⟩ **FORUM** | **DESIGNING AT THE INTERSECTIONS**

In this forum we explore different perspectives for how to apply intersectionality as a critical framework for design across multiple contexts. — **Yolanda A. Rankin and Jakita O. Thomas, Editors**

INTech: Designing Intersectional Learning Experiences for Black Girls

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As scholars and practitioners within the field of HCI, we often think in terms of designing technology to address a problem or to improve a societal issue. As designers, we enjoy a privileged status that allows us to use our imaginations and tools to create whatever our hearts desire. And though a body of HCI research has positioned children as designers and creators of technology, rarely do we stop to think about the privilege that white children enjoy or the disadvantages that Black children experience because of race. Moreover, when we examine the narrative about who gets to design along the intersection of race and gender, Black girls are rendered invisible. This is not surprising since issues of racism and gender discrimination, especially among children, have been taboo subjects within the HCI community. However, recent research [1] has raised the question of how can we hope to transform the HCI community to be more inclusive, diverse, and equitable if we do not expose how racism and gender discrimination contribute to unequal outcomes for minoritized populations. For many Black people, education is perceived as the path to academic and economic development, including exposure and access to STEM education and tech career opportunities. Yet less research has intentionally centered the experiences of Black girls as they mature into young women who imagine, create, design, and innovate. For these reasons, we turn our attention to Black girls in the context of computer science education as a gateway to design.

The lack of HCI research that examines the experiences of Black girls testifies to the fact that Black girls are an understudied population in the HCI community. Understanding their experiences using an intersectional lens is vital for constructing equitable learning environments that seek to overcome structural barriers that limit and in some cases prohibit their participation in computing. This is crucial to inclusion and equal representation to promote diversity in the computing workforce. Most existing research on girls' experience in STEM, however, emphasizes white participants, with the assumption that these findings are relevant to all girls regardless of racial identity [2]. The unique experiences of Black girls are hidden in aggregate results, and their intersectional experiences are often ignored or overlooked. Furthermore, most research on students' experiences in K–12 computer science education has been conducted in traditional classroom settings in predominantly white schools where Black girls are typically underrepresented, both as girls and as Black students—a positionality that is likely to undermine their motivation for CS. Rankin et al. [3] reveal that formal K–12 CS education can be a hostile environment rife with racism that negatively affects Black girls' ability to persist in computing. Unsurprisingly, Black women seek to create safe spaces outside of the public education system to overcome the traditional barriers to formal CS education and to promote Black girls' positive experiences and motivation for CS education and subsequently becoming designers of technology. Employing intersectionality as a critical lens, this article conceptualizes developing safe spaces to support Black girls becoming designers in the context of CS education.

INTECH FOUNDATION

INTech Foundation is a nonprofit organization whose mission is to inform and inspire girls to innovate in the technology industry. INTech has engaged more than 1,500 Black girls in grades 4 to 12 across the U.S. in out-of-school experiences through summer camps and after-school programs. INTech programs uphold three pillars:

• *Inform.* INTech provides girls with opportunities to master essential computer science concepts, such as creativity, abstraction, algorithms, and programming, and to learn about different potential pathways for technology careers.

• *Inspire.* INTech introduces young Black girls to women with a

Insights

→ Safe spaces outside of the traditional K–12 classroom are imperative for Black girls to learn CS.

→ Intersectional computing should be used to include more Black girls in computing.

→ To create a level playing field in terms of who gets to design, issues of social context must be considered.

background in the technology industry who share their educational and career experiences.

• *Innovate.* INTech provides girls with opportunities to work together in lightweight teams [4] in which they learn how to create and implement technology solutions. In a team setting, girls reap the benefits of peer teaching, peer learning, and increased engagement.

As a response to the Covid-19 pandemic, INTech hosted multiple virtual summer camps during the summers of 2020 and 2021 to teach a total of 161 middle school girls how to build websites through four different five-day camp experiences [5]. INTech seeks to increase the confidence of Black girls in tech by ensuring a significant representation of Black women among the camp staff and guest speakers. By ensuring representation, INTech addresses the lack of representation and the lack of Black women role models in computing, providing Black girls with an opportunity to see someone like themselves "doing CS" and to benefit from implicit mentorship [6].

INTERSECTIONALITY AS A PRAXIS

Intersectionality examines how intersecting power relations influence social relations in everyday life [7]. Researchers use intersectionality to analyze categories of race, class, gender, sexuality, ethnicity, ability, age, and so on as interrelated and mutually shaping one another. According to Patricia Hill Collins [7], six core constructs of intersectionality inform one another: social inequality, power, relationality, social context, complexity, and social justice. These core constructs serve as guideposts for thinking through intersectionality as a critical framework. In this article, we apply intersectionality, specifically the concepts of social context and social justice, to explore the experiences

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of Black middle school girls who participated in the INTech virtual summer camps.

SOCIAL CONTEXT

Thomas et al. [8] first introduced *intersectional computing* to provide the vocabulary and tools necessary for identifying how interconnected systems of power operate to produce unequal outcomes that benefit certain populations in the field of computing. *Social context*, one of the core constructs of intersectionality, shows how the distinctive social locations of individuals and groups within intersecting power relations shape intellectual production [7]. For example, some high school CS classes are offered under the guise that students will learn CS concepts such as computational thinking and computer programming. Instead, students use the computer to become proficient in MS Office [3]. Developing proficiency in MS Office aligns more with digital literacy, which has very little to do with CS education. The conceptual mismatch between the course learning objectives and
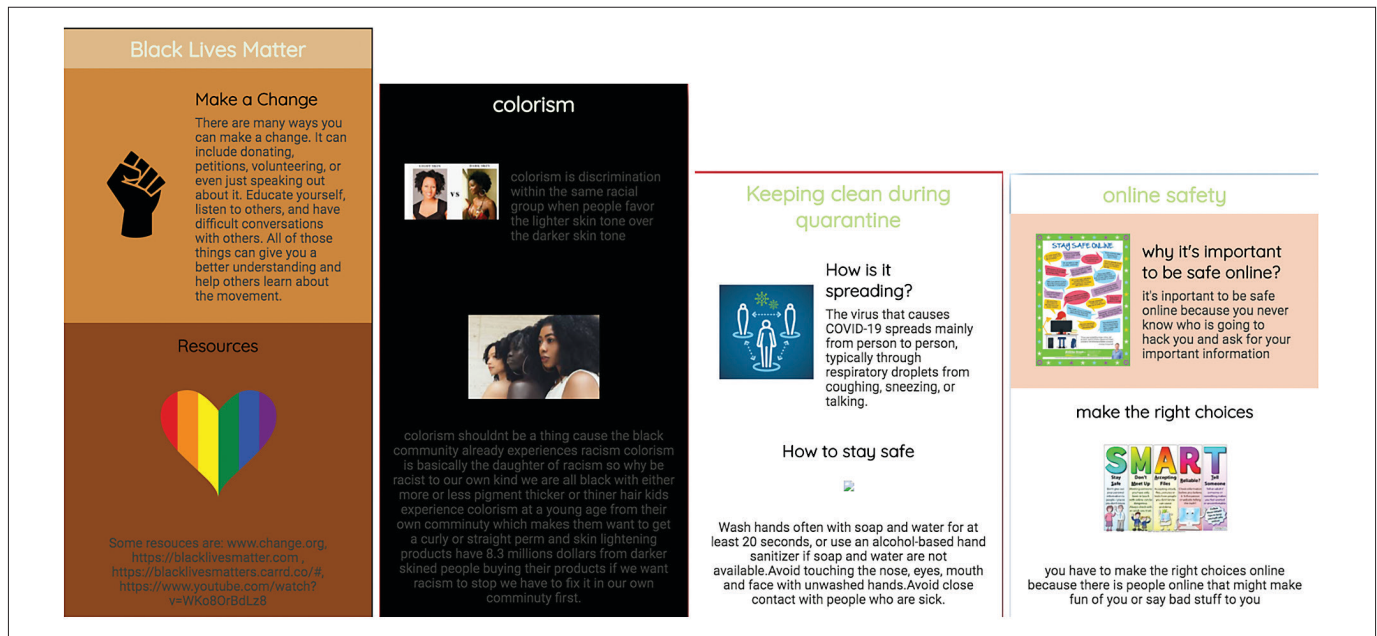
Camp attendees created posters highlighting their interest in applying computing to solve problems that they find important. From left to right: racial justice, colorism, Covid-19 health and safety, online safety.

students' expectations illustrates how structural barriers such as access are erected in computing. In the scenario where the student enrolls in a college-level introductory CS course and realizes that what she learned in high school was not CS, she recognizes that she is not as academically prepared as her peers who were exposed to CS prior to matriculation. This notion that exposure to computer programming prior to college is a prerequisite for successfully attaining a CS degree creates the perception of being deficient, one that Black women often encounter in their undergraduate CS education [3].

In contrast, INTech accommodates students regardless of their exposure to computer programming prior to participation in the virtual camp. To understand the social context of virtual camp participants, INTech scholars complete a survey during registration to assess their educational background to determine whether they have taken a CS camp or class. Some students list participation in CS activities with the nonprofit organization Black Girls Code as indicative of their prior computer programming experiences; however, many students state that they either had no prior experience or listed INTech programs throughout the year that they attended. This matters because it is imperative that INTech

create an environment where students' first experience with technology is a positive one. INTech summer camps offer introductory and advanced tracks so that girls who are attending for the first time are able to grasp the material at a pace that is not overwhelming.

Attending to the social context means to acknowledge and recognize the historical impact of power relations on less dominant social groups. The history of an unequal and unjust educational system in the U.S. created the racial disparities between white and non-white students, one where schools situated in predominantly Black neighborhoods lack adequately equipped computer labs, do not have trained teachers and support staff who can teach computing, and do not offer CS curriculum appropriate for middle school and high school students. If the goal is to develop a diverse STEM workforce, then facing the challenges of constructing equitable learning

INTech accommodates students regardless of their exposure to computer programming prior to participation in the virtual camp.

environments that benefit all students, especially those lacking resources, is extremely important. INTech espouses the idea that design is for everyone, positioning Black girls to be innovators in tech.

Social context also includes understanding the economic implications for those who have access to CS education and computing resources versus those who do not. With more Blacks living in poverty in the U.S. than whites, access to CS education is a luxury that many cannot afford. This points to an unequal and unjust education system that continues to privilege those of middle- or upper-class economic standing. Because of this, many INTech programs are offered for free, and for those events that do cost, scholarships supported by individual donors and corporate sponsors are offered. To date, INTech has awarded 347 scholarships, as well as provided computers to those who need them for virtual camps.

Understanding social context draws attention to other factors such as geographical location that limits students' access to CS education as a gateway to design. INTech addresses this challenge by meeting students where they are. For example, in 2015, INTech partnered with Teach for America South Carolina to host three

camps in one day, teaching Black girls in Orangeburg, Kingstree, and Walterboro. Even though 60 percent of the attendees stated that they attended the camps because they were interested in computing and it sounded fun, only 47 percent had taken CS classes or camps prior to INTech. A majority of the students who have participated in other in-person programs reside in North Carolina. Recognizing an opportunity to recruit Black girls who lived outside of North Carolina, we switched to a virtual model during the Covid-19 pandemic, enabling us to reach more students, including those who resided in rural areas in the U.S. and in Canada.

SOCIAL JUSTICE

Social justice is a core construct of intersectionality that raises questions about intersectional scholarship and practice. Collins [7] posits that social justice is elusive in unequal societies where the rules may seem fair and appear to be equally applied to everyone, yet in reality are differentially enforced through discriminatory practices. Limited CS course offerings, placement of CS courses outside of the academic core curriculum, and lack of teacher preparation and instructional resources contribute to disparities in the availability and quality of CS learning experiences for students of color in primary and secondary schools in the U.S. [6]. These structural barriers are compounded by additional social barriers including classroom and campus climate, stereotype threat, and the lack of role models, mentors, and peers engaged in computing.

INTech was founded to serve as an informal learning program that specifically serves Black girls, teaching them HTML, CSS, and JavaScript, user-centered design concepts, and computer engineering concepts. It is imperative that INTech scholars receive curriculum aligned with industry standards to give them the agency to create their own projects, shifting power away from the program staff and to the students. At the beginning of camp, scholars are placed into groups of three or four, where they are tasked with selecting a social issue of their choice to explore during the week that will serve as the subject for the websites and apps they build. Topics include Black Lives Matter, issues in the LGBTQIA+ community, Covid-19, online safety, and others [9].

In addition to learning how to code, INTech scholars visit tech companies such as Microsoft, Google, Red Hat, Red Ventures, AvidXchange, Ally Financial, Slalom, Zuora, and Kompleks Creatives in Durham, North Carolina. Being able to connect what is learned in the classroom with real world jobs has been critical in helping INTech scholars envision what is possible to them.

Key to INTech programing are the guest speakers, Black women who have careers in the tech industry. They share their stories through keynotes or panel discussions, where INTech scholars are able to interact and ask questions, such as *Was your mom the only one supportive of your career?*, *Was there ever a time when your job or studies got to be too much and you felt you had to give up or take a break from them?*, and *Was it hard to be successful as a Black woman?* These questions show that Black girls are inquisitive about the lived experiences of the implicit role models in tech who look like them.

CONCLUSION

In summary, this case study of INTech programs highlights how intersectional computing can be used to include more Black girls in computing. For those seeking to create a level playing field in terms of who gets to design, issues of social context must be considered. Failure to do so could inflict more harm on an already marginalized population.

ENDNOTES
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