# Iterative, Reflexive, and Generative Processes of Participatory Design of Arts: Interrogating Racial Ideologies in Design

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**Abstract:** Set in the context of our study that used digital illustrated stories to evoke the power of artistic renderings for public communication of research, we investigate underlying racial ideologies of the artist/researcher in the illustrations. We transformed our ethnographic findings around subjugated embodied disciplinary knowledge into artistic renderings to initiate discussion with teacher candidate participants on equity in school mathematics teaching. In the process of participatory design of arts, the artist/researcher engaged in multiple conversations with the teacher candidates through iterative redesigns centered on these discussions. Based on video data, interview data and the artist/researcher's reflexive accounts, we examined whether and how the collaboration between the artist/researcher and teacher candidate participants could open spaces for ideological expansion. Our findings demonstrate that iterative cycles of participatory redesign of arts, focusing on racial ideologies, can be generative toward ideological expansions toward equity.

## Background

Design is never neutral. From benches in the park to illustrations in picture books, design can discriminate (Benjamin, 2019). Picture book illustrations that children encounter in the early years of their lives can carry problematic racial ideologies such as color blindness, white gaze, and objectifying racialized people through representation (Rogers & Christian, 2007). These ideologies are not static or rigid; rather they are "sense making that stabilizes, challenges, and/or transforms the distribution of material and symbolic resources in society" (Philip et al., 2018, p. 184). From this perspective, ideologies can dynamically change in the course of interactions.

Our study used digital illustrated stories to evoke the power of artistic renderings for public communication – in the context of this study, public communication of critical views on embodiment in mathematics education with teacher candidates. In the normative disciplinary spaces of mathematics, bodies marginalized due to gender, race, and other dimensions of histories of oppression can be subjugated (Takeuchi, 2018). The design of the digital illustrated story was carried out in iterative cycles, by attending to lived experiences shared by the teacher candidate participants, being mediated by the illustration. In this paper, we focus on the negotiation of ideologies enacted in the process of design. Our study was participatory design wherein we critically attended to the power, historicity, and relational dynamics, as provoked by Bang and Vossoughi (2016). Inspired by socially engaged arts (Dewhurst, 2010), we tried to design a visual artifact to open up the conversations on equity in school teaching and learning by depicting lived bodily experiences of schooling (Takeuchi & Dadkhahfard, 2019) previously shared by migrant children. Dimensions of race, power, and politics should be fully accounted for, in the process of participatory design (Vakil et al., 2016). By attending to ideologies that manifest in the process of design, we question the neutrality of designed artifacts and unveil the politics in the design process.

## Methodology

Our study was carried out in three interrelated phases. In Phase I, we identified the themes around disciplinary norms in mathematics classrooms, based on our ethnographic findings. The main theme we decided to illustrate involved racialized bodily experiences of migrant children that were censored in the context of institutionalized, in-school mathematics learning (as depicted in textual form by Takeuchi, 2018). In Phase II, in order to challenge such disciplinary norms of the mathematics classrooms, Author 1 (Dadkhahfard) used her graphic design skills to digitally illustrate ethnographic findings described in our earlier works. We decided to make the illustrated story book "wordless" to communicate with audiences from diverse linguistic backgrounds and diverse age groups and the book was repeatedly re-designed. We then used the designed illustrated story in Phase III in the context of teacher education. Interrogating racial ideologies in illustrations was done through iterative cycles of design within Phase II and III. We repeatedly revisited initial illustrations by focusing on racial ideologies (Philip et al., 2018) that are inscribed in multiple versions of illustrations. Reflexivity in the process of participatory design research should be critical. Therefore, we attended to ideologies perpetuating intersectional histories of oppression while also reflecting on "how we see, and how we move differently based on new forms of perception and understanding"

(Bang & Vossoughi, 2016, p. 181). Arts can invite the emergence of reflectivity, but this process could be experienced with emotions including discomfort as designers/artists deeply examine their taken-for-granted perspectives, and ideologies (Skukauskaite et al., 2021). We treat this discomfort experienced by the designer in the iterative process of co-creating arts with the participants as potential resources for ideological expansion (Philip et al., 2018). In our study, we see this reflexive process as potential spaces for value sharing and challenging power hierarchies between artist/researcher and the participants.

We used the illustrated story designed in Phase II in a teacher education course and facilitated conversations about mathematics, equity, and power. The study in Phase III on which this paper is based was conducted in a teacher education program located in a Canadian city and each teacher candidate was specialized in early childhood and elementary school education. A total of 22 teacher candidates participated in the study and five were racialized teacher candidates. Written responses were collected during in-class activity and follow-up interviews were conducted with five teacher candidates. Interviews elicited how teacher candidates interpreted the illustrated story and whether and how they connected or did not connect with the story. They were also asked to discuss mathematics pedagogy depicted in the illustrated story in relation to their future teaching. During the interview, teacher candidates also draw images of how they would continue the story. Each interview was audio and video-recorded. Video was mostly used to capture gestures and drawings and did not capture the faces of the teacher candidate participants to ensure their privacy. After each interview, we wrote detailed field notes and interview data was fully transcribed. After Phase III, Author 1 engaged in the redesign of illustrations iteratively, based on the conversations she had during the interviews. For the purpose of this paper, we use data from Phase II and III and versions of digital illustrated stories designed by Author 1. We ask the following research questions: 1) How did racial ideologies change in the iterative process of participatory art design? 2) How did the collaboration with the participants help facilitate this change? In our findings, where appropriate, we use the first-person account of an artist/designer to address these questions, along with thematic analysis from video and interview data. Analysis was collaboratively done between the two authors to unveil and reflect on potential underlying racial ideologies perpetuated through illustrations.

## Findings
### Initial racial ideologies
In the initial design, the illustrated story represented the experience of marginalization and differences in slightly abstract ways and did not explicitly depict race by assigning skin colors to migrant students. To show race implicitly and distinguish between migrant students and their peers, instead of representing explicit racial aspects of the characters by skin colors, I (Dadkhahfard, the artist/researcher) assigned two color themes (blue and pink) to migrant students, their parents, and their homes (Figure 1; Panel 1 & 2). I then used black and white for other students to create a clear contrast (Figure 1; Panel 3). By making characters somewhat abstract for their countries of origin or racial backgrounds, I thought that audiences could have more space to come up with diverse interpretations of the difference and marginalization. This might allow them to construct stories related to their own experiences of mathematics learning, inspired by the illustrated story. By making characters without specificities of their countries of origin or racial backgrounds, I also tried to avoid reproducing stereotypes. As an illustrator, I struggled to represent race in my design. Historically, stereotypical, and simplified images of racialized people have been perpetuated in illustrations and picture books (Edmonds, 1986). In this struggle, I chose the color that was "neutral" to me. However, in this process, I perpetuated racial ideologies of color blindness and white gaze in illustrations (as pointed out by Rogers & Christian, 2007).

**Figure 1**
*Abstract Depiction of Race in the First Version of the Illustrated Story Book*

## Interactions with teacher candidates

We used the illustrated story book in Phase III to facilitate conversations about mathematics teaching, equity, and power with the teacher candidate participants. Some of the racialized teacher candidates talked implicitly about the role of race in mathematics learning and pointed out a problem of the lack of representation on race in the initial illustration. For instance, Betty said "If there's more, like color involved … Looking at it [pointing at the designed illustrated stories], I wouldn't have guessed that the two students were, like, Filipino. You can tell that they're different than the students." Similarly, Dana said, "Students that are reading this wouldn't understand 'Ooh, you're different than me because you're Black.'" In their conversations with me, racialized teacher candidates suggested that I as the designer should make race more explicit in the illustrations to bring forth discussions on equity in mathematics classrooms. They pointed out that the abstract color schemas highlighting migrant students' experiences were interpreted as indicators of differences, but not as representations of racial dynamics. The depiction of race in the form of visual art and its relationship to the evoking conversation around race has received relatively little attention (Dewhurst, 2010). However, the conversations with teacher candidates suggest that explicit racial representation was essential for advancing the discussion on race and inequity in mathematics classrooms. After the conversations with teacher candidates and the deepening of our understanding around depictions of race, we, the Authors, started to engage in iterative inquiry of what it means to illustrate race and racialized experiences.

## The redesign process

In the second cycle of designing the illustrated story, we started testing different racial representations in the illustrated story. After several back-and-forth attempts at modification, I engaged in watching videos of the participants who were depicted as protagonists in the illustrations with a focus on understanding more about the lived history of these people. I did not focus on skin colors of racialized migrant students but tried to add more complex layers of meaning-making that could depict these students' experiences in the mainstream mathematics classroom (e.g., representing the history of mathematics methods used at home more fully – Figure 2). In the modified illustrated story, I chose to assign color to the characters' skin in complex ways with multiple layers (See the process of adding layers in Figure 3) that were closer to their skin color. However, in this process, we were mindful of not reducing race to skin color. I came to the profound understanding that illustration of racialized experiences in institutional spaces of school should be at the core of the image. In the revision, I focused on racialized migrant children's experiences of being forced to erase and hide intergenerational mathematical knowledge passed on in home environments. I also tried to depict the experiences of subjugation and agency inscribed in racialized bodies.
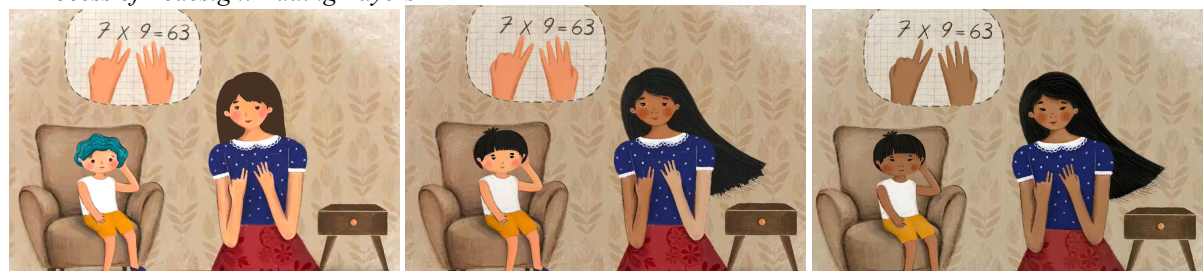
**Figure 2**
*Depiction of Race in the Modified Version of Illustrated Story Book*



**Figure 3**
*A Process of Redesign: Adding Layers*

Other considerations for the design to depict racialized experiences are illustrating mothers of color teaching mathematics to their children. This is to counter the history of mathematics that has been constituted as a masculine discipline (Mendick, 2006) that mostly excluded women of color (Leyva, 2016). To counter this hegemonic norm, I described what mothers passed on mathematically to their children (also to be aligned with findings from Takeuchi's (2018) original ethnographic study that was depicted in illustrations).

## Scholarly significance of the study

Our study focused on reflexive accounts of an artist/researcher to critically examine her taken-for-granted values, perspectives, and ideologies through her collaboration with participants. Interrogating racial ideology in design can possibly challenge discriminatory design (Benjamin, 2019). Our paper highlights that collaboration with the teacher candidate participants in the iterative process of design can challenge taken-for-granted values, perspectives, and ideologies manifested in the processes. In Phase II, we had to question the neutrality in ideology in our design-based research. Design-based research in the learning sciences were never neutral (Vakil et al., 2016); instead, it can either reinforce or challenge racial ideologies.

Our study depicts iterative, reflexive, and generative processes of designing and redesigning the illustrated story, in order to critically interrogate racial ideologies (Philip et al., 2018) in the process of design. Through ideological expansion afforded in the process of participatory design, we can also move towards designing *tertiary artifacts* that are alternative representations of the world to help us envision the possibilities that are not presently achieved (Wartofsky, 1979). Gutiérrez (2016) discusses the possibilities of designing tertiary artifacts with historical epistemology – the tertiary artifacts that help our "learning to see historically, to imagine new futures for people and their communities" (p. 190). Tertiary artifacts play a significant role in mediating the ways in which influential people like teachers envision the world in new ways. While the scope of this paper was limited to teacher candidates, our future research will depict how racialized parents and children engage in the iterative process of co-designing arts as a way of challenging normative ideologies manifested in mathematics classrooms. This can lead to an envisioning of a more equitable pedagogy in school and beyond.

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