the academy facilitates identity exploration and transformation of past trauma among participants while exposing them to creative economy skill sets

with an eye for future implementation of technology skills curriculum. The art academy is currently located in a territory occupied by multiple rival gangs and, therefore, is directly involved in attempting to intervene as an alternative space for gang-affiliated youth. In order to best serve the local community, the organization maintains an open-door policy in that they regularly integrate new youth and emerging adults into program activities and scheduling. These newcomers come from the surrounding neighborhood, across Southern California, and from state and city judicial branches as an alternative to incarceration.

We situate our work within both DBIR and CBPD methods. We engage youth to envision futures and design collocated interactions for MR smart glasses. We aimed to elicit their perspectives on emerging technologies while exposing them to creative design skills per the site director's vision for the academy. We aim to centralize the perspectives of recently incarcerated and gang-affiliated Black and Latina/o youth within the context of emerging technology design. Therefore, using a series of co-design sessions, we sought to answer the following research questions:

(1) How can we empower youth to design for mixed reality smart glass devices while examining socially collocated interactions?
(2) How do youth situate their lived experiences, values, and attitudes when designing for social collocation in mixed reality?
(3) How do youth conceptualize the use of mixed reality smart glasses for various social contexts into designs, explanations, and artifacts?

4 METHODS

Over three months in the summer of 2022, we conducted seven participatory design workshops with 15 youth, with one participant being an emerging adult, using a design-based implementation research (DBIR) approach [110]. Participants self-identified as Black and Latina/o. DBIR considers the needs of partnering organizations, policymakers, facilitators, and participants in designing new technologies and transformative systems [47]. Drawing from community-based participatory design research, we engaged youth in MR software design activities to spark their interest in design, teach design methods, nurture a sense of belonging in technology careers (see [40]), and uncover insights about youth lifeworlds and context. Workshops were held in an open-format structure, allowing youth to participate in activities as they pleased, in alignment with the operating and service-providing models of the research site. Community center-based informal environments, like Boys and Girls Clubs, expect drop-in participation to serve the needs of local communities better [14]. As is typical with community center programming, the "drop-in" of new participants throughout the workshop series made activity management demanding. It required consistent adjustments to the research protocols and made typical research activities like tracking participant demographics difficult. These factors resulted in deviating from the initial planned protocols and administrative research activities [22]. Although it was challenging to keep up with the administrative aspects of implementing the research study, the "open door" organization of research activities allowed participants to feel welcomed and successfully mitigated against common issues of power imbalances typically found in participatory research methods where the needs of the community are not taken into account [43, 57]. All names in the results section are pseudonyms used to help keep any participant identifying information anonymous per university and IRB policies.

4.1 Participants

The population and research context is recently incarcerated, gang-affiliated, and system-impacted young and emerging adults (see [2]). The term *"youth"* refers to individuals between the ages of 15 and 25, which aligns with the definition provided by the United Nations [99]. Our university's Institutional Review Board (IRB) approved this study for ethical research. All recruitment was conducted onsite at the organization during regular operating hours. A recruitment script communicated research goals and objectives and gave potential participants a brief study overview. In this study, participants 18 and older received consent and assent forms. No participants under 18 were involved; however, we used the term "youth" to describe our participants following the United Nations definition of youth. Before starting the research workshops, we confirmed the participants' interest and collected signed consent and assent forms. After several meetings with the site director, it was suggested that participation should not be compensated and instead supplement the existing curriculum at the academy. Per the director: *"We know that technology is the future, and we are trying to equip the youth with the technological skills to be ready for that future, but we don't have the necessary tools to amplify our mission"*. Thus, researchers and the director decided to refrain from compensating workshop participants.

4.2 Workshop Activities and Structure

Our workshop activities focused on understanding underlying social norms, life perspectives, and conceptualizations rather than concrete implementations of socially collocated MR applications. In addition to these goals, we sought to teach new design and technology concepts related to MR, including artificial intelligence (AI) topics. We conducted seven design workshops with 15 youth participants organized into three phases: exploring social mixed reality applications, scenarios, and ideations, and finally prototyping via body storming to explore the use of MR for social collocated enhancement. Each workshop session lasted 60 minutes. By adapting design activities from prior work, including Vacca et al.'s [2017] engagements with Latina youth designing social-emotional learning apps [132], Persa et al.'s [2023] co-designs with low-income middle school youth around wearable mindfulness technologies [111], and Cheng et al.'s [2018] collaborative efforts creating mental health-focused games for youth [20], we developed our tailored workshop activities. Aligning with Barab and Squire's [8] emphasis on learning opportunities, our workshops integrated educational components to scaffold critical thinking, discussion, and reflection while cultivating student learning and attitudinal gains. Participants learned storyboarding and bodystorming techniques, gained

exposure to future technologies, and provided insights on conceptualizing socially collocated applications from socio-technical perspectives. Supplemental workshop materials, including operationalization and stimuli with accompanying worksheets, are available upon request.

Many of these participants have been neglected by traditional school systems and may have undiagnosed learning needs compounded by personal traumas stemming from incarceration and gang affiliations [48, 83]. Therefore, we leveraged principles from the universal design for learning (UDL) framework and integrated methods to enable multiple means of action and expression to maximize opportunities for participants to voice themselves and be engaged through all workshop sessions [19]. For example, to further elicit participants' perspectives and to set up subsequent activities, youth were individually provided with iPhone 7 devices to create video and audio recordings reflecting on workshop activities and their associated experiences, ideas, and attitudes. Additionally, we used worksheets to scaffold participant responses and thinking, included an itinerary at the beginning of each session, and encouraged participants to respond to prompt questions in their preferred language (i.e., Spanish).

4.2.1 Workshop 1: Exploring a Social Mixed Reality Application. During our first workshop, we expressed to participants their roles as the following: (1) designers, (2) learners and evaluators, and (3) thought leaders. As designers, to collaboratively explore how MR smart-glasses could integrate into society in a manner that promotes interpersonal connections. As learners and evaluators, working to understand design techniques and to provide input on improving content relevance and engagement to better align with their interests and learning desires. As thought leaders, who can shed light on their lifeworlds, understandings of lived experience, and their communities' tacit cultural assets and knowledge systems. Our intent in explicitly inviting engagement through these roles was to ensure that participants felt they had an equal role and voice in shaping workshop activities and contributing to design ideas.

We proceeded to introduce MR as an emerging technology. Influenced by workshop resources found within the *Google People Artificial Intelligence Research (PAIR)* online guidebook, we proceeded to inform the goal of the design session by presenting it as a challenge statement, for example, *"Explore an existing social MR prototype app as a group and discover its available functions"* [107]. A unique challenge statement was made for each subsequent session, depicting the research goal of that particular workshop. Challenge statements grounded our focus for each workshop as we worked through each activity for the given session. We defined MR by situating the technology in current research and prototype applications. We did this by presenting a video showcasing the capabilities of the Microsoft *"Mesh Network"* and the Hololens MR device [94]. Subsequently, we tasked participants with completing a sensitizing workbook influenced by context mapping techniques implemented in a study examining immersive social biosignal interaction in virtual reality (VR) [77]. Through this workbook, we aimed to understand how participants reflected on recent social situations involving technology. We then had participants share their reflections and guided a discussion on technology, society, and its influence on how we interact in a socially collocated context.

Researchers pre-configured 18 iPhone 7 devices by setting up individual temporary emails and Snapchat profiles, and subsequently *"friended"* each profile to one another before integrating them into the design sessions to mitigate technical difficulties. Participants then explored the social MR app *"Blocks"* [54] designed for mobile devices. Snapchat profiles were used to enable the *"Blocks"* experience, which is an experimental filter on the application [120]. We organized this portion of the workshop agenda as a free play session aimed to (1) familiarize participants with mobile MR, (2) demonstrate the potential for socially collocated MR experiences, and lastly (3) ground participants in an experience to have a working understanding of the technology. Further, we used the *"Blocks"* as a primer for subsequent workshop activities to encourage participants to consider how MR devices could improve face-to-face interactions and move towards *"an active role in deliberately attempting to improve its quality, value or extent"* [106]. This workshop concluded with the question prompts (*i.e., What are your first thoughts about the activity or experience?, What would you like to learn more about?*) to capture sentiments and perspectives on the session activities.

4.2.2 Workshops 2-4: Design Challenges as Scenarios and Ideation. Workshops 2-4 focused on ideating MR collocated experiences via storyboarding and eliciting an understanding of how youth conceptualize MR use from their unique perspectives. Applying DBIR principles [39, 41], participants engaged with diverse educational materials throughout the workshop series. YouTube videos covered MR concepts, design techniques (e.g., storyboarding, prototyping), Black and Latino tech innovators (e.g., Iddris Sandu [125]), and current research initiatives/prototypes (e.g., *"People Lens" project*), [98]. The initial workshop in this series focused on the design technique of storyboarding. The challenge statements for these workshops were - *"We will learn about design thinking through storyboarding and bodystorming activities"* and *"We prototype ideas that address our design challenge and work together to solve them"*.

In the third workshop, the participants were given iPhone 7 devices to record themselves and reflect on the session. The following prompting questions were given: *"What were three key experiences that stood out to you in this session"*, *"What are three things you found difficult about this session"*, *"What are three things you enjoyed in this session"* and *"Can you describe anything you may have learned in this session?"* for participants to answer using the iPhone 7 devices. The rationale for requiring participants to answer the given prompts after sessions was to (1) collect participation and sentiment data and (2) gauge how and what should be changed in the subsequent session procedures to ensure that workshop activities continued to align with participant interests [112].

Initially, we seeded participants with prompts to spark ideation and discussion, but after youth feedback, we later pivoted towards a scenario-driven design approach to organize workshop activities [18, 45, 61, 100, 101]. Researchers generated scenarios to scaffold ideation through design challenge prompts. For example, the scenario *"You want to learn about your emotions and interact with them"* prompted the challenge *"Design an experience that requires two people to interact with each other's emotions or health-related data like heartbeats. How might this experience enhance how people interact with one another? Is MR necessary to enable these interactions, or can*

we use other technologies?" . This scenario-driven design approach served to (1) aid participant understandings, (2) allow participants to use their experiences as expertise while eliciting designs for MR smart glass applications, and (3) be used as a scaffolding technique to initiate ideas, conversations, and reflections. Design challenges were presented as scenarios for group ideation, with 3-4 participants per group. Groups merged and remixed ideas from other teams before iterating to enhance participant-made design concepts. Ideations were captured on large poster paper and iPhone 7 devices.

4.2.3 Workshops 5-7: Low-fidelity Prototypes and Bodystorming. The fifth through seventh design workshops focused on implementing low-fidelity prototypes using arts and crafts materials and, subsequently, bodystorming design to promote the conceptualization of spatial interactions and multi-sensory experiences. Bodystorming utilizes props and spatial thinking in prototyping. It allows individuals with varying backgrounds to contribute ideas and explore mixed reality experiences beyond 2D thinking [95]. Further, embodied design methods shift the focus from concrete user needs to the rapid expression of ideas using the lived body (tacit knowledge, emotions, cultural values, and experiences) as representative tools to guide expression [103, 136].

At the start of each session, researchers taught participants bodystorming methodologies through articles, YouTube videos, and short practice activities. Afterward, participants applied these concepts and remixed ideas from alternative groups in a subsequent workshop. Bodystorming encouraged critical reflection on how MR can enhance social interaction beyond enablement (see [32, 86]). This method is well-established in *"social play"* digital game literature and best accounts for the interplay of social context and interaction between two or more people spatially [51]. This method shifts focus from designing interactive artifacts to examining socio-spatial factors technologically supported by MR for collocated interactions, leading to richer insights [32, 86].

4.3 Follow-up Interviews

Following workshops three through seven, researchers conducted 15-20 minute semi-structured audio-recorded interviews with select youth participants. Interview opportunities were extended to all other participants besides the ones we selected to interview. Some interview sessions included groups of students; others were one-on-one sessions with a participant. Our protocols focused on eliciting further insights on participant-made artifacts from the session, their mental models, and perceptions based on their lived experiences. For example, we asked *"What scenarios from the past do you see your design working best in, or would have been the most useful? Why?"* and *"What barriers or opportunities do you think would enable or prevent your designs from being used?"* . We also asked for feedback on workshop activities to continue to align our research agenda with youth interests. All interviews were held at the organization after research sessions.

4.4 Data Analysis

Our data consisted of observation notes, reflections, participant artifacts, worksheets, photographs, and audio recordings of interviews at each design session. Due to the sensitive nature and context of the research site, only the first author was involved in facilitating the sessions. The first author is an active community member with personal insights related to the territorial gangs and unique dynamics of the community, having implemented a feasibility study the year prior at the same organization. After each workshop session, a narrative memo was created to summarize the outcomes, emergent themes, and memorable quotes from participants. Example narrative memo prompts included: *"Provide a brief overview of the session, including the research methods used, and the primary tasks or interactions participants were asked to perform?; What were the most important behaviors, reactions, or interactions you observed during this session? Did anything surprise you, or did anything stand out as particularly noteworthy?; Were there any technical issues or other logistical problems during the session? If so, how did they impact the session, and how were they resolved?"* . The narrative memo linked images, quotes from just-in-time interviews, and notes, which were then sent to the second author for review and analysis. Both authors discussed the data, including participants' video recordings on the iPhone 7 devices, to determine key overarching themes and refine and reflect on design activity approaches. These feedback loops helped us incorporate and embed participant reflections into the design activities.

The data collection and analysis procedures followed the recommendations of McDonald et al. [2019] for HCI qualitative research analysis [89]. Our output did not focus on agreeing on codes but on surfaced themes and emergent topics derived from participant-made artifacts, interviews, workshop observations, notes, research memos, and discussions after reviewing work after workshop sessions [25]. Further, our endeavors focused on detecting, clustering, and organizing recurring themes of interest, producing a top-down hierarchy of insights to answer our research questions. Our analytical procedure was as follows: (1) The first author examined all collected data formats and reviewed notes, artifacts, images, interviews, and narrative memos to holistically make sense of the data and answer the research questions. (2) The first author grouped the apparent thematic topics and features into categories. (3) Both the first and second authors triangulated data using interviews, relevant literature, and participant artifacts. (4) The authors held thematic discussions to refine findings and agree upon emergent themes.

5 RESULTS

5.1 Embodied Perspectives as MR Design Characteristics

5.1.1 Beyond Privacy: Towards Situated Values in Mixed Reality Design with Black and Latina/o Youth. Our analysis revealed that while recognizing the potential to enrich social interactions, participants expressed ambivalence about personal data usage in MR, given concerns about misappropriation by institutional actors like law enforcement and private companies. Participant designs frequently use the body to extend critical reflections of their lifeworlds in ways that participants may or may not have consciously considered. These participants believed that established technology, media, and government institutions collected, stored, and shared their personal (even intimate) data so that their inclusion in such applications was taken for granted, and their bodies, therefore, were also (partially) the property of such institutions or infrastructures.

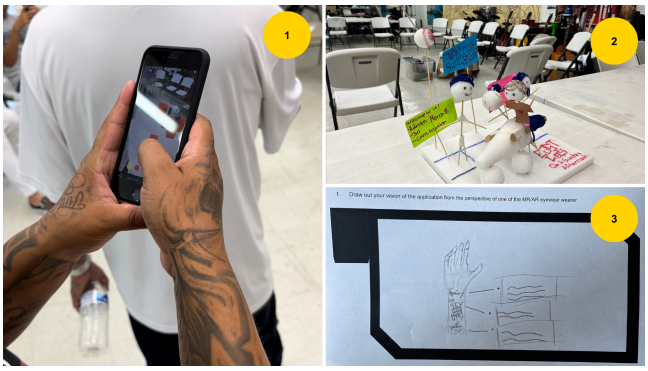


Figure 2: (1)Participant in the initial workshop exploring the experimental mixed reality Snapchat application, "Blocks", with others. (2)During bodystorming activities, participants of the "HelloHi?" application crafted a 3D scene depicting the use of their application. The paper notes depict visual cues that users of their smart glass application can see and interact with. (3)During workshops 2-4 a participant ideated on an application that utilizes bodily enablers to interact with a partner's tattoos. After probing on the design idea, it was revealed that this participant wanted to use the immersive capabilities of MR to express themselves on their own terms.

For example, when asked where information from the *"HelloHi?"* prototype would be obtained, Laura expresses that the device *"just knows, like facial recognition, it scans them and their face"*. Other group members pointed out that they did not like the idea of sharing real-time information with the application. Aracely, another member of the *HelloHi?* group states *"Basically with the glasses, when you look at somebody, it'll tell you about them, like their name, age, their Instagram, or where they work, and stuff like that. I don't like it [facial recognition features] because the good part about it is that it [the smart glasses] tells you what you need to know, but it knows too much about you!"*.

However, as Dariel describes, personal information is already *"out there in the wild, the police already have it"*. Comments about police maintaining access to personal information and the leverage of this information against users may reflect underlying resentment towards systems that undermine the participative status of these individuals in a larger societal context. Dariel adds *"I'm more of a behind-the-scenes type of guy; I'm known in certain areas [referring to his gang affiliation], and if they [rival enemies, and or police] use it [the HelloHi? application], I'll be able to be pointed out easier"*. Minimally, for these participants, the idea of providing personal data was not a part of a positive utopian vision or an issue of *"privacy concerns"*, but rather, an extractive process that disempowered communities feel pressured to surrender to in exchange for societal access. The participants' rejection of how data is used in specific ways highlights how current technological design fails to unify computational opportunities with the physical lived experiences of Black and Latina/o youth. We also discovered that the participants frequently utilized physical attributes to support their design concepts. However, when asked about the data source enabling the in-person interactions they were designing, some participants expressed distrust of institutional actors (police, large tech companies) maintaining access to personal information. For example, David has the following to say about the potential for MR devices to enhance social interaction:

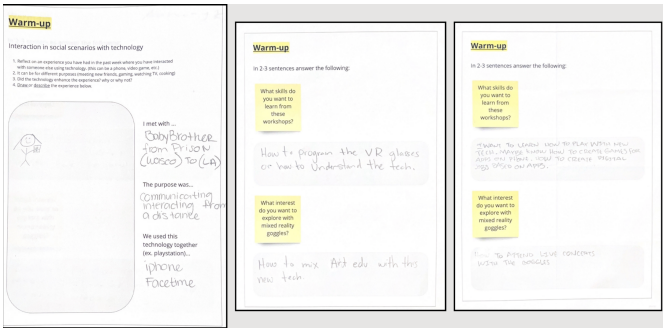
> *"It's easy to ignore [forget that the device is collecting this info] and if I notice it [the device] trying to help me I'm going to push it away. I don't want it knowing my feelings. You will have to worry about what the metaverse has to say about your info. Social media influences people in too many negative ways."*

The reasoning and sentiments behind participant statements become more understandable when considering the severe real-world contexts they navigate compared to those who typically have access to emerging technology design engagements. Their perspectives arise from challenging structural conditions, systems, and restricted options - not arbitrary views or experiences of privilege. For example, a participant's response to a sensitizing booklet prompt *reflect on an experience you have had in the past week where you have interacted with someone using technology* reveals the use of the iPhone FaceTime feature to communicate with their younger sibling in prison: *"I met with my baby brother from prison (Wasco) to (LA)"* (See 3a). Participants' opposition to perceived data exploitation signals a failure of human-centered design to reconcile computational affordances with marginalized youth's embodied, lived experiences.

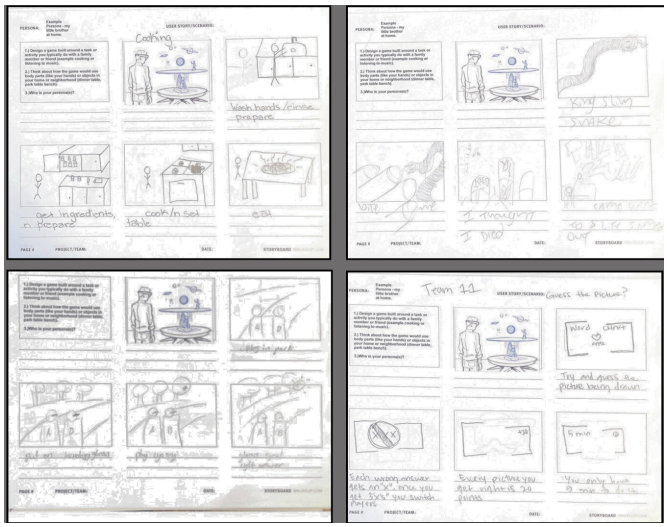
5.1.2 Surfacing Invisible Issues with MR to Amplify Voice and Agency for Black and Latina/o Youth. Our analysis reveals a tension in using MR for social experiences - while the technology allows Black and Latina/o youth to bypass restrictive spaces and exercise agency in their designs, implementing these virtual environments within traditional institutions at odds with cultural or personal values could perpetuate exclusion if not carefully scaffolded [122]. Participants frequently ground design ideas as embodied design elements to surface intangible and invisible qualities such as emotions and reflections on lived experiences, criticizing institutional structures that have maintained exclusionary practices against them. For example, Luis states -

> *"I feel like growing up, I didn't have a safe space to share my art. I was always excluded from that (being able to participate in school art programs). Like many of my friends who were good at art, I just gave up because nobody ever really gave them a chance. I feel like with this, it will give anybody a chance to do it (practice art)".*

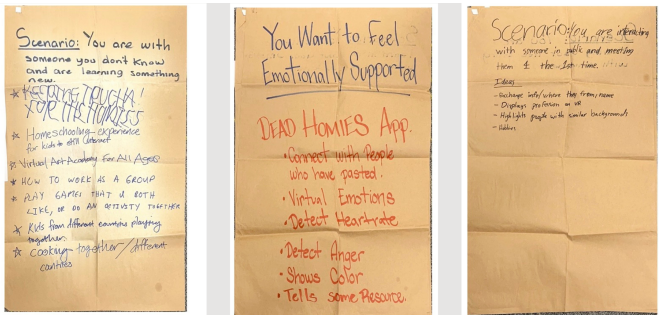
On a high level, participants describe the need for collocated MR applications to permit greater autonomy in generating personal self-discoveries. The social reality of participants' participative status as "gang-affiliated" or "system-impacted" individuals drives application design inspiration, particularly concerning the *"Paint Academy"* design idea. When probed to expand on his response, Luis states - *"Many kids go through that (get excluded from) and especially in inter-city schools, because they had a bunch of those programs (art-related curriculum and classes) for us and they got rid of them"*. Apparent in his response is the critique of a more significant societal problem of equity and access in the context of education, a form of oppression that Black and Latina/o communities often face. In designing for



(a) We used worksheets to scaffold thinking and to encourage participation by following the UDL method of providing multiple means of representation. This worksheet was a part of our sensitizing booklet to understand how participants use technology with others daily. One participant revealed that they used their mobile phone to connect with an incarcerated family member.



(b) During workshops 2-4, we required participants to storyboard potentially collocated MR ideas based on provided design challenges. We learned that because we initially grounded participants in an MR experience during workshop 1, they were more readily able to come up with ideas and respond to design challenges. For instance, participants generated ideas related to games, language learning, and cooking with others.



(c) After implementing just-in-time interviews with participants during workshops 2-4, we ideated design ideas in a group format using poster paper to capture ideas and spur discussion in workshops 5-7. We realized group discussions were particularly more successful with participants. Discussions led to identifying potential features and functions for the 'DeadHomies' and what eventually became the 'HelloHi' design idea (called initially 'Keep Trucha' Chicano slang for "Be on the lookout").

Figure 3: We created custom worksheets and other forms of stimuli to scaffold design activities and elicit participant engagement. Due to the nature of our open-format sessions, we regularly made adjustments to design activities on the fly to accommodate participant needs. In doing so, we often uncovered deep insights related to participant's past and life stories.

collocated experiences, questioning of access to quality educational opportunities surfaced. Intuitively, like Luis, participant design ideas embodied assumptions and conceptualizations about inclusion and autonomy. The conceptual understandings, unarticulated assumptions, and beliefs related to criticisms of large institutions, what inclusive, equitable access entails, and what autonomy should look like shaped design ideas.

Further, the embodiment of these underlying perspectives also revealed participants' ability to incorporate social-ecological interpretations when surfacing invisible issues. Participants are interested in using MR devices to enhance self-efficacy, explore interests, and connect with like-minded youth. As Luis expresses, the *"Paint Academy"* design prioritizes maintaining a sense of agency by *"learning how to paint without ever feeling you are going to mess up"* - Luis. Authentic cultural, personal, and ideational exchanges can occur

freely between multiple individuals through unstructured social mixed reality spaces. As found in findings from Maloney et al.'s study (2021), these unstructured spaces empower youth to remain engaged in digital artifact creation and socializing [85].

Artifacts for collocated designs also revealed participants' desire to be emotionally seen and feel connected to their peers, family, or society. Participants frequently engaged with potential design ideas that provided opportunities to authentically establish an emotional bond with others beyond superficial encounters. For example, the need for *"being seen"* was a crucial design element by the participants of the *"Dead Homies"* prototype. Youth utilized *"being seen"* as an embodied attribute to address loss and promote improved human-to-human connections through virtual agents to further their own agency, self-expression, and empowerment. For example, one group designed an emotional support app adapting *"Dead Homies"* idea to enable interaction with avatars representing a *"shared visual experience with deceased loved ones"* - Greg. This interaction would be shared among collocated users and provide them with a visual experience similar to MyHeritage's *"Deep Nostalgia"* AI tool, which creates short videos from still photographs [6]. In interviews, participants suggested that re-experiencing departed loved ones could have therapeutic benefits. The MR experience increases visibility on an emotional level and *"it makes people feel more visible. It improves understanding of relationships with family members or friends"* - Greg. The participant suggests therapists may benefit from this prototype to better comprehend patients' interpersonal relationships. These implications expand broadly into therapy applications as explored in the HCI literature [37, 118, 126]. Using AI agents to foster emotional connections between people is an intriguing concept that *"can enhance our emotions toward others and within ourselves"* -Greg. Employing MR in this way may allow users to notice new aspects of shared experiences that may have gone unnoticed. The use of AI also enhances the authenticity of virtual agents, creating a more personalized experience reminiscent of real-life interactions with others, which Nijolt describes as *"virtual embodied characters"*[101]. The student detailed the use of AI to enhance interpersonal storytelling by creating a personalized experience that fosters emotional connection. These social mixed reality designs reveal embodied constructs, surfacing intangible characteristics of bodily and emotional states like loss and isolation, revealing aspects of participant lifeworlds that may be difficult to navigate because they are hard to express otherwise.

Participants came up with the *"My Tattoos"* app that facilitates self-expression by enabling users to discover the significance and narrative behind the tattoo designs of a recently acquainted nearby companion. *"My Tattoos"* facilitates socially collocated interactions through bodily enablers, allowing individuals to showcase their ink meaningfully. Users can upload images, memes, or other media onto a social profile linked to the app for further context. The concept arose from a design prompt for participants to explore how people can share personal stories with familiar and unfamiliar acquaintances. Participants also proposed an extension of *"My Tattoos"* in which users can contribute virtual elements via speech in real time. By adding and discussing personal histories, Lourdes described the experience *"can deepen one another's understanding"* in a potentially embodied manner [79]. Tattoos in this context function as enablers [32], physical entities that trigger and focus the MR experience. Participants, at times, sought to create contexts for interacting outside of the cultural scripts of normative white culture, particularly concerning their physical bodies. As Lourdes observed, *"people constantly ask about my tattoos and make (negative)assumptions"*, and participants hoped that the *"My Tattoos"* design might offer an opportunity for individuals to communicate their personal histories without fear of judgment during initial meetings. Such interactions empower those with tattoos to recount their experiences on their terms outside the institutionally sanctioned channels. Such informal communication channels could create space for Black and Latina/o participants to navigate bicultural identities, including language, gestures, tattoos, and professional appearance.

5.1.3 From Self to Community - Ecological Thinking and MR Designs. In workshop three, Carlos presented *"MomMe"*, a game concept that facilitates family interaction through reminiscing past photos and videos. The application employs biosignals to reveal emotions and foster deeper connections between household members by using those data points in a gamified manner that quizzes users on the immersive photo or video. The game aims to enhance familial bonds, focusing on resolving conflicts in interactive shared experiences, and can be used to *"mediate a situation when the two are mad at each other"* - Carlos. Carlos is a new member of the art academy following his release from prison six months prior to the workshop after serving a ten-year prison term. This concept focuses on using technology to improve emotional connections among family members by reliving memories. It serves as a tool for repairing strained relationships within families. HCI researchers have used MR technology to enhance people's understanding of emotions and bodily states to improve self-regulation through biosignal feedback [37, 80, 138]. Although these studies examine the use of biosignals in MR environments, Carlos's concern for the broader implications of adapting the experience to help others improve familial bonds demonstrates an ecological mental model for its use. Despite the complexities of reintegration into society after serving multiple years in the prison system, Carlos shows how MR technology could benefit individuals in deciphering physical emotions during social readjustment. Though this idea was pursued only after the initial ideation stage in session three due to Carlos's constraints on attending workshops, the concept reveals how participants think beyond individual use to enhance interpersonal relationships. This insight highlights a unique application of technology in personal life contexts while considering broader community implications.

Participants in this study consistently exhibited an ecological perspective when thinking about collocated designs. Participants explored how MR can be used between individuals and examined the role of technology concerning their communities, family, and culture as a whole. For instance, the participants of the *"HelloHi"*, *"Paint Academy"*, *"MomMe"*, and *"My Dead Homies"* ideas explored these notions holistically, reflected in their institutional criticisms of the police, schools, and large technology companies such as Meta. In other words, when designing for enhancement, youth were concerned about the role of technology in larger societal systems, not just about how they can individually use the tech for their benefit. Design ideas traversed layers beyond individual norms and explored potential dynamics between others and organizational systems. When thinking about the *"My Dead Homies"* design, participants

expressed the use of the technology in therapeutic settings; *"Paint Academy"* designers reflected on agency and inclusion for those who have had access to educational art programming restricted or denied; *"MomMe"* participants described leveraging the technology to help others reflect on interpersonal and intrapersonal emotions; and finally *"HelloHi"* members emulated on thoughts about institutional powers and their role in society particularly about data, namely the police, and social media giants such as Meta. Black and Latina/o youth explicitly defined the role of MR in enhancing social collocated interactions as enabling agency, unearthing invisible human experiences and making them visualizable (emotions) and readily explorable, and finally enabling authentic explorations of interest and ideas outside traditionally sanctioned channels.

5.2 Adapting Participatory Design Methods to Community Constraints and Values.

Generally, participants were optimistic about the activities and the scaffolded elements implemented in each workshop, particularly learning materials related to fundamental concepts of technology design and mixed reality. Evident from the start, participants were eager to learn more about the technical skills required to build applications for MR devices. When participants were first tasked with exploring the 'Blocks' Snapchat game, many played well beyond the 15-minute allotted free time and expressed that it was their first time experiencing MR. We understand this excitement may result from novelty, but enthusiasm and active engagement were observed throughout all workshops. For example, participants frequently asked *"Are we going to learn how to build games for these?"* - Carlos.

Additionally, when scaffolding elements were introduced at the start of each session, such as the *"People Lens"* research paper, participants naturally spurred short discussions on topics like privacy, inclusion, and ethics amongst each other on their own. Further, when analyzing experiences regarding the bodystorming activities, George noted that initial storyboarding and low-fidelity prototyping appeared simple until *"movement (the prototype experience) was acted out"* - George. The shift from ideation on paper to acting out the design idea accentuated the importance of considering how individuals interact with the immersive experience and its implications for enhancement. George states *"when we were drawing it felt real simple but then acting it out, its movement (the prototype experience), you realize you have to take into account how people interact with space"*. The advantages of prioritizing critical reflection on interpersonal social enhancement over building or improving features outweighed any drawbacks that scaffolding techniques may have imposed. We observed that scaffolding elements such as topic-specific videos or worksheets that prompted reflections and short responses facilitated participant engagement with design challenges and sustained exploration of social collocated enhancement. Naturally occurring discussions from these activities often included stories about participants' personal experiences, sentiments, and perceptions centered on the potential use of MR within these personal narratives. For example, Lourdes' revealed that both her brothers were murdered before the age of 18, and many of Lourdes's tattoos pay homage to her brother's lives.

Initially designed as closed sessions with the intent to have consistent student attendance, our workshops were changed to an open format to align with the research site's organizational values and operational model. By holding initial meetings with key stakeholders such as the site director, it was easier to make spot decisions and improvisations, a typical characteristic of community-based DBIR methodology [21]. Adversely, though, upon reflection on data, the constant turnover of participants hindered the ability of groups to develop design ideas over time, often forcing some to drop ideas that were ideated on during previous session engagements. Although turnover was an issue, just-in-time adjustments and flexibility in design activities, as opposed to rigid protocols and agendas, empowered participation. For example, one participant expressed *"I learned how to use different scenarios to make a game, to open my brain up and think about it from different perspectives"* - Claire. Circumstances like parole meetings and court mandates prevented some participants from full involvement. Sometimes, participants attended a workshop and generated an initial prototype idea. However, they could not revisit the concept in subsequent sessions due to shifts in session goals. Consequently, while many exciting concepts surfaced, the analysis remained largely perfunctory, with many ideas left underexplored and missed opportunities for deeper investigation into how MR could enhance interactions in collocated environments. While the open format posed some difficulties initially, targeted scaffolding techniques enabled participatory exploration of technology design, pointing towards procedural adjustments that may optimize collaborative innovation and learning in open formats.

6 DISCUSSION

6.1 Embodied Perspectives Reveal Critical Reflections on Lived Experiences Through MR Design

Our work serves as an exploratory investigation of engaging with recently incarcerated and gang-affiliated Black and Latina/o youth to center design perspectives and speculate on MR futures for socially collocated interactions. Our results reveal that constructs of the self are impossible to uncouple from participants' conceptualizations of socially collocated MR interactions. Designing meaningful immersive experiences that integrate digital elements into the real, physical world requires more than just focusing on the technological implementation and advancement of MR systems. Acknowledging the embodied characteristics of intangible constructs of identity and social structures that shape people's lives is essential. Emotions, perceptions, race, class, and gender are intangible but genuinely impact how people experience and interact with the world. These intangible personal and social factors are embodied - shaping people's experiences in physical, visceral ways. Meaningful immersive experience design must account for these intangible social realities that dictate people's behaviors, interactions, and how they inhabit physical spaces. Focusing on the technical/digital aspects without considering how identity and social forces shape embodiment and experience is insufficient. Designing experiences that interlace digital elements into natural and physical surroundings cannot be entirely accounted for without acknowledging the embodied characteristics of intangible constructs of the self and the

invisible socially constructed infrastructures around us that dictate how we operate. Building purposeful social collocated experience with MR requires a holistic perspective, especially considering the multi-modal capabilities of these devices that use artificial intelligence, machine learning, and even block-chain to offer *"a window into a virtual simulated world"* [74]. Designers should not only consider the technical or digital elements of blended experiences but also how intangible constructs of identity and social structures manifest in tangible, embodied ways that shape interactions amongst collocated people.

As gang members, these participants' daily decision-making involves navigating complex social structures for survival, including assessing risks posed by rival gang territories[2], discriminatory policing[15], and biased encounters due to their visible tattoos and racial discrimination. They must negotiate these threats regularly as they traverse invisible boundaries and prejudices that criminalize their mere existence. Moreover, these problems are compounded by difficulties in dealing with bi-cultural identities [53, 82]. The ramifications of systematic marginalization, evidenced by practices such as mass incarceration and inequitable educational opportunities, preclude affected participants from inhabiting identities dissociated from the imposed categorizations of *"gang member"* or *"recently incarcerated"*. Thus, a common design impetus is created among participants to facilitate reasserting agentic capacities, reflecting their denied participative status in society. Upon closer examination of youth designs, it is clear that they maintain an intuitive sense and embodied understanding of the often overlooked invisible forces that dictate real-world outcomes. This experiential knowledge cannot be quickly gained through academic study alone. Designers of MR technologies would be remiss to exclude the participation of these populations when considering designs for socially collocated interactions for 3D blended environments. If, indeed, spatial computing represents a new paradigm shift in the ways we interact with both data and our natural world, then taking a closer examination of the holistic set of characteristics that may dictate the way we interact with one another is imperative, especially if MR devices promise to augment human capacities in meaningful ways. Participant's lived experiences provide critical insights into the invisible social forces that shape behavior and embodiment and should be included in MR social experience design.

Frequent, early community engagement in the design process via DBIR and CBPD can align intelligent systems with people's cultural identities and practices, co-constructing situated values. Participant's ambivalent perspectives reveal the need for designers to carefully contemplate the use of personal data in MR and balance potential benefits with concerns about misuse. A shared set of values defined with communities needs to be established, especially if the goal of these intelligent and multi-modal systems is to be *"always on and contextually aware"* while also increasingly becoming more ubiquitous in both private and public spaces [93]. Our findings suggest that MR designs can potentially create spaces that move beyond traditional sanctioned settings - to serve as counter spaces for individuals to freely construct digital environments conducive to personal growth, exploration, and learning.

6.2 Adapting Participatory Design Methods to Community Constraints

A key concern of this generative research agenda was that participants would need an adequate understanding of MR functionalities to design effectively for social collocated enhancement. We used scaffolding techniques derived from curriculum and instruction methods to support these understandings and may have influenced the participants' end prototypes and design proposals. We did not measure pre and post-participant understanding and, therefore, could not compare any potential differences in what participants understood about the critical concepts related to mixed reality. Future implementation of this research can benefit from pre and post-measurement of participants to make more specific claims about design concepts related to social collocated enhancement. Many participants alluded to advanced understandings, but we need to explicitly measure self-efficacy to determine that participation in the design workshops increased their learning about MR and other related topics.

Another practical issue with running participatory design workshops was inconsistent participant attendance. Because we aimed to create an open door policy and minimize *"epistemic burden"* at the facility, we allowed those interested to participate at their leisure. This inconsistency in attendance makes it challenging to build workshops off of one another. In other words, not having the same participants in each session resulted in re-explaining concepts, adjusting activities to particular Participant needs, and balancing workshop activities to accommodate new participants. This *"drop-in"* effect may have resulted in the following: (1) lack of understanding of what MR technology is by all participants, (2) misunderstanding of what the core design challenges called for, and (3) missed opportunities to express design ideas or expand on existing ones. In particular, we did not have the opportunity to explore the design dimensions investigated in the current literature. For example, examining embodied MR or combining different design attributes as suggested by Dagen et al. [2019] [32]. In particular, orienting design challenges around these design dimensions would require consistent participation and understanding from the start of the sessions in sequence. Lastly, future study implementations can benefit from a more structured approach to attendance and participation. Ultimately, though, any adjustments should align with the research site's goals and operation philosophies to ensure that we *"work with these communities to reach their own goals"* [112].

6.3 Post Workshop Engagement

MR technologies' potential in enhancing social interactions is an emerging research topic [72]. Meta's Oculus Quest, recently introduced to the market, is an example of commercial MR systems becoming accessible. Research on youth's use of MR for social purposes outside lab settings has only begun to emerge (see [84, 85]). Exploring mixed reality devices' impact on youths' lives remains challenging due to their limited accessibility, form factors, and high cost (a single Hololens 2 device can cost between $3,500 and $4000). The high cost of MR technologies is an obstacle for marginalized populations to adopt their use readily, not considering the high level of IT infrastructure needed to maintain these devices. The

COVID-19 pandemic has underscored the digital divide's severity and consequences among such groups [52].

We would be irresponsible to engage with these youths about MR's future and not try to provide a means to engage with the technologies we designed for. To enter into a community and discuss ways they might use technology in their everyday lives but then be denied the opportunity to continue to explore and build skills with these technologies after we have completed the design sessions would be highly irresponsible. Therefore, we sought to address this issue by obtaining access to devices and benefit community members while adhering to organizational goals [112]. In line with our commitment to responsible action, we applied for the *"Create With VR Grant"* from Unity and Meta on behalf of the Arts Academy. This grant provided 20 Meta Quest 2 headsets and professional training in VR creation through Unity. This initiative enabled the democratization of access to MR technologies and created an avenue for creative expression with these technologies at the art academy. Further, the first author has committed his time to ensure proper device setup and training for the staff at the academy so that youth can handle the technical difficulties that often follow when implementing new technology in the classroom [109].

7 CONCLUSION

This study implemented participatory design workshops to understand how Black and Latina/o youth design MR technology to enhance socially collocated interactions. Researching youth working with or designing such technologies might reveal new interaction models that extend from their lifeworlds rather than those of outside designers. The realities of youth lives typically manifest in designs by leveraging the body as a design attribute. The body typically served as the foundation for interaction models that youth created when architecting ideas for MR social interactions. Embodiment in this manner often depicted deep stories about the lives of these youths, weaving their way into design ideas. We hypothesized that cultural identity, interpersonal relationships, and lifeworlds must be considered when designing MR technology to enhance socially collocated experiences to create meaningful and impactful designs. These insights also point to characteristics we may not want to design or build for, especially considering how technology may intervene between humans and their experiences. Design sessions revealed that youth grounded their design ideas within their personal experiences, specifically around issues and critiques of agency, interpreting emotions, and reflections and critiques on large institutions such as educational and policing systems. Internalized reflections became externalized ideations, subconsciously or not. The real-world ramifications of these findings imply that MR designs may be successful when they empower agency and allow individuals to visualize data that is not readily available in immersive manners, such as bodily states. Finally, using the body as a conduit for initiating interactions was met with negative sentiments toward the potential use of collected data. Specifically, the potential for collected information to be used against a potential wearer of the device was explicitly verbalized by participants. The design implications for MR technologies, especially in collocated scenarios, must emphasize privacy and agency when sharing data with a collocated partner and the device itself.

Designs need to be flexible enough to promote authentic explorations of personal interest and provide opportunities for efficacy yet remain guarded enough that applications do not impede the user's or others' privacy. Furthermore, wearable MR devices promote and may even amplify agency, self-expression, and even explorations into emotions. MR affordances, such as immersive experiences, can enhance characteristics of the human experience by making what was previously inconspicuous, distinguishable, and interactive, including things like emotions, ideas, and life stories. This study highlights the importance of considering agency and inclusion in designing mixed-reality experiences and the potential for these technologies to promote self-efficacy and meaningful connections among users. The design ideas of the participants highlight the potential for MR to promote agency and engagement in activities that may be unwelcoming or restrictive in traditional environments.

The participants' emphasis on inclusion and access underscores the critical societal implications of MR design. Designers must consider these issues to ensure equitable access for all. These application ideas serve as examples of how MR can be used to empower individuals and critique established institutions to promote change. The design of future technologies by large corporations or well-funded research laboratories typically reflects systematic access to academically and institutionally inclined students. As social MR technology becomes more accessible and widely used, consumers will not always reflect on those who have historically shaped their designs. Thus, as the impact of MR devices creates opportunities for health, learning, art, and inclusion, it remains essential to understand the use of these technologies in people's everyday lives. Techniques like CBPR and DBIR can help align designs to human values.

Further, it is critical to consider social practices beyond a specific technology or platform - to build systems that augment the human experience equitably, in unbiased, fair, safe, and considerate manners. The democratization of opportunity should not only rest on the shoulders of those most marginalized in our society - but responsibility should also fall on those who reap the benefits of being in positions of power. This study highlights the importance of attending to Black and Latina/o youth conceptualizations of future technologies and examining sociocultural constructs when designing MR applications for socially collocated enhancement.

ACKNOWLEDGMENTS

We like to thank Fabian Debora and the youth of the Homeboy Art Academy for allowing us to be apart of their sacred space.

REFERENCES

[1] Angie Abdilla, Noelani Arista, Kaipulaumakaniolono Baker, Scott Benesiinaabandan, Michelle Brown, Melanie Cheung, Meredith Coleman, Ashley Cordes, Joel Davison, Kūpono Duncan, Sergio Garzon, D Fox Harrell, Peter-Lucas Jones, Kekuhi Kealiikanakaoleohaililani, Megan Kelleher, Suzanne Kite, Olin Lagon, Jason Leigh, Maroussia Levesque, Jason Edward Lewis, Keoni Mahelona, Caleb Moses, Isaac ('ika'aka) Nahuewai, Kari Noe, Danielle Olson, 'ōiwi Parker Jones, Caroline Running Wolf, Michael Running Wolf, Marlee Silva, Skawennati Fragnito, and Hēmi Whaanga. 2020. Indigenous protocol and artificial intelligence position paper.

[2] Laura S Abrams and Diane L Terry. 2014. "You can run but you can't hide": How formerly incarcerated young men navigate neighborhood risks. *Child. Youth Serv. Rev.* 47 (Dec. 2014), 61–69.

[3] Sultan A Alharthi, Katta Spiel, William A Hamilton, Elizabeth Bonsignore, and Zachary O Toups. 2018. Collaborative Mixed Reality Games. In *Companion of the 2018 ACM Conference on Computer Supported Cooperative Work and Social Computing* (Jersey City, NJ, USA) *(CSCW '18 Companion)*. Association for Computing Machinery, New York, NY, USA, 447–454.

[4] Sally A Applin and Catherine Flick. 2021. Facebook's Project Aria indicates problems for responsible innovation when broadly deploying AR and other pervasive technology in the Commons. *Journal of Responsible Technology* 5 (May 2021), 100010.

[5] Ronald T Azuma. 1997. A survey of augmented reality. *Presence* 6, 4 (Aug. 1997), 355–385.

[6] Umberto Bacchi. 2021. *'Spooky' AI tool brings dead relatives' photos to life.* Reuters.

[7] Lakshika Balasuriya, Sanjaya Wijeratne, Derek Doran, and Amit Sheth. 2016. Finding street gang members on Twitter. In *Proceedings of the 2016 IEEE/ACM International Conference on Advances in Social Networks Analysis and Mining (ASONAM '16)*. IEEE Press, Davis, California, 685–692.

[8] Sasha Barab and Kurt Squire. 2004. Design-Based Research: Putting a Stake in the Ground. *Journal of the Learning Sciences* 13, 1 (Jan. 2004), 1–14.

[9] Ruha Benjamin. 2019. *Race after technology: Abolitionist tools for the new jim code.* John Wiley & Sons, US America.

[10] Laura Benton, Asimina Vasalou, Rilla Khaled, Hilary Johnson, and Daniel Gooch. 2014. Diversity for design: a framework for involving neurodiverse children in the technology design process. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (Toronto, Ontario, Canada) *(CHI '14)*. Association for Computing Machinery, New York, NY, USA, 3747–3756.

[11] P Jeffrey Brantingham, George E Tita, Martin B Short, and Shannon E Reid. 2012. The ecology of gang territorial boundaries. *Criminology* 50, 3 (Aug. 2012), 851–885.

[12] Kirsten E Bray, Christina Harrington, Andrea G Parker, N'deye Diakhate, and Jennifer Roberts. 2022. Radical Futures: Supporting Community-Led Design Engagements through an Afrofuturist Speculative Design Toolkit. In *Proceedings of the 2022 CHI Conference on Human Factors in Computing Systems* (<conf-loc>, <city>New Orleans</city>, <state>LA</state>, <country>USA</country>, </conf-loc>) *(CHI '22, Article 452)*. Association for Computing Machinery, New York, NY, USA, 1–13.

[13] Robin N Brewer, Christina Harrington, and Courtney Heldreth. 2023. Envisioning Equitable Speech Technologies for Black Older Adults. In *Proceedings of the 2023 ACM Conference on Fairness, Accountability, and Transparency* (Chicago, IL, USA) *(FAccT '23)*. Association for Computing Machinery, New York, NY, USA, 379–388.

[14] Katherine Brown and Michael Cole. 2002. *Cultural Historical Activity Theory and the Expansion of Opportunities for Learning After School.* John Wiley & Sons, Ltd, US America, 225–238. https://doi.org/10.1002/9780470753545.ch17

[15] Kristen M Budd, Dave Lane, Glenn W Muschert, and Jason A Smith. 2023. *Beyond Bars: A Path Forward from 50 Years of Mass Incarceration in the United States.* Policy Press, United States. https://doi.org/10.51952/9781447370130

[16] Diana Budds. 2016. How Urban Design Perpetuates Racial Inequality–And What We Can Do About It. https://www.fastcompany.com/3061873/how-urban-design-perpetuates-racial-inequality-and-what-we-can-do-about-it. Accessed: 2023-8-15.

[17] Joy Buolamwini, Sorelle A Friedler, and Christo Wilson. 2018. Gender shades: Intersectional accuracy disparities in commercial gender classification. https://proceedings.mlr.press/v81/buolamwini18a/buolamwini18a.pdf. Accessed: 2023-12-9.

[18] J.M. Carrol. 1999. Five reasons for scenario-based design. In *Proceedings of the 32nd Annual Hawaii International Conference on Systems Sciences. 1999. HICSS-32. Abstracts and CD-ROM of Full Papers*, Vol. Track3. IEEE, Maui, HI, USA, 11 pp.–. https://doi.org/10.1109/HICSS.1999.772890

[19] CAST. Accessed: 2023-12-11. The UDL Guidelines. https://udlguidelines.cast.org.

[20] Vanessa Wan Sze Cheng, Tracey A Davenport, Daniel Johnson, Kellie Vella, Jo Mitchell, and Ian B Hickie. 2018. An App That Incorporates Gamification, Mini-Games, and Social Connection to Improve Men's Mental Health and Well-Being (MindMax): Participatory Design Process. *JMIR Ment Health* 5, 4 (Nov. 2018), e11068.

[21] Michael Cole. 2001. Challenges to studying developmental processes in voluntary afterschool programs. UC San Diego. Prepared for AERA, April, 2001.

[22] Michael Cole and the Distributed Literacy Consortium. 2006. *Fifth Dimension, The: An After-School Program Built on Diversity.* Russell Sage Foundation, Manhattan, New York. http://www.jstor.org/stable/10.7758/9781610441292

[23] The Design-Based Research Collective. 2003. Design-Based Research: An Emerging Paradigm for Educational Inquiry. *Educational Researcher* 32, 1 (2003), 5–8. https://doi.org/10.3102/0013189X032001005

[24] Allan Collins. 1992. Toward a Design Science of Education. In *New Directions in Educational Technology*, Eileen Scanlon and Tim O'Shea (Eds.). Springer Berlin Heidelberg, Berlin, Heidelberg, 15–22.

[25] Juliet M. Corbin and Anselm L. Strauss. 2015. *Basics of qualitative research: Techniques and procedures for developing grounded theory.* SAGE, USA.

[26] Sasha Costanza-Chock. 2020. *Design Justice: Community-led Practices to Build the Worlds We Need.* MIT Press, Cambridge, Massachusetts.

[27] Kate Crawford and Ryan Calo. 2016. There is a blind spot in AI research. *Nature* 538, 7625 (Oct. 2016), 311–313.

[28] Roderic Crooks. 2022. Seeking Liberation: Surveillance, Datafication, and Race. *Surveill. Soc.* 20, 4 (Dec. 2022), 413–419.

[29] Stefany Cruz, Alexander Redding, Connie W Chau, Claire Lu, Julia Persche, Josiah Hester, and Maia Jacobs. 2023. EquityWare: Co-Designing Wearables With And For Low Income Communities In The U.S. In *Proceedings of the 2023 CHI Conference on Human Factors in Computing Systems* (Hamburg, Germany) *(CHI '23, Article 277)*. Association for Computing Machinery, New York, NY, USA, 1–18.

[30] Jay Cunningham, Gabrielle Benabdallah, Daniela Rosner, and Alex Taylor. 2023. On the Grounds of Solutionism: Ontologies of Blackness and HCI. *ACM Trans. Comput.-Hum. Interact.* 30, 2 (April 2023), 1–17.

[31] Ella Dagan, Ana María Cárdenas Gasca, Ava Robinson, Anwar Noriega, Yu Jiang Tham, Rajan Vaish, and Andrés Monroy-Hernández. 2022. Project IRL: Playful Co-Located Interactions with Mobile Augmented Reality. *Proc. ACM Hum.-Comput. Interact.* 6, CSCW1 (April 2022), 1–27.

[32] Ella Dagan, Elena Márquez Segura, Ferran Altarriba Bertran, Miguel Flores, and Katherine Isbister. 2019. Designing 'True Colors': A Social Wearable that Affords Vulnerability. In *Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems* (Glasgow, Scotland Uk) *(CHI '19, Paper 33)*. Association for Computing Machinery, New York, NY, USA, 1–14.

[33] Tawanna R Dillahunt, Sheena Erete, Roxana Galusca, Aarti Israni, Denise Nacu, and Phoebe Sengers. 2017. Reflections on Design Methods for Underserved Communities. In *Companion of the 2017 ACM Conference on Computer Supported Cooperative Work and Social Computing* (Portland, Oregon, USA) *(CSCW '17 Companion)*. Association for Computing Machinery, New York, NY, USA, 409–413.

[34] Tawanna R Dillahunt, Alex Jiahong Lu, and Joanna Velazquez. 2023. Eliciting Alternative Economic Futures with Working-Class Detroiters: Centering Afrofuturism in Speculative Design. In *Proceedings of the 2023 ACM Designing Interactive Systems Conference* (Pittsburgh, PA, USA) *(DIS '23)*. Association for Computing Machinery, New York, NY, USA, 957–977.

[35] Betsy DiSalvo, Jason Yip, Elizabeth Bonsignore, and Carl DiSalvo. 2017. *Participatory Design for Learning: Perspectives from Practice and Research.* Taylor & Francis, United Kingdom.

[36] Andrea A. diSessa and Paul Cobb. 2004. Ontological Innovation and the Role of Theory in Design Experiments. *The Journal of the Learning Sciences* 13, 1 (2004), 77–103. http://www.jstor.org/stable/1466933

[37] Nina Döllinger, Carolin Wienrich, and Marc Erich Latoschik. 2021. Challenges and opportunities of immersive technologies for mindfulness meditation: A systematic review. *Front. Virtual Real.* 2 (April 2021), 29.

[38] Lynn Dombrowski, Ellie Harmon, and Sarah Fox. 2016. Social Justice-Oriented Interaction Design: Outlining Key Design Strategies and Commitments. In *Proceedings of the 2016 ACM Conference on Designing Interactive Systems* (Brisbane, QLD, Australia) *(DIS '16)*. Association for Computing Machinery, New York, NY, USA, 656–671.

[39] Allison Druin. 1999. Cooperative inquiry: developing new technologies for children with children. In *Proceedings of the SIGCHI conference on Human Factors in Computing Systems* (Pittsburgh, Pennsylvania, USA) *(CHI '99)*. Association for Computing Machinery, New York, NY, USA, 592–599.

[40] Allison Druin. 2002. The role of children in the design of new technology. *Behaviour and information technology* 21, 1 (2002), 1–25.

[41] Allison Druin. 2014. Inclusive ownership of participatory learning. *Instructional Science* 42, 1 (2014), 123–126.

[42] Alpana Dubey, Nitish Bhardwaj, Abhinav Upadhyay, and Roshni Ramnani. 2023. AI for Immersive Metaverse Experience. In *Proceedings of the 6th Joint International Conference on Data Science & Management of Data (10th ACM IKDD CODS and 28th COMAD)* (Mumbai, India) *(CODS-COMAD '23)*. Association for Computing Machinery, New York, NY, USA, 316–319.

[43] Sheena Erete, Aarti Israni, and Tawanna Dillahunt. 2018. An intersectional approach to designing in the margins. *Interactions* 25, 3 (April 2018), 66–69.

[44] Virginia Eubanks. 2018. *Automating inequality: How high-tech tools profile, police, and punish the poor.* St. Martin's Press, United States of America.

[45] S K Feiner. 1999. The importance of being mobile: some social consequences of wearable augmented reality systems. In *Proceedings 2nd IEEE and ACM International Workshop on Augmented Reality (IWAR'99)*. IEEE, Columbia, 145–148.

[46] Joel Fischer, Martin Porcheron, Andrés Lucero, Aaron Quigley, Stacey Scott, Luigina Ciolfi, John Rooksby, and Nemanja Memarovic. 2016. Collocated Interaction: New Challenges in 'Same Time, Same Place' Research. In *Proceedings of the 19th ACM Conference on Computer Supported Cooperative Work and Social Computing Companion* (San Francisco, California, USA) *(CSCW '16 Companion)*. Association for Computing Machinery, New York, NY, USA, 465–472.

[47] Barry J. Fishman, William R. Penuel, Anna-Ruth Allen, Britte Haugan Cheng, and Nora Sabelli. 2013. Design-Based Implementation Research: An Emerging Model

for Transforming the Relationship of Research and Practice. *Teachers College Record* 115, 14 (2013), 136–156. https://doi.org/10.1177/016146811311501415 arXiv:https://doi.org/10.1177/016146811311501415

[48] Dorothy J Florian-Lacy, Joseph L Jefferson, and Jacqueline Fleming. 2002. The Relationship of Gang Membership to Self-Esteem, Family Relations, and Learning Disabilities. *TCA Journal* 30, 1 (March 2002), 4–16.

[49] Sarah Fox, Mariam Asad, Katherine Lo, Jill P Dimond, Lynn S Dombrowski, and Shaowen Bardzell. 2016. Exploring Social Justice, Design, and HCI. In *Proceedings of the 2016 CHI Conference Extended Abstracts on Human Factors in Computing Systems* (San Jose, California, USA) *(CHI EA '16)*. Association for Computing Machinery, New York, NY, USA, 3293–3300.

[50] William R Frey, Desmond U Patton, Michael B Gaskell, and Kyle A McGregor. 2020. Artificial Intelligence and Inclusion: Formerly Gang-Involved Youth as Domain Experts for Analyzing Unstructured Twitter Data. *Soc. Sci. Comput. Rev.* 38, 1 (Feb. 2020), 42–56.

[51] Brian Gajadhar, Yvonne de Kort, and Wijnand IJsselsteijn. 2008. Influence of social setting on player experience of digital games. In *CHI '08 Extended Abstracts on Human Factors in Computing Systems* (Florence, Italy) *(CHI EA '08)*. Association for Computing Machinery, New York, NY, USA, 3099–3104.

[52] Mackenzie Goldberg. 2021. Low internet access drives digital divide during COVID-19. Retrieved February 6, 2023, from https://la.myneighborhooddata.org/2021/02/low-internet-access-drives-digital-divide-during-covid-19/.

[53] Roger Geertz Gonzalez and Jeaná Morrison. 2016. Culture or No Culture? A Latino Critical Research Analysis of Latino Persistence Research. *Journal of Hispanic Higher Education* 15, 1 (2016), 87–108. https://doi.org/10.1177/1538192715579460 arXiv:https://doi.org/10.1177/1538192715579460

[54] Anhong Guo, Ilter Canberk, Hannah Murphy, Andrés Monroy-Hernández, and Rajan Vaish. 2019. Blocks: Collaborative and Persistent Augmented Reality Experiences. *Proc. ACM Interact. Mob. Wearable Ubiquitous Technol.* 3, 3 (Sept. 2019), 1–24.

[55] David Hankerson, Andrea R Marshall, Jennifer Booker, Houda El Mimouni, Imani Walker, and Jennifer A Rode. 2016. Does Technology Have Race?. In *Proceedings of the 2016 CHI Conference Extended Abstracts on Human Factors in Computing Systems* (San Jose, California, USA) *(CHI EA '16)*. Association for Computing Machinery, New York, NY, USA, 473–486.

[56] Christina Harrington and Tawanna R Dillahunt. 2021. Eliciting Tech Futures Among Black Young Adults: A Case Study of Remote Speculative Co-Design. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems* (<conf-loc>, <city>Yokohama</city>, <country>Japan</country>, </conf-loc>) *(CHI '21, Article 397)*. Association for Computing Machinery, New York, NY, USA, 1–15.

[57] Christina N Harrington, Katya Borgos-Rodriguez, and Anne Marie Piper. 2019. Engaging Low-Income African American Older Adults in Health Discussions through Community-based Design Workshops. In *Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems* (Glasgow, Scotland Uk) *(CHI '19, Paper 593)*. Association for Computing Machinery, New York, NY, USA, 1–15.

[58] Drew Harwell. 2019. Oregon became a testing ground for Amazon's facial-recognition policing. But what if Rekognition gets it wrong?

[59] Gillian R Hayes. 2011. The relationship of action research to human-computer interaction. *ACM Trans. Comput.-Hum. Interact.* 18, 3 (Aug. 2011), 1–20.

[60] Joseph Henrich, Steven J Heine, and Ara Norenzayan. 2010. The weirdest people in the world? *Behav. Brain Sci.* 33, 2-3 (June 2010), 61–83; discussion 83–135.

[61] Ilyena Hirskyj-Douglas, Anna Kantosalo, Andrés Monroy-Hernández, Joelle Zimmermann, Michael Nebeling, and Mar Gonzalez-Franco. 2020. Social AR: Reimagining and Interrogating the Role of Augmented Reality in Face to Face Social Interactions. In *Conference Companion Publication of the 2020 on Computer Supported Cooperative Work and Social Computing*. Association for Computing Machinery, New York, NY, USA, 457–465.

[62] Callie Holderman, Eakta Jain, Michael Running Wolf, and Liv Erickson. 2022. Privacy, Safety and Wellbeing: Solutions for the Future of AR and VR. In *ACM SIGGRAPH 2022 Panels* (Vancouver, BC, Canada) *(SIGGRAPH '22, Article 1)*. Association for Computing Machinery, New York, NY, USA, 1–2.

[63] Callie Holderman, Eakta Jain, Michael Running Wolf, and Liv Erickson. 2022. Privacy, Safety and Wellbeing: Solutions for the Future of AR and VR. In *ACM SIGGRAPH 2022 Panels* (Vancouver, BC, Canada) *(SIGGRAPH '22, Article 1)*. Association for Computing Machinery, New York, NY, USA, 1–2.

[64] Juan Pablo Hourcade, Natasha E Bullock-Rest, and Heidi Schelhowe. 2010. Digital Technologies and Marginalized Youth. In *Proceedings of the 9th International Conference on Interaction Design and Children* (Barcelona, Spain) *(IDC '10)*. Association for Computing Machinery, New York, NY, USA, 360–363.

[65] Janette Hughes and Melanie Maas. 2017. Developing 21st Century Competencies of Marginalized Students Through the Use of Augmented Reality (AR). *LEARNing Landscapes* 11, 1 (2017), 153–169.

[66] Lilly Irani. 2018. "Design Thinking": Defending Silicon Valley at the Apex of Global Labor Hierarchies. *Catalyst* 4, 1 (May 2018), 1–19.

[67] B A Israel, A J Schulz, E A Parker, and A B Becker. 1998. Review of community-based research: assessing partnership approaches to improve public health. *Annu. Rev. Public Health* 19 (1998), 173–202.

[68] Yasmin B Kafai, Deborah A Fields, and Kristin A Searle. 2020. Understanding participation cultures in youth online making: Equity, ethics, and connections to learning. *Yearbook of the National Society for the Study of Education* 119, 1 (2020), 220–236.

[69] Maximilian Kasy and Rediet Abebe. 2021. Fairness, Equality, and Power in Algorithmic Decision-Making. In *Proceedings of the 2021 ACM Conference on Fairness, Accountability, and Transparency* (Virtual Event, Canada) *(FAccT '21)*. Association for Computing Machinery, New York, NY, USA, 576–586.

[70] Maria Kauhondamwa, Heike Winschiers-Theophilus, Simson Kapembe, Hiskia Costa, Jan Guxab, Isay Kamati, and Helena Afrikaner. 2018. Co-Creating Personal Augmented Reality Accessories to Enhance Social Well-Being of Urban San Youth. In *Proceedings of the Second African Conference for Human Computer Interaction: Thriving Communities* (Windhoek, Namibia) *(AfriCHI '18)*. Association for Computing Machinery, New York, NY, USA, Article 10, 10 pages. https://doi.org/10.1145/3283458.3283480

[71] Douglas Kellner and Jeff Share. 2007. Critical media literacy is not an option. *Learn. Inq.* 1, 1 (May 2007), 59–69.

[72] Kangsoo Kim, Mark Billinghurst, Gerd Bruder, Henry Been-Lirn Duh, and Gregory F Welch. 2018. Revisiting trends in augmented reality research: A review of the 2nd decade of ISMAR (2008–2017). *IEEE transactions on visualization and computer graphics* 24, 11 (2018), 2947–2962.

[73] Eric Klopfer, Judy Perry, Kurt Squire, and Ming-Fong Jan. 2017. *Collaborative learning through augmented reality role playing*. Routledge, United Kingdom, 311–315.

[74] E Klopfer and K Squire. 2008. Environmental Detectives—the development of an augmented reality platform for environmental simulations. *Educ. Technol. Res. Dev.* 56 (2008), 203–228.

[75] Steve Knopper. 2018. *Why fortnite is accused of stealing dance moves*. Rolling Stone. Retrieved Feburary 19, 2024 from https://www.rollingstone.com/music/music-features/fortnite-epic-games-2-milly-stealing-dance-moves-769344/

[76] Christopher A Le Dantec, Robert G Farrell, James E Christensen, Mark Bailey, Jason B Ellis, Wendy A Kellogg, and W Keith Edwards. 2011. Publics in practice: Ubiquitous computing at a shelter for homeless mothers. In *Proceedings of the SIGCHI conference on human factors in computing systems*. ACM, New York, United States, 1687–1696.

[77] Sueyoon Lee, Abdallah El Ali, Maarten Wijntjes, and Pablo Cesar. 2022. Understanding and Designing Avatar Biosignal Visualizations for Social Virtual Reality Entertainment. In *Proceedings of the 2022 CHI Conference on Human Factors in Computing Systems* (<conf-loc>, <city>New Orleans</city>, <state>LA</state>, <country>USA</country>, </conf-loc>) *(CHI '22, Article 425)*. Association for Computing Machinery, New York, NY, USA, 1–15.

[78] Soyoung Lee, Julie Hui, Zachary Rowe, and Tawanna R Dillahunt. 2023. A Collective Approach to Providing Digital Skills Training Among U.S. Public Housing Residents. In *Extended Abstracts of the 2023 CHI Conference on Human Factors in Computing Systems* (Hamburg, Germany) *(CHI EA '23, Article 4)*. Association for Computing Machinery, New York, NY, USA, 1–6.

[79] Jian Liao, Adnan Karim, Shivesh Singh Jadon, Rubaiat Habib Kazi, and Ryo Suzuki. 2022. RealityTalk: Real-Time Speech-Driven Augmented Presentation for AR Live Storytelling. In *Proceedings of the 35th Annual ACM Symposium on User Interface Software and Technology* (Bend, OR, USA) *(UIST '22, Article 17)*. Association for Computing Machinery, New York, NY, USA, 1–12.

[80] Lika Haizhou Liu, Xi Lu, Richard Martinez, Dennis Wang, Fannie Liu, Andrés Monroy-Hernández, and Daniel A Epstein. 2022. Mindful Garden: Supporting Reflection on Biosignals in a Co-Located Augmented Reality Mindfulness Experience. In *Companion Publication of the 2022 Conference on Computer Supported Cooperative Work and Social Computing* (Virtual Event, Taiwan) *(CSCW'22 Companion)*. Association for Computing Machinery, New York, NY, USA, 201–204.

[81] Daria Loi, Christine T Wolf, Jeanette L Blomberg, Raphael Arar, and Margot Brereton. 2019. Co-designing AI Futures: Integrating AI Ethics, Social Computing, and Design. In *Companion Publication of the 2019 on Designing Interactive Systems Conference 2019 Companion* (San Diego, CA, USA) *(DIS '19 Companion)*. Association for Computing Machinery, New York, NY, USA, 381–384.

[82] Maurice Rafael Magaña. 2022. The politics of Black and Brown solidarities: race, space, and hip-hop cultural production in Los Angeles. *Ethn. Racial Stud.* 45, 5 (April 2022), 942–965.

[83] Christopher A Mallett. 2014. Youthful Offending and Delinquency: The Comorbid Impact of Maltreatment, Mental Health Problems, and Learning Disabilities. *Child Adolesc. Social Work J.* 31, 4 (Aug. 2014), 369–392.

[84] Divine Maloney, Guo Freeman, and Andrew Robb. 2020. A Virtual Space for All: Exploring Children's Experience in Social Virtual Reality. In *Proceedings of the Annual Symposium on Computer-Human Interaction in Play* (Virtual Event, Canada) *(CHI PLAY '20)*. Association for Computing Machinery, New York, NY, USA, 472–483. https://doi.org/10.1145/3410404.3414268

[85] Divine Maloney, Guo Freeman, and Andrew Robb. 2021. Social Virtual Reality: Ethical Considerations and Future Directions for An Emerging Research Space. In *2021 IEEE Conference on Virtual Reality and 3D User Interfaces Abstracts and Workshops (VRW)*. IEEE, Columbia, 271–277. arXiv:2104.05030 [cs.HC]

[86] Elena Márquez Segura, Laia Turmo Vidal, Asreen Rostami, and Annika Waern. 2016. Embodied Sketching. In *Proceedings of the 2016 CHI Conference on Human Factors in Computing Systems* (San Jose, California, USA) *(CHI '16)*. Association for Computing Machinery, New York, NY, USA, 6014–6027.

[87] John Martin, Seann Dikkers, Kurt Squire, and David Gagnon. 2014. Participatory Scaling Through Augmented Reality Learning Through Local Games. *TechTrends* 58, 1 (Jan. 2014), 35–41.

[88] Luiza Prado de O Martins and P J S Vieira de Oliveira. 2014. Questioning the "critical" in Speculative & Critical Design. https://medium.com/a-parede/questioning-the-critical-in-speculative-critical-design-5a355cac2ca4. Accessed: NA-NA-NA.

[89] Nora McDonald, Sarita Schoenebeck, and Andrea Forte. 2019. Reliability and Inter-rater Reliability in Qualitative Research: Norms and Guidelines for CSCW and HCI Practice. *Proc. ACM Hum.-Comput. Interact.* 3, CSCW (Nov. 2019), 1–23.

[90] Morgan McLeod. 2023. Public service announcement: 50 years and a wake up. https://www.sentencingproject.org/video/public-service-announcement-50-years-and-a-wake-up/. Accessed: 2023-12-9.

[91] Zion Mengesha, Courtney Heldreth, Michal Lahav, Juliana Sublewski, and Elyse Tuennerman. 2021. "I don't Think These Devices are Very Culturally Sensitive."-Impact of Automated Speech Recognition Errors on African Americans. *Front Artif Intell* 4 (Nov. 2021), 725911.

[92] Samuel Messick. 1994. The Interplay of Evidence and Consequences in the Validation of Performance Assessments. *Educ. Res.* 23, 2 (1994), 13–23.

[93] Meta. 2021. Inside Facebook Reality Labs: Wrist-based Interaction for the Next Computing Platform. Meta Newsroom, March 2021. Retrieved February 27, 2023 from https://about.fb.com/news/2021/03/inside-facebook-reality-labs-wrist-based-interaction-for-the-next-computing-platform/.

[94] Microsoft. 2021. Microsoft's Alex Kipman unveils Microsoft Mesh. https://youtu.be/IkpsJoobZmE. Accessed: 2023-12-11.

[95] Microsoft. Accessed: 2023-12-11. Expanding the Design Process for Mixed Reality. https://learn.microsoft.com/en-us/windows/mixed-reality/discover/case-study-expanding-the-design-process-for-mixed-reality.

[96] Paul Milgram and Fumio Kishino. 1994. A taxonomy of mixed reality visual displays. https://cs.gmu.edu/~zduric/cs499/Readings/r76JBo-Milgram_IEICE_1994.pdf. Accessed: 2023-11-23.

[97] Ernest Morrell, Rudy Duenas, Veronica Garcia, and Jorge Lopez. 2015. *Critical Media Pedagogy: Teaching for achievement in city schools*. Teachers College Press, 1234 Amsterdam Ave. New York NY 10027 United States.

[98] Cecily Morrison, Edward Cutrell, Martin Grayson, Anja Thieme, Alex Taylor, Geert Roumen, Camilla Longden, Sebastian Tschiatschek, Rita Faia Marques, and Abigail Sellen. 2021. Social Sensemaking with AI: Designing an Open-ended AI Experience with a Blind Child. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems* (Yokohama, Japan) *(CHI '21, Article 396)*. Association for Computing Machinery, New York, NY, USA, 1–14.

[99] United Nations. Accessed: 2023-12-11. Youth. https://www.un.org/en/global-issues/youth.

[100] Anton Nijholt. 2021. Experiencing Social Augmented Reality in Public Spaces. In *Adjunct Proceedings of the 2021 ACM International Joint Conference on Pervasive and Ubiquitous Computing and Proceedings of the 2021 ACM International Symposium on Wearable Computers*. Association for Computing Machinery, New York, NY, USA, 570–574.

[101] Anton Nijholt. 2021. Social Augmented Reality: A Multiperspective Survey. In *2021 Joint 10th International Conference on Informatics, Electronics & Vision (ICIEV) and 2021 5th International Conference on Imaging, Vision & Pattern Recognition (icIVPR)*. IEEE, Coloumbia, 1–8.

[102] Safiya Umoja Noble. 2018. Algorithms of oppression. In *Algorithms of oppression*. university press, New York.

[103] Claudia Núñez-Pacheco. 2018. Reflection through Inner Presence: A Sensitising Concept for Design. *Multimodal Technologies and Interaction* 2, 1 (Feb. 2018), 5.

[104] Kean O'Brien, Leonardo Vilchis, and Corina Maritescu. 2019. Boyle Heights and the Fight against Gentrification as State Violence. *AQ* 71, 2 (2019), 389–396.

[105] Ihudiya Finda Ogbonnaya-Ogburu, Angela D R Smith, Alexandra To, and Kentaro Toyama. 2020. Critical Race Theory for HCI. In *Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems* (Honolulu, HI, USA) *(CHI '20)*. Association for Computing Machinery, New York, NY, USA, 1–16.

[106] Thomas Olsson, Pradthana Jarusriboonchai, Paweł Woźniak, Susanna Paasovaara, Kaisa Väänänen, and Andrés Lucero. 2020. Technologies for Enhancing Collocated Social Interaction: Review of Design Solutions and Approaches. *Comput. Support. Coop. Work* 29, 1 (April 2020), 29–83.

[107] Pair with Google. Accessed: 2023-12-11. Guidebook Workshop Facilitator's Guide. https://pair.withgoogle.com/guidebook/workshop/Guidebook-Workshop-Facilitator-Guide.pdf.

[108] Tabitha C Peck, Laura E Sockol, and Sarah M Hancock. 2020. Mind the Gap: The Underrepresentation of Female Participants and Authors in Virtual Reality Research. *IEEE Trans. Vis. Comput. Graph.* 26, 5 (May 2020), 1945–1954.

[109] Lucy Pei and Roderic Crooks. 2020. Attenuated Access: Accounting for Startup, Maintenance, and Affective Costs in Resource-Constrained Communities. In *Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems* (Honolulu, HI, USA) *(CHI '20)*. Association for Computing Machinery, New York, NY, USA, 1–15.

[110] William R. Penuel, Barry J. Fishman, Britte Haugan Cheng, and Nora Sabelli. 2011. Organizing Research and Development at the Intersection of Learning, Implementation, and Design. *Educational Researcher* 40, 7 (2011), 331–337. https://doi.org/10.3102/0013189X11421826

[111] Nicholas Persa, Craig G Anderson, Richard Martinez, Max Collins, Maria J Anderson-Coto, and Kurt D Squire. 2023. Enhancing Youth Self-Regulation Through Wearable Apps: Increasing Usage Through Participatory Design in Low Income Youth. *ACM Trans. Comput.-Hum. Interact.* 29, 5 (Jan. 2023), 1–34.

[112] Jennifer Pierre, Roderic Crooks, Morgan Currie, Britt Paris, and Irene Pasquetto. 2021. Getting Ourselves Together: Data-centered participatory design research & epistemic burden. In *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems* (<conf-loc>, <city>Yokohama</city>, <country>Japan</country>, </conf-loc>) *(CHI '21, Article 406)*. Association for Computing Machinery, New York, NY, USA, 1–11.

[113] Robert Racadio, Emma J Rose, and Beth E Kolko. 2014. Research at the margin: participatory design and community based participatory research. In *Proceedings of the 13th Participatory Design Conference: Short Papers, Industry Cases, Workshop Descriptions, Doctoral Consortium papers, and Keynote abstracts - Volume 2* (Windhoek, Namibia) *(PDC '14)*. Association for Computing Machinery, New York, NY, USA, 49–52.

[114] Samantha Reig, Erica Principe Cruz, Melissa M. Powers, Jennifer He, Timothy Chong, Yu Jiang Tham, Sven Kratz, Ava Robinson, Brian A. Smith, Rajan Vaish, and Andrés Monroy-Hernández. 2023. Supporting Piggybacked Co-Located Leisure Activities via Augmented Reality. In *Proceedings of the 2023 CHI Conference on Human Factors in Computing Systems* (<conf-loc>, <city>Hamburg</city>, <country>Germany</country>, </conf-loc>) *(CHI '23)*. Association for Computing Machinery, New York, NY, USA, Article 788, 15 pages. https://doi.org/10.1145/3544548.3580833

[115] Stephen D Ritchie, Mary Jo Wabano, Jackson Beardy, Jeffrey Curran, Aaron Orkin, David VanderBurgh, and Nancy L Young. 2013. Community-based participatory research with indigenous communities: the proximity paradox. *Health Place* 24 (Nov. 2013), 183–189.

[116] Ari Schlesinger, W Keith Edwards, and Rebecca E Grinter. 2017. Intersectional HCI: Engaging Identity through Gender, Race, and Class. In *Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems* (Denver, Colorado, USA) *(CHI '17)*. Association for Computing Machinery, New York, NY, USA, 5412–5427.

[117] Elham Shaabani, Ashkan Aleali, Paulo Shakarian, and John Bertetto. 2015. Early Identification of Violent Criminal Gang Members. In *Proceedings of the 21th ACM SIGKDD International Conference on Knowledge Discovery and Data Mining* (Sydney, NSW, Australia) *(KDD '15)*. Association for Computing Machinery, New York, NY, USA, 2079–2088.

[118] Mel Slater, Solène Neyret, Tania Johnston, Guillermo Iruretagoyena, Mercè Álvarez de la Campa Crespo, Miquel Alabèrnia-Segura, Bernhard Spanlang, and Guillem Feixas. 2019. An experimental study of a virtual reality counselling paradigm using embodied self-dialogue. *Sci. Rep.* 9, 1 (July 2019), 10903.

[119] Angela D R Smith, Alex A Ahmed, Adriana Alvarado Garcia, Bryan Dosono, Ihudiya Ogbonnaya-Ogburu, Yolanda Rankin, Alexandra To, and Kentaro Toyama. 2020. What's Race Got To Do With It? Engaging in Race in HCI. In *Extended Abstracts of the 2020 CHI Conference on Human Factors in Computing Systems* (<conf-loc>, <city>Honolulu</city>, <state>HI</state>, <country>USA</country>, </conf-loc>) *(CHI EA '20)*. Association for Computing Machinery, New York, NY, USA, 1–8.

[120] Snap Inc. 2021. Building blocks. https://docs.snap.com/spectacles/templates/building-blocks

[121] Maximilian Speicher, Brian D Hall, and Michael Nebeling. 2019. What is Mixed Reality?. In *Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems* (Glasgow, Scotland Uk) *(CHI '19, Paper 537)*. Association for Computing Machinery, New York, NY, USA, 1–15.

[122] Kurt Squire and Seann Dikkers. 2012. Amplifications of learning: Use of mobile media devices among youth. *Convergence* 18, 4 (Nov. 2012), 445–464.

[123] Kurt Squire and Eric Klopfer. 2007. Augmented Reality Simulations on Handheld Computers. *Journal of the Learning Sciences* 16, 3 (June 2007), 371–413.

[124] George J. Sánchez. 2021. *Boyle Heights: How a Los Angeles Neighborhood Became the Future of American Democracy* (1 ed.). Vol. 59. University of California Press, Manhattan, New York. http://www.jstor.org/stable/j.ctv1tjrv8c

[125] S. M. Taylor. 2023. *Gen-z entrepreneur Iddris Sandu discusses the future of spatial labs and raising $10 million in seed money*. EBONY. https://www.ebony.com/iddris-sandu-spatial-labs-seed-funding/

[126] Nađa Terzimehić, Renate Häuslschmid, Heinrich Hussmann, and M c Schraefel. 2019. A Review & Analysis of Mindfulness Research in HCI: Framing Current Lines of Research and Future Opportunities. In *Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems*. Association for Computing Machinery, New York, NY, USA, 1–13.

[127] Alexandra To, Angela D R Smith, Dilruba Showkat, Adinawa Adjagbodjou, and Christina Harrington. 2023. Flourishing in the Everyday: Moving Beyond

Damage-Centered Design in HCI for BIPOC Communities. In *Proceedings of the 2023 ACM Designing Interactive Systems Conference* (Pittsburgh, PA, USA) *(DIS '23)*. Association for Computing Machinery, New York, NY, USA, 917–933.

[128] Jasper Tran O'Leary, Sara Zewde, Jennifer Mankoff, and Daniela K Rosner. 2019. Who Gets to Future? Race, Representation, and Design Methods in Africatown. In *Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems* (Glasgow, Scotland Uk) *(CHI '19, Paper 561)*. Association for Computing Machinery, New York, NY, USA, 1–13.

[129] Eve Tuck. 2009. Suspending damage: A letter to communities. *Harv. Educ. Rev.* 79, 3 (Sept. 2009), 409–428.

[130] Kim M Unertl, Chris L Schaefbauer, Terrance R Campbell, Charles Senteio, Katie A Siek, Suzanne Bakken, and Tiffany C Veinot. 2016. Integrating community-based participatory research and informatics approaches to improve the engagement and health of underserved populations. *J. Am. Med. Inform. Assoc.* 23, 1 (Jan. 2016), 60–73.

[131] Data USA. n.d.. La City (east central/central city & boyle heights) puma, CA. https://datausa.io/profile/geo/la-city-east-centralcentral-city-boyle-heights-puma-ca

[132] Ralph Vacca. 2017. Bicultural: Examining Teenage Latinas' Perspectives on Technologies for Emotional Support. In *Proceedings of the 2017 Conference on Interaction Design and Children*. ACM, New York, United States, 117–126.

[133] Ralph Vacca. 2019. Brokering Data: Co-Designing Technology with Latina Teens to Support Communication with Parents: Leveraging Cultural Practices of Latinx Youth through Co-Design. In *Proceedings of the 18th ACM International Conference on Interaction Design and Children* (Boise, ID, USA) *(IDC '19)*. Association for Computing Machinery, New York, NY, USA, 197–207.

[134] Ana Villanueva, Zhengzhe Zhu, Ziyi Liu, Kylie Peppler, Thomas Redick, and Karthik Ramani. 2020. Meta-AR-App: An Authoring Platform for Collaborative Augmented Reality in STEM Classrooms. In *Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems*. Association for Computing Machinery, New York, NY, USA, 1–14.

[135] Greg Walsh. 2018. Towards equity and equality in American co-design: a case study. In *Proceedings of the 17th ACM Conference on Interaction Design and Children* (Trondheim, Norway) *(IDC '18)*. Association for Computing Machinery, New York, NY, USA, 434–440.

[136] Joris Weijdom. 2022. Performative prototyping in collaborative mixed reality environments: an embodied design method for ideation and development in virtual reality. In *Sixteenth International Conference on Tangible, Embedded, and Embodied Interaction* (Daejeon, Republic of Korea) *(TEI '22, Article 10)*. Association for Computing Machinery, New York, NY, USA, 1–13.

[137] Max J Western, Miranda E G Armstrong, Ishrat Islam, Kelly Morgan, Una F Jones, and Mark J Kelson. 2021. The effectiveness of digital interventions for increasing physical activity in individuals of low socioeconomic status: a systematic review and meta-analysis. *Int. J. Behav. Nutr. Phys. Act.* 18, 1 (Nov. 2021), 148.

[138] Lei Zhang, Tianying Chen, Olivia Seow, Tim Chong, Sven Kratz, Yu Jiang Tham, Andrés Monroy-Hernández, Rajan Vaish, and Fannie Liu. 2022. Auggie: Encouraging Effortful Communication through Handcrafted Digital Experiences. *Proceedings of the ACM on Human-Computer Interaction* 6, CSCW2 (July 2022), 1–25. arXiv:2207.07771 [cs.HC]