ABSTRACT

Title of Thesis:	A MODEL FOR EMBEDDED ANTI-RACISM INSTRUCTION IN AN UNDERGRADUATE TECHNOLOGY DESIGN COURSE
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Racism and other forms of bias in technology design have significant social ramifications. Decisions made, technology developed or not, the inclusion or exclusion of minoritized and marginalized voices in design and user testing – impact society and individuals. Understanding the impact of systemic racism and personal bias on decisions made by individuals with the knowledge and skills to create, manipulate, and control technology is imperative to the welfare of minoritized and marginalized individuals and the broader society. Ensuring that professionals are well-trained and understand their responsibilities and the power they wield is the purview of university Information Science programs.

By creating and implementing a suite of course materials, this study seeks insight into student engagement with anti-racism instruction to understand better the efficacy of this type of instruction in practice. The study has the potential to identify new methods for the instruction of anti-racism and other anti-bias topics in technical courses. In doing so, we can combine the Human-Computer Interaction (HCI) concept of "design for all" with the Critical Race Theory

(CRT) idea that it is not enough to understand the social situation; we must strive to change it, to improve it.

A MODEL FOR EMBEDDED ANTI-RACISM INSTRUCTION
IN AN UNDERGRADUATE TECHNOLOGY DESIGN COURSE

By

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Dedication

  I dedicate this thesis to my partner in life, Brian, whose support and encouragement during my graduate studies, research, and writing have been instrumental in my ability to complete this work. I also dedicate this work to my sons, Owen and Artemis, who have educated me throughout their lives, teaching me to see the world from their perspectives. Thank you for your belief in my ability to start a new career and continue my education.

Acknowledgments

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List of Abbreviations

ABAR: anti-bias / anti-racism

ARTS: Anti-Racist Teaching Seminar

BIPOC: Black, Indigenous, People of Color; used to describe groups of individuals who are not

    considered to be White.

CRT: Critical Race Theory

HCI: Human-Computer Interaction

Chapter 1: Context of the Study of Anti-racism Instruction in Information Science

1.1 Introduction

    Racism is pervasive in the United States. It is systemic. So much so that many in our society do not see it. One of the five tenets of Critical Race Theory is that "racism is ordinary, not aberrational" (Delgado & Stefancic, 2017). It is this ordinariness of systemic racism that is so insidious and makes it difficult to overcome. Information and Computer Scientists like to believe that technology is pure - neutral, somehow separate and protected from the faults of society. We believe that technology is not impacted by systemic racism or bias. Likewise, we believe that technology does not impact systemic racism except perhaps positively. But, as Mehran Sahami from Stanford said, "Technology is not neutral. The choices that get made in building technology have social ramifications" (Knight, 2018).

    As technology is not neutral and in many ways reflects the society in which it is created, "racism is pervasive and ordinary in our society's digital platforms and the larger socio-technical systems in which they are embedded," and we must be aware that "the technology sector's color-blind tendencies… reinforce racist disparities" (Ogbonnaya-Ogburu et al., 2020). Racism in artificial intelligence (AI) is a widespread problem, from its use to target individuals in Black and other communities of color to errors in facial recognition of Black faces. But AI is not the only area of technological design where racism has negative impacts. "Color-blind tendencies" in technology design, specifically in user experience (UX) and user interface (UI) design, impact the products created and make invisible the needs and voices of large portions of our society. We cannot claim to be universally inclusive if we do not actively seek to include the needs and

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perspectives of marginalized and oppressed communities in the design and creation of technology.

Prior study at the University of Maryland - College Park (UMD) of the links between the personal biases of technology designers, bias evident in the technology they create, and feelings of exclusion and discrimination in the user community led to more recent research into student experiences of and education in the effects of bias on technology. That research determined that "technology design education does not yet teach students how to effectively avoid embedding their unconscious social and cultural biases into artifacts they design and build" (Fitzgerald, 2020). Instruction in personal and professional ethics in targeted courses, although exemplary, has not been sufficient to ensure that Information Science students understand systemic racism, their personal biases, and the impact of those biases on the technology they create.

To equip students with the skills needed to reduce the adverse effects of individual bias and systemic racism on technological design, Information Science (IS) and Computer Science (CS) programs and individual instructors must incorporate effective anti-racism instruction into technology design courses. As teaching faculty, we must help our students understand the power to shape and alter society that they will have as professionals. Information scientists have virtually unlimited access to and control over a substantial and growing array of technologies. How does society know it can rely on the information professionals to whom it entrusts the design and implementation of these technological tools? How does an information professional ensure that personal and systemic racism does not adversely impact their work? How do they understand and define what racism and, to a broader degree, bias in information science means?

A decade ago, Harris et al. wrote that "it is only in relatively recent years that there has been a growing appreciation of the need to afford the topic of ethics and social responsibility a

prominent place within the information systems curriculum," but Nielsen introduced the concept nearly four decades earlier in "Social Responsibility and Computer Education" (Harris et al.,2011; Nielsen, 1972). More recently, universities such as Stanford, Harvard, MIT, UMD, and others have incorporated ethics courses into Information and Computer Science curricula. The continuing expansion of technology into our daily lives and issues of racist algorithms, user interfaces, and other products of technological design indicate that more specific instruction in racism and anti-racism is needed.

1.2   Research Questions

Much of the curriculum development in anti-racism instruction is formative. It includes coalition building and co-design efforts, such as in the Anti-Racist Teaching Seminar (ARTS) in the College of Information Studies at UMD. This study steps into the gap in anti-racism instruction in technology design courses to investigate student receptivity and engagement with the topic of anti-racism in an embedded format. The goal is to understand the efficacy of more holistic instruction on the subject of anti-racism in undergraduate technology design courses. The research can provide valuable insight into the disconnect between education and practice and lead to more effective course materials for technology design courses. The timing of this study is especially relevant as there is growing public concern over the misrepresentation and lack of representation of marginalized groups in technology design. The discipline of Information Science must expand and diversify the field. To do this, we cannot continue to be color-blind and blind to the systemic oppression in the United States that is perpetuated in the technology we design.

This study seeks to understand:

RQ1.   How do measures of student self-reports of knowledge or interest change during an undergraduate technology course with embedded anti-racism learning modules?

RQ2.   How do students describe their experiences with the learning modules and the impact of the learning experience on their future design decisions?

RQ3.   Do students demonstrate an understanding of and ability to implement effective anti-racism design practices?

1.3   Positionality Statement

I spent most of my career designing, programming, creating, developing, and managing software and databases. My understanding of the ethical responsibilities of an information professional is grounded in the introduction to an ethical code that I received as an undergraduate student member of the Association of Computing Machinery (ACM) several decades ago. As a software analyst and database designer, I had extensive control of the data of numerous clients and employers throughout my career. I had a reputation for honesty, integrity, and ethical behavior as a professional but no formal academic training in information or data ethics. Recently I changed careers and became a lecturer in Information Studies at UMD. In the courses that I teach, I have the opportunity and responsibility to educate the next generation of information scientists. It is important to me as an instructor that I understand how to incorporate instruction in ethics and social justice into my courses to prepare students for their professional responsibilities to collect, house, manipulate, and analyze data and create new technology.

These factors motivated me in my studies as a Human-Computer Interaction Master's student to investigate how instructors incorporate diversity, equity, inclusion, and ethics into the curricula of information science courses, specifically technology design, and how students

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engage and experience these topics. In my early studies, I began with a broad view of ethics. However, in working with my advisor, researching available literature and practices, learning from the experienced instructors in the courses I took as a graduate student, and seeing events in popular media, it became clear that a more narrow, focused approach was needed. Consequently, my research is based on my desire to understand the consequences and effects of racism and anti-racism in technology and the possible educational approaches to combatting these issues through embedding learning materials in undergraduate technology design courses.

I have to consider my identity and positionality in approaching this research topic. As a relative novice in academia, I must consider whether I am asking questions already asked and effectively answered. Are these questions relevant only to me, or are they relevant in the broader context of academia and society? In pursuing this research, I must be diligent in ensuring that I understand the topic from an academic perspective in addition to a practitioner's perspective. But in approaching the issues of racism and anti-racism, other aspects of my identity are equally important. As a White, cis-gender, heterosexual, female baby boomer, my personal biases related to anti-Black racism and the systemic racism inherent in the culture in which I was born, educated, and continue to live and work are relevant to this work. As the mother of two indigenous Latinx sons, I must also acknowledge my potential for personal bias based on how our society, government, and educational systems treat them. As the person I am, I must consider my responsibilities in conducting this research and always remain cognizant of inhabiting a space that is not mine. In academia, minoritized voices and faculty, especially those of Black academics, are grossly underrepresented.

In pursuing this research, I contemplated whether I was exacerbating those problems and whether I had the authority to continue. The population of White academics has a responsibility

to open and make space for Black scholars and members of other minoritized and marginalized groups to grow and thrive. "Pervasive structural relationships of power and powerlessness," voice and voicelessness "tend to foster ideological justifications for the maintenance of such relationships" (Narayan, 1995). By conducting research in this space, I walk the tightrope of making valid contributions and remaining "genuinely attentive and responsive to the needs, interests, and welfare" of the members of minoritized and marginalized groups, whether faculty or students (Narayan, 1995). I must be mindful and active in elevating the voices of Black academics and information professionals.

1.4 Outline

The organization of this thesis follows the research process for this exploratory study of embedding anti-racism instruction in an Information Science technology design course (Figure 1).
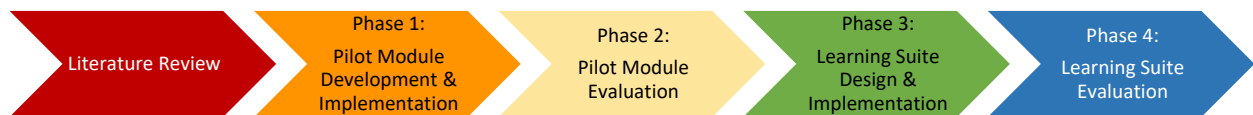
Figure 1 - Research and Thesis Process

My approach to embedding anti-racism instruction in technology design courses began with a small-scale pilot study through the development, implementation, and evaluation of a single anti-racism module in a technology design course in the College of Information Studies at UMD, INST362 – User-Centered Design. The post-activity participant interviews led to the design of a suite of five anti-racism learning modules. This research encompasses the pilot study, the subsequent learning suite design and development, the implementation of the learning

modules in the Fall 2021 semester INST362 course, and the investigation of student experiences

and changes in their understanding of the impact of racism on technology design.

The thesis begins with the literature review in Chapter 2, which establishes the context

for this exploratory study of anti-racism instruction embedded in Information Science technology

design courses. The chapter discusses issues of bias and racism in technology, the relationship

between Human-Computer Interaction (HCI) and racism, the state of diversity, equity, and

inclusion (DEI) instruction in technology design courses, anti-racism instruction in Information

Science curricula, and the place for Critical Race Theory (CRT) in this space.

Chapter 3 outlines the first two phases of the study, explaining the pilot study created and

conducted to introduce undergraduate students and their instructors to anti-racism instruction in

technology design. This chapter also presents the themes and findings from the pilot study.

In Chapter 4, the findings from Phase 2 were used to inform the design of a suite of anti-

racism learning modules (Phase 3). This chapter features the design process of the five learning

modules for the life-cycle of a user-centered design course and the co-design process via the

ARTS. The chapter concludes with a discussion of implementing the embedded anti-racism

instruction in multiple teaching formats of the selected Information Science technology design

course. Chapter 5 continues the third phase of the study by describing the methods for participant

recruitment, data collection, and evaluation of the learning modules via student surveys and

student work-product analysis. Chapter 6 (Phase 4) explores the findings from the surveys and

analysis of student work products conducted and gathered in phase 3 to answer the research

questions. Finally, Chapter 7 concludes by examining the limitations of this study, potential for

future research, implications of the study's findings, and recommendations for instructors in

technology design courses who might be interested in incorporating anti-racism instruction into their technology design course curriculum.

Chapter 2:   Literature Review

This research is situated in an ongoing history of research into concerns about bias and racism in technology and the responsibility of university Information Science, Computer Science, and other programs to prepare students to address these issues in their professional work. Rising concerns about racist technology have prompted calls for curriculum development and instruction of ethics and diversity, equity, and inclusion (DEI) topics at the university level (Harris et al., 2011; Nielsen, 1972; Ogbonnaya-Ogburu et al., 2020;). The literature examined in this chapter addresses concerns about racism in technology, the potential impact of anti-racism instruction in university technology design curricula, and the potential contributions of Critical Race Theory tenets in designing anti-racism learning materials. Existing practices of teaching ethics and DEI topics, including anti-racism and the potential of HCI to counteract racist technology, are also investigated.

2.1   Racism in Technology

Racism in technology design has individual and societal ramifications. Systemic racism and personal bias influence information and computer scientists' design decisions and technological creations (Bajorek, 2019; Benjamin, 2020; D'avila, 2018; Kantayya, 2020; Mone, 2016; Palaniyappan, 2020). The resultant technology has far-reaching effects on the welfare of individuals and communities (Buolamwini et al., n.d.; Erete et al., 2021; Lentin, 2019; Steele, 2011; Terp, 2020). Technology is frequently assumed to be neutral, but it reflects a society that is inherently racist (Hankerson et al., 2016). Technology is adversely affected by the personal biases, and systemic racism designers bring to technology design. There are direct societal impacts from the technology used in our society and that technology is not neutral (Knight,

2018). Ihudiya Finda Ogbonnaya-Ogbura et al. (2020) and others specifically addressed the pervasive existence of racism in technology.

Popular media and news are awash in articles about incidences of bias and racism in technology from Google search engine "errors" that label Black men as "Gorillas" and sensors in water faucets that fail to recognize darker skin tones to algorithms that target or filter Black names in law enforcement profiling and job applicant pre-processing (Gordon, 2020; Hankerson et al., 2016; Mone, 2016). Racism in artificial intelligence (AI) is a widespread problem in facial recognition, voice recognition, and search engine software (Bajorek, 2019; Buolamwini et al., n.d.; Kantayya, 2020; Noble, 2018). However, AI is not the only area of technology design where racism exists and has unsurprising negative consequences. Human-Computer Interaction (HCI) has problems too. The color-blind tendencies of user experience (UX) and user interface (UI) design result in biased and racist products and software that ignore the needs and silence the voices of the minoritized and marginalized in large portions of society (Noble, 2018; Ogbonnaya-Ogburu et al., 2020).

2.2 *Human-Computer Interaction and a Critical Theory of Race*

In 2008 Patrick Feng and Andrew Feenberg proposed a framework for a critical theory of technology. Their conceptualization is of a template that coordinates technical considerations with societal considerations. It acknowledges "a philosophy of technology open to cultural considerations" with technology design as "a function of the way in which things appear to be 'natural' to the designer" (Feng & Feenberg, 2003). The evidence of bias and racism in existing technology requires designers to consider the cultural structures– the history and societal practices that impact current design. In the United States, the history, societal practices, and cultural systems are inherently racist. A society's cultural background affects technology. It is

culturally biased in large part due to what Feng and Feenberg refer to as a "naturalness" or

"taken-for-granted understanding," a concept that in Critical Race Theory is "ordinariness"

(Delgado & Stefancic, 2017). There is strength in their attention to technology history and

culture's impact on current design. Their directive is to question technology and consider how we

can create designs that are "humane and liberating rather than oppressive and controlling" (Feng

& Feenberg, 2003). Despite their thorough discussion of traditional design philosophy and the

creation of a framework that could lead to more equitable technology, the ultimate weakness of

the critical theory of technology is similar to the gaps identified in critical legal studies by the

early scholars of Critical Race Theory. Like critical legal studies, the critical theory of

technology focuses too much on broad cultural values and ignores the dominant social group's

potential damage to marginalized and minoritized social groups (Bell, D., 2018; Delgado &

Stefancic, 2017). This is no less true for the human-computer interaction (HCI) community than

any other group within the broader arena of technology design (Himmelsbach et al., 2019;

Winchester, 2020).

In the past few years, Black women academics and practitioners in HCI have raised their

voices to call the HCI community to become "attuned to issues of race" (Ogbonnaya-Ogburu et

al., 2020). HCI must recognize the lack of diversity in the community and acknowledge the

dangers of color-blind racism to minoritized community members and the technology created. In

"Critical Race Theory for HCI," Ihudiya Ogbonnaya-Ogburu, Angela Smith, Alexandra To, and

Kentaro Toyama (2020) argue that Critical Race Theory can provide a lens through which to see

the racial disparities of the HCI community and a mechanism for supporting and advancing

inclusive research and design. The authors maintain that investigating ourselves, our practices,

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and our assumptions in the HCI community from the perspective of CRT will help us recognize "the pervasiveness of racism in our digital systems" (Ogbonnaya-Ogburu et al., 2020).

To use a CRT lens, whether critiquing ourselves in HCI or engaging in anti-racism instruction, it is essential to know the central tenets of the movement: 1) the ordinariness of racism, 2) the idea of interest convergence, 3) race is socially constructed, 4) differential racialization, and 5) the importance of storytelling and counter-storytelling (Delgado & Stefancic, 2017). Kimberle' Crenshaw proposed an additional tenet, that of intersectionality (Crenshaw, 2010). Ogbonnaya-Ogburu, Smith, To, and Toyama acknowledge that HCI understands the value of storytelling but pushes the community to do more to elevate voices of color.

HCI has an established reputation for and dedication to universal design, i.e., technology that works for everyone. The HCI community has engaged in social justice and inclusion via accessible design. These practices align with the idea of interest convergence since HCI's reputation benefits. However, Ogbonnaya-Ogburu and their co-authors push the community to be more than aspirational. CRT is, after all, as much a social movement as a theory. HCI's practice of incorporating user and community participation in user-centered design should be actively directed to racism in design, provided care is taken not to succumb to color-blind racism that has been the model of liberal anti-racism for the past few decades (Bonilla-Silva, 2017). As HCI professionals, academics, and researchers, we must also keep in mind that working with Black people and communities is not the same as fully engaging in conversations about racism and the impact of racism on technology (Erete et al., 2021). Adapting critical race theory for HCI as Ogbonnaya-Ogburu et al. propose can provide a framework to enhance HCI strengths.

2.3 The State of DEI Instruction in Information Science – Ethics with a Side of Social Responsibility

The importance of ethical practices in technology design has been understood since the early days of professional organizations such as the Association of Computing Machinery (ACM), as Codes of Ethics were created to voice the organization's stated focus on ethics (Anderson et al., 1992). Likewise, there have been discussions on the importance of ethics instruction in computer science programs since the early 1970s. Consequently, research into ethics instruction in CS programs at various universities in the United States has been widespread. However, the research has customarily focused on creating ethics courses in CS programs and adapting those ideas for IS programs (Fiesler et al., 2020). Information Science is not Computer Science lite and consequently requires the development of instruction in ethics and social responsibility targeted to the specific needs of IS students. As information systems become more pervasive, there is a growing movement to address the ethics and social responsibility educational needs in Information Science to combat risks to vulnerable minoritized and marginalized populations with a directive to make ethics instruction "a core component of the curriculum for all IS students" (Harris et al., 2011).

Researchers and instructors realize that general ethics instruction, principally in elective courses, is insufficient to infuse ethical understanding and behavior in information professionals or combat the effects of racism in technology design. In their research to investigate how students in information and computer science programs understand technology's ethical impact, Prioleau et al. found a gap in connecting ethics to technology and technology design (Prioleau et al., 2021). The authors noted that "being informed does not always lead to change in behavior or to implementation" and suggested incorporating design training into ethics instruction. As early

as 1997, C. Dianne Martin understood the need to equip technological professionals "with the skills and the experience in wrestling" with social impact and ethical problems (Martin, 1997). These researchers identified the disconnect between instruction and practice.

The awareness of this disconnect has prompted a search for an understanding of what is meant by ethics instruction and how it is taught. Casey Fiesler, Natalie Garrett, and Nathan Beard conducted a qualitative analysis of technology ethics courses to understand trends and goals in computing ethics coursework (Fiesler et al., 2020). Their findings indicate that there has been an increase in emphasis on ethics instruction in various disciplines in the past half-decade, with the most significant impact on Information Science and Computer Science. There is also growing interest in "integrating ethics content into existing technical classes." The Embedded EthiCS pilot program at Harvard is one example of how this methodology is implemented in a Computer Science program (Grosz et al., 2019). However, there is a lack of consistency across curricula with a wide range of topics, many of which are conceptual rather than providing practical application of the concepts.

The growing understanding of the problems created when IS students are not taught the importance of ethical practices and social responsibility has prompted some to advocate for greater emphasis on instruction that helps students develop ethical reflexivity (Stahl, 2011). Developing ethical reflexivity or an ethical "muscle memory" requires students to understand the benefits of information ethics to themselves and society and practice ethical reflection. The increased focus on ethics, diversity, equity, and inclusion (DEI) instruction in Information Science is a laudable goal. However, the topics covered in such teaching are broad, ranging from privacy to professional, environmental, and social responsibility. Such a wide range of topics can be overwhelming for students and make developing practical skills difficult. The field of

technology is rapidly growing and changing. The topics in information ethics also rapidly change, which creates additional challenges for researchers and instructors seeking to develop effective instructional interventions and students attempting to focus on a constantly evolving landscape of issues (Floridi, 2008).

In the discussions of information ethics and social responsibility, something is missing that should be central to any discussion of social responsibility, diversity, equity, and inclusion: racism and anti-racism. In sharing his concept of "Design For the Margins" as a method of design that centers those who are most marginalized, thereby including the marginalized and the majority, Ceasar McDowell said, "Within the structure of the United States, it is blackness that defines the fundamental marginal group. The marginalization of blacks is in the origin story of this country and the current politics of this country" (McDowell, 2018). The centrality of the marginalization of Black people has led to repetitive, negative impacts in the design and use of technology. Therefore attention to racism and anti-racism must be centered in technology design courses. To understand anti-racism instruction, we must understand the two essential and related terms – systemic racism and anti-racism.

- Systemic racism involves the "complex interactions of culture, policy, and institutions that create and maintain racial inequality in nearly every facet of life for people of color" and Black people (Pacific University, 2021).
- Anti-racism is "the active process of identifying and eliminating racism by changing systems, organizational structures, policies and practices, and attitudes, so that power is redistributed and shared equitably." (CSHA, 2021; Nkrumah, 2022; The CARED Collective, 2020)

Models that use embedded instruction, such as Harvard's EthiCS and others, offer a template for programs and instructors who want to move beyond standalone targeted courses. However, these programs mainly focus on ethics as a general topic (Fiesler et al., 2020; Grosz et al., 2019). The existence of racism in technology with incidences such as those highlighted by Joy Buolamwini and others argue for a more definite focus on bias and specifically on racism (Berman & Paradies, 2008; Buolamwini et al., n.d.; Kantayya, 2020; Lai & Wilkins, 2019). In this goal, there is inspiration in design and engineering curricula from the work of faculty and researchers, including Caesar McDowell, Logan D. A. Williams, and Woodrow Winchester. As McDowell (2018) says, racism is our origin story. By addressing racism in design, we can begin to solve some issues and build frameworks for embedded instruction that can be adapted to address the other problems of bias in technology design.

2.4   Summary – Engaging in Anti-Racist Instruction

Research and curriculum exist that addresses the general topic of information ethics and the more specific topics of diversity, equity, and inclusion in university-level education in Information and Computer Science (Fiesler et al., 2020; Grosz et al., 2019; Kules, 2018; Saab, 2010). However, there is a noticeable gap in anti-racism instruction. With recent events, including media coverage of George Floyd's murder and the subsequent trial of Chauvin, and articles about the widespread problem of biased and racist technology, there is increased interest in including race and racism in Information and Computer Science curricula.

This interest has been essentially aspirational despite calls to "design for the margins," raise issues of race and racism "in a way that is heard by all participants," and "define, or name, barriers to anti-racist and inclusive institutional cultures in order to dismantle them" (McDowell, 2021; Ogbonnaya-Ogburu et al., 2020; Patel, 2020). These aspirations must be more than

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momentary and more than virtue signaling for White instructors. As educators in HCI and Information Science, we must recognize "that this is the work of years," not moments (Reddy, 2020). Targeted courses and courses using embedded instruction are two possible methods of introducing race, racism, and anti-racism into Information Science curricula. Other methods can include college or department-sponsored extra-curricular activities such as hackathons and data challenges and purpose-created interest groups that can also be sponsored and supported by the college or department. Creating a curriculum using embedded anti-racism instruction does not attack the usefulness or preclude the continuation of targeted courses. Likewise, exploration of other exposure methods can add to the learning experiences of Information and Computer Science students.

The current study focuses on implementing and evaluating embedded anti-racism instruction in Information Science technology design courses. In creating curricula and interventions for anti-racism embedded instruction, the motivation for the Harvard EthiCS pilot is relevant if we substitute "anti-racism practices" for "ethical reasoning" and make those practices "a central element in the curriculum" (Grosz et al., 2019). Although challenging for instructors and students, such instruction can be enlightening, thought-provoking, and rewarding. Developing a curriculum for embedded instruction should take the strengths of existing technology design courses and add anti-racism interventions throughout the curriculum rather than tacking on materials to fulfill an instructor or department's social justice bucket list. Thoroughly integrating anti-racism instruction into the flow of existing courses can negate the argument that there is "insufficient time to incorporate diversity content" (Fitzgerald, 2020).

The Critical Race Theory framework for HCI proposed by Ogbonnaya-Ogburu et al. is a valuable model for expanding anti-racism instruction in the Information Science curricula. As

instructors develop new curricula to embed anti-racism instruction in technology design courses, following this framework or something similar is imperative. The suite of anti-racism learning modules I designed to embed in the undergraduate technology design course can begin to fill the gap in DEI instruction by providing theory-based, validated materials and following the CRT framework for HCI. The learning materials in the modules follow CRT tenets: acknowledging the ordinariness of racism, incorporating the concept of interest convergence and how it plays out in technology design, and centering Black academics, professionals, authors, and designers through storytelling and counter-storytelling (Delgado & Stefancic, 2017; Ogbonnaya-Ogburu et al., 2020; Pulliam, 2017).

The recent focus on faculty support groups such as the ARTS at UMD can provide instructors with the support needed to develop relevant course materials and mentors to help overcome the "fear of unintentional faux pax in the classroom" (Fitzgerald, 2020). Just as no single course with embedded ethics instruction will create ethically-minded technology designers, no single course with embedded anti-racism instruction will create anti-racist designers (Grosz et al., 2019). These early efforts need to be expanded to include relevant interventions in curricula throughout the department or college to provide students with the support to build their skills and develop the cultural competencies necessary to combat racist technologies and create viable alternative technologies in their professional careers.

Chapter 3: Pilot Study – Bias and Racism in Design

A single anti-bias / anti-racism (ABAR) learning module was created to inform the direction and scope of the development of a suite of learning modules for implementation in the technology design course in Phase 3 of the research on embedding anti-racism content and instruction in Information Science technology design courses (see Figure 1). To gain detailed insight into undergraduate Information Science students' receptivity and experience learning about bias and racism in technology within a mature technology design course, I created a pilot learning module on bias and racism in technology design and an associated research project. Before implementing the learning module, the research project was submitted to the IRB and approved (Appendix P).

3.1   Research Questions

The research questions that I sought to answer in the pilot study were

RQ1. What activities, approaches, and modules on diversity, inclusion, and bias can improve student understanding of the link between personal and systemic bias and the resultant bias in technology design?

RQ2. How can a holistic approach to teaching diversity, inclusion, and anti-bias in technology design courses impact student receptivity and understanding of their responsibilities as information professionals?

3.2   Learning Module Design

Before I began work on the Bias and Racism in Design module, I examined current practices in diversity, equity, and inclusion instruction in Information Science and Computer

Science. That research is included in the literature review in Chapter 2. In addition to my experience as a faculty member in the College of Information Studies, where I teach and design courses and course materials for the students in undergraduate technology design classes, I worked with the User-Centered Design course instructors to obtain feedback and critique of the learning module before its final approval.

The Bias and Racism in Design module used in the pilot study (Appendix A) was created to introduce the topic with the stated learning outcome – "You will be able to demonstrate how racism and bias manifest in technology design." The learning module included three short articles by experts in design and anti-bias/anti-racism – "On Racism and Sexism in Branding, User Interface, and Tech" (Fard, 2021), "Black-Centered Design is the Future of Business" (Winchester, 2020), and "Why Your Design is Biased" (Takahashi, 2018). Students were prompted to choose from a list of products and, using the knowledge gained from the readings, complete a worksheet of ten "Things to Consider." Course instructors provided feedback to students based on the rubric included in the learning module.

3.3   Pilot Study Implementation

When the learning module was complete, it was reviewed by my advisor and the four instructors of the UMD Spring 2021 INST362 – User-Centered Design course. At that point, it was introduced into the course as an extra credit assignment. Once the assignment closed, participants were recruited from the students who completed and submitted the work. Assignment submission and semi-structured interview data were gathered from students who agreed to participate in the study. There were a total of N=10 student submissions and interviews. Based on consultation with my advisor, we consider this an acceptable sample size for the formative nature of the pilot study.

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3.4   Sampling Method and Participant Recruitment

The sampling method for this study was purposeful sampling. Participants were intentionally selected for the pilot study from the active student population of four sections of the Spring 2021 semester INST362 – User-Centered Design course. Student participants were recruited via instructor emails and announcements posted on the Canvas (ELMS) learning management system in the Spring 2021 INST362 – User-Centered Design course sections. The full text of the student invitation can be seen in Appendix B. Instructors were asked to share the recruitment message with enrolled undergraduate students of the course who submitted the extra credit assignment. Eligible students were required to be at least 18 years of age. Although purposeful sampling was used, participants voluntarily responded to the recruitment efforts, so there is potential for self-selection bias.

All participants in the pilot study engaged remotely. Participants completed the consent form and the pre-interview survey (Appendix C) before scheduling and attending the online video call via Zoom. Participants were given the opportunity to read the consent form and ask questions before beginning the semi-structured interview. Once that process was complete, the interview began and was recorded using the Zoom video call software. Recordings include videos of participants who chose to have their cameras on during the interview and audio for those who decided to leave their cameras off. I had my camera on during the sessions, but individual participants were given the option of having their cameras on or off to protect their privacy and increase their comfort with the process.

3.5 Semi-Structured Post-Activity Interview

The post-activity interview was designed to gauge student receptivity to the inclusion of ABAR learning modules in a technology design course where the traditional emphasis has been on the concepts and skills related to the primary subject matter of the course. I conducted a semi-structured interview with each of the 10 participants. The interviews took place via Zoom with both audio and video recorded. Post-activity interview questions probed

- students' self-reported knowledge of and experience with bias and racism before participating in the learning module,

- students' pre-assignment expectations for the learning module,

- whether students exhibited an understanding of the existence and impact of bias and racism in technology design after completing the module,

- which aspects of the learning module students found most engaging and effective, and

- student views of the prospect of embedding anti-racism learning modules in technology design courses in the iSchool.

The entire collection of questions is shown in Appendix D, including the following questions.

- Tell me about your knowledge of bias and racism before you participated in this learning module.

- What questions about bias and racism in technology design do you still have after completing the exercise?

- Tell me how the module was or was not beneficial in helping you recognize the existence of bias in a product.

- How can incorporating such modules and exercises in technology design courses strengthen your understanding of these topics?

- How would you change this exercise to make it more effective and engaging for yourself and other students?

3.6 Findings

After the interviews, the audio recordings were transcribed using the Otter transcription software with manual corrections of mistakes in the automatic transcription process (Otter.ai, Inc., n.d.). After the transcription, the Delve qualitative coding tool was used to perform descriptive and in vivo coding with further analysis to identify themes common throughout the transcripts (Ho & Limpaecher, n.d.). The transcripts were reviewed to compare similarities and differences in responses between participants. The main themes that emerged are presented in Table 1.

Table 1 – Themes from Pilot Study Semi-Structured Interview

Themes	Description
Vague initial knowledge of the topic	Lived experiences affect initial understanding. Participants who self-identified as Black had greater pre-module understanding of the general topic based on their lived experience. "I didn't know a lot. I would say, what does that have to do with technology. I never put the two together" – P10.
Everyone's lived experience is different	The lived experiences of individuals differs and those differences affect knowledge and understanding of racism and anti-racism.
Increased post-activity understanding	Increased understanding includes awareness of the need for mindful design, unintended racism, and the systemic impact of systemic racism. "I feel like I'm more aware of like, the biases and racism in products" – P07.
Limited exposure to university courses	Participants noted limited exposure to ABAR instruction and conversations in university courses.
Desire for more instruction	Participants expressed a desire for more ABAR instruction at multiple levels and in multiple situations, including university-

	wide and in "most iSchool courses" – P09. Several participants indicated that one exercise is not enough.
Desire for embedded instruction in technology design courses	Participants want ABAR instruction in technology design courses throughout the semester, suggesting small weekly exercises.
Desire for variety of activity types and formats in anti-racism learning modules	A variety of activity types and formats can increase student engagement and receptivity. Including videos, discussions, "Miro board to share ideas" – P08, reflection and retrospection, affinity exercises, partner/small group work, and student interactions can make ABAR topics more interesting and effective.
Importance of classroom environment	Instructor attitudes are important to creating the proper classroom environment needed to work with sensitive topics. "As long as you're trying and also making sure you come off as genuine. That can definitely make a lot of difference" – P05.
Students see the benefit of anti-racism instruction	"Even when I move on to a class, it's not related. I'll think about … How can this be used in the next step? And the next step above that" – P10. "In the companies that I work for having that understanding, very beneficial to my career development" – P07.

The learning exercise that was the subject of this pilot study was the first experience for many of the participants in having in-course instruction about anti-bias and anti-racism in technology design. Participants expressed a desire to have anti-racism instruction included in courses throughout the university but more directly in their iSchool courses.

Participants also expressed frustration with the perceived need to make anti-racism instruction more polite or palatable. One participant expressed that frustration in this way,

I think a lot of words are used to make racism more comfortable, people use "bias." Or they'll say, sometimes just be like, "It's not being nice to other people." Racism isn't just treating people differently because of the color of their skin. It's in health, it's in tech, it goes down to like our livelihood. It's a life or death situation. … So I don't like it when people say bias. Call it what it is – P10.

Participants lived experiences, knowledge of the topic, and experiences were different depending on the self-described identity of individual participants. Unfortunately, not all participants offered their racial and ethnic identity information. Since the question was not on the original Informed Consent or in the interview protocol, I did not introduce the inquiry into the sensitive conversations of the semi-structured interviews. Consequently, in Phase 3, the main study includes gathering demographic data.

3.7 Conclusions from the Pilot Study

Based on the findings in the pilot study, a suite of five learning modules was created and implemented as embedded assignments in the Fall 2021 INST362 – User-Centered Design course sections. The differences in participants' lived experiences related to identity prompted the inclusion of demographic questions to gather data about participants' racial, ethnic, and gender information in the student surveys. I determined to spend the summer of 2021 as a member of the College of Information Studies ARTS in a co-design effort with other members of the ARTS, including iSchool students and INST362 instructors, to create, review, and prepare the modules in preparation for implementation in the Fall 2021 semester.

Chapter 4:   The Design of a Suite of Anti-racism Learning Modules for a

      Technology Design Course

This chapter describes the design of the five-module anti-racism learning suite

implemented in the UMD College of Information Studies' undergraduate User-Centered Design

course during the Fall 2021 semester. I begin by introducing the factors that influenced the

decision to create multiple learning modules. That is followed by information about the role of

CRT in course material design and inclusion. I then cover primary design considerations,

including the Read/Watch/Design framework, module implementation in multiple teaching

formats, and the creation of interventions to coordinate with team projects. I discuss the

experience of co-designing in the Anti-Racist Teaching Seminar during the summer of 2021. I

present the five learning modules with examples of materials and outcomes before concluding

with a discussion of the process of implementing the modules in the four course sections of the

Fall 2021 course. Prior to implementing the learning modules and the study, the research was

submitted to the IRB and approved (Appendix Q).

4.1   A Suite of Anti-Racism Learning Modules

A suite of five anti-racism learning modules was created and presented to students at

crucial design phases in the User-Centered Design course. Multiple factors influenced the

determination to develop and implement a full suite of modules. The first was my research into

existing practices of teaching ethics, specifically the DEI topics of racism and anti-racism, in

Information Science and Computer Science. In the past several years, Information and Computer

Science programs at universities across the United States have begun to consider the importance

of ethics, diversity, equity, and inclusion instruction for students in their programs. Of those, a

few, Harvard EthiCS among them, are experimenting with embedding ethics and DEI topics throughout their program curricula (Fiesler et al., 2020; Grosz et al., 2019). Despite the continuing impact of systemic racism in technology, resources about Information Science, Computer Science, or other technology programs incorporating the topics of racism and anti-racism are scarce. Leroy L. Long III at Embry-Riddle Aeronautical University has created a starter kit for engineering classrooms. The kit lists 20 action items that serve as a "starting point toward creating anti-racist engineering classrooms for 2020 and beyond" (Long, 2020). With the creation of the ARTS in 2021, the College of Information Studies at UMD became a voice in the movement to incorporate anti-racism instruction into Information Science and Computer Science curricula.

The findings from the pilot study in the Spring 2021 semester's INST362 – User-Centered Design course (Chapter 3) supported my approach, indicating that students desire additional learning modules focused on racism and anti-racism. Interview responses indicated that modules should be holistically embedded into the course to support both technical and anti-racism learning needs. As participant P01 said, "incorporating these kind of modules within the context of the project will definitely create a very clear connection between the readings and then actually applying it to your work." Participant P02 emphasized the need, "if you have a module like this in every stage, I think that'd be really helpful."

An unexpected motivation for creating the suite of learning modules was inspired by pilot study participant P05, "when you truly try to embed the topic of bias into everything that shows that teachers do care, or the department cares, or the school cares." So, in addition to providing Information Science students with the skills and tools to be anti-racist designers and information

professionals, departments and instructors have the opportunity to create more welcoming academic environments for students from minoritized and marginalized groups.

4.2   Critical Race Theory and User-Centered Course Design

Incorporating the student participants' feedback from the pilot study into the creation of the suite of learning modules adheres to the practice of user-centered design by considering the opinions and experiences of the students in the creation of the new modules. In addition to articles included in the extra credit learning module implemented in the pilot study (Appendix A), the anti-racism suite includes other media forms. Those media include videos, audio, and blog posts. The decision to include various media formats was influenced by the educational implications of Garner's theory of multiple intelligences and pluralization, "the idea that topics and skills should be taught in more than one way" (Marenus, 2020). Feedback from participant P04 in the pilot study, who said, "showing videos for examples is better… students don't read all the text. They just skim through it" also supported this decision.

The five learning modules' readings, videos, and other resources use the CRT practice of narrative and storytelling to help students achieve a deeper understanding and visualize the consequences of racism in technology (Bell, L.A., 2020; Delgado & Stefancic, 2017). The content of the modules comprises narratives, personal experiences, and professional expertise in the form of readings, videos, poetry, and presentations. Including narratives and expert writings by Black designers, information and computer scientists, and engineers also serve to center their voices and lived experiences in discussing racism and anti-racism in technology design. Racist and anti-racist technology designs are also included to provide students with real-world examples, practice identifying racism in designs, and methods for preventing and correcting those problems. See Table 2 for the readings, videos, examples, and other resources used in the

suite of learning modules. Additional details can be found in the learning modules in Appendices

E – I.

Table 2 - Resource Materials Used in the Learning Modules (readings, videos, and examples)

Module	Readings, Videos, Examples, and Optional Resources
1	• **Reading:** *A brief history of how racism manifests itself in design and how we can learn from it* (Palaniyappan, 2020) • **Reading:** *Black-centered design is the future of business* (Winchester, 2020) • **Video:** *Blind spots: Challenge Assumptions* (PwC, 2017) • **Video:** *AI, Ain't I A Woman* (Buolamwini, 2018) • **Example:** *Shade Finder Quiz* (Fenty Beauty, 2021) • **Optional Resource:** *11 Terms You Should Know to Better Understand Structural Racism* (Aspen Institute, 2021) • **Optional Resource:** *A Hundred Racist Designs: Part Two* (Gordon, 2020) • **Optional Resource:** The Next Generation of Technologists Need a Lesson in Ethics (Knight, 2018) • **Optional Resource:** *Diversity is Not Enough* (McDowell, 2018) • **Optional Resource:** *Colorism* (NCCJ, 2021) • **Optional Resource:** *What is Universal Design* (NDA, 2020) • **Optional Resource**: Critical Alphabet (Noel, 2020b) • **Optional Resource:** *Systemic Bias vs Implicit Bias: Why the Difference Matters When Reviewing the Report by the Ontario Human Rights Commission on Racial Profiling by the Toronto Police Services* (Renee', 2018) • **Optional Resource:** *Why your design is biased* (Takahashi, 2018) • **Optional Resource:** *Design is Diversity: It's Time to Talk About Our Role as Designers* (Teixeira, 2017)
2	• **Reading:** *Combatting Racial Bias in UX Design* (Stevens, 2020) • **Reading:** *How to Conduct Inclusive UX Research [3. Best practices for making your user research more inclusive* (Querini, 2021) • **Video:** *Design for the Margins* (Engagement Lab, 2016; Interaction Institute for Social Change, 2014; McDowell, 2021)) • **Video:** *The White Default* (Harvard GSD, 2020; Iyamah, 2020) • **Optional Resource:** *#GoodTechChoices: Addressing past and current racism in tech and data* (Terp et al., 2020)
3	• **Reading:** *What does design have to do with racism?* (D'avila, 2018) • **Reading:** *Designing with intention: Human-Centered Design in the Age of Racial Reckoning* (Shapkauski, 2021) • **Video:** *The Danger of the Single Story* (Adichie, 2009) • **Example:** Critical Alphabet (Noel, 2020b) • **Optional Resource:** awkward silences Ep #48 – UXR, Diversity, and Inclusion with Randy Duke (Duke et al., 2021) • **Optional Resource:** *The Challenge of Designing for Everyone – Benjamin Evans form AirBnB* (Evans, 2018)

	• **Optional Resource:** *The Upfront Guide to Design Your Inclusive Personas* (Francioni, 2020) • **Optional Resource:** *Coded Bias* (Kantayya, 2020) • **Optional Resource:** *Being Inclusive-minded When Building Products* (Khara, 2019) • **Optional Resource:** *A Designer Teaches People How to See Others Who Are Not Like Them* (Noel, 2020c) • **Optional Resource:** *Envisioning a Pluriversal Design Education* (Noel, 2020a)
4	• **Reading:** *Testing Your Product with a Diverse Audience* (Nguyen, 2018) • **Reading:** *Designing an Inclusive Networking Platform for BIPOC Creatives* (Wu, 2020) • **Reading:** *How design can help with inclusion* (Braga, 2017) • **Video:** *Integrating Inclusion: Google Camera* (Sherman & Google, 2017) • **Video:** *The White Default* (Harvard GSD, 2020; Iyamah, 2020) • **Example:** Critical Alphabet (Noel, 2020b) • **Optional Resource:** *8 Ways the Tech Community is Building Anti-Racist Products and What We Can Learn from Them* (Guidoccio, 2020)
5	• **Reading:** *Removing Bias in AI Pt. 1: The People Problem: Adobe XD Ideas* (Lindberg, 2020) • **Reading:** *Removing Bias in AI Pt. 2: Gender & Racial Bias: Adobe XD Ideas* (Lindberg, 2020) • **Video:** *Designing for a More Equitable World* (Carroll, 2019) • **Example:** Critical Alphabet (Noel, 2020b)

4.3   Design Considerations

4.3.1   Learning via a Read/Watch/Design Structure

The structure of the five learning modules as Read/Watch/Design activities is inspired by

Caro Williams-Pierce's Read-Watch-Play approach to classroom learning. However, it does

violate Williams-Pierce's instruction to avoid the term "learning objective" (Williams-Pierce,

2021). Admittedly, I have much to learn from Williams-Pierce's approach. The concept was

adapted for the INST362 course to a Read/Watch/Design structure. Each module introduces

students to the learning objectives for the module, followed by an overview of the module

content before engaging the students in the Read/Watch/Design activities. The Read activities in

each module include two to three short readings of 2 to 10 minutes in duration. These readings

are followed by the Watch activity with one or two supporting videos that are usually less than 4-minutes in length. The modules wrap up with the Design activity, either an individual activity in Modules 1 and 5 or group activities in Modules 2 – 4.

4.3.2   Implementation in Multiple Teaching Formats

In addition to creating learning outcomes, instructional materials, and exercises to support students in developing skills in identifying and avoiding the pitfalls and consequences of racism in design, I adapted the modules for the multiple teaching formats of the four sections of INST362. Although there was no adjustment to the Read/Watch activities, the Design exercises in Modules 2 - 4 were adapted to fit the constraints of both face-to-face and online course sections. The Module 2 exercise was designed for students in the face-to-face classes to complete as an in-class activity, going out into campus to conduct short user interviews before returning to class to discuss the experience and results of the activity. Understanding that students in online synchronous and asynchronous course sections might not have access to the UMD campus for an in-class user interview exercise, the activity was altered to allow students to conduct the user interviews outside of the class.

4.3.3   Designing Learning Interventions to Coordinate with Team Projects

Another consideration in the design of the learning modules was fitting the modules into a mature technology design course with a full syllabus and major team-based design project without excessively burdening either the instructors or the students with extra work which did not naturally fit the existing instruction, learning outcomes, and activities. For this reason, the design exercises in the three core modules were created as group exercises to be completed within the structure of the existing student project teams. The intent is that the modules will

become holistic parts of the larger learning environment in a technology design course such as INST362 – User-Centered Design. For this reason, the team-based design assignments included a note to the instructors to include the activity "as part of an existing team activity instead of as an additional separate exercise" (Appendices F - H).

4.4   Co-Designing the Modules in the Anti-Racist Teaching Seminar

As a faculty and student member of the ARTS, I collaborated with the other members for advice and critique of the suite of anti-racism learning modules during development. The ARTS was formed and facilitated by Tamara Clegg, Eric Huang, Bill Kules, and S. Nisa Asgarali-Hoffman, faculty and graduate students in the College of Information Studies (iSchool) at UMD during the Summer of 2020. During that summer, ARTS co-existed and was complementary to a separate Anti-Racism Reading Group active in the iSchool. The mission of ARTS is to build on work begun by individual instructors in the iSchool to develop skills in teaching about, facilitating, and normalizing conversations about race and racism in technology and design courses where these topics are not usually considered or taught. The goal of ARTS and its members is to create learning materials to teach iSchool students how systemic racism manifests in technology.

I joined the seminar as a teaching faculty member the first summer. As my graduate research progressed, my membership and attendance in the seminar became more focused on my research. My participation was as a graduate student working on designing and creating anti-racism learning modules for the INST362 – User-Centered Design course, in addition to my role as an instructor. During the spring and summer of 2021, as I designed and created the suite of five learning modules for implementation in INST362 during the Fall 2021 semester, this learning community became advisors, critics, and collaborators. The weekly meetings of the

ARTS provided a structured venue for discussion of the content I planned to include in each module. I presented the general format of the Read/Watch/Design structure. I reviewed the readings and videos for validity and accuracy regarding both racism and user-centered design. The weekly workgroup sessions were instrumental in finalizing the content and structure of the Design exercises in each of the five modules. Feedback from the student members of the community was particularly helpful in developing the learning modules because they presented a student's perspective on activities that they would find engaging and instructive. Given the complex and sensitive nature of the racism and anti-racism topics, ARTS discussions about how to broach these subjects in the classroom provided valuable insights that I used in the INST362 briefings to advise and prepare the instructors for teaching anti-racism in their fall course sections.

4.5   Five Modules in the Undergraduate Technology Design Course

The five learning modules (see Table 3) are comprised of an introductory module and a summary retrospective reflection with three core modules that focus on phases of the user-centered design process. Module 1 is a prologue to Modules 2 through 4 and provides students with the basic terms and concepts they use and reference throughout the remainder of the semester (Appendix E). Module 5 is the concluding module and provides space for students to reflect on the complex and sensitive concepts and topics they encountered and worked through during the semester (Appendix I) (Krogstie, 2009). With this scaffolding in place, Modules 2 – 4 present situations, concepts, and design activities directly relevant to the core instruction in the User-Centered Design course. These modules were designed to be embedded in an existing syllabus and used in collaboration with the technical concepts and skills introduced at different phases in the process of user-centered design. Thus Module 2 (Appendix F) focuses on

contextual inquiry, user research, and user interviews. Module 3 (Appendix G) contains learning

objectives, content, and an exercise to support work creating user scenarios and personas.

Finally, Module 4 (Appendix H) works to help students explain how racism can affect the

process of user testing and demonstrate how to create a user testing process that includes a

diverse user group.

Table 3 - Suite of 5 Anti-Racism Learning Modules and Their Purpose

Module	Appendix
Module 1: Intro to Racism & Anti-racism in Technology Design	E
Module 2: Read/Watch/Design – Anti-racism in Contextual Inquiry	F
Module 3: Read/Watch/Design – Anti-racism in User Scenarios	G
Module 4: Read/Watch/Design – Anti-racism in User Testing	H
Module 5: Read/Watch/Design – Anti-racism in User-Centered Design, Retrospective Reflection	I

Table 4 – Module Framework

Component
Objectives
Overview
Readings
Videos
Assignment / Activity
References and Optional Further Reading

Each learning module was created with Read/Watch/Design activities, and each module

page contains the same basic sections (see Table 4).

- Objectives – includes the three to four learning objectives for each module. These were

  developed in collaboration and with the critical feedback of the ARTS workgroup during

  the summer of 2021.

- Overview – each learning module contains a descriptive overview of the content and

  relevance of the materials and activities included in that module. See Figure 2 for an

  example of the overview section.

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Figure 2 - Overview Section of Learning Module 2

- Readings – two to three short articles related to the subject of each learning module, user scenarios and user testing, for example, are included in this section of the module page. Each reading provides information about the time required to complete the task to set student expectations about their time commitment for the activity.

- Videos – one or two videos are included in this section of each learning module as the Watch activity. As with the readings, each video provides information about the time length to set student expectations about their time commitment for the activity.

- Assignment – when students complete the Read and Watch activities, they have the necessary information to proceed to the Design exercise included in each learning module. The discussion activities in Modules 1 and 5 are individual activities that require both original posts and responses to their peers' posts in the course. Modules 2, 3, and 4 design exercises are intended to be group activities conducted within the project teams once those have been established in each course section.

- References and Optional Further Reading – this section contains references for each module's learning content and additional readings that some students might find beneficial and engaging.

The exception to this structure is that Module 1 also contains a section of Important Terms that ground students in the vocabulary of bias and racism. These terms are used and referenced throughout the remaining learning modules. In addition to the Important Terms section, Module 1 also includes a more extensive overview to provide students with the information needed to understand the relevance of anti-racism instruction in a technology design course such as INST362 – User-Centered Design.

4.5.1 Module Learning Objectives

Each learning module includes objectives relevant to the instructional content and subject matter of that section. The objectives are designed to guide students through the process of mastering the concepts and skills in each module. The objectives for each learning module can be seen in Table 5.

Table 5 - Student Learning Objectives for Each Anti-Racism Module

Module	Objectives
01	- Begin to define the concepts of personal bias, privilege, intersectionality, positionality, systemic racism, colorism, and list examples in technology design. - Demonstrate how racism and anti-racism manifest in existing technologies. - Identify examples of blind spots (biases, personal privilege, intersectionality, and positionality). - Explain how anti-racism and anti-bias more generally is a design skill that will serve you well in your future career.
02	- Explain how racism can affect the process of contextual inquiry. - Demonstrate how to incorporate anti-racism into contextual inquiry and user research. - Identify examples of personal marginalization related to technology.

03	• Explain how racism can affect the process of creating user scenarios. • Identify examples of assumptions and stereotypical information that lead to stereotypes in user scenarios. • Demonstrate how to create user scenarios that incorporate an inclusive mindset.
04	• Explain how racism can affect the process of user testing. • Identify examples of racism in technology designs that were not identified in the user testing phase. • Demonstrate how to create a user testing process that includes a diverse group of users.
05	• Identify examples of practices that can reduce the existence of racism in technologies. • Explain how anti-racism and anti-bias more generally is a design skill that will serve you well in your future career. • Critique the anti-racism learning modules and their effectiveness in increasing your understanding of how racism and anti-racism manifest in existing technologies.

4.6 Implementing the Suite of Anti-racism Learning Modules

To provide support and access to the learning modules for the INST362 instructors, I created a sandbox course site in the learning management system Canvas (ELMS). I added each instructor in the role of "guest instructor." The home page of the course site provides access to the five learning modules and additional resources (Figure 3). The two slide decks available as additional resources were created after the initial instructor briefing before the beginning of the fall semester at the request of the instructors. The first is a slide deck for instructors to use in introducing the anti-racism modules to their students. The second is for instructor use in introducing the research study to students.
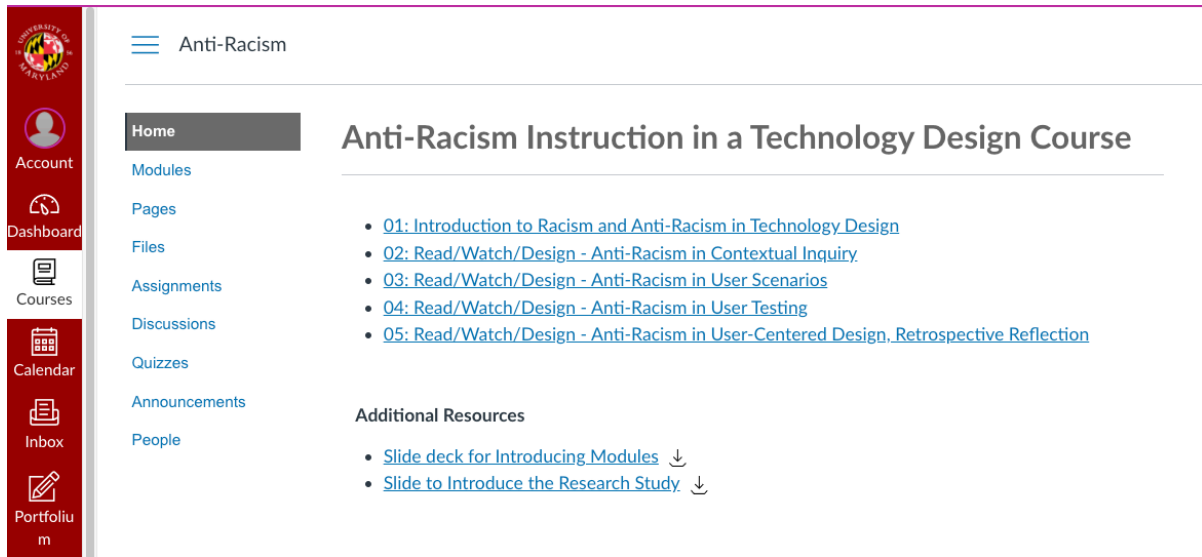
Figure 3 - Anti-Racism Instruction in a Technology Design Course ELMS Sandbox

Instructors can access each learning module by clicking the desired learning module to open the associated ELMS page; see Figure 4 for the layout of the Module 4 page. The format of this page is representative of the standard layout for all five learning modules. It contains sections for learning objectives, the module overview, the Read/Watch/Design activities in the Readings, Videos, and Assignment sections. Each learning module page also includes a selection of references and optional further reading for students interested in extending their learning experience.

04 Read/Watch/Design - Anti-Racism in User Testing

Objectives

By the end of this module you should be able to...

- Explain how racism can affect the process of user testing.
- Identify examples of racism in technology designs that were not identified in the user testing phase.
- Demonstrate how to create a user testing process that includes a diverse group of users.

Overview

Returning to The Designer's Critical Alphabet, use the definition of positionality and the corresponding reflective question as you and your team prepare for user testing of your project design.

Positionality is the practice of a researcher delineating their own position in relation to a research context. A positionality statement can also help designers reveal their own biases and understand who they are and how that affects the solutions that they propose.

How does your positionality affect how you approach a specific design task or problem? (Noel, 2020)

Use the READ/WATCH/DESIGN activities to grow your skills.

Readings

- Testing Your Product with a Diverse Audience [4-minute read]
- Designing an Inclusive Networking Platform for BIPOC Creatives (An example design process) [6-minute read]
- How design can help with inclusion [9-minute read]

Videos

- Integrating Inclusion: Google Camera

[2-minutes]

Assignment

- Design - Anti-Racism in User Testing

References and Optional Further Reading

- Braga, C. (2017, April 28). *How design can help with inclusion.* Medium. https://uxdesign.cc/how-design-can-help-with-inclusion-9d71a60d6359.
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Figure 4 - ELMS Page for Module 4 - Read/Watch/Design - Anti-Racism in User Testing

The Assignment menu item in the left navigation panel on the ELMS page provides

direct access to the design exercises and other assignments. The assignments contain the design

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exercises that correspond to each learning module, including the alternate Module 2 assignment

for the online sections of INST362 (Figure 5). Additionally, quiz questions for Module 1 through

Module 5 are listed. These question banks contain multiple-choice and essay questions relevant

to the information in each learning module and were developed for insertion in existing course

quizzes at the request of the instructors during the first Instructor Check-in Interview in the Fall

2021 semester.

Figure 5 - Anti-Racism Learning Module Assignments, including Design Exercises and Quiz Questions

The discussions that are part of the design exercises for Module 1 and Module 5 are

available via the Discussions item on the ELMS navigation panel (Figure 6). This allows the

instructors to view the discussions directly and familiarize themselves with the discussion

activities.
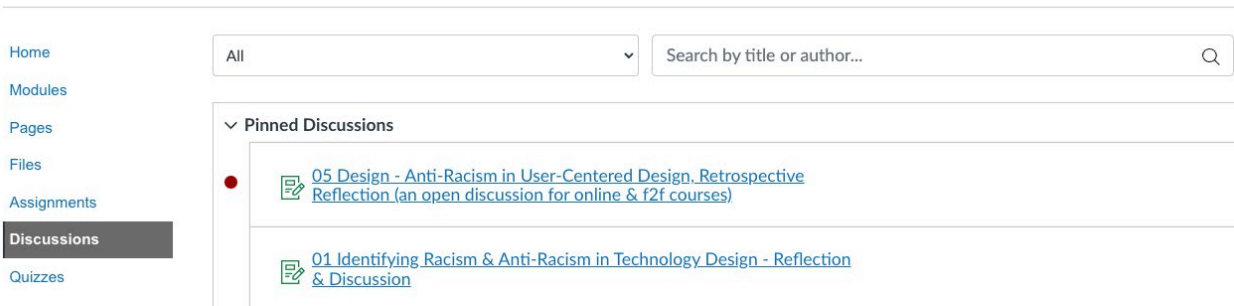
Figure 6 - Discussions for Module 1 and 5 Design Exercises

The final area in the sandbox relevant to the instructors is the Rubric information. All

rubrics created for the design exercises are contained here and can be seen in Figure 7.
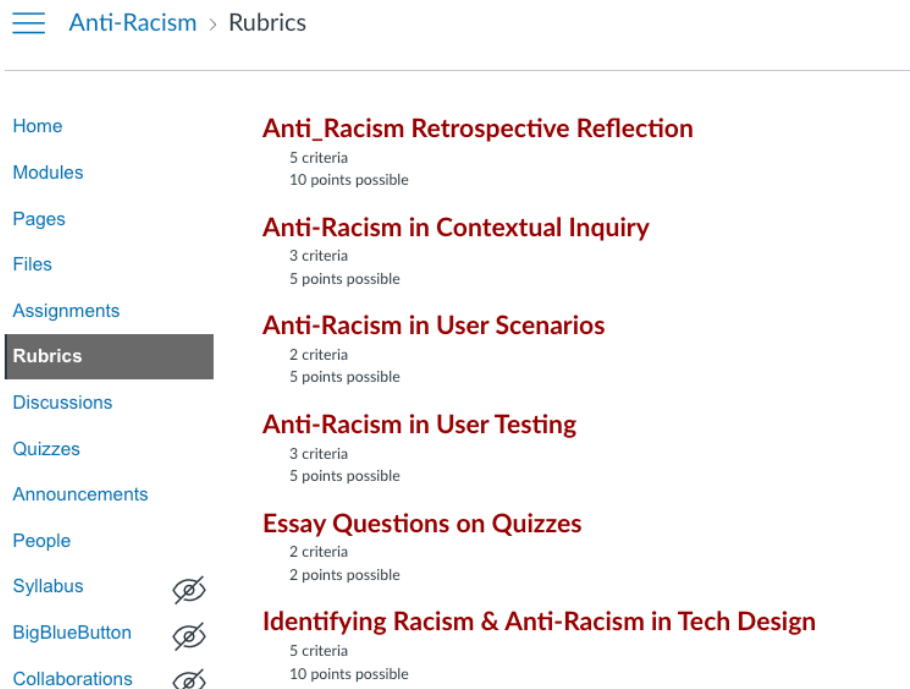
Figure 7 - Rubrics for the Design Exercises in the Anti-Racism Learning Modules

All content in the sandbox can be imported into an instructor's ELMS course site via the

"Import Existing Content" feature. This reduces the implementation workload of the instruction

teams.

Chapter 5:   Methods of Evaluation of the Suite of Anti-racism Learning Modules

5.1   Participant Recruitment

As with the pilot study, the sampling method for the main study was purposeful sampling. The participants were intentionally selected from the active student population of the four sections of the Fall 2021 semester INST362 – User-Centered Design course in which the anti-racism learning modules were embedded. Student participants were recruited via ELMS announcements from professors in the course sections. Instructors were asked to share the recruitment message with enrolled undergraduate students of the course. Eligible students were required to be at least 18 years of age and participate in the five learning module activities. The full text of the recruitment message can be found in Appendix M. All participants in the main study engaged with the researcher remotely. Student participants completed the consent form and demographic survey (Appendix O), Early Semester Survey (Appendix J), and End-of-Semester Survey (Appendix K) online. Although purposeful sampling was used, participants voluntarily responded to the recruitment efforts, so there is potential for self-selection bias.

5.1.1   Challenges in Recruiting Study Participants

In running a G*Power analysis via a simple ANOVA test and lowering the default to .80 power (an 80% probability of determining an effect when it exists), the a-priori sample size was determined to be 76 (UCLA, 2021). Unfortunately, despite attempts to recruit additional participants, the sample size for this study was 50 participants. Recalculating using the posthoc analysis yielded a power value for this study of .60.

The study sample size is evidence of challenges in recruiting university students as study participants; such challenges are not unique to this study (Khatamian Far, 2018; Rocchi et al., 2016). First among the recruiting challenges in this study was the diversity of course instruction formats. Two of the course sections were taught in a synchronous face-to-face format. A third section was formatted as synchronous online instruction, and the fourth section was in an asynchronous online form. This variety of formats resulted in difficulties engaging with students for participant recruitment. It is possible that challenges to recruiting a larger participant pool were compounded because Fall 2022 was the first semester of on-campus instruction since the beginning of the Covid-19 pandemic. The process of returning to campus social and academic activities may have resulted in students feeling over-burdened and unable or unwilling to add the additional load of participating in the study. Unfortunately, no data related to causes of recruitment difficulties was collected as part of this study.

Initial incentives consisted of electronic gift cards awarded via a lottery. When the sample size did not achieve the desired levels, I consulted the teaching and research faculty in the College of Information Studies for ideas about how to increase the sample size. As a result of these conversations, I amended the study and received IRB approval to allow the course instructors to provide extra credit for students who participated in the study (Appendix Q). Although this amendment resulted in increased participation, I could not achieve the a-priori number of 76 participants. The limitations of this low participant sample size are discussed in Chapter 7.

5.2   Student Survey Design

I designed Early Semester (Appendix J) and End-of-Semester (Appendix K) self-administered surveys. The purpose of the surveys was to measure student understanding and

interest before and after working with the learning modules. The Early Semester survey included demographic questions, 7 Likert questions, and 3 open-ended questions. The End-of-Semester survey had 17 Likert questions, 7 of which corresponded to the questions in the first survey, and 8 open-ended questions. Demographic information, including race, ethnicity, and gender, was collected to identify engagement differences and topic knowledge based on participants' individual and intersectional identities. The demographic questions allowed for multiple selections and provided "prefer to self-describe," "prefer not to say," and in the case of gender, "a gender not listed" options to allow respondents to specify their labels where those were not adequately represented.

The close-ended questions used 5-point Likert scales (Petrillo et al., 2011). The participant knowledge, skills, and interest questions measured levels from "1 – very low" to "5 – very high." Additional close-ended questions were included in the End-of-Semester survey to collect information about the respondent's experience with the learning modules. These questions also used 5-point Likert scales and measured agreement from "1 – strongly disagree" to "5 – strongly agree."

The open-ended questions were included to allow respondents to convey richer, more detailed information about their expectations, experiences, self-assessment of learning, and suggestions for potential improvements to the learning modules. These questions include the following:

- Early Survey: What is the most important thing you want to learn (if anything) from participating in the anti-racism learning modules?

- End Survey: What was the most important thing you learned (if anything) from participating in the anti-racism learning modules?

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- End Survey: What advice would you give the researchers to improve the anti-racism learning modules' structure, format, and content?

5.3 Data Collection

Multiple types of data were gathered from student participants for analysis to provide information to answer the three research questions. To answer RQ1 (how do students' self-assessment of racism/anti-racism knowledge change), responses to close-ended questions in the early semester and end-of-semester surveys were quantitatively analyzed. These pre and post-activity Likert survey questions address self-reports of knowledge and interest and how those assessments changed during the semester. To address the question of student experiences with the learning modules RQ2, participant responses to the open-ended survey questions were collected to identify codes and themes. Student posts to the retrospective reflection discussion activity were coded to supplement the analysis of the survey responses. Student submissions for Module 2, Module 3, and Module 4 exercises and answers to associated quiz questions were collected to tackle RQ3, students' understanding of anti-racism design practices. The discussion posts in Module 1 and Module 5 provide additional data for analyzing students' understanding of the topics.

5.4 Analysis Methods

This study explores student response to the implementation of the suite of five learning modules developed to provide holistic learning within the context of the INST362 – User-Centered Design course as an example of embedded anti-racism instruction in an undergraduate technology design course. I analyzed the study data at the level of individual students to provide

information to address the research questions. This analysis included both qualitative and quantitative analysis.

5.4.1 Qualitative Coding Process

Survey data open-ended responses were processed via collaborative qualitative content analysis. Three investigators engaged in inductive analysis in multiple rounds using an open coding method. Investigators read and individually coded all student responses to the Early Semester survey. Individual coding was followed by meetings to compare, discuss, and confirm codes. After concluding decisions on base codes, researchers again worked individually to identify common themes. This round of analysis was followed by meetings to compare, discuss, and confirm themes. At this point, investigators engaged in collaborative work using Miro to display, sort, and categorize codes and themes. Using the codes and themes identified, investigators coded student responses to the End-of-Semester survey adding new codes as necessary. These individual coding sessions were once more followed by meetings when the three investigators compared, discussed, and finalized the codes and themes. Again, the investigators collaborated using Miro to display, sort, and categorize codes and themes. I then analyzed the responses using the agreed-upon codes and themes to eliminate duplication. When necessary, I created new codes and merged themes to reflect the information in the student responses. The three investigators met a final time to review my analysis. At this point, I used the codes and themes as agreed upon to analyze student responses to the Module 5 – Retrospective Reflection (Cascio et al., 2019; Thomas, 2006).

5.4.2   Quantitative Analysis

Responses to close-ended survey questions and student work products were analyzed quantitatively. For example, answers to pre and post-activity questions of students' self-assessment of their knowledge of and interest in racism and anti-racism were analyzed via group comparison to measure the change. I executed t-tests on the responses to QK1 through QK7 from the pre and post-activity (test) surveys. T-tests assuming unequal variances were calculated for the course sample, followed by t-tests across course delivery format (in-person and online). Student experiences and understanding were assessed using the post-activity close-ended survey questions and student submissions to the Module 5 – Retrospective Reflection assignment. The Module 5 submissions were assessed using the grading rubric in the suite of learning modules implemented in INST362.

Chapter 6:   Evaluation of the Design of Embedded Anti-racism Learning Modules

Evaluation of the data collected during the study of the embedded suite of anti-racism learning modules begins with a description of the study participants. That is followed by an analysis of data from the Early Semester and End-of-Semester surveys and student work products to answer the three research questions. The first question covers the assessment of changes in student knowledge and interest through the semester while engaging with the learning modules. The second question seeks to understand student experiences with the learning modules. The final research question analyzes post-activity student understanding of the concepts and skills taught in the learning modules.

6.1   Participants

As shown in Table 6, seventy-three (73) students submitted informed consent forms. Of those, 14 students declined to participate in the study. Of the remaining 59 who indicated agreement to participate in the study, 9 were duplicate submissions resulting in 50 unique student participants. Of the group of participants, 49 completed the Early Semester Survey. Only 29 study participants submitted the End-of-Semester Survey. This drop-off was not accompanied by requests to withdraw from the study, so the discussion exercise postings and other work products of all study participants are included in the findings.

Table 6 - Student Responses to the Informed Consent and Surveys by Course Section

Course Section (Delivery Format)	Informed Consent	Early Semester Survey (N = 49)	End-of-Semester Survey (N = 29)
0101 (online)	4	4	3
0102 (in-person)	5	5	4
0103 (online)	21	20	10
0104 (in-person)	17	17	9
Unspecified	3	3	2
Duplicate	9		
Declined	14		
Total Participants	**50**	**49**	**29**
Total Completed	*** 73**	**49**	**29**

* This includes 14 students who completed the Informed Consent but declined to participate in the study and 9 duplicate submissions.

Of the study participants, sixty-two percent (62%) are BIPOC (Black, Indigenous, People of Color). The racial identities in this group include 40% who are Asian, 20% who are Black, and 2% who are Middle Eastern or North African (MENA). Thirty-two percent (32%) of participants are White, with 2% indicating another race or origin and 4% who preferred not to disclose or did not answer. See Table 7.

Table 7 - Racial Demographics of Student Participants

Race (N=50)	Number	Percentage
Asian	20	40%
White	16	32%
Black	10	20%
Middle Eastern or North African (MENA) *	1	2%
Self-described	1	2%
Not given	2	4%
American Indian / Alaska Native	0	0%
Native Hawaiian / Other Pacific Islander	0	0%
Total	**50**	

*1 participant identified as MENA and White; was only counted as MENA, not double-counted.

Table 8 includes gender demographic information for the student participants. Sixty-four percent (64%) of participants identified as male and twenty percent (20%) as female. Six percent

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(6%) of participants identified as cisgender. One individual identified as non-binary or third gender for 2% of the participant pool; one respondent identified as genderqueer for 2% of the pool. A final six percent (6%) of respondents preferred not to disclose their gender identity or did not answer the question.

Table 8 - Gender Demographics of Student Participants

Gender (N=50)	Number	Percentage
Male	32	64%
Female	10	20%
Cisgender, female	3	6%
Not given	3	6%
Genderqueer	1	2%
Non-binary / Third gender *	1	2%
Agender	0	0%
Cisgender, male	0	0%
Transgender	0	0%
Self-described	0	0%
Total	**50**	

* Participant also identified as Female, not double-counted.

Two percent (2%) of participants identified their ethnicity as Hispanic, Latino/a/x, or Spanish origin, 10% self-described their ethnicity, and 6% did not disclose. The remaining 82% of participants indicated "Not of Hispanic, Latino/a/x, or Spanish origin." See Table 9.

Table 9 - Ethnic Demographics of Student Participants

Ethnicity (N=50)	Number	Percentage
Not of Hispanic, Latino/a/x, or Spanish origin	41	82%
Self-described	5	10%
Not given	3	6%
Hispanic, Latino/a/x, or Spanish origin	1	2%
Total	**50**	

6.2 RQ1: Student Knowledge

Two surveys were created to examine changes in students' self-assessed knowledge and interest in anti-racism topics based on their engagement with the modules. In the Early Semester

Survey, students indicated their knowledge and interest before engaging with the suite of five anti-racism learning modules. Post-activity self-assessments were gathered via the End-of-Semester Survey. Both surveys included the same questions about knowledge and interest in three major categories: 1) general knowledge and interest in racism and bias; 2) knowledge and interest in racism and bias related to technology and user-centered design; and 3) personal ability to apply knowledge about racism and bias. Respondents indicated their self-assessment using a 5-point Likert scale ranging from "1- Very Low" to "5- Very High." The data from these questions was analyzed by comparing student self-assessment before participation in the learning activities (pre-activities) and after participation (post-activities).

To determine whether the pre and post-activity responses to the seven (7) close-ended questions were significantly different, I ran *t*-tests. Since some student participants did not submit a post-activity survey, the sample sizes were unequal, so I used Welch's test for unequal variances. Table 10 shows a comprehensive analysis with p-values ranging from 0.0000 for QK3, QK4, QK6, and QK7 to 0.0023 for QK1. I next executed the tests for participant responses from the course sections with the online delivery format; those results are shown in Table 11. Results of the *t*-tests for QK1 – QK7 across course sections with an in-person delivery format are shown in Table 12. Figure 8 shows the pre and post-activity results for general knowledge and interest in ABAR topics. Figure 9, Figure 10, Figure 11, and Figure 12 include the results of the four questions related to knowledge and interest in technology and user-centered design relevant to ABAR topics. Finally, Figure 13 and Figure 14 have respondent data from the two questions regarding the personal ability to apply knowledge of bias and racism in design practice.

Table 10 – Comprehensive Participant Pre/Post-test Evaluation of Anti-Racism Knowledge and Interest Questions

Survey Question	Pre-test Scores		Post-test Scores			
	Mean (M)	Standard Deviation (SD)	Mean (M)	Standard Deviation (SD)	t(49)	p
QK1	3.4375	0.8970	4.1071	0.8751	-3.1883	0.0023
QK2	3.3958	1.0260	4.2857	0.7629	-4.3055	0.0001
QK3	3.3542	1.0208	4.2857	0.7229	-4.5188	0.0000
QK4	3.3958	1.1622	4.4286	0.6901	-4.8606	0.0000
QK5	3.5000	1.1299	4.2857	0.8545	-3.4235	0.0010
QK6	3.2083	1.0306	4.1786	0.7724	-4.6556	0.0000
QK7	3.1875	0.8910	4.1429	0.8483	-4.6485	0.0000

Table 11 - Participant Pre/Post-test Evaluation of Anti-Racism Knowledge and Interest Questions (Online Delivery)

Survey Question	Pre-test Scores		Post-test Scores			
	Mean (M)	Standard Deviation (SD)	Mean (M)	Standard Deviation (SD)	t(25)	p
QK1	3.5600	0.7118	3.8462	0.9871	-0.9273	0.3654
QK2	3.4800	1.0847	4.3077	0.7511	-2.7520	0.0095
QK3	3.2800	0.9798	4.3846	0.7679	-3.8166	0.0006
QK4	3.2800	1.1733	4.4615	0.6602	-3.9695	0.0003
QK5	3.6800	1.2490	4.4615	0.7763	-2.3699	0.0234
QK6	3.3600	1.1504	4.1538	0.8006	-2.4827	0.0183
QK7	3.1200	0.8813	4.1538	0.8006	-3.6466	0.0011

* Note: 2 Participants did not indicate a course section, so are not included in the Delivery Format Analysis.

Table 12 - Participant Pre/Post-Test Evaluation of Anti-Racism Knowledge and Interest Questions (In-Person Delivery)

Survey Question	Pre-test Scores		Post-test Scores			
	Mean (M)	Standard Deviation (SD)	Mean (M)	Standard Deviation (SD)	t(22)	p
QK1	3.2727	1.0771	4.3077	0.7511	-3.3381	0.0022
QK2	3.3182	0.9946	4.2308	0.8321	-2.9119	0.0068
QK3	3.4545	1.1010	4.0769	0.7596	-1.9733	0.0571
QK4	3.5909	1.1406	4.3077	0.7511	-2.2386	0.0320
QK5	3.3182	0.9946	4.0000	0.9129	-2.0646	0.0487
QK6	3.0455	0.8985	4.1538	0.8006	-3.7794	0.0008
QK7	3.2727	0.9351	4.1538	0.8987	-2.7605	0.0104

* Note: 2 Participants did not indicate a course section, so are not included in the Delivery Format Analysis.

6.2.1 Student Self-Assessment of General Knowledge About Bias and Racism

The prompt requesting students assess their knowledge and interest in general ABAR topics was

- QK1: Definitions of personal bias, racism, systemic racism, and intersectionality.

As shown in Figure 8, the distribution of responses regarding knowledge and interest in ABAR definitions shifted toward the upper end of the scale by the completion of the learning modules. In particular, as the percentage of students indicating low levels of knowledge and interest dropped, there was a significant rise in very high levels, increasing from 8% to 41% over the semester. Indications of medium levels also fell significantly (-19%) as high levels of knowledge and interest rose. An analysis of the median for responses shows an increase from a medium to a high level of self-assessed knowledge after completing the learning modules. The results of the End-of-Semester survey show a marked rise in self-assessed knowledge and interest after working with the Anti-racism Learning Modules during the semester, with p-values of 0.0023 across all sections and 0.0022 for in-person sections. Online sections show no significant difference, with a p-value of 0.3654.
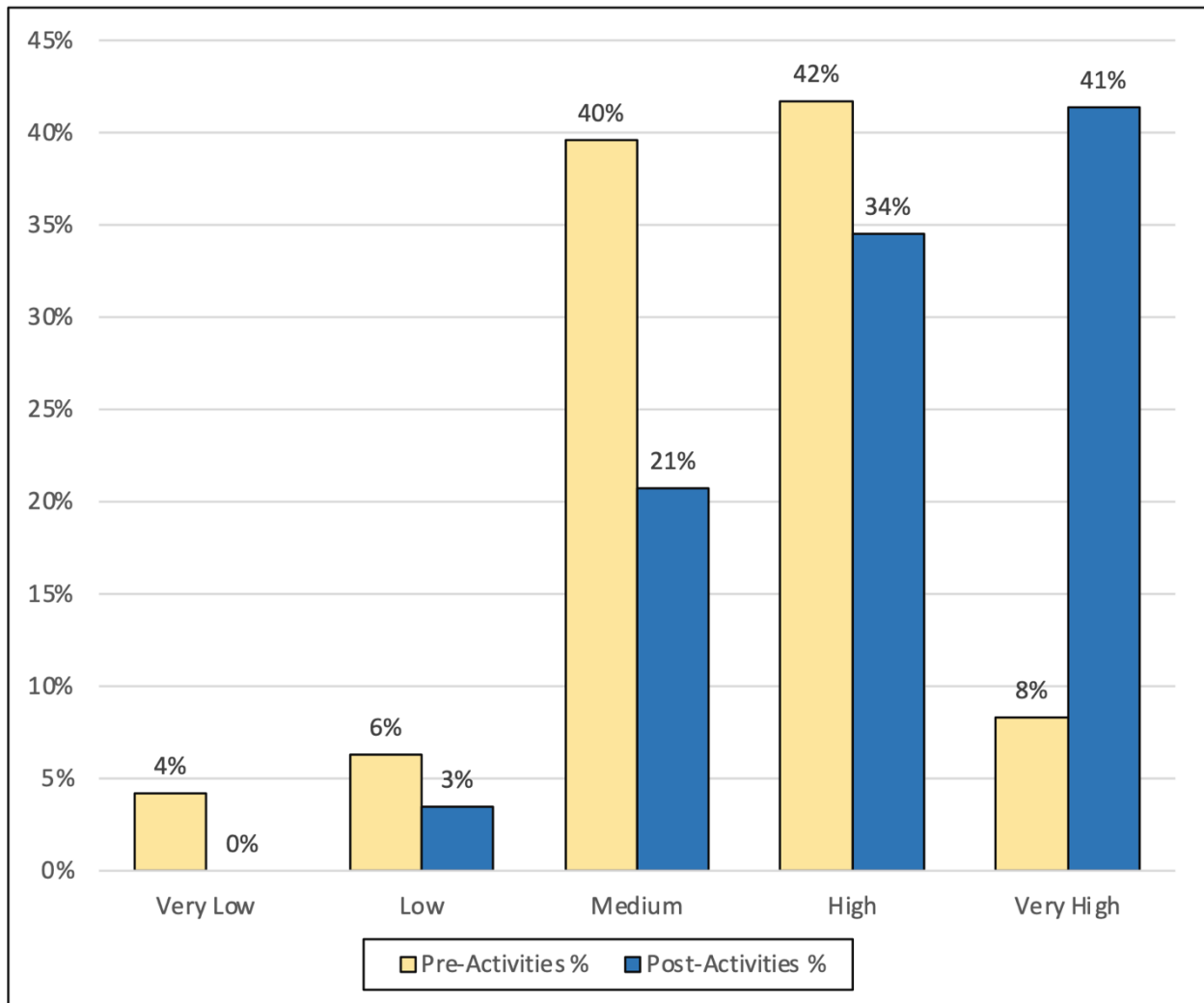
Figure 8 – QK1: General Knowledge and Interest: Student Self-Assessment of knowledge and interest about definitions of personal bias, racism, systemic racism, and intersectionality pre and post-exposure to the suite of anti-racism learning activities.

[NOTE: 20 of the study participants did not respond to the End-of-Semester Survey, although they did not withdraw from the study.]

6.2.2   Student Self-Assessment of Knowledge of Racism and Bias Related to Technology and User-Centered Design

The four survey prompts related to the impact of racism in technology design were

- QK2: How personal bias, racism, systemic racism, intersectionality, positionality are relevant to the user-centered design process.

- QK3: The impact of personal bias and systemic racism on technology design work.

- QK4: How information scientists and designers can intentionally or unintentionally create racist technology.

- QK5: Racism exists in current and historic technology products and software.

As with the general knowledge about bias and racism, the distribution of responses regarding knowledge and interest in topics related to technology design and user-centered design also shifted toward the upper end of the scale by the completion of the learning modules (See Figure 9, Figure 10, Figure 11, and Figure 12). Student responses indicating low self-assessed knowledge and interest in technology and user-centered design ABAR topics dropped to 0% across all four assessment questions. Likewise, there were decreases in the percentage of students who rated their knowledge and interest at a medium level. Reduction in the percentage of students who indicated a medium level was less significant for QK5 than for QK1 – QK4, the questions related to the relevance and impact of bias and racism in design and the resultant technologies.

The decreases in very low to medium levels corresponded to increases in the percentage of students who rated their knowledge and interests as very high, increasing by 31%, 35%, 38%, and 36% for each of the four technology questions.

Analysis of the median for responses shows an increase from a medium to a high level of self-assessed knowledge for QK2 and QK3, related to the relevance and impact of bias and racism in technology design and user-centered design. For QK2, results of the *t*-tests show p-values of 0.0001 across all sections, 0.0095 in online sections, and 0.0068 in in-person sections (Table 10, Table 11, Table 12). Analysis of QK3 responses again shows significant differences across all sections and in online sections with values of 0.0000 and 0.0006, respectively (Table 10 and Table 11). However, with a p-value of 0.0571 in the in-person sections, the difference was not significant (Table 12). The median rating for QK4, the question regarding racist technology being a result of either intentional or unintentional decisions by designers, was high before engagement with the learning activities and increased to very high by the completion of the learning modules and showed significant differences in all three *t*-tests with p-values of 0.0000 (Table 10), 0.0003 (Table 11), and 0.0320 (Table 12). This change in the median values can be seen in the final question prompt, QK5 - racism exists in current and historic technology products and software with the resultant p-values of 0.0010 (Table 10), 0.0234 (Table 11), and 0.0487 (Table 12). In the category of knowledge and interest related to technology design and user-centered design, the results show a striking increase in self-assessed knowledge and interest after working with the Anti-racism Learning Modules during the semester.
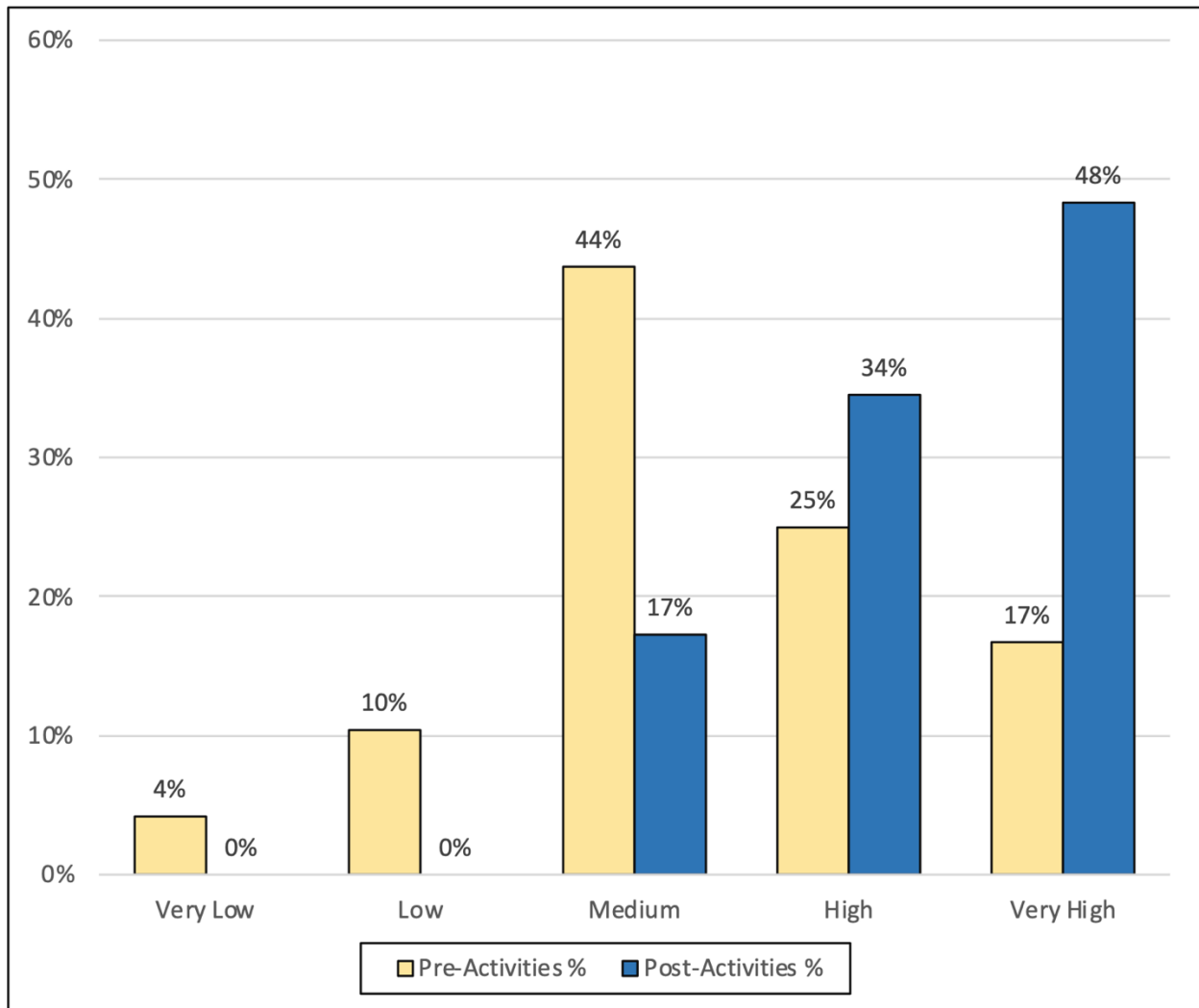
Figure 9 - Knowledge and Interest Related to Technology and User-Centered Design: Student Self-Assessment of knowledge and interest about the relevance of personal bias, racism, systemic racism, intersectionality, and positionality pre and post-exposure to the suite of anti-racism learning activities.

[NOTE: 20 of the study participants did not respond to the End-of-Semester Survey, although they did not withdraw from the study.]
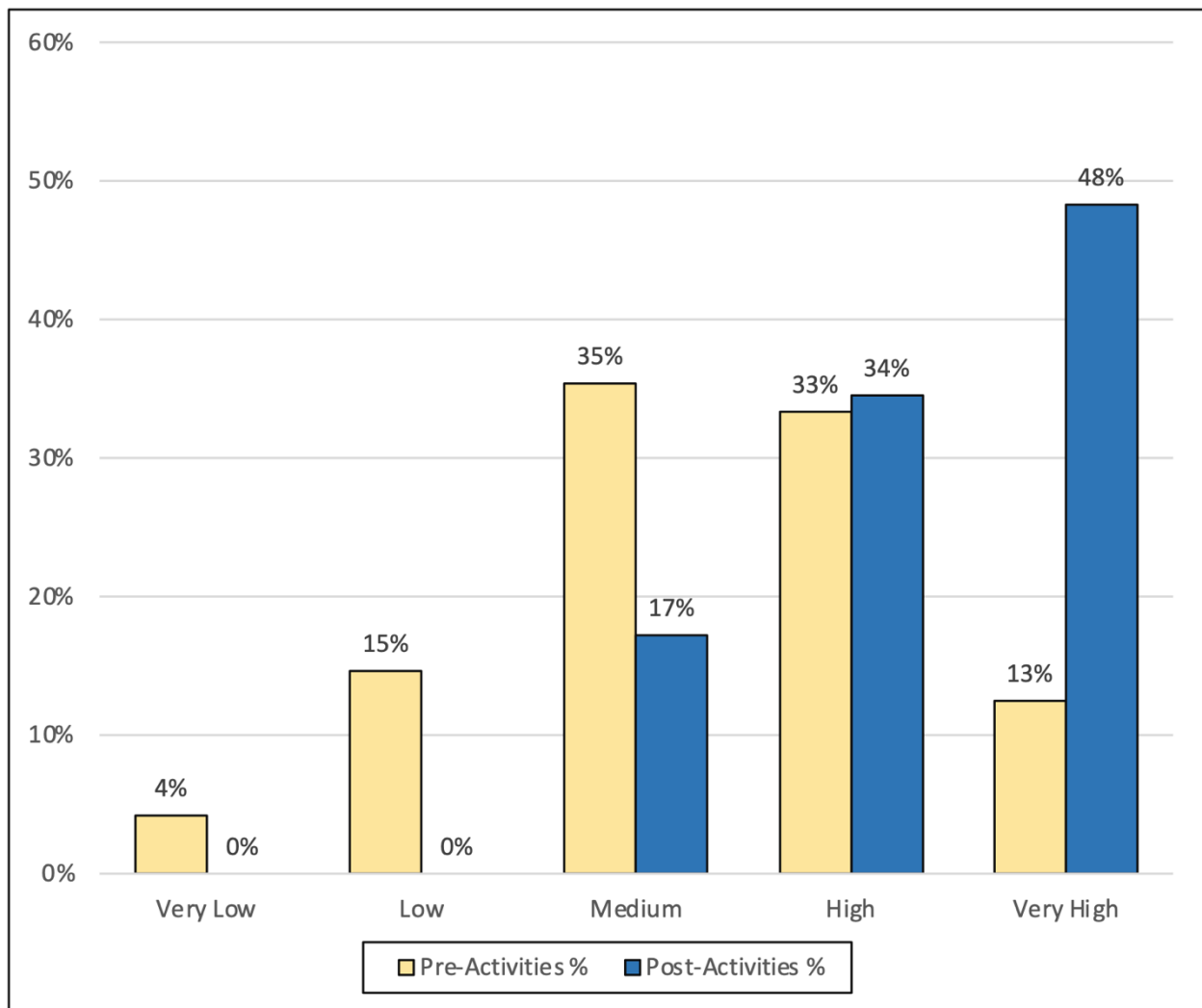
Figure 10 - Knowledge and Interest Related to Technology and User-Centered Design: Student Self-Assessment of knowledge and interest about the impact of personal bias and systemic racism pre and post-exposure to the suite of anti-racism learning activities.

[NOTE: 20 of the study participants did not respond to the End-of-Semester Survey, although they did not withdraw from the study.]
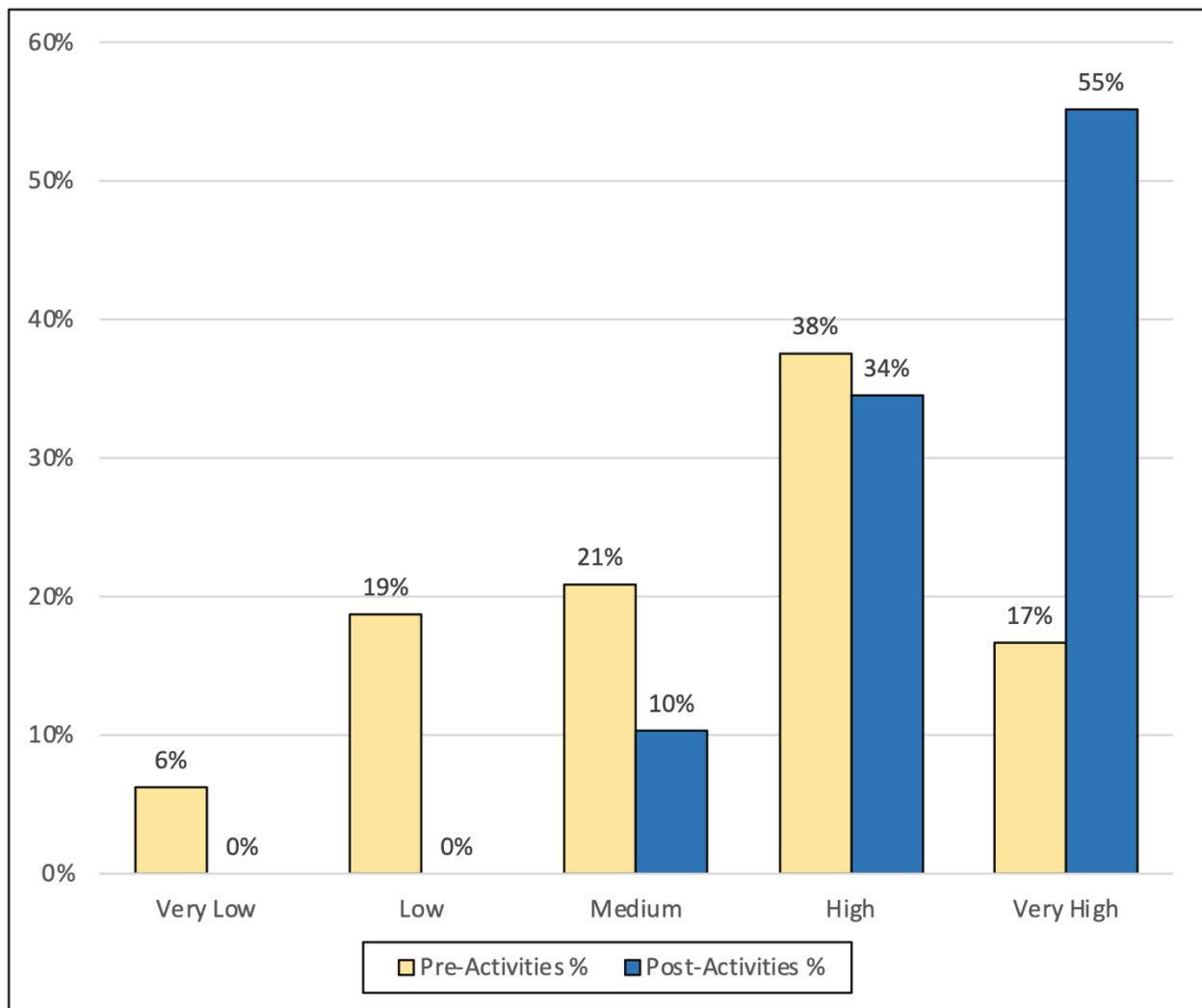
Figure 11 - Knowledge and Interest Related to Technology and User-Centered Design: Student Self-Assessment of knowledge and interest about intentional/unintentional creation of racist technology pre and post-exposure to the suite of anti-racism learning activities.

[NOTE: 20 of the study participants did not respond to the End-of-Semester Survey, although they did not withdraw from the study.]
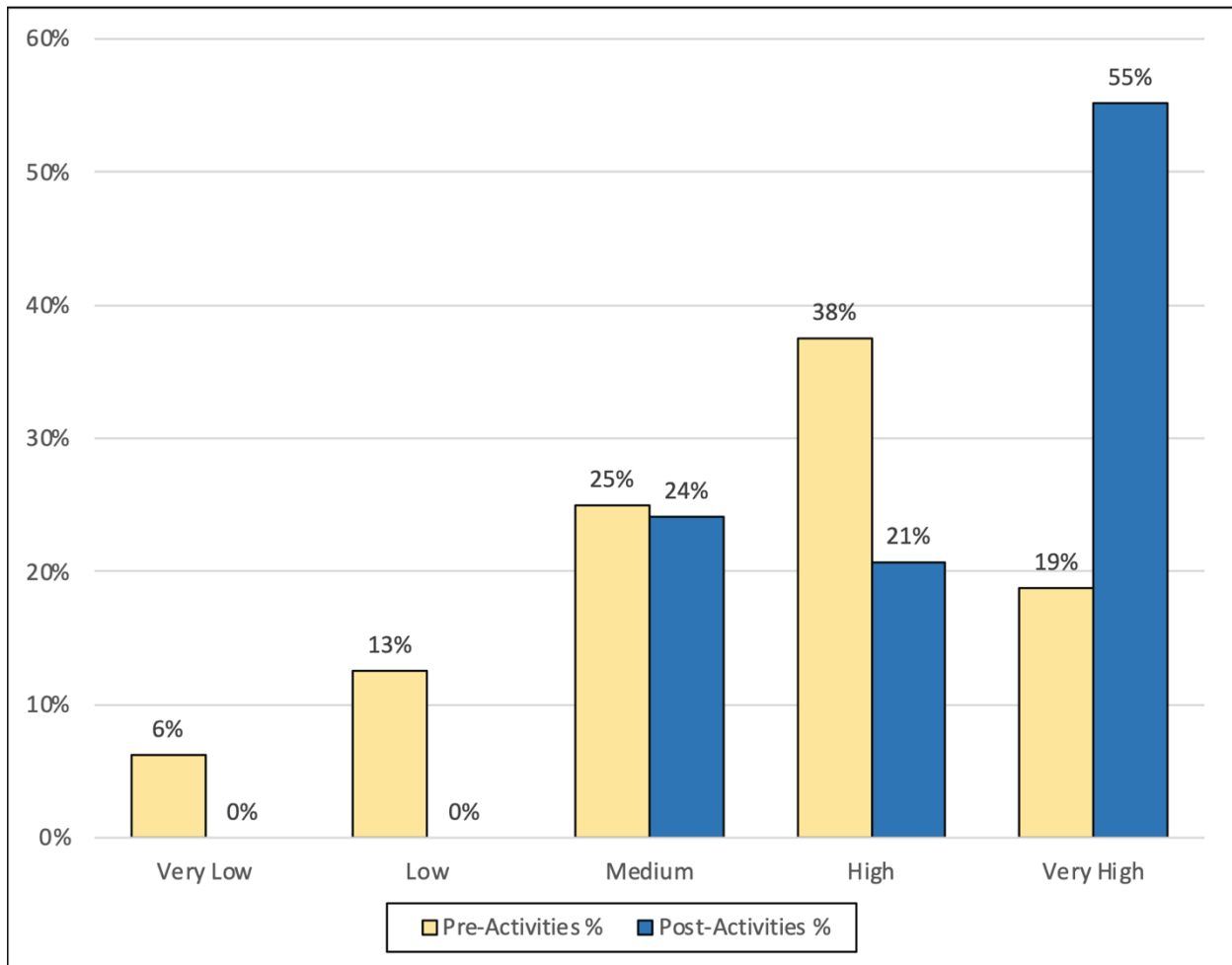
Figure 12 – Knowledge and Interest Related to Technology and User-Centered Design: Student Self-Assessment of knowledge and interest about racism in current and historic technology pre and post-exposure to the suite of anti-racism learning activities.

[NOTE: 20 of the study participants did not respond to the End-of-Semester Survey, although they did not withdraw from the study.]

6.2.3 Student Self-Assessment of Personal Ability to Apply Knowledge About Racism and Bias

The final category, personal ability to apply knowledge, included the survey prompts

- QK6: My ability to identify the impacts of personal bias and systemic racism in technology design.

- QK7: My ability to avoid the impacts of personal bias and systemic racism in my design work.

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The most encouraging results are the changes in student self-assessment of their ability to recognize the impacts of personal bias and systemic racism in design and avoid those in their own design work. Respondents indicating a medium or below level knowledge and interest regarding their individual abilities dropped from sixty-five percent (65%) to twenty-one percent (21%) for QK6 and from seventy percent (70%) to twenty-eight percent (28%) for QK7 at the end of the semester (See Figure 13 and Figure 14). This dramatic drop was offset by encouraging increases in students' self-assessed confidence in their abilities to identify and avoid bias and racism in technology design. By the end of the semester, the respondents with high to very high self-assessments of ability increased by forty-five percent (45%) to identify bias and racism in technology design and avoid bias and racism in their own work. Of the respondents to the End-of-Semester survey, seventy-nine (79%) and seventy-three percent (73%) rated their personal abilities as "Very High." The p-values in the t-test results support these findings with values of 0.0000, 0.0183, and 0.0008 for QK6 and 0.0000, 0.0011, and 0.0104 for QK7 (Table 10, Table 11, and Table 12).
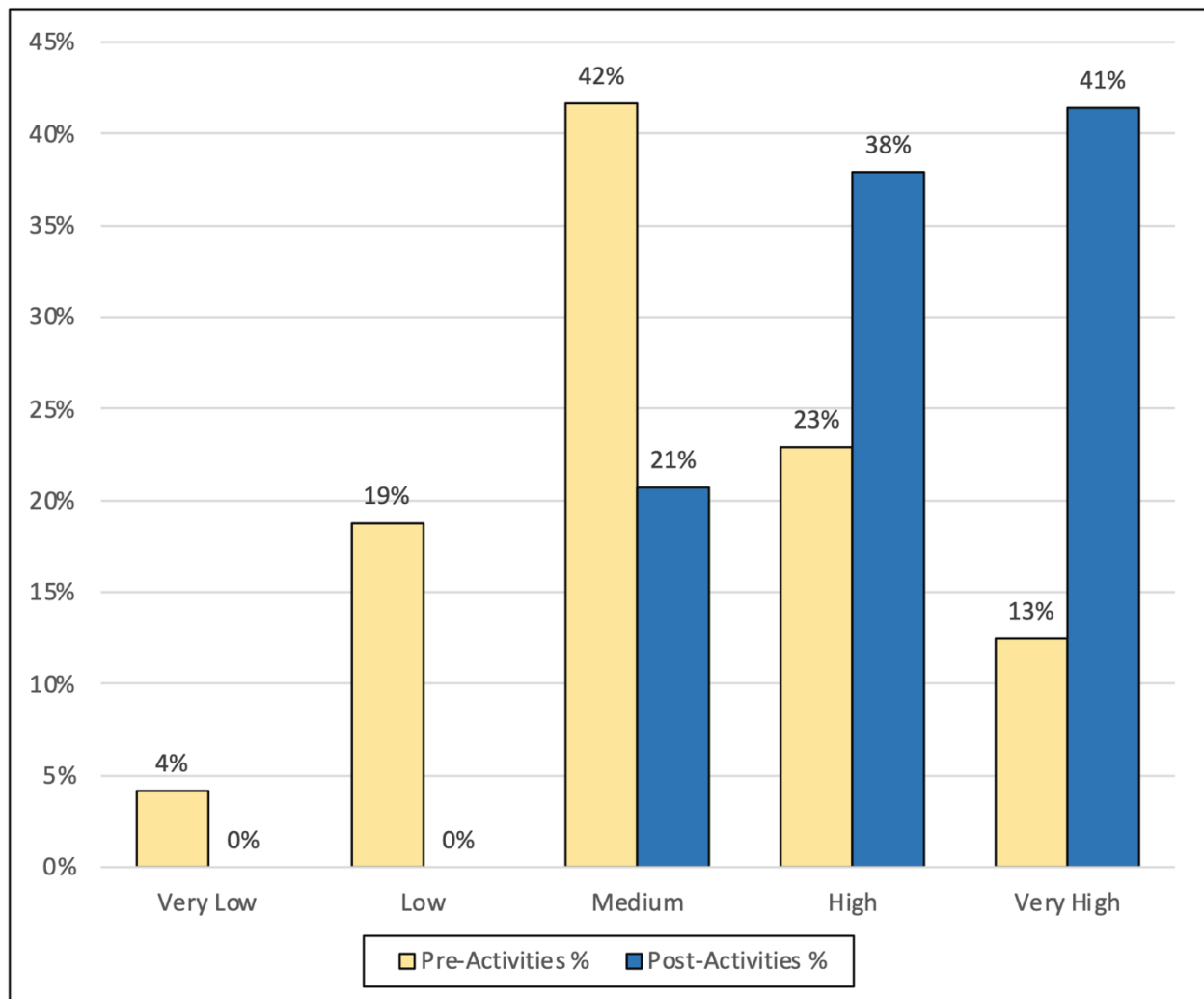
Figure 13 - Personal Ability to Apply Knowledge in Technology Design: Student Self-Assessment of ability to identify the impacts of personal bias and systemic racism pre and post-exposure to the suite of anti-racism learning activities.

[NOTE: 20 of the study participants did not respond to the End-of-Semester Survey, although they did not withdraw from the study.]
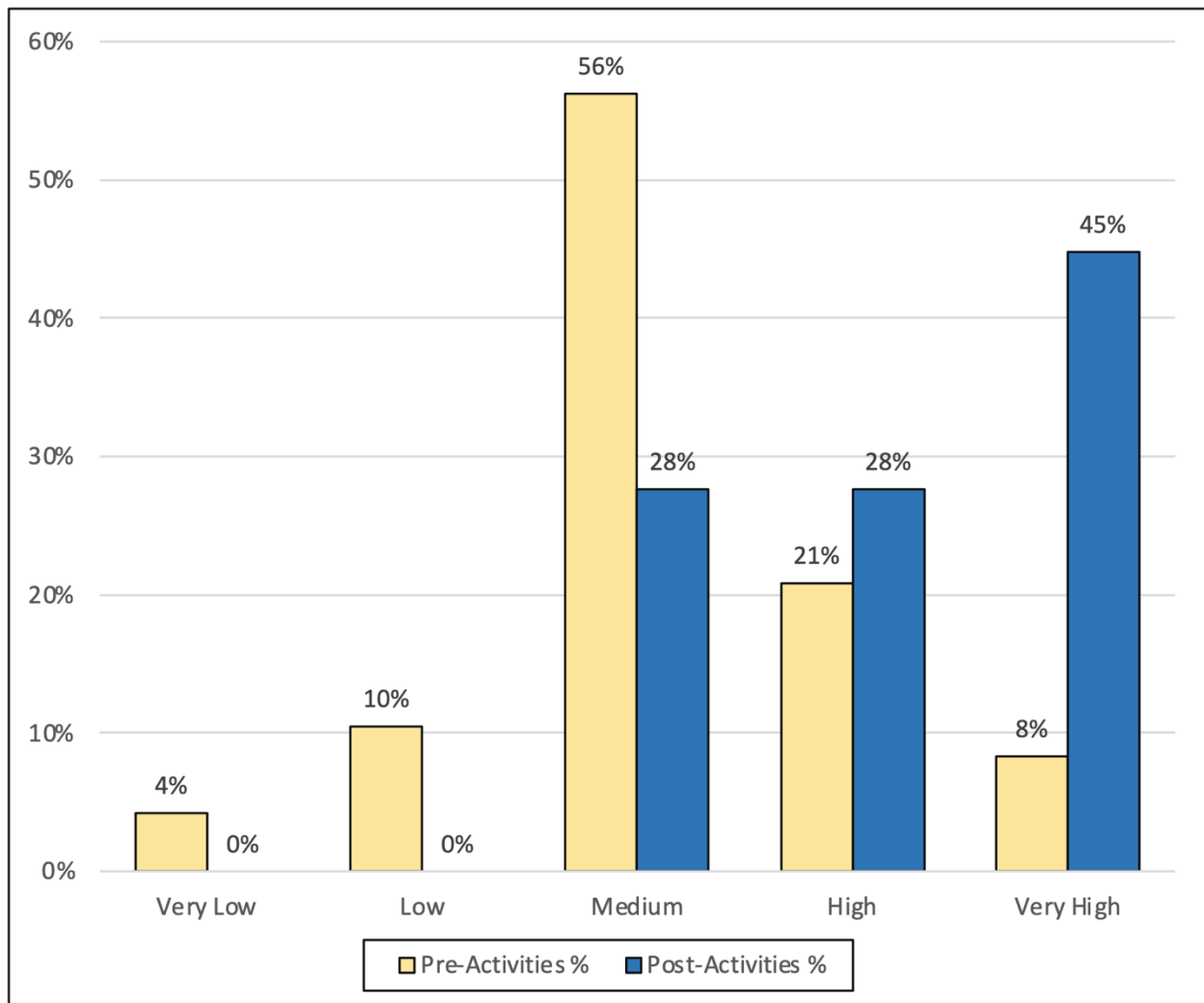
Figure 14 - Personal Ability to Apply Knowledge in Technology Design: Student Self-Assessment of ability to avoid the impacts of personal bias and systemic racism in their work pre and post-exposure to the suite of anti-racism learning activities.

[NOTE: 20 of the study participants did not respond to the End-of-Semester Survey, although they did not withdraw from the study.]

6.2.4   Analysis of Open-ended Survey questions

Each survey also included open-ended questions to provide more detailed information about students' self-assessment of their ABAR knowledge. These responses yielded insight and detail that supplements the findings from the close-ended prompts. Over 100 responses were analyzed, coded, and sorted into themes as described in Section 5.4 in Chapter 5. Eight main themes emerged from the participant responses to questions related to their knowledge and are shown in Table 13. The most dominant themes involve understanding the concepts and impact of

bias and racism in design, developing practices for avoiding biased and racist design, barriers to

anti-racist design, and more general knowledge of the importance of diversity and inclusion.

Table 13 - Themes for Student Self-Assessment of Knowledge of Anti-Racism Topics

Theme	Description	Count*
Developing practices to avoid biased / racist design	Understanding of useful preventative practices including diverse design teams and user groups, avoid pre-judgement, and incorporate outside opinion, maintain respect. "Create design for the margins. There can be diversity in the target audience" – SP41.	47
Keeping diversity and inclusion at the forefront	Maintaining an awareness of the importance of diversity and inclusion in the entire design process. "More diversity in the design and project can be reached if the team itself is diverse" – SP48.	21
Understanding the impact of bias and racism in design	New understanding of the role and impact of bias, racism, and anti-racism in technology and design. "The existence of bias in design to the detriment of minority groups" – SP07. "Can definitely make an impact in our society" – SP09.	19
Developing a more complete understanding of biased/racist design	New understanding of definitions, causes (unintentional vs deliberate), impact of racist design, and obligation to do better. "With technology being as advanced as it is we can do better" – SP09.	12
Promoting practical anti-racism strategies in design	Understanding the importance of strategies for anti-racist design. "I want a core set of values to refer to when going through the design process" – SP51.	4
Developing understanding of barriers to practices to avoid biased/racist design	Understanding the pitfalls that can create barriers to successful anti-racist design, such as time-constraints, assumptions, and the tendency of stereotypes in personas. "We interviewed and created personas based on convenience. This was mostly due to time constraints which led us to interview those we know" – SP38.	2
Disconnect in understanding the link between systemic racism and personal bias	Expression of ideas such as being inclusive only when necessary. "It's always a good idea to think about diversity and inclusion, but only when necessary" – SP05.	1

* "Count" represents the frequency of occurrence of codes within the theme identified in the "Theme" column of the table.

It should be noted that twenty (20) of the students who submitted the Early Semester survey did not submit the End-of-Semester survey. Although the statistics for the close-ended survey questions and the results of the qualitative coding of the open-ended survey prompts are encouraging, it would be a mistake to extrapolate these results as an indication of the self-assessment that these 20 students might have provided.

6.3   RQ2: Student Experiences

Data collected to assess student experiences with the suite of five embedded anti-racism learning modules includes multiple sources and formats, including closed and open-ended survey questions and student discussion posts for the Module 5 - Retrospective Reflection. The End-of-Semester survey (Appendix K), which was used as part of the analysis for RQ1 to identify changes in student self-assessed knowledge and interest, also collected data about student experiences with the suite of learning modules. The survey contained ten (10) close-ended questions, which used five-point Likert scales and several open-ended questions to allow respondents to communicate their experiences with the learning modules.

The findings of student experiences with the learning modules are presented based on three key theme categories identified in the survey questions. These include the course environment, student experience with the learning modules, and logistics – pace and workload. The results of the Likert survey questions analysis can be seen in Figure 15, Figure 16, and Figure 17.

In the course environment and student experience categories, respondents indicated their experiences with the learning modules using a 5-point Likert scale ranging from "1- Strongly Disagree" to "5- Strongly Agree." Figure 15 and Figure 16 show the results of these prompts.

Figure 15 includes the three prompts that assessed student experience with the learning

environment. Results from four prompts shown in Figure 16 are related to the category of

students' direct experience working with the learning activities and assignments.

In the logistics – pace and workload category, respondents indicated their experiences

with the learning modules using a 5-point Likert scale with value choices ranging from "1- Much

too slow" to "5- Much too fast." Figure 17 shows the results of these prompts and includes data

from the two questions about student experience with the logistics of the learning modules.

6.3.1 Course Environment in Relation to the Anti-Racism Learning Modules

The survey prompts related to the course environment were

- QE1: I had enough time to complete the anti-racism learning assignments.

- QE5: I completed the assignments in a supportive environment.

- QE7: There was not enough interaction with other students during the assignments.

Analysis of the responses to the prompts about the course environment was positive,

except for the prompt that asked participants about their experience regarding interactions with

other students. The majority of respondents experienced a supportive environment in the course

as they worked through the anti-racism activities and assignments, with sixty-two percent (62%)

strongly agreeing that the environment was supportive, twenty-four percent (24%) indicating

agreement, and only fourteen percent (14%) neither agreeing nor disagreeing. No respondents

disagreed or strongly disagreed that the environment was supportive. Likewise, responses to QE1

agreed or strongly agreed that they had sufficient time to complete the assignment, with ninety

percent (90%) indicating their agreement. Again no participants responded negatively to this

question. The surprising and confusing information in this category is that participants indicated

disagreement with the statement that there was not enough interaction with other students during their work on the anti-racism activities (QE7). Thirty-eight percent (38%) of respondents disagreed or strongly disagreed. Thirty-eight percent (38%) neither agreed nor disagreed, and only twenty-four percent (24%) indicated insufficient interaction. The results of the qualitative analysis of the open-ended survey questions indicated a strong desire for much more interaction with their peers during these learning activities, where the responses to QE7 are mixed.
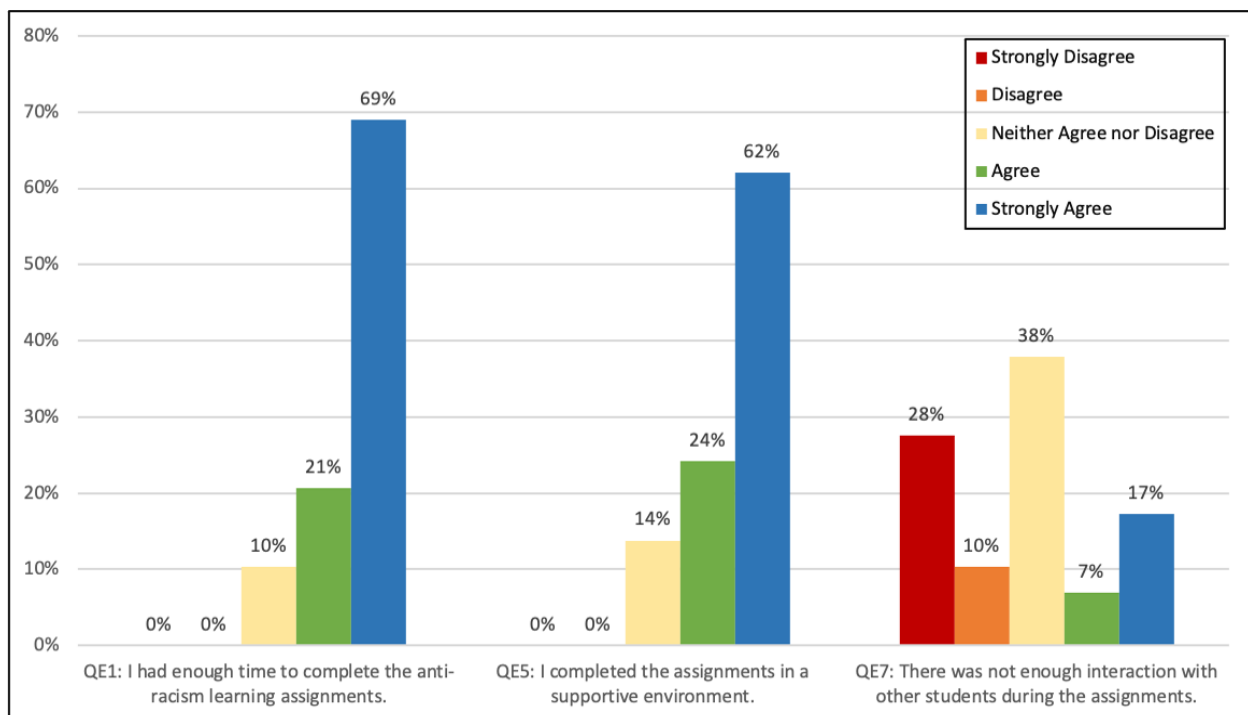
Figure 15 - Student Report of Their Experiences of the Course Environment Related to the Anti-Racism Learning Modules

6.3.2   Personal Experiences with the Module Activities and Assignments

The survey prompts related to the student's direct experience with the learning activities were

- QE2: The learning modules were clear with anti-racism learning assignments and the purpose of the assignments.

- QE3: Participating in the assignments was a positive experience.

- QE4: I did not have enough opportunities for self-reflection or de-briefing.

- QE6: The anti-racism learning modules did not feel authentic.

- QE8: The anti-racism modules provided useful information for my project.

Five prompts requested information about students' personal experiences with the anti-racism learning modules. Ninety-three percent (93%) of respondents found the activities and purpose clear. Eighty-three percent (83%) indicated that participating in the learning modules was a positive experience and seventy-six percent (76%) found the information contained in the learning modules useful for their design projects.

QE4, which asked participants to indicate whether they had sufficient opportunities for self-reflection, supports the findings in the qualitative analysis of the open-ended questions. Only forty-five percent of participants stated that they had enough chances, and fifty-six percent (56%) indicated a need for more self-reflection.

It is concerning that thirteen percent (13%) of respondents thought the learning modules were not authentic. A further thirty-one percent (31%) neither agreed nor disagreed that the modules were not authentic. This information was not reflected in the qualitative analysis and should be further investigated in future research.
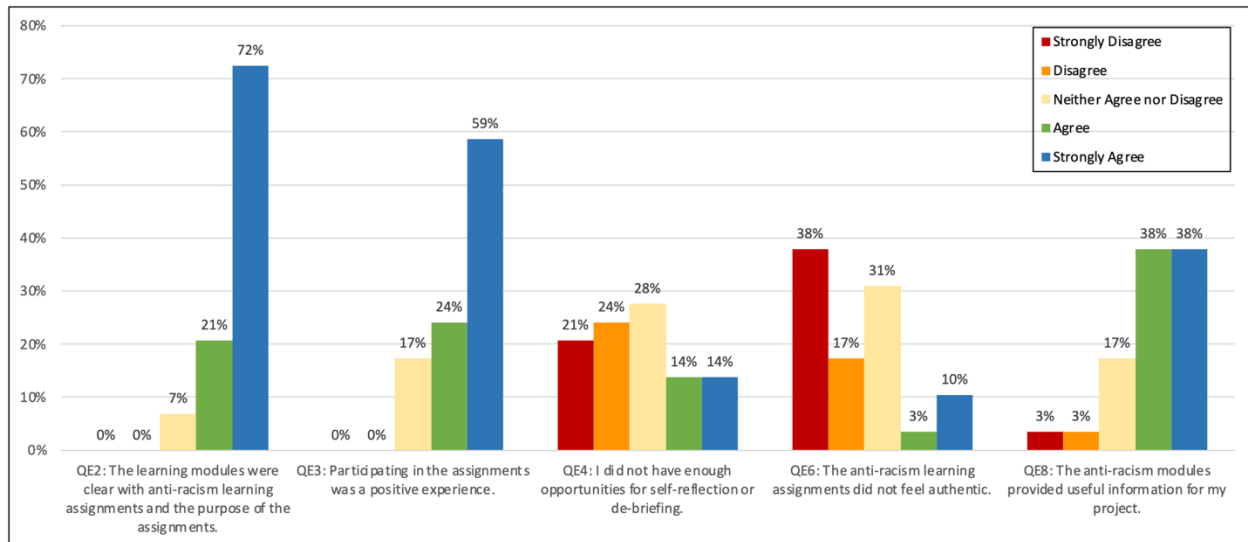
Figure 16 - Student Reports of Their Personal Experiences with the Anti-Racism Learning Modules Activities and Assignments

6.3.3 Logistics of the Implementation of the Learning Modules – Pace and Workload

The survey prompts related to the logistics of the implementation of the modules and activities were

- QE9: The number and pace of the anti-racism modules.

- QE10: The workload of the anti-racism modules.

The final category of prompts relates to the student experience of the logistics of the learning modules. Was the pace of the modules too fast or too slow? What was their experience with the workload? The responses to both of these prompts indicate a good balance in the design of the modules and that the instructors provided sufficient time during the semester for students to engage with the modules. Seventy-two percent (72%) of respondents indicated that the pace was average, and eighty-six percent (86%) thought the workload was also average. This was surprising because there was some indication from the qualitative analysis of the open-ended questions that some participants thought the pace was "sluggish" and there was a mix of opinions about the workload, with some participants requesting more and others requesting less.

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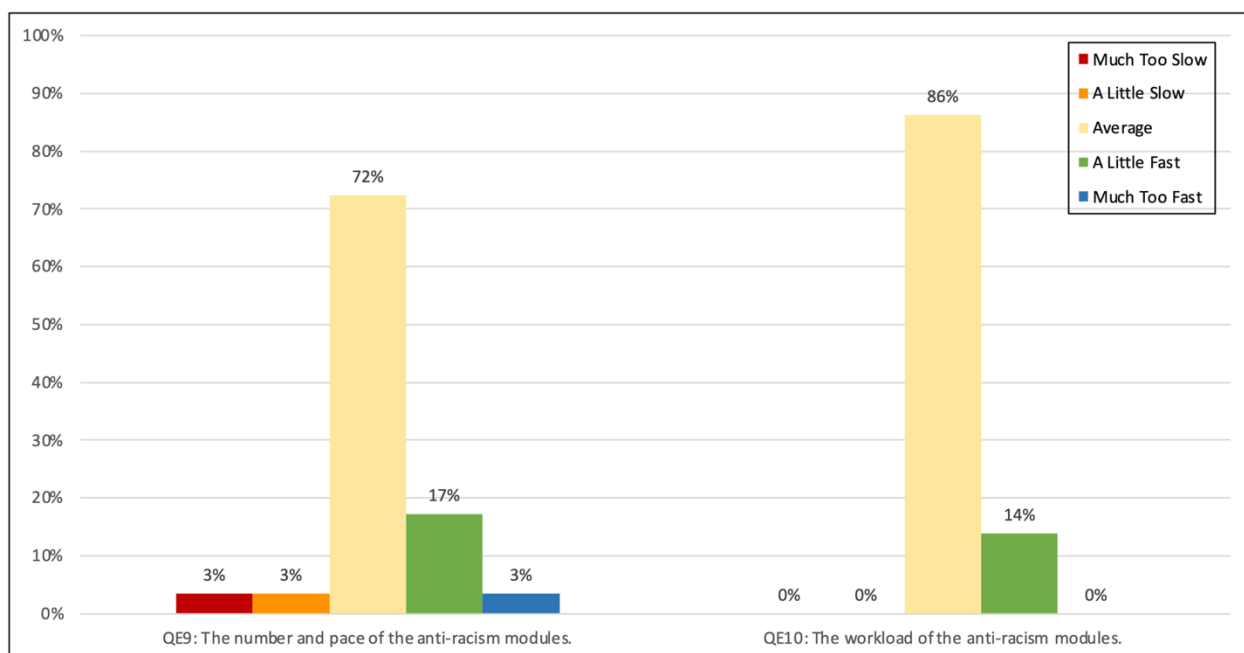
Figure 17 - Student Reports of Their Experience with the Logistics of the Implementation of the Anti-Racism Learning Modules -- Pace and Workload

In addition to the quantitative data gathered from the close-ended prompts, open-ended questions were included in the End-of-Semester survey to collect more in-depth information about student experiences. The themes resulting from the collaborative qualitative coding of those responses are included in Table 14. The most dominant themes involve the importance of the learning modules' authenticity, content, and structure in creating and maintaining student engagement and receptivity. Interaction with each other and the materials is also key to student engagement. Finally, two themes indicate a strong interest in embedding anti-racism instruction in technology design courses: desire/need for anti-racism instruction in iSchool courses and expanding content to increase understanding and engagement.

Table 14 - Themes for Student Experiences with Anti-Racism Learning Modules

Theme	Description	Count
Structure, content, expectations as a support to	Factors such as structure and content can also create support to student engagement and receptivity. "I loved watching the videos and having additional resources readily available" – SP01.	44

engagement and receptivity	"The manner in which the anti-racism modules were presented/structured/worded should continue. They felt reasonably authentic" – SP33.	
Expand content to increase understanding and engagement	Seeking more learning activities, quantity and variety of materials. "Keep expanding the anti-racism learning modules! They were great to reference throughout our project!" – SP01.	21
Structure, content, expectations as a barrier to engagement and receptivity	A variety of factors related to structure and content can create barriers to student engagement and receptivity. "The modules were long and overloaded" – SP04. "Ensure that the modules are as tonally neutral as possible. I can imagine certain users who are 'on the fence,'" "would respond poorly to the content otherwise" – SP33.	21
Create more interaction with each other and the materials to promote engagement	Seeking more active interaction and collaboration in completing and reflecting on the anti-racism modules. "More impactful to integrate collaborative group discussions throughout the design process" – SP01. Seeking more interactive activities, including case studies, focused labs with "mock situations," and discussion assignments. "Would be cool to have labs that focused on being given a design for individuals to improve based on the lessons" – SP21.	16
Promote practical anti-racism strategies in design	Teach, promote, and provide examples of tangible actions and best practices for anti-racist design. "Provide a large number of racism examples and give solutions about how to deal with those" – SP57. "Put them into practice in assignments" – SP26.	8
Desire/need for anti-racism instruction in iSchool courses	Expressed understanding that the modules have impact personally and for society and that anti-racism instruction should not be optional. "Important for all students to know that designing an app that won't be useful for some group of users is not good since this might negatively impact on those users in many ways" – SP06.	7
Expand content to more general discussion of intersectionality and social impact	Seeking content related to intersectionality, allyship, passive non-racist vs active anti-racist activities. "More emphasis on allyship and what it could look like" – SP01. "Focus on inclusivity and shine light on different backgrounds. There are other methods of inclusivity we did not talk about" – SP53.	7
Authenticity impacts experience,	Authenticity and tone of the learning interventions can positively or negatively impact student engagement and receptivity.	6

engagement, and receptivity	Negative: "The same overall message that 'Diversity is good and racism is bad' without giving it much further thought" – SP21. Positive: "Really valuable to hear from UX designers and researchers in the field who are BIPOC themselves" – SP01.	
Continually monitor student engagement	Instructors should request feedback from students to improve learning, engagement, and receptivity. "Gathering participants' opinions about anti-racism and their attitude" – SP29.	1
Leverage student knowledge and life experience to promote understanding and engagement	Use the variety of students experiences to promote understanding and engagement. "Celebrate the breadth of experiences and perspectives of its students/participants would be beneficial and maximize engagement" – SP01.	1

6.4 RQ3: Student Understanding

To assess student levels of demonstrated understanding of the concepts of anti-racist design and their ability to implement effective anti-racist design, data was collected and analyzed from discussion posts submitted for the Module 5 assignment. See Appendix I for the assignment details. The Module 5 assignment has the benefit of being the summary assignment for the suite of anti-racism modules and is structured for individual submissions with responses to classmate posts. Module 1 as an initial assignment would not have been helpful in assessing student understanding based on participation in the learning modules. The remaining three (3) assignments are all designed as team activities and group submissions, so assessing individual student understanding using these submissions would be problematic. The researcher evaluated student submissions for understanding using the grading rubric provided to the instructors (Appendix I). Many of the student responses offer additional insight into understanding and ability to apply the anti-racist design concepts. Since some instructors allowed students to pick one of the four questions to answer, the average student scores (Figure 18) are based on the

number of responses for each question rather than the overall number of assignment submissions. This approach should provide a more realistic assessment of student understanding. Of the fifty (50) study participants, forty-two students submitted the Module 5 assignment. The results of grading and evaluation of those submissions constitute the findings on students' understanding and ability to apply concepts and skills encountered in the anti-racism learning modules.

The four (4) questions in the assignment, which were graded using the rubric provided in the Module 5 materials (Appendix I), are

1. What is the least useful concept from the learning modules? Why?

2. What is the most memorable or useful concept from the learning modules? Why?

3. How can you use the design concepts and techniques you have learned to advance justice, equity, and to avoid racism and bias in your designs?

4. How might your team's design solution change if it were developed for users of a different race, sexual identity, gender, age, community, geographic area?

Information gathered for each of the four (4) questions includes the number of student submissions and the average percentage score by question for all students (Figure 18). The assignment rubric included three rating categories with different points possible for each of the four questions. The following rating criteria provide insight into the method of assessing student responses to the questions.

- Good – Comprehensive information, focused and clearly linked to the learning materials. Includes several supporting details/examples. Describes connections between concepts and skills learned and impact on team/designers/self.

- Acceptable – Partially addresses the prompt. Describes connection to the learning modules but does not address the impact on team/designers/self. Lists an example but is unclear how it relates to the learning modules.

- No marks – Does not answer the question or the answer is so incoherent that the tie to the material cannot be determined.

Questions 3 and 4 are directly related to student understanding. They assess the ability to implement the concepts and skills included in the suite of learning modules. For Question 3, there were forty (40) submissions with an average score of eighty-eight point three percent (88.3%). There were forty-one (41) submissions for Question 4 with an average score of eighty-six percent (86%). Since this is the first encounter with ABAR topics and learning activities in a technology design course for many of these students, the scores are encouraging.

Questions 1 and 2 relate to concepts that the students found most or least valuable, with submission numbers of 31 and 28, respectively, with scores based on the grading rubric (see Appendix I) of 79% and 85.7%. When combined with the student responses, this information may prove helpful in future adjustments to the content of the suite of anti-racism learning modules.
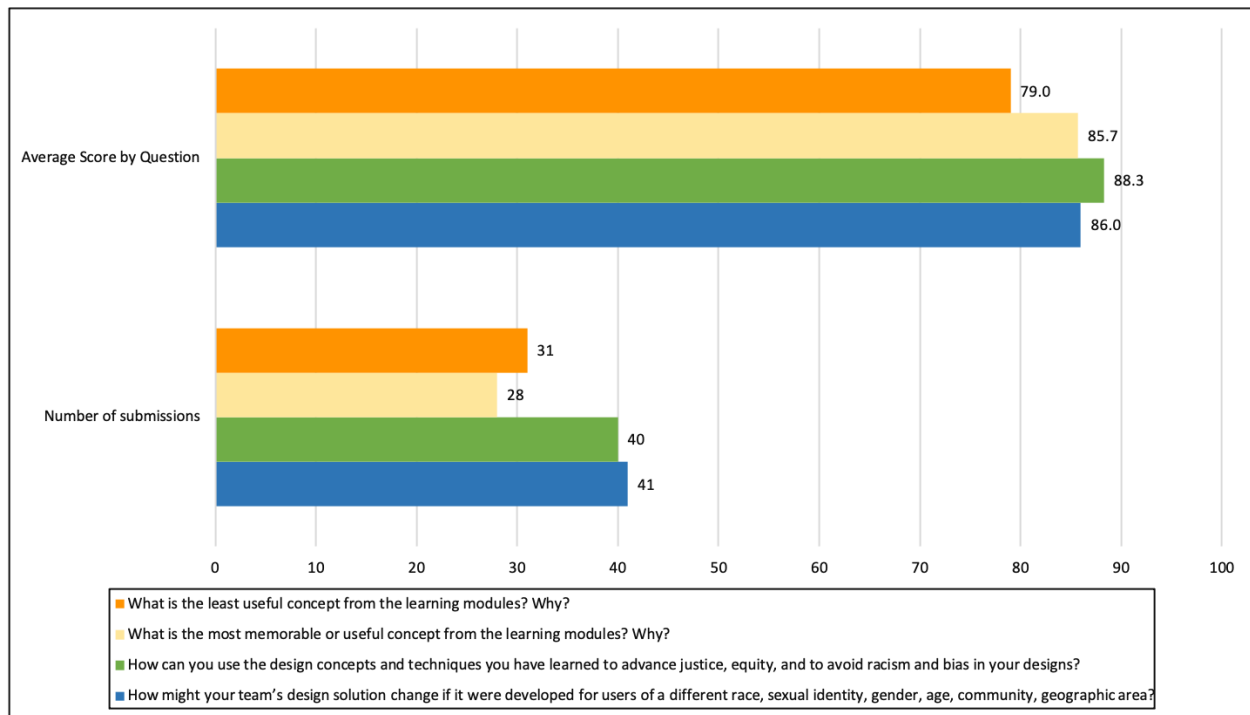
Figure 18 - Assessment of Student Submission for the Module 5 - Retrospective Reflection Assignment

In addition to the student scores on the discussion question prompts for the assignment, I also include quotes from student submissions. Some submission quotes are included to show gaps in student understanding, while other submission quotes highlight evidence of understanding, receptivity, and potential for applying their new knowledge. These quotes are included to reflect and represent student voices and their stories.

As mentioned, some student responses evidence either a gap in understanding or only a rudimentary understanding of the impact of bias and racism in technology. One example is the submission by SP02, "If our app is going to be tailored to different races, genders, and ages, we need to add more buttons in the app to allow users to find their race, gender, and age quickly. It will be a complex project. At the same time, our application interface will look messy." This is reminiscent of complaints by technology designers that designing for accessibility is hard. In another case, there is evidence of a disconnect in the instructions that both accessibility and ABAR design are essential. SP06 wrote that addressing user needs based on race and gender

would require "removal of our voice command feature and the audio," and "my team and I included those features to allow and help disable [sic] people use our app." Another student's response exhibited a stereotypical, unnuanced, and biased view of African American users, "if the app is for the African American, we would rather make our app home page's background dark instead of white." The student did not indicate why a "dark" background would be of specific interest to African American users. Clearly, more scaffolding and instruction are needed.

Other submissions provided more encouraging evidence of student understanding.

We recognize our responsibility as innovators and designers – which is to consider the larger context with regard to all of the cultural, political, and racist biases in our society, and the potential implications of this new technology on marginalized groups – SP01.

Several students displayed an understanding of the importance of diversity in design teams and user groups.

- "The impact of a diverse team was huge in our design process." "Thanks to our team diversity, we had access to diverse user groups" – SP30.

- "We made sure to recruit a diverse group of participants to test our prototype. By doing this, we were able to hear feedback about our prototype from many different perspectives" - SP32.

- "Anti-racism means carefully considering the differences and similarities between the needs expressed by separate groups and how various individuals may use our design differently" - SP33.

SP38 described an epiphany in their design process regarding the importance of team diversity,

We only had one female… in our process and the idea of a privacy feature, regarding location, was suggested. This was a design feature, we, a group of all males, missed. People with different perspectives and experiences… would have continued to suggest fantastic design features we may have overlooked.

Another student (SP12) noted the importance of intentionality, "We must be intentional to avoid designing products that exclude a certain group even when remembering to add alt-text to images." While yet another noted the dangers of overconfidence in their ability to apply anti-racist design practices, thereby missing the existence of unintentional racism or bias.

Of particular relevance and interest are those students who actively used the anti-racism materials in their project process with their project teams. Participants who described their efforts to "make sure our project and design process practiced anti-racist values" – SP35 provided insight into their process.

- "Our team did our best to minimize any intentional and unintentional racism in our design. To achieve this goal, we made a conscious effort to include participants from many different demographic groups, particularly those that are often marginalized in our society" – SP33.
- "We didn't make any large decisions without consciously thinking about inclusivity and accessibility" – SP51.

SP35's description of their project work is striking in displaying their understanding of the anti-racist learning materials and the importance of anti-racist design.

Our project was one that aimed to target individuals of many cultural backgrounds/ethnicities; we had to make sure our project and design process practiced

anti-racist values. Anti-Racism in the context of our project meant that we had to appease many individuals from different backgrounds yet not perpetuate any stereotypes. To address the intentional and unintentional racism in our design, we took additional steps towards aspects like creating inclusive personas; we did this by avoiding things like single story narratives that attempt to include all aspects into one persona. Rather, we made sure to build multiple personas and scenarios. We also had to make sure that all of the ideas/thoughts we had came solely from our CI/CA/Interviews. This way, we were gaining ideas from actual individuals from these various backgrounds and not allowing our own biases/assumptions get into the way of our design process. If we could have more time, something I would have done would be to actually gain much more insight from the user evaluations based on our prototype. Though I thought we did a great job of recruiting individuals, I would have liked to include even more individuals from other backgrounds in order to gain additional thoughts regarding how our design may be biased in some form – SP35.

In their submissions for the Module 5 assignments, students displayed varying levels of understanding and ability to apply the knowledge and skills gained from the anti-racism learning modules during the semester. Some responses indicate a gap in understanding, while others exhibit an awareness of the importance and responsibility of designers to practice anti-racist and inclusive design. Students highlighted the importance of building diverse design teams and user groups. The relative distribution of students who indicated that they actively incorporated the concepts of anti-racist design into their team projects was slightly over forty-two percent (42%). The students whose teams practiced anti-racist design on their projects did so with varying degrees of detail and success.

Chapter 7:   Conclusion

The work I completed in research and design as an exploration of embedding anti-racism instruction into technical design courses contributes to the body of knowledge in the continuing inquiry about bias and racism in technology and the responsibility of Information and Computer Science programs to prepare students to address these issues. The suite of learning modules and the framework are equally valuable contributions.

This research provides beneficial insight into student receptivity, engagement, learning, and application in this environment. There are areas for improvement in the learning modules and study design. However, the suite of anti-racism learning modules can be implemented in a User-Centered Design course as-is or with modifications and customization to fit the needs of specific instructors and students. Additionally, the suite provides a framework for creating and including embedded anti-racism instruction in other technology design courses. The findings highlight new directions for study in the areas of ABAR instruction in Information Science and Computer Science curricula. This research can provide a base and reference for future research involving Information Science instruction and the merging of technology content with social justice and social responsibility content. Such a merging is at the heart of Human-Computer Interaction.

7.1   Limitations

Limitations must be acknowledged to properly assess the value of the research, the findings, and the conclusions. The primary limitations of this research are

- Participant sample size.
- Self-selection bias.

- Variations in the course sections.

- Pre and post-activity survey design.

With fifty (50) participants across all course sections having a population of two hundred thirty-seven (237) students, we cannot consider the data and findings to fully represent the reception and impact of the suite of five anti-racism learning modules in the population of students. The participant sample size is a limitation to the completeness of the findings. Additionally, although purposeful sampling was used, participants self-selected. Consequently, the participant pool consists of students who may have higher than average interest in the subject, so there is potential for self-selection bias. Despite the sample size being less than ideal, we can draw valid conclusions from the findings to inform future research and development of similar anti-racism and DEI learning modules using this framework.

Variations in the course sections include the number of participants in each section, method of content delivery, module implementation, and grading practices. The number of participants in each section varied from four (4) students to twenty-one (21). The different course delivery methods, face-to-face and online, may have impacted student experience and engagement in ways for which the study did not account. Some instructors implemented the learning modules and assignments as designed by the researcher, while others made modifications to serve the needs of their students. Although customization of the learning modules to fit the needs of students is the eventual intent of these interventions, changes may have affected student experience and engagement in ways that the study did not measure. Finally, the sections had multiple graduate teaching assistants. Each grader likely had different grading practices, methods, and rigidity in adherence to rubrics. The potential for these differences to introduce assessment discrepancies made analysis of assignment grades as a

measure of student understanding problematic. For this reason, all participants' Module 5 assignment submissions were graded by the researcher using the rubric (See Appendix I). The content of the reflections was also investigated to answer the question of students' demonstrated understanding and ability to implement anti-racist design practices.

The final limitation is in the pre and post-activity surveys. The surveys provide an excellent first look at participant experiences and knowledge self-assessment. However, follow-up focus groups or interviews could provide richer data and clarify participant confusion over the meaning of questions and researcher confusion over respondent answers to the open-ended questions. With my limited experience designing surveys, I created some ambiguous open-ended questions. A post-study review prompted by information encountered in the qualitative coding of responses identified the potential for multiple interpretations by survey respondents. The three vague questions were variations of

- Based on your project and experience with the anti-racism learning modules, what did we do/not do that we should STOP/START/CONTINUE doing?

Some respondents accurately interpreted "we" to refer to the researchers and instructors and provided information about changes that might improve their understanding and experience. Others interpreted "we" to refer to themselves and provided answers indicating how they could make changes as students and designers to reduce the effects of personal bias and systemic racism in their designs. Despite not being the information initially sought in these questions, these responses did prove helpful as a gauge of student understanding and ability to apply their new skills.

7.2 Discussion

In this section, I begin by discussing the findings from the student self-assessments of changes in their knowledge and interest in racism and anti-racism topics over the semester. I follow with results related to student experiences with the learning modules and conclude with findings on student understanding and ability to apply that understanding.

Student self-assessment of how their knowledge and interest changed during participation with the suite of anti-racism learning modules showed measurable increases in knowledge, interest, and student confidence in applying their new skills (RQ1). The percentage of respondents who indicated a low or very low knowledge of and interest in the impact of racism in technology dropped to 0% by the end of the semester. Conversely, there were increases in multiple self-reports, including a forty percent (40%) increase in high levels of knowledge of the relevance to user-centered design (QK2), a thirty-six percent (36%) increase for the impact of bias and racism on technology (QK3), a forty-three present (43%) increase in high levels of ability to identify the impact of bias and systemic racism in technology design (QK6), and a forty-four percent (44%) increase in high levels of ability to avoid those impacts in their work (QK7). These changes were reflected in the *t*-test results. The suite of learning modules made a significant difference on all counts except QK1 in the online delivery format; a larger sample might have allowed me to ascertain better the pre/post-test difference in the online class context.

Students indicated new awareness of

- the existence of unintentional racist designs – "I learned that racism in design is often not a result of conscious decisions on the part of designers" – SP33.
- the importance of diverse design teams – "Our design team was very diverse. This made it natural to emphasize inclusion" – SP38.

- the importance of diverse and inclusive user groups – "Create designs for the margins. Most of the designs are catered to their target audience, but there can be diversity in the target audience itself" – SP41,

- and the importance of the human aspect of design – "Employ more empathy towards others in our designs" – SP05.

Analysis of the End-of-Semester survey and responses to the Module 5 - Retrospective Reflection assignment shows that student experiences with the learning modules were generally positive and prompted the desire for more such learning interventions (RQ2). An overwhelming eighty-three percent (83%) of respondents found participating in the learning activities to be a positive experience, with seventy-six percent (76%) indicating that the information was helpful in their design projects. When considered in conjunction with the ninety-three percent (93%) of respondents who believe the content and purpose of the modules were clear, the findings are encouraging. They indicate that the design of the suite of modules provided a successful learning experience for students. Although qualitative analysis of the open-ended survey questions offers rich data for improvements in the modules, students' high levels of understanding of the purpose and indications that the materials were helpful and the experience positive are encouraging for me as an instructor and other faculty who may consider implementing such a format in their technology design courses.

However, some students reported negative experiences. It is concerning that thirteen percent (13%) of respondents indicated that the modules were not authentic, and a further thirty-one percent (31%) neither agreed nor disagreed. Participant SP21 noted that the "Content just feels the same and generic. Personally, I just skim it and receive the same overall message that 'Diversity is good and racism is bad' without giving it much further thought." These negative

responses should not be discounted, and future researchers and instructors should seek to understand the causes of such reactions to improve the learning experiences for all students.

Finally, the Module 5 assignment assessment shows student understanding and retention of the concepts and the active use of their new anti-racism skills in their semester projects (RQ3). The scores on questions directly related to understanding were eighty-six (86%) and eighty-eight percent (88.3%), in the B to B+ range and denoting a good mastery of the subject (University of Maryland - College Park, n.d.). Several student project teams' immediate adaptation of anti-racist practices bodes well for student participants' knowledge retention and continued use.

7.3 *Implications*

Despite the potential self-selection bias, one of the most important findings of this study is that undergraduate information science students are receptive to embedded instruction of anti-racist and other social justice design practices in practical application technology design courses. Students' immediate use of the materials and practical skills in the Fall 2021 semester can inform work for faculty designing such embedded instruction for other technology design courses.

Student participants were also forthcoming about ways to improve the learning experience for themselves and future students with suggestions about adjustments to the module structure, delivery format, and content. This active engagement in seeking to improve the material indicates a buy-in to this instruction format that should encourage those working to create similar learning activities in their courses. An unexpected finding was the level of interest in more significant personal interaction with other students in the learning experience with the subjects of bias, racism, and anti-racism. I expected students to seek some level of buffering in engaging in these sensitive topics. Some of the participants in the pilot study indicated that a

level of anonymity would provide a welcome sense of protection when discussing these sensitive topics.

- "So they don't receive immediate backlash. It's like one of my experiences, I was like, the only person of color in the room and it just like felt really weird" – P08.
- "You're afraid of, your teacher's going to look at you different, or your fellow students are going to look at you differently," "or you don't want to be disliked" – P05.

However, the overwhelming consensus of survey responses in the main study indicates a desire for greater collaboration and interaction between themselves and others when confronting these topics.

7.4 Future Research

There are several avenues of opportunity to use the findings in this research to move beyond the initial exploratory study and extend the knowledge gained here. A larger-scale analysis is needed to corroborate these findings and identify additional areas for anti-racism learning intervention implementation in technology design courses. Use of the framework designed for this research to create a suite of modules for a different type of technology design course and a subsequent study may validate the framework and concept or identify flaws and areas for improvement. Longer-term research conducted across multiple semesters could provide the opportunity to recruit a larger participant pool. A larger sample size would give greater validity to the findings and might identify information not collected or identified in the small sample size of this study. Additionally, a larger sample size would allow researchers to study the differences in experience and engagement among students in various demographic groups. For example, how do receptivity and experience differ between Black, Indigenous, and other POC

students versus White students? Are receptivity, engagement, and learning outcomes different for international students whose experiences with racism may diverge from the experience of U.S. students?

There is also the need for longitudinal studies to follow student participants and track their retention of concepts and skills learned. Such a study should investigate long-term changes in participant design practices and experiences. An important question that could not be answered in a single semester study is whether there are sustained effects of student engagement with the anti-racism learning modules. Does the experience with the suite of embedded anti-racism learning modules in a single semester of the INST362 – User-Centered Design course inform participants' work in their future classes and careers?

Future researchers should also incorporate focus groups or individual interviews with members of the participant pool to enhance the data gathered in surveys. Although surveys provide an initial examination, more in-depth study and analysis are needed to determine the potential benefits of this method of instruction.

7.5   Recommendations for Instructors in Technology Design Courses

The instructors and teaching assistants involved in implementing and teaching the suite of anti-racism learning modules had some training and knowledge of anti-racism instruction. Several are members of the ARTS, and all participated in pre-implementation briefings and instructor support meetings during the Fall 2021 semester. In preparation for implementing these modules and teaching sensitive topics in technology design courses, it will be beneficial for an instructor to reflect on their journey to becoming anti-racist designers and instructors. Joining a reading group, attending faculty workshops on anti-racism, participating in an instructor learning community, and collaborating with other instructors who plan to or have previously implemented

these or similar learning interventions can provide invaluable support as an instructor prepares to teach anti-racism topics in a technology design course. Instructors should also create an inclusive classroom environment that promotes the discussion of sensitive topics (Oleson & McNair, 2021; Prieto, 2018). In teaching sensitive topics in technology design courses, I keep in mind what one of the student participants in the pilot study (P05) said about instructors engaging in anti-racism instruction, "As long as you're trying and also making sure you come off as genuine. That can definitely make a lot of difference." Students do not expect their instructors to be experts on the topic, but they do require authenticity.

Ultimately, the suite of learning modules created in this study is intended to be adaptable and customizable. Instructors in user-centered design courses should be able to fully integrate the modules into their courses in a manner that works for them and their students. As the modules become a holistic part of the course, the implementation should not cause extreme changes in workload for the students or management and grading load for instructors. However, the learning modules require maintenance to remain relevant and engaging for students as they participate in meaningful and sensitive conversations about the social responsibilities of information scientists, technology designers, and developers.

The resources used in the learning activities of each module were gleaned from the writings and presentations of information and technology professionals and educators. The voices of Black, Indigenous, Latinx, Asian, and other people in minoritized and marginalized groups were deliberately centered in the resources included. This practice should continue as materials are updated and added. Whenever possible, the resources should consist of writings, videos, and presentations in engrossing, accessible formats with the look and feel of popular media with which students regularly engage. Many of the examples provided are "of the

moment," current or near current incidents that reflect what can go wrong when information professionals ignore or abdicate their social responsibilities, especially to minoritized and marginalized groups. Due to the nature of the materials, ongoing maintenance and updates to the resources included in the learning modules are required. Annual review of the continuing relevance of materials should help keep the modules current and engaging. For instructors whose interests lean in this direction, this activity may prove enjoyable and enlightening. For instructors whose workloads or research interests preclude direct involvement in resource gathering, delegating these activities to teaching assistants may be possible. Information Studies programs seeking to introduce and expand ABAR and DEI curricula may find that having a repository of such resources and materials helps teaching faculty to begin the process of embedding anti-racism and anti-bias instruction into their courses and collaborate with others doing the same work. Whether instructors, staff, or teaching assistants perform this labor, they need to be compensated. DEI and anti-racism work is time-consuming, emotionally taxing, often uncompensated, and frequently allocated to BIPOC faculty, staff, or students. Those who do this work deserve compensation for their efforts (Brown, 2021; Hayes, 2021).

7.6 Final Thoughts

As a White HCIM student and teaching faculty member of the College of Information Studies at UMD, I am aware of and intent on my responsibility to elevate the voices of Black academics, experts, and information professionals in my research and in the learning modules I create. I believe that I accomplished this goal in my research by actively seeking, studying, and citing the works of academics and professionals such as Joy Buolamwini, Ceasar McDowell, Ihudiya Finda Ogbonnaya-Ogburu, Safiya Umoja Noble, Angela Smith, Woodrow Winchester III, and others. In the design of the anti-racism learning modules, I was inspired by scholars in

Critical Race Theory, such as Michelle Alexander, Derrick Bell, and Kimberle' Crenshaw, among so many others, to use narrative and storytelling, specifically "resistance and emerging/transforming stories" (Bell, L.A., 2020) as instruction in the consequences of racist design and practices that can prevent such design. I purposefully included readings and videos created by Black authors, experts, and UX designers, as well as those from other minoritized and marginalized groups. My journey to becoming an anti-racist instructor is not complete. The work of becoming anti-racist is similar to the work of developing cultural competency; it is ongoing, never-ending, and always a work in progress. This is true for Information and Computer Science students and instructors.

The lessons learned and information gained in designing and implementing this suite of five anti-racism learning modules embedded in a technology design course provide a framework for creating embedded anti-racism instruction and learning interventions for other technology design courses. There is both interest and appetite for such education in the Information Science undergraduate student population. The most frequent word used in the open-ended survey prompt responses was "more" -- more videos, more activities, more interaction, more examples, and more practice. Student participants also voiced the belief that a single module or even a single course is not enough to build the robust skill set needed to become anti-racist designers or information scientists. To have a long-term impact, such learning interventions must become universal - part of the core of Information Science and Computer Science programs.

The suite of anti-racism learning modules can also provide a template for expanding course content to include concepts of intersectionality and allyship (Rankin et al., 2020). In their final retrospective reflection, SP01 said it better than I could.

It would have been nice to explore some of the other intersections of racism including

transphobia and ableism. For example, biases in user design that exclude or harm

individuals from these communities also bleed into and perpetuate racism.

Clearly, there is work to do, more research, more course design, and more support needed

for instructors and students who want to tackle these vital topics via practical application.

Appendix A: Pilot Study – Bias and Racism in Design – Extra Credit Learning Module

Extra Credit Learning Module
Designing a Pilot Learning Module for Anti-Bias Instruction in a Technology Design Course
April 5, 2021

This text will be used for the Extra Credit Learning Module. This includes the module introduction, links to the assigned readings, assignment instructions and worksheet, learning outcome, grading rubric, and cited sources.

Bias and Racism in Design - Extra Credit Learning Module

Our design decisions, the technologies we choose to develop or shelve, and our inclusion or exclusion of marginalized voices in design and user testing – have direct and indirect, positive and negative impacts on society and individuals. Bias and racism in artificial intelligence is understood to be a widespread problem, but it is not the only area of technology design where bias has negative impacts. Personal and systemic bias and racism in user experience and user interface design impact products created and makes the needs and voices of large portions of our society invisible. As technology designers, we cannot claim to be universally inclusive if we do not actively work to include the needs and perspectives of marginalized and oppressed people in the design and creation of technology.

From bias to a more specific focus on racism in design: "The idea here is that if you design an intervention or change to work for (and with) those who are most marginalized, then you inevitably cover them and those who are in the majority. Within the structure of the United States, it is blackness that defines the fundamental marginal group. The marginalization of blacks is in the origin story of this country and the current politics of this country." – Ceasar McDowell

What do we mean when we talk about racism in technology and design? How can we as designers identify bias and prevent its effects on the products we create?

The readings in this module help to start answering those questions.

Readings
- "On Racism and Sexism in Branding, User Interface, and Tech" by Adam Fard
- "Black-centered design is the future of business" by Woodrow Winchester III
- "Why Your Design is Biased" by Lico Takahashi

Exercise
Instructions: Complete the following steps. Submit the worksheet in Step 2 with your responses in a Word or Google document or a PDF file.

1. Choose one of the products in the list below.
   - Fitness Tracker (i.e., Fitbit, Apple Watch)
   - Voice-assistant (i.e., Alexa, Siri)
   - eCommerce site (i.e., Hugo Boss, Zara, Amazon)
   - Covid-19 Contact Tracing applications

2. Using what you learned in the readings along with the knowledge and skills you are developing in INST362, answer the following questions related to the product you chose in Step 1.

Things to Consider	Response (1-3 sentences)
1. How might this product be experienced differently by BIPOC (Black, Indigenous, People of Color) or LGBTQ+ users or by users who are not US citizens or for whom English is not their first language?	
2. What aspects of the product might make some users feel uncomfortable, unseen, unsafe, ignored, or targeted?	
3. What features or aspects of the product might increase marginalization for some users?	
4. What features or potential uses of the product might make life more difficult or dangerous for some users?	
5. Identify features of the product that don't work for users in the groups listed in "A." above?	
6. What changes would you make to improve the outcome of the design of this product?	
7. What design stage(s) would be affected by the changes?	
8. How might your changes impact the final product?	
9. Could those changes reduce or eliminate bias and racism in the product?	
10. Are there any potential unintended consequences of your changes that might exacerbate the problem instead of solving it?	

NOTE: Evidence of bias or racism does not mean that was the intention of the designers.
REMEMBER: Intention and impact are NOT the same thing.

Learning Outcome

You will be able to demonstrate how racism and bias manifest in technology design.

Rubric

Criteria	Ratings
Explain the need for change in the chosen product or design	1 pt
Identify potential changes in the design stage	1 pt
Determine the expected outcome/impact to the final product	0.5 pts
Identify potential unintended consequences of the changes	0.5 pts

Sources

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Appendix B: Pilot Study – Student Invitation

Student Invitation
Designing a Pilot Learning Module for Anti-Bias Instruction in a Technology Design
Course
April 15, 2021

This text will be used for the invitation.
I would like to invite you to participate in a research study of the experience of INST362 students as they encounter materials and activities in a learning module that addresses bias and racism in technology design and development.

Your participation will involve sharing your submission to the 3-point extra credit Bias and Racism in Design assignment and meeting with me via phone or videoconference for a 30-minute interview where we will discuss your experiences.

Please reply to this message if you are interested in participating. I will follow up to schedule a convenient time.

The objective of the project is to improve our understanding and teaching practices of topics of bias and racism in technology design courses in the iSchool. This can help guide curriculum and teaching material development and improve the learning opportunities for students in the Information Science program.

If you are an employee or student, your employment status or academic standing at UMD will not be positively or negatively affected by your participation or non-participation in this study.

If you have any questions about the research, please contact me at pduffy@umd.edu or (202) 329.5126.

Sincerely,
Pamela Duffy

Appendix C: Pilot Study – Informed Consent

<div align="center">

Consent Form
Designing a Pilot Learning Module for Anti-Bias Instruction in a Technology Design Course
April 15, 2021

</div>

This text will be used for the consent form. After participants complete the consent form, they will be scheduled for an interview date and time (see Interview Questions).

Project Title
Designing a Pilot Learning Module for Anti-Bias Instruction in a Technology Design Course

Purpose of the Study
You have been asked to participate in this study because you are a student in INST362 and submitted the 3-point extra credit *Bias and Racism in Design* assignment. The purpose of this research is to understand the experiences of students to better gauge the effectiveness of this type of instruction in practice.

Procedures
After you provide your informed consent at the bottom of this page, you will be asked to upload the material you submitted for the assignment. We will conduct an interview with you that will take approximately 30 minutes and be audio recorded. During the interview we will walk through the learning module exercise and discuss your experiences. For example, we will ask you to discuss the learning module and what knowledge you gained from the experience.

Potential Risks and Discomforts
There are no major risks associated with this study. You will be asked to report and discuss your experiences learning about the effects of bias in user-centered design and your knowledge of this material. You may feel discomfort with aspects of this discussion. You may decline to answer any question or to withdraw from the study for any reason at any time.

Potential Benefits
There are no direct benefits to you. However, you may benefit from the opportunity to reflect upon your experiences and consider strategies for identifying and avoiding the effects of bias in your designs. The results of the study will provide insight into student receptivity to instruction in bias and anti-racism in technology design courses. This can provide increased understanding of effective methods of teaching these topics and guide curriculum development. The findings will be of interest to information and computer science programs as they seek to integrate anti-bias and anti-racism more deeply into curricula.

Confidentiality
Interviews and questionnaire responses are confidential. Only researchers working on the project will have access to the raw interview data or questionnaire responses. Any personally-identifying information about you will be removed from transcripts or questionnaire responses before analysis.

Confidential paper materials will be stored in a locked file cabinet in the College of Information Studies at the University of Maryland. Any confidential digital information will be stored on a password-protected University server.

Right to Withdraw and Questions
Your participation in this research is completely voluntary. You may choose not to take part at all. If you decide to participate in this research, you may stop participating at any time. If you decide not to participate in this study or if you stop participating at any time, you will not be penalized or lose any benefits to which you otherwise qualify. **If you are an employee or student, your employment status or academic standing at UMD will not be positively or negatively affected by your participation or non-participation in this study.**

If you decide to stop taking part in the study, if you have questions, concerns, or complaints, or if you need to report an injury related to the research, please contact the investigator:

Pamela Duffy,
College of Information Studies,
2116 Patuxent Building,
4161 Fieldhouse Drive,
College Park, MD 20742-4911
(202) 329-5126
pduffy@umd.edu

Participant Rights
If you have questions about your rights as a research participant or wish to report a research-related injury, please contact:

University of Maryland College Park
Institutional Review Board Office
1204 Marie Mount Hall
College Park, Maryland, 20742
E-mail: irb@umd.edu
Telephone: 301-405-0678

This research has been reviewed according to the University of Maryland, College Park IRB procedures for research involving human subjects.

Statement of Consent
By selecting "I agree" and providing your name and email address, you confirm that you are at least 18 years of age; you have read this consent form or have had it read to you; your questions have been answered to your satisfaction and you voluntarily agree to participate in this research study.

You may print, save, or download a copy of this consent form for your records.

- Name:
- Email address:

- Do you consent to participate in this research project?
    - I agree
    - I disagree

Please provide your name and email address and click the button below to indicate your consent.

Interview Questions
Designing a Model Learning Module for Anti-Bias Instruction in a Technology Design
Course
April 5, 2021

The following questions will be used for the semi-structured interviews. They will reference information and materials in the extra credit learning modules that the student participants submitted. Question sequence will be adjusted if needed during the interview.

Preparation
- Have the learning module and submissions open online.

Questions
1. Tell me about your knowledge of bias and racism before you participated in this learning module.
    1. General and specific knowledge
    2. Other training received
2. What did you learn from this exercise?
3. Do you have a better understanding of the potential impact of bias and racism on technology design?
4. What questions about bias and racism in technology design do you still have after completing the exercise?
5. How might this exercise impact your future design work?
6. Tell me how the module was or was not beneficial in helping you recognize the existence of bias in a product.
7. How can you apply what you learned to other technology design courses and projects?
8. In the future, will you be able to analyze technology designs to determine whether bias or racism is evident in the design process or product?
9. How might similar modules and exercises implemented throughout the INST362 course provide greater understanding of how to identify and prevent bias and racism from impacting technology design?
10. How can incorporating such modules and exercises in technology design courses strengthen your understanding of these topics?
11. How would you change this exercise to make it more effective and engaging for yourself and other students?

Appendix E: Interventions – Learning Module 1 – Intro to Racism & Anti-racism in Technology Design

01 - Intro to Racism & Anti-racism in Technology Design #intro

Objectives
By the end of this module you should be able to...

- Begin to define the concepts of personal bias, privilege, intersectionality, positionality, systemic racism, colorism, and list examples in technology design.
- Demonstrate how racism and anti-racism manifest in existing technologies.
- Identify examples of blind spots (biases, personal privilege, intersectionality, and positionality).
- Explain how anti-racism and anti-bias more generally is a design skill that will serve you well in your future career.

Important Terms
1. *Accessibility*: the extent to which a product is accessible (perceivable, operable, and understandable) by as many people as possible (refer to the course module on accessibility).
2. *Bias*: a disproportionate weight in favor of or against one thing, person, or group compared with another, usually in a way considered to be unfair (Noel, 2020).
3. *Colorism*: a practice of discrimination by which those with lighter skin are treated more favorably than those with darker skin. This is widespread in cultures, nations, and communities throughout the world (NCCJ, 2021).
4. *Diversity*: the condition of having or being composed of different elements, variety: especially the inclusion of different types of people (as people of different races, cultures, genders, intersectionalities) in a group or organization (Teixeira, 2017). Implies an appreciation of the differences.
5. *Diversity in Design*: diversity of experience, perspective, creativity; diversity of thought (Teixeira, 2017).
6. *Implicit/Unconscious Bias*: prejudice, bigotry, or unfairness directed by someone from a privileged group towards individuals from an oppressed or marginalized group (Renee', 2018).
7. *Intersectionality*: considers that various forms of social stratification, such as class, race, sexual orientation, age, religion, creed, disability, and gender, do not exist separately from each other but are woven together (Noel, 2020).
8. *Marginalization*: the process where something or someone is pushed to the edge of a group and is treated as insignificant or peripheral (Noel, 2020).
9. *Positionality*: the practice of a researcher or designer delineating their own position in relation to a research or design context (Noel, 2020).
10. *Privilege*: a special right, advantage, or immunity granted or available only to a particular person or group, usually used to describe social inequalities (Noel, 2020).
11. *Racism*: the marginalization and/or oppression of people of color (Blacks, Latinx, Native Americans, Asians, Indigenous People) based on a socially constructed racial hierarchy that privileges White people (Racism, 2020).

12. *Systemic Bias*: prejudice, bigotry, or unfairness directed by health, educational, government, judicial, legal, religious, political, financial, media, or cultural institutions towards individuals of an oppressed or marginalized group (Renee', 2018).
13. *Systemic Racism*: a combination of systems, institutions, and factors that advantage White people and for people of color, cause widespread harm and disadvantages in access and opportunity; it is grounded in the history of our laws and institutions (Racism, 2020).
14. *Universal Design*: the design and composition of an environment (building, product, service) so that it can be accessed, understood, and used to the greatest extent possible by all people regardless of their age, size, ability, or disability (NDA, 2020).

Overview
Among designers and companies that engage in User-Centered Design and Universal Design, there is a growing awareness that designing with users instead of for users and designing products and services that are accessible and usable by "all people regardless of their age, size, ability, or disability" must also include Diverse Design (NDA, 2020). Diversity in Design is not just a popular catchphrase at this point in time. It is important because it incorporates broader perspectives which lead to more inclusive results and experiences for a broader user audience. More inclusive experiences lead to more universal design and greater benefits to designers, companies, and society at large.

As designers, we need to learn to identify our personal biases to aid us in seeing the manifestations of racism in designs whether ours or someone else's. When we talk about blind spots, we're talking about our biases, privileges, intersectionalities, and positionalities. But blind spots are not the only reason for bias and racism in technology. Systemic racism has a tremendous impact on the technology that exists and in a vicious cycle technology can feed and strengthen systemic racism. So, before we get into how we can improve designs and work to prevent racism in the technologies we design, we need to take time to look at some definitions. Understanding the terms can help us identify issues when we encounter them.
User-centered design emphasizes the human in the collaboration of human and technology and humans make mistakes. But we can acknowledge our mistakes, attempt to correct the mistakes we make, and learn to make fewer mistakes. We can learn to be equitable, anti-racist designers. It is not a one-time activity, where we get a certificate, declare ourselves to be equitable designers, and move on.

Equitable, anti-racist design is a skill that must be practiced and used to be maintained and improved. Just as the discipline of user-centered design and equitable design constantly evolve to improve outcomes for all users, we must continue to evolve also.

The design decisions we make, the technologies we develop, and whether marginalized voices are included in design and user testing affect people. It can have direct and indirect impacts, as well as positive and negative effects on the users of technologies and the individuals and companies who create and market those technologies.

Personal bias and systemic racism have been a problem in artificial intelligence for many years, but that is not the only area of technology design where racism has negative effects. Biases and systemic racism manifest in user experience design, impact the products created, and make the voices and needs of large segments of our society invisible.

Including marginalized and oppressed groups in the design process, both as members of the design team and as active members of the target audience, contributes to ensuring that we design and create technology that meets everyone's needs and perspectives. "The idea here is that if you design an intervention or change to work for (and with) those who are most marginalized, then you inevitably cover them and those who are in the majority. Within the structure of the United States, it is blackness that defines the fundamental marginal group. The marginalization of blacks is in the origin story of this country and the current politics of this country." – Ceasar McDowell

If we do not actively practice equitable design and include marginalized and oppressed groups, we cannot claim to be universal designers.

Purpose
When we talk about racism in technology and design, what do we mean? As designers, how can we identify racism and prevent its effects on our work?

The purpose of this module is to help you begin answering these questions. You will encounter other activities at critical points throughout the semester in your learning about the design process. In the activities, you will learn how the design process affects marginalized communities and individuals, so you can avoid these issues in your designs and recognize problems in the designs of others. Although we'll often focus on race in the United States as this manifests in design, anti-racism and anti-bias can be applied to different cultural contexts around the world, and help create fairer societies for people of different genders, religions, castes and ethnicities.

The presence of bias or racism does not *necessarily* mean that this was the intention of the designers.
Although they do not always have full control and authority, designers should strive to ensure that the impact of their designs fulfill the intent and they should monitor their designs for unintended consequences.

Use the READ/WATCH/DESIGN activities below to grow your skills.

Readings
- "Design | A brief history of how racism manifests itself in design and how we can learn from it." By Amrutha Palaniyappan [9-minute read]
- "Black-centered design is the future of business" by Woodrow Winchester III [4-minute read]

Videos
- Blind spots: Challenge Assumptions - PwC [2:19 minutes]
- "AI, Ain't I A Woman" by Joy Buolamwini [3:32 minutes]

Assignment: Identifying Racism & Anti-racism in Technology Design - Reflection & Discussion
Instructions: Use the information from the readings and videos to self-assess your current understanding and exposure to the topic and to reflect on your blind spots, biases, privilege,

positionality, or intersectionality. Answers should be posted in the discussion thread. Note: that you will not be able to see other responses until you have posted yours.

1. What does racism in technology mean?
2. Anti-Blackness hurts everyone. "Speech recognition technologies … make almost twice as many errors when transcribing African American voices as they do with white American voices" (Gordon, 2020). List 1 example of anti-Blackness in technology. How does it negatively impact other users who are not Black or non-Black people of color?
3. Anti-racism helps everyone. Fenty Beauty Shade Finder by Rihanna is an example of anti-racist design that benefits more than Black clients and the site provides advice beyond helping clients find the right makeup for their skin tone. Take a look at this site, then list 1 other example of anti-racism in technology (You can use the existing readings and videos or provide an example from your experience or the internet). How does it benefit groups of people in addition to Black users?
4. Using any of the tags (#blindspot, #privilege, #bias, #positionality, #intersectionality), please post to the discussion to answer the following question:
   ○ What are blind spots that I might have?
5. Respond to at least one classmate's post. The response should be respectful and clearly linked to the module materials.

NOTE: We will continue discussions throughout the semester as a community journal.

Rubric: Anti-racism Reflection				
Criteria	Ratings			Pts
	Good	Acceptable	No Marks	
Question 1: · Discusses the meaning of racism in technology.	1.5 pts Describes the meaning. Clearly linking their response to the module materials.	0.75 pts Describes the meaning. But it is unclear how their response links to the module materials.	0 pts Does not answer the question or the answer is so incoherent that the tie to the material can't be determined by the grader.	1.5 pts
Question 2: · Provides an example of anti-Blackness in technology. · Describes the negative features of the technology · Articulates the negative impact to users (e.g., Black, non-Black	3 pts Lists an example and describes the connection between features and impact to users. Describes at least 1 approach to counteract the	1.5 pts Lists an example. Partially addresses the prompt but does not address each part of the prompt. (e.g., Describes negative features, but does not address how the		3 pts

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people of color, and others) · Reflects on approaches that could counteract the negative impact.	negative impact of the technology.	features impact users, or does not mention approaches that could counteract or eliminate the negative impact.)		
Question 3: · Provides an example of anti-racist design in technology. · Describes the positive features of the technology · Articulates the positive impact users (e.g., Black, non-Black people of color, and others)	3 pts Lists an example and describes the connection between features and impact to users.	1.5 pts Lists an example. Partially addresses the prompt but does not address each part of the prompt. (e.g., Describes positive features, but does not address how the features impact users.)		3 pts
Question 4: · Using tags (e.g., #blindspot, #privilege, #bias, #positionality, #intersectionality)	0.5 pts Lists 1 or more tags to answer the question in a way that links to the module materials.	0.25 pts Lists a tag but it is unclear how it relates to the module materials.		0.5 pts
· Responds to at least one classmate's post	2 pts The student carefully and respectfully responds to another's post. Clearly linking their response to the module materials.	1 pt The student respectfully responds to another's post but does not link their response to the module materials.	0 pts No response is posted or the response violates the community ground rules by posting harassing, derogatory, or disrespectful language.	2 pts
				Total Points: 10

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Appendix F: Interventions – Learning Module 2 – Anti-racism in Contextual Inquiry

02 #contextual_inquiry

Read/Watch/Design - Anti-racism in Contextual Inquiry

Objectives
- By the end of this module you should be able to...
- Explain how racism can affect the process of contextual inquiry.
- Demonstrate how to incorporate anti-racism into contextual inquiry and user research.
- Identify examples of personal marginalization related to technology.

Overview

As technology designers and developers, we need to actively and mindfully engage in anti-racist design at all stages of the design process to avoid racism in design.

Start your contextual inquiry and user interviews by recognizing that user-centered design must seek to be fully representative of the diverse needs and perspectives of users in the target audience. (Note: You should also understand that business needs will have an effect on how representative you can be on a specific project.)

You should ask yourself and your team a series of questions as you conduct the contextual inquiry, create user surveys or questions, identify those you need to interview, conduct the interviews, and validate your findings.

Who are our users?

Who aren't our users (i.e., who are we excluding)? Why?

Who is likely to use our product or service? What ages, races, genders, ethnic groups, abilities, professions and how will intersectionality in these identities affect their needs?

How can we include these voices in our design process?

How might this design affect non-dominant populations?

Throughout the entire process from contextual inquiry to final delivery, monitor your user group for any gaps or missing voices, including racial ones. If you identify a gap in perspective or experience, consider how you can expand your group of interviewees or users to correct or fill the gap. Assess whether the gap has had an impact on the design.

Use the READ/WATCH/DESIGN activities below to grow your skills.

Read
- *Combating Racial Bias in UX Design* [3-minute read]
- Best Practices for Making Your User Research More Inclusive [14-minute read]

Watch
- [Design for the Margins](#) - Dr. Ceasar McDowell [4:52 minutes]
- [The White Default](#) - Jacquelyn Iyamah [3:40 minutes]

Design

For online courses

NOTE to instructors: This can be included as part of an existing cold interview activity instead of as an additional separate exercise.

Contextual inquiry provides an opportunity to actively explore mindful anti-racist design.

Scenario:

UMD's campus needs a Covid-19 Vaccine and Contact Tracing application. You and your project team are responsible for designing the app.

Design a method for interviewing a diverse group of potential UMD users using what you learned in the readings and videos.

Who will you interview?

How can you include the voices of people and groups that are not among your interviewees?

Prepare 4 questions to ask. Keep in mind that your questions should help your potential user explain their goals, fears, or concerns about the application. Don't ask personal health questions, especially related to Covid.

How do the questions you created make it easier for you to identify potential unintended consequences for Black, non-Black People of Color, individuals with disabilities, and other UMD community members in minority groups?

How do your questions allow for understanding the potential impact to users whose identities intersect multiple groups?

Conduct 2 cold interviews using your questions.

Submit your design here.

For f2f courses

NOTE to instructors: This can be included as part of an existing cold interview activity instead of as an additional separate exercise.

Contextual inquiry provides an opportunity to actively explore mindful anti-racist design.

Scenario:

UMD's campus needs a Covid-19 Vaccine and Contact Tracing application. You and your project team are responsible for designing the app.

Design a method for interviewing a diverse group of potential UMD users using what you learned in the readings and videos.

Who will you interview?
How can you include the voices of people and groups that are not among your interviewees?

Prepare 4 questions to ask. Keep in mind that your questions should help your potential user explain their goals, fears, or concerns about the application. Don't ask personal health questions, especially related to Covid.

How do the questions you created make it easier for you to identify potential unintended consequences for Black, non-Black People of Color, individuals with disabilities, and other UMD community members in minority groups?
How do your questions allow for understanding the potential impact to users whose identities intersect multiple groups?

Go out into the campus and conduct 2 cold interviews using your questions.

Submit the answers to questions 1 - 5 and your interview notes here.

Rubric: Anti-racism in Contextual Inquiry				
Criteria	Ratings			Pts
	Excellent	Acceptable	Poor	5 pts
Contextual Inquiry Did the student address all questions in preparing for their interviews?	2 pts	1.25 pts	.75 pts	2 pts
Assignment Completeness Did the student submit all interview questions and notes?	1 pt	.75 pts	.25 pts	1 pt
Assignment Quality Were the student's answers to questions 1 - 5 thoughtful and well-constructed?	2 pts	1.25 pts	.75 pts	2 pts
			Total Points: 5	

References and Optional Further Reading

Engagement Lab. (2016). *Design for the Margins*. *Vimeo*. Interaction Institute for Social Change. https://vimeo.com/170859192.
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Appendix G: Interventions - Learning Module 3 – Anti-racism in User Scenarios

03 #user_scenarios

Read/Watch/Design - Anti-racism in User Scenarios

Objectives
- By the end of this module you should be able to…
- Explain how racism can affect the process of creating user scenarios.
- Identify examples of assumptions and stereotypical information that leads to stereotypes in user scenarios.
- Demonstrate how to create user scenarios that incorporate an inclusive mindset.

Overview
To actively engage in anti-racist design, we must begin to develop an inclusive mindset and that takes practice. In completing the contextual inquiry and user interviews you considered a number of questions to help you approach that phase of design using an inclusive, anti-racist lens. Now as you work through the process of building user scenarios, continue that practice. Take care to interpret the information you gained in user interviews from the perspective of the interviewees (not through your biases as members of your design team).

Kat Holmes, SVP Product Design and UX at SalesForce said, "The problem with human-centered design is that no one says which human should be at the center" (Evans, 2018). Are you placing yourself or the actual users at the center?

Use the READ/WATCH/DESIGN activities below to grow your skills.

Read
- What does design have to do with racism? [5-minute read]
- Designing with intention: Human-Centered Design in the Age of Racial Reckoning [4-minute read]

Watch
- The Danger of the Single Story, Chimamanda Ngozi Adichie [19-minutes]

Design Assignment (team activity for online & f2f courses)
NOTE to instructors: This can be included as part of an existing team activity instead of as an additional separate exercise.

Creating user scenarios provides an opportunity to actively explore mindful anti-racist design.

Task:
Dr. Lesley-Ann Noel developed "The Designer's Critical Alphabet" card deck and app as a tool to help designers approach the design process using an inclusive mindset. In the deck, "I" is represented by intersectionality.

Intersectionality considers that various forms of social stratification, such as class, race, sexual orientation, age, religion, creed, disability, and gender, do not exist separately from each other but are woven together.

What are the multiple forms of oppression that affect the stakeholders in your design challenge? (Noel, 2020a)

Considering intersectionality as you create user scenarios can help you create more inclusive scenarios and avoid racial and other stereotypes. However, it comes with the risk of creating single story narratives that attempt to include all aspects in one scenario, narrative, or persona and perpetuate stereotypes. As Chimamanda Ngozi Adichie so eloquently said in her TEDtalk, "The consequence of the single story is this: it robs people of dignity" (Adichie, 2009). For technology designers it creates incomplete pictures of the users of our designs.

Working with your team and using the readings and video along with Dr. Noel's definition of intersectionality and the corresponding reflective question to assist, create 3 user scenario(s) for a diverse group of potential users for your project.

NOTE: In a real industry project the number of scenarios would be determined by context but in a course assignment, it must be constrained the time available in a single semester.

Submit your scenario(s) here.

Rubric: Anti-racism in User Scenarios				
Criteria	Ratings			Pts
	Excellent	Acceptable	Poor	5 pts
User Scenarios Did the student address all questions in creating three user scenarios?	3 pts Very well thought out user scenarios. Comprehensive information, focused, and clearly linked to the module materials. Includes several supporting details/examples.	2 pts Somewhat well thought out. Comprehensive information, focused, and links to some of the module materials. Includes 1-2 details/examples	1 pt The scenario is not well thought out. Information links to module materials but has gaps. Hard to follow, no details/examples.	3 pts
Assignment Completeness Did the student submit 3 complete, detailed user scenarios?	2 pt 3 detailed user scenarios submitted	1.25 pts 2 user scenarios or 3 incomplete scenarios submitted.	.75 pts 1 user scenario or 2 incomplete scenarios submitted.	2 pts
			Total Points: 5	

References and Optional Further Reading

Adichie, C. N. (2009). *The Danger of the Single Story. YouTube/TED.*
        https://www.youtube.com/watch?v=D9Ihs241zeg&t=856s.

Coded Bias. (2021). *Netflix*. https://www.netflix.com/title/81328723.

D'avila, B. (2018, December 27). *What does design have to do with racism?* Medium.
        https://medium.com/@medinous/what-design-has-to-do-with-racism-932d689aaa09.

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        and Inclusion with Randy Duke, Senior Research and Design Strategist at Cantina [audio
        blog]. https://www.userinterviews.com/blog/uxr-diversity-and-inclusion-with-randy-
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        https://uxplanet.org/the-upfront-guide-to-design-your-inclusive-personas-be9b179a4d74.

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        https://doi.org/10.21606/pluriversal.2020.021.

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        them*. Hyperallergic. https://hyperallergic.com/601804/a-designer-teaches-people-how-to-
        see-others-who-are-not-like-them/.

Shapkauski, C. (2021, February 17). *Designing with intention: Human-Centered Design in the
        Age of Racial Reckoning*. Watermark Agency. https://wmkagency.com/blog/designing-
        with-intention-human-centered-design-in-the-age-of-racial.

Appendix H: Interventions - Learning Module 4 – Anti-racism in User Testing

04 #user_testing

Read/Watch/Design - Anti-racism in User Testing

Objectives
- By the end of this module you should be able to…
- Explain how racism can affect the process of user testing.
- Identify examples of racism in technology designs that were not identified in the user testing phase.
- Demonstrate how to create a user testing process that includes a diverse group of users.

Overview
Returning to The Designer's Critical Alphabet, use the definition of positionality and the corresponding reflective question as you and your team prepare for user testing of your project design.

Positionality is the practice of a researcher delineating their own position in relation to a research context. A positionality statement can also help designers reveal their own biases and understand who they are and how that affects the solutions that they propose.

How does your positionality affect how you approach a specific design task or problem? (Noel, 2020)

Use the READ/WATCH/DESIGN activities below to grow your skills.

Read
- [Testing Your Product with a Diverse Audience](#) **[4-minute read]**
- [Designing an Inclusive Networking Platform for BIPOC Creatives](#) **(An example design process) [6-minute read]**
- [How design can help with inclusion](#) **[9-minute read]**

Watch
- [Integrating Inclusion: Google Camera](#) **[2-minutes]**

Design (team activity)

Assignment: Design - Anti-racism in User Testing (for online & f2f courses)
NOTE to instructors: This can be included as part of an existing team activity instead of as an additional separate exercise.

Recruiting users and developing a test plan provides an opportunity to actively explore mindful anti-racist design.

Task:
Working with your team and using your design project.

Thinking back to the 2 - Anti-racism in Contextual Inquiry video The White Default with Jacquelyn Iyamah, consider the following questions as you and your team analyze your user testing for unintended racism or bias.

How can participant recruitment for user testing highlight issues of unintended bias and racism in your project design for Black, non-Black People of Color, individuals with disabilities, and other UMD community members in minority groups?
Who will you recruit for user testing? Are you pulling from a diverse sample?
How have the constraints of a small semester project impacted your choice of participants in user testing? Who else would you have liked to include?
How can you include the voices of people and groups that were not represented in your user testing?

Submit your analysis here.

Rubric: Anti-racism in User Testing				
	Ratings			Pts
	Excellent	Acceptable	Poor	5 pts
User Testing Did the student address all questions in preparing for their user testing and analyzing the results?	2 pts	1.25 pts	.75 pts	2 pts
Assignment Completeness Did the student submit a complete, detailed analysis of their user testing?	1 pt	.75 pts	.25 pts	1 pt
Assignment Quality Were the student's answers to the questions and analysis of their user testing thoughtful and well-constructed? Comprehensive information, focused, and clearly linked to the module materials.	2 pts	1.25 pts	.75 pts	2 pts
				Total Points: 5

References and Optional Further Reading
Braga, C. (2017, April 28). *How design can help with inclusion*. Medium. https://uxdesign.cc/how-design-can-help-with-inclusion-9d71a60d6359.
Guidoccio, A. (2020, July 6). *8 ways the tech community is Building Anti-Racist products and what we can learn from them*. Exygy. https://exygy.com/blog/anti-racist-products/.

Nguyen, N. (2018, April 4). *Testing Your Product with a Diverse Audience*. Medium. https://medium.com/@nhungphnguyen/testing-your-product-with-a-diverse-audience-ca38b640009c.

Noel, L.-A. (2020, October 4). Critical Alphabet. https://criticalalphabet.com/.

Sherman, P., & Google. (2017, May 16). *Integrating Inclusion: Google Camera - YouTube*. YouTube. Retrieved February 19, 2022, from https://www.youtube.com/watch?v=9cTtzIAfnFo

Wu, G. (2020, October 12). *Designing an inclusive networking platform for BIPOC creatives*. Medium. https://uxdesign.cc/pocreatives-designing-an-inclusive-networking-platform-for-bipoc-creatives-a-ux-case-study-4d7ee337c701.

Appendix I: Intervention - Learning Module 5 – Anti-racism in User-Centered Design, Retrospective Reflection

05 #retrospective

Read/Watch/Design - Anti-racism in User-Centered Design, Retrospective Reflection

Objectives
By the end of this module you should be able to…
- Identify examples of practices that can reduce the existence of racism in technologies.
- Explain how anti-racism and anti-bias more generally is a design skill that will serve you well in your future career.
- Critique the anti-racism learning modules and their effectiveness in increasing your understanding of how racism and anti-racism manifest in existing technologies.

Overview
This semester we have learned about how to incorporate anti-racism and try to avoid bias in user-centered design. Beginning with the introductory module you have learned about issues of racism in technology design and examined ways to reduce or eliminate those problems during several key stages of design including - contextual inquiry, user scenarios, and user testing. Now take some time to look back at the experience: what have you learned, what do you still need/want to learn, and how will you move forward from here?

Returning to The Designer's Critical Alphabet, consider the following letters as you read, watch the videos, and complete the assignment (Noel, 2020). If you are interested, The Designer's Critical Alphabet app is freely available

Android:
https://play.google.com/store/apps/details?id=com.crossteam.a2z&hl=en_US&gl=US

iOS: **https://apps.apple.com/us/app/critical-alphabet/id1533698628**

"A" - Assumptions: Our inferences and ideas are often based on assumptions that we haven't thought about critically. A critical thinker is attentive to assumptions because they are sometimes incorrect or misguided.
What are your assumptions about the people and the context that you are researching? Have you double-checked the truth of your assumptions?

"B" - Bias: Bias is disproportionate weight in favor of or against one thing, person, or group compared with another, usually in a way considered to be unfair. Self-correction against implicit or unconscious bias takes a lot of conscious work.
Have you acknowledged your biases and tried to counter them by trying to understand the perspectives of others?

"J" - Justice: Justice is fairness in the way that people are treated. Social justice refers to the distribution of wealth, opportunities, and privileges. Racial justice is the systemic fair treatment

of people of all races. Climate justice acknowledges that climate change can have differing social, economic, public health, and other adverse impacts on diverse populations.
How can you use your design concepts to advance an agenda of justice?

"M" - Marginalization: Marginalization is the process where something or someone is pushed to the edge of a group and is treated as insignificant or peripheral.
How does your design disrupt the marginalization of people? If you work with marginalized or underserved groups, how will you ensure that the work is developed from the users' perspective?

"Y" - You: You play an active role in change and transformation. You have the agency to question what is happening around you and to take action as a response. Design may be one form of response. As a designer, you may play many different roles.
What are the attitudes needed to be a manager, change agent, facilitator, or researcher? How can you facilitate collaborations and co-creation across multi-disciplinary and multi-cultural teams?

**Use the READ/WATCH/DESIGN activities below
to reflect on the skills you have learned this semester.**

Read
Think about these readings in the context of this semester's anti-racism learning and user-centered design. Although focused on AI, how are they relevant to UC Design?
- [Removing Bias in AI Pt. 1: The People Problem: Adobe XD Ideas](#) [10-minute read]
- [Removing Bias in AI Pt. 2: Gender & Racial Bias: Adobe XD Ideas](#) [10-minute read]

Watch
- [Designing for a More Equitable World](#), Antionette Carroll [5-minutes]

Design (an open discussion)

Assignment: Design - Anti-racism in User-Centered Design, Retrospective Reflection (for online & f2f courses)

NOTE to instructors: This can be included as part of an existing team activity instead of as an additional separate exercise.

This semester we have covered racism and bias in user-centered design. From the introductory module through several key stages of design including - contextual inquiry, user scenarios, and user testing. Now take some time to look back at the experience, what you have learned, what you still need/want to learn, and how you move forward from here.

Task:

Think back to the four anti-racism learning modules you have completed this semester and consider your team project.

How might your team's design solution change if it were developed for users of a different race, sexual identity, gender, age, community, geographic area?

How can you use the design concepts and techniques you have learned to advance justice, equity, and to avoid racism and bias in your designs?
What is the most memorable or useful concept from the learning modules? Why?
What is the least useful concept from the learning modules? Why?

Submit your reflection in the discussion thread (200-300 words) and respond to at least 2 of your classmates. Please remember to respond respectfully.

Rubric: Anti-racism Retrospective Reflection				
Criteria	**Ratings**			**Pts**
	Good	**Acceptable**	**No Marks**	
Question 1: · Discusses ways the team's design solution might change if developed for users of a different race, sexual identity, gender, age, community, geographic area.	2 pts Describes possible changes. Clearly linking their response to the module materials. Comprehensive information, focused, and clearly linked to the module materials. Includes several supporting details/examples.	1 pt Describes possible changes. But it is unclear how their response links to the module materials.	0 pts Does not answer the question or the answer is so incoherent that the tie to the material can't be determined by the grader.	2 pts
Question 2: · Reflects on ways they can use the concepts and skills learned to advance justice, equity, and avoid racism and bias in their designs.	3 pts Describes the connection between concepts and skills learned and impact on their future designs.	1.5 pts Partially addresses the prompt but does not address each part of the prompt. (e.g., Describes how skills learned can advance justice, but does not address how they can impact their future designs.)		3 pts

Question 3: · Provides an example of a memorable, useful concept learned. · Describes how the concept can be useful.	2 pts Provides an example and describes the connection between the concept and impact to designers.	1 pt Lists an example. Partially addresses the prompt but does not address each part of the prompt. (e.g., Describes the connection to the learning module, but does not address how the concept impacts designers.)		2 pts
Question 4: · Provides an example of less than useful concept in the learning modules. · Describes why the concept is not useful.	1 pts Provides an example to answer the question in a way that links to the module materials.	0.5 pts Lists an example but it is unclear how it relates to the module materials.		1 pt
· Responds to at least one classmate's post	2 pts The student carefully and respectfully responds to another's post. Clearly linking their response to the module materials.	1 pt The student respectfully responds to another's post but does not link their response to the module materials.	0 pts No response is posted or the response violates the community ground rules by posting harassing, derogatory, or disrespectful language.	2 pts
				Total Points: 10

References and Optional Further Reading

Carroll, A., TED Archive. (2019). *Designing for a More Equitable World. YouTube.* https://www.youtube.com/watch?v=z9XKBgdOrHU.

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Noel, L.-A. (2020, October 4). Critical Alphabet. https://criticalalphabet.com/.

Appendix J: Early Semester Student Survey

Name: _____

University ID (UID): _____

INST362 Section:

   o 0101   o 0102   o 0103   o 0104

Please provide the following demographic information:

What is your student residency?
- o In-state
- o Out-of-state _____
- o International _____

With which race(s) do you identify?

☐ American Indian or Alaska Native	☐ Middle Eastern or North African
☐ Asian	☐ White
☐ Black or African American	☐ Some other race or origin
☐ Native Hawaiian or Other Pacific Islander	☐ Prefer to self-describe
	_____
	☐ Prefer not to say

With which ethnicit(y/ies) do you identify?

☐ Hispanic, Latino/a/x, or Spanish origin	☐ Some other ethnicity or origin
☐ Not of Hispanic, Latino/a/x, or Spanish origin	☐ Prefer to self-describe
	_____
	☐ Prefer not to say

We realize that the racial/ethnic categor(y/ies) you selected encompass many different nationalities. If you are interested in sharing more, please describe your nationality (i.e., Armenian, Puerto Rican, Vietnamese).

With which gender(s) do you identify?

☐ Male	☐ Genderqueer
☐ Female	☐ A gender not listed
☐ Non-binary / third gender	
☐ Transgender	_____
☐ Cisgender	☐ Prefer to self-describe
☐ Agender	_____
	☐ Prefer not to s

Rate your knowledge/skills/interest level BEFORE participating in the anti-racism learning modules for each item below. (1 = very low; 2 = low; 3 = medium; 4 = high; 5 = very high)

	1 = very low	2 = low	3 = medium	4 = high	5 = very high
Definitions of personal bias, racism, systemic racism, intersectionality, positionality.	○	○	○	○	○
How personal bias, racism, systemic racism, intersectionality, positionality is relevant to the user-centered design process.	○	○	○	○	○
The impact of personal bias and systemic racism on technology design work.	○	○	○	○	○
How information scientists and designers can intentionally or unintentionally create racist technology.	○	○	○	○	○
Racism exists in current and historic technology products and software.	○	○	○	○	○
My ability to identify the impacts of personal bias and systemic racism in technology design.	○	○	○	○	○
My ability to avoid the impacts of personal bias and systemic racism in my design work.	○	○	○	○	○

What is the most important thing you want to learn (if anything) from participating in the anti-racism learning modules?

120

What advice would you give the researchers about how to implement anti-racism learning modules?

Final Comments/Suggestions/Advice:

Appendix K: End-of-Semester Student Survey

Name: _____

University ID (UID): _____

INST362 Team Design Project: _____

INST362 Section:

  ○ 0101   ○ 0102   ○ 0103   ○ 0104

Please indicate your agreement with these statements (1 = strongly disagree; 5 = strongly agree)

	1 = strongly disagree	2	3	4	5 = strongly agree
I had enough time to complete the anti-racism learning assignments.	○	○	○	○	○
The learning modules were clear with anti-racism learning assignments and the purpose of the assignments.	○	○	○	○	○
Participating in the assignments was a positive experience.	○	○	○	○	○
I did not have enough opportunities for self-reflection or de-briefing.	○	○	○	○	○
I completed the assignments in a supportive environment.	○	○	○	○	○
The anti-racism learning assignments did not feel authentic.	○	○	○	○	○
There was not enough interaction with other students during the assignments.	○	○	○	○	○
The anti-racism modules provided useful information for my project.	○	○	○	○	○

Rate your knowledge/skills/interest level AFTER participating in the anti-racism learning modules for each item below. (1 = very low; 2 = low; 3 = medium; 4 = high; 5 = very high)

	1 = very low	2 = low	3 = medium	4 = high	5 = very high
Definitions of personal bias, racism, systemic racism, intersectionality, positionality.	○	○	○	○	○
How personal bias, racism, systemic racism, intersectionality, positionality is relevant to the user-centered design process.	○	○	○	○	○
The impact of personal bias and systemic racism on technology design work.	○	○	○	○	○
How information scientists and designers can intentionally or unintentionally create racist technology.	○	○	○	○	○
Racism exists in current and historic technology products and software.	○	○	○	○	○
My ability to identify the impacts of personal bias and systemic racism in technology design.	○	○	○	○	○
My ability to avoid the impacts of personal bias and systemic racism in my design work.	○	○	○	○	○

Based on your project and experience with the anti-racism learning modules, what did we do that we should STOP doing?

Based on your project and experiences with the anti-racism learning modules, what did we not do that we should START doing?

Based on your project and experience with the anti-racism learning modules, what did we do that we should CONTINUE doing?

The number and pace of the anti-racism modules was: (1 = much too slow; 5 = much too fast).

    ○ 1   ○ 2   ○ 3   ○ 4   ○ 5

The workload of the anti-racism modules was: (1 = much too slow; 5 = much too fast).

    ○ 1   ○ 2   ○ 3   ○ 4   ○ 5

What was the most important thing you learned (if anything) from participating in the anti-racism learning modules?

What advice would you give the researchers to improve the anti-racism learning modules' content?

What advice would you give the researchers to improve the anti-racism learning modules' structure and format?

What should we do to improve the INST362 experience as a whole?

Final Comments/Suggestions/Advice:

Appendix L: Participant Recruitment for Information Science Instructor

Instructor Invitation
A Model for Embedded Anti-racism Instruction
in an Undergraduate Technology Design Course
August 12, 2021

This text will be used for the invitation.

I want to invite you to participate in a research study that will support the ongoing creation and evaluation of learning modules and activities embedded in the curriculum of technology design courses (specifically INST362) that address intentional and unintentional racism in technology design and development. This research aims to improve our understanding and teaching practices of topics of anti-racism and bias in technology design courses in the iSchool. This can help guide curriculum and teaching material development and improve the learning opportunities for students in the Information Science program. We are collecting and analyzing data from students and instructors to understand better the experiences and outcomes for both these groups of stakeholders. We want to work with you and your students in this course.

This is how it works. First, we obtain participation agreements from you and the students. We do this via an online informed consent form that provides more details and allows you to get your questions answered. Then during the semester, we collect specific types of data. We collect identifiers and contact information from everyone, plus:

We will survey students early in the semester before beginning the learning modules and at the end of the semester.

We collect student assignment work products with the graded rubric scores to assess quality of the work.

From instructors, we collect notes from meetings, including the preparation meeting before the semester, the semester check-ins, and the end-of-semester debrief.

Please note:

The study aims to assess the efficacy of the embedded anti-racism learning materials and activities, NOT you as an instructor, although you may gain insights into your teaching.

We will not share the participation status of any participants with any other participants. Specifically, we will not tell instructors which of their students are participating.

If students choose to participate in the research, they will be entered in two raffles for chances to win a $25 gift card. Four cards per course section will be awarded.

All participation is voluntary. You or the students may withdraw from the study at any time.

Your employment status at UMD will not be impacted by your participation or non-participation in this study.

If you have any questions about the research, please contact me at pduffy@umd.edu.

If you agree to participate in this study, please read and sign the online consent form [INSERT LINK HERE].

Sincerely,

Pamela Duffy

Appendix M: Participant Recruitment for Information Science Student

Student Invitation
A Model for Embedded Anti-racism Instruction
in an Undergraduate Technology Design Course
August 12, 2021

This text will be used for the invitation.

I want to invite you to participate in a research study that will support the ongoing creation and evaluation of learning modules and activities embedded in the curriculum of technology design courses (specifically INST362) that address intentional and unintentional racism in technology design and development. This research aims to improve our understanding and teaching practices of topics of anti-racism and bias in technology design courses in the iSchool. This can help guide curriculum and teaching material development and improve the learning opportunities for students in the Information Science program. We are collecting and analyzing data from students and instructors to understand better the experiences and outcomes for both these groups of stakeholders. We want to gather information from you to understand your experiences and outcomes with the learning materials.

This is how it works. First, we obtain a participation agreement from you and the instructors. We do this via an online informed consent form that provides more details and allows you to get your questions answered. Then during the semester, we collect specific types of data from you.

We will survey you in the beginning of the semester and the end of the semester.

We collect assignment work products with the graded rubric scores.

If you choose to participate, you will be entered into raffles for chances to win a $25 gift card at mid-semester and at the end of the semester.

Please note:

The study aims to assess the anti-racism learning materials and activities, NOT you as a student.

We will not share the participation status of any participants with any other participants. Specifically, we will not tell instructors which students are participating.

All participation is voluntary. You may withdraw from the study at any time.

Your participation or non-participation in this study will not impact your course grade or academic standing.

If you are an employee, your employment status at UMD will not be impacted by your participation or non-participation in this study.

If you have any questions about the research, please contact me at pduffy@umd.edu.

If you agree to participate in this study, please read and sign the online consent form and complete the early semester survey [INSERT LINK HERE].

Sincerely,

Pamela Duffy

Appendix N: Informed Consent for Information Science Instructor

Instructor Consent Form
A Model for Embedded Anti-racism Instruction
in an Undergraduate Technology Design Course
August 12, 2021

This text will be used for the consent form.

Project Title
A Model for Embedded Anti-racism Instruction in an Undergraduate Technology Design Course
[IRB Packet #: 1796321-1]

Purpose of the Study
This study is being conducted by Pamela Duffy, HCIM student at the University of Maryland, College Park. The purpose of this research is to understand the experiences and outcomes of students to gauge better the effectiveness of this type of instruction in practice.

Procedures
During the semester, we will collect specific types of data. We collect identifiers and contact information from students and instructors, plus:
- We survey students early in the semester prior to beginning the learning modules and at the end of the semester.
- We collect student materials: anti-racism assignment work products with the graded rubric scores.
- We collect materials from instructors: notes from meetings, including the preparation meeting before the semester, the check-ins, and the end-of-semester debrief.

Potential Risks and Discomforts
There are no significant risks associated with this study, the surveys, the collection of data from instructor meetings, or the collection of data from student work products or their assessments, except for breach of confidentiality, which will be minimized to the extent possible.

Potential Benefits
There are no direct benefits to instructors or students. However, students may benefit from the opportunity to reflect upon their experiences and consider strategies for identifying and avoiding the effects of bias and racism in their designs. You may benefit from the opportunity to reflect upon your experiences and those of your students, and consider strategies for incorporating sensitive topics into technology design courses. The study results will provide insight into the student experiences with anti-racism learning interventions in technology design courses. This can provide an increased understanding of effective methods of teaching these topics and guide curriculum development. The findings will interest information science programs and faculty as they seek to integrate anti-bias and anti-racism more deeply into curricula.

Confidentiality
We will not share the participation status of any participants with any other participants. Specifically, we will not tell instructors which of their students are participating.

Surveys and student work products are confidential. Only researchers working on the project will have access to the raw survey data. In addition to researchers, instructors will have access to student work products. Any personally identifying information about you will be removed from surveys or work products before analysis. Raw data will only be accessible to the researchers and stored in a password-protected Box Drive.

If we write a report about this research project, your identity will be protected to the maximum extent possible. Information may be shared with representatives of the University of Maryland, College Park, or governmental authorities if you or someone else is in danger or if we are required to do so by law.

Confidential paper materials will be stored in a locked file cabinet in the College of Information Studies at the University of Maryland. Any confidential digital information will be stored on a password-protected University server.

Right to Withdraw and Questions
Your participation in this research is completely voluntary. You may choose not to take part at all. If you decide to participate in this research, you may stop participating at any time. If you decide not to participate in this study or if you stop participating at any time, you will not be penalized or lose any benefits to which you otherwise qualify. **If you are an employee or student, your employment status or academic standing at UMD will not be positively or negatively affected by your participation or non-participation in this study.**

If you decide to stop taking part in the study, if you have questions, concerns, or complaints, or if you need to report an injury related to the research, please contact the investigator:

Pamela Duffy,
College of Information Studies,
2116 Patuxent Building,
4161 Fieldhouse Drive,
College Park, MD 20742-4911
(202) 329-5126
pduffy@umd.edu

Participant Rights
If you have questions about your rights as a research participant or wish to report a research-related injury, please contact:

University of Maryland College Park
Institutional Review Board Office
1204 Marie Mount Hall
College Park, Maryland, 20742
Email: irb@umd.edu
Telephone: 301-405-0678

This research has been reviewed according to the University of Maryland, College Park IRB procedures for research involving human subjects.

Statement of Consent

By selecting "I agree," providing your name, university id, email address, and phone number, and clicking the button, you confirm that you are at least 18 years of age; you have read this consent form or have had it read to you; your questions have been answered to your satisfaction, and you voluntarily agree to participate in this research study.

You may print, save, or download a copy of this consent form for your records.

- Do you consent to participate in this research project?
    - I agree
    - I disagree
- Name:
- University ID (UID):
- Email address:
- Phone number:

Please provide your name, UID, email address, and phone number, and click the button below to indicate your consent.

Appendix O: Informed Consent for Information Science Student

Student Consent Form
A Model for Embedded Anti-racism Instruction
in an Undergraduate Technology Design Course
August 12, 2021

This text will be used for the consent form (Page 1). After participants complete the consent form, they will be given the link to survey (Page 2).

<u>**Page 1**</u>

Project Title
A Model for Embedded Anti-racism Instruction in an Undergraduate Technology Design Course [IRB Packet #: 1796321-1]

Purpose of the Study
This study is being conducted by Pamela Duffy, HCIM student at the University of Maryland, College Park. The purpose of this research is to understand the experiences and outcomes of students to gauge better the effectiveness of this type of instruction in practice.

Procedures
After you provide your informed consent at the bottom of this page, you will be directed to the survey. Early in the semester and again at the end of the semester, we will ask you to complete surveys. The surveys will ask for identification and demographic data, about your experiences, and for your feedback. Each survey will take approximately 10 minutes to complete. We will collect your anti-racism assignment work products with the graded rubric scores.

Potential Risks and Discomforts
There are no significant risks associated with this study, the surveys, or the collection of data from your assignment work products, except for breach of confidentiality, which will be minimized to the extent possible. You will be asked to report and discuss your experiences learning about the effects of racism in user-centered design. You may feel discomfort with aspects of the survey questions. You may decline to answer any question or to withdraw from the study for any reason at any time.

Potential Benefits
There are no direct benefits to you. However, you may benefit from the opportunity to reflect upon your experiences and consider strategies for identifying and avoiding the effects of bias and racism in your designs. The study results will provide insight into the student experiences with anti-racism learning interventions in technology design courses. This can provide an increased understanding of effective methods of teaching these topics and guide curriculum development. The findings will interest information science programs and faculty as they seek to integrate anti-bias and anti-racism more deeply into curricula.

Confidentiality
We will not share the participation status of any participants with any other participants. Specifically, we will not tell instructors which students are participating.

Surveys and student work products are confidential. Only researchers working on the project will have access to the raw survey data. In addition to researchers, instructors will have access to student work products. Any personally identifying information about you will be removed from surveys or work products before analysis. Raw data will only be accessible to the researchers and stored in a password-protected Box drive.

If we write a report about this research project, your identity will be protected to the maximum extent possible. Information may be shared with representatives of the University of Maryland, College Park, or governmental authorities if you or someone else is in danger or if we are required to do so by law.

Confidential paper materials will be stored in a locked file cabinet in the College of Information Studies at the University of Maryland. Any confidential digital information will be stored on a password-protected University server.

Compensation
At the midpoint of the semester and again at the end of the semester, you will be entered into raffles to win a $25 gift card. Four gift cards will be raffled for each course section.

Right to Withdraw and Questions
Your participation in this research is completely voluntary. You may choose not to take part at all. If you decide to participate in this research, you may stop participating at any time. If you decide not to participate in this study or if you stop participating at any time, you will not be penalized or lose any benefits to which you otherwise qualify. This would not affect your academic status or your course grade. **If you are an employee or student, your employment status or academic standing at UMD will not be positively or negatively affected by your participation or non-participation in this study.**

If you decide to stop taking part in the study, if you have questions, concerns, or complaints, or if you need to report an injury related to the research, please contact the investigator:

<div align="center">

Pamela Duffy,
College of Information Studies,
2116 Patuxent Building,
4161 Fieldhouse Drive,
College Park, MD 20742-4911
(202) 329-5126
pduffy@umd.edu

</div>

Participant Rights
If you have questions about your rights as a research participant or wish to report a research-related injury, please contact:

**University of Maryland College Park
Institutional Review Board Office
1204 Marie Mount Hall
College Park, Maryland, 20742
Email: irb@umd.edu
*Telephone: 301-405-0678***

This research has been reviewed according to the University of Maryland, College Park IRB procedures for research involving human subjects.

Statement of Consent
By selecting "I agree," providing your name, university id, and email address, and clicking the button, you confirm that you are at least 18 years of age; you have read this consent form or have had it read to you; your questions have been answered to your satisfaction, and you voluntarily agree to participate in this research study.

You may print, save, or download a copy of this consent form for your records.

- Do you consent to participate in this research project?
    - I agree
    - I disagree
- Name:
- University ID (UID):
- Email address:

Please provide your name, UID, and email address, and click the button below to indicate your consent.

Page 2
You will now be directed to the early semester student survey.

Appendix P: IRB Approval – Pilot Study

UNIVERSITY OF
MARYLAND

INSTITUTIONAL REVIEW BOARD

DATE: April 16, 2021

TO: Pamela Duffy
FROM: University of Maryland College Park (UMCP) IRB

PROJECT TITLE: [1745046-1] Designing a Pilot Learning Module for Anti-Bias Instruction in a
                               Technology Design Course
REFERENCE #:
SUBMISSION TYPE: New Project

ACTION: APPROVED
APPROVAL DATE: April 16, 2021
EXPIRATION DATE: April 15, 2022
REVIEW TYPE: Expedited Review

REVIEW CATEGORY: Expedited review category # 7

Thank you for your submission of New Project materials for this project. The University of Maryland
College Park (UMCP) IRB has APPROVED your submission. This approval is based on an appropriate
risk/benefit ratio and a project design wherein the risks have been minimized. All research must be
conducted in accordance with this approved submission.

Prior to submission to the IRB Office, this project received scientific review from the departmental IRB
Liaison.

This submission has received Expedited Review based on the applicable federal regulations.

This project has been determined to be a MINIMAL RISK project. Based on the risks, this project requires
continuing review by this committee on an annual basis. Please use the appropriate forms for this
procedure. Your documentation for continuing review must be received with sufficient time for review and
continued approval before the expiration date of April 15, 2022.

Please remember that informed consent is a process beginning with a description of the project and
insurance of participant understanding followed by a signed consent form. Informed consent must
continue throughout the project via a dialogue between the researcher and research participant. Unless
a consent waiver or alteration has been approved, Federal regulations require that each participant
receives a copy of the consent document.

Please note that any revision to previously approved materials must be approved by this committee prior
to initiation. Please use the appropriate revision forms for this procedure.

All UNANTICIPATED PROBLEMS involving risks to subjects or others (UPIRSOs) and SERIOUS and
UNEXPECTED adverse events must be reported promptly to this office. Please use the appropriate
reporting forms for this procedure. All FDA and sponsor reporting requirements should also be followed.

All NON-COMPLIANCE issues or COMPLAINTS regarding this project must be reported promptly to this
office.

Please note that all research records must be retained for a minimum of seven years after the completion of the project.

If you have any questions, please contact the IRB Office at 301-405-4212 or irb@umd.edu. Please include your project title and reference number in all correspondence with this committee.

This letter has been electronically signed in accordance with all applicable regulations, and a copy is retained within University of Maryland College Park (UMCP) IRB's records.

UNIVERSITY OF MARYLAND

INSTITUTIONAL REVIEW BOARD

DATE: September 3, 2021

TO: Pamela Duffy
FROM: University of Maryland College Park (UMCP) IRB

PROJECT TITLE: [1796321-1] A Model for Embedded Anti-Racism Instruction in an Undergraduate Technology Design Course
REFERENCE #:
SUBMISSION TYPE: New Project

ACTION: APPROVED
APPROVAL DATE: September 3, 2021
EXPIRATION DATE: September 2, 2022
REVIEW TYPE: Expedited Review

REVIEW CATEGORY: Expedited review category # 7. Waiver of Written Consent, 45CFR46.117(c)(1).

Thank you for your submission of New Project materials for this project. The University of Maryland College Park (UMCP) IRB has APPROVED your submission. This approval is based on an appropriate risk/benefit ratio and a project design wherein the risks have been minimized. All research must be conducted in accordance with this approved submission.

Prior to submission to the IRB Office, this project received scientific review from the departmental IRB Liaison.

This submission has received Expedited Review based on the applicable federal regulations.

This project has been determined to be a MINIMAL RISK project. Based on the risks, this project requires continuing review by this committee on an annual basis. Please use the appropriate forms for this procedure. Your documentation for continuing review must be received with sufficient time for review and continued approval before the expiration date of September 2, 2022.

Please remember that informed consent is a process beginning with a description of the project and insurance of participant understanding followed by a signed consent form. Informed consent must continue throughout the project via a dialogue between the researcher and research participant. Unless a consent waiver or alteration has been approved, Federal regulations require that each participant receives a copy of the consent document.

Please note that any revision to previously approved materials must be approved by this committee prior to initiation. Please use the appropriate revision forms for this procedure.

All UNANTICIPATED PROBLEMS involving risks to subjects or others (UPIRSOs) and SERIOUS and UNEXPECTED adverse events must be reported promptly to this office. Please use the appropriate reporting forms for this procedure. All FDA and sponsor reporting requirements should also be followed.

All NON-COMPLIANCE issues or COMPLAINTS regarding this project must be reported promptly to this office.

Generated on IRBNet

Please note that all research records must be retained for a minimum of seven years after the completion of the project.

If you have any questions, please contact the IRB Office at 301-405-4212 or irb@umd.edu. Please include your project title and reference number in all correspondence with this committee.

This letter has been electronically signed in accordance with all applicable regulations, and a copy is retained within University of Maryland College Park (UMCP) IRB's records.

DATE: October 15, 2021

TO: Pamela Duffy
FROM: University of Maryland College Park (UMCP) IRB

PROJECT TITLE: [1796321-2] A Model for Embedded Anti-Racism Instruction in an
                               Undergraduate Technology Design Course
REFERENCE #:
SUBMISSION TYPE: Amendment/Modification

ACTION: APPROVED
APPROVAL DATE: October 15, 2021
EXPIRATION DATE: September 2, 2022
REVIEW TYPE: Expedited Review

REVIEW CATEGORY: Expedited review category # 7

Thank you for your submission of Amendment/Modification materials for this project. The University of
Maryland College Park (UMCP) IRB has APPROVED your submission. This approval is based on an
appropriate risk/benefit ratio and a project design wherein the risks have been minimized. All research
must be conducted in accordance with this approved submission.

Prior to final approval of this project scientific review was completed by the IRB Member reviewer

This submission has received Expedited Review based on the applicable federal regulations. This project
has been determined to be a MINIMAL RISK project. Based on the risks, this project requires continuing
review by this committee on an annual basis. Please use the appropriate forms for this procedure. Your
documentation for continuing review must be received with sufficient time for review and continued
approval before the expiration date of September 2, 2022.

Please remember that informed consent is a process beginning with a description of the project and
insurance of participant understanding followed by a signed consent form. Informed consent must
continue throughout the project via a dialogue between the researcher and research participant. Unless
a consent waiver or alteration has been approved, Federal regulations require that each participant
receives a copy of the consent document.

Please note that any revision to previously approved materials must be approved by this committee prior
to initiation. Please use the appropriate Amendment forms for this procedure.

All UNANTICIPATED PROBLEMS involving risks to subjects or others (UPIRSOs) and SERIOUS and
UNEXPECTED adverse events must be reported promptly to this office. Please use the appropriate
reporting forms for this procedure. All FDA and sponsor reporting requirements should also be followed.
All NON-COMPLIANCE issues or COMPLAINTS regarding this project must be reported promptly to this
office.

Please note that all research records must be retained for a minimum of seven years after the completion
of the project.

Generated on IRBNet

If you have any questions, please contact the IRB Office at 301-405-4212 or irb@umd.edu. Please include your project title and reference number in all correspondence with this committee.

This letter has been electronically signed in accordance with all applicable regulations, and a copy is retained within University of Maryland College Park (UMCP) IRB's records.

Generated on IRBNet

UNIVERSITY OF MARYLAND

INSTITUTIONAL REVIEW BOARD

DATE: November 29, 2021

TO: Pamela Duffy
FROM: University of Maryland College Park (UMCP) IRB

PROJECT TITLE: [1796321-3] A Model for Embedded Anti-Racism Instruction in an
                               Undergraduate Technology Design Course
REFERENCE #:
SUBMISSION TYPE: Amendment/Modification

ACTION: ACKNOWLEDGED
EFFECTIVE DATE: November 29, 2021
EXPIRATION DATE: September 2, 2022

Thank you for submitting the Amendment/Modification materials for this project. The University of
Maryland College Park (UMCP) IRB has ACKNOWLEDGED your submission. No further action on
submission 1796321-3 is required at this time.

The following items are acknowledged in this submission:

- Amendment/Modification - To add graduate student, Keaunna Cleveland, to the project. She will
  assist in data collection and analysis.

If you have any questions, please contact the IRB Office at 301-405-4212 or irb@umd.edu. Please
include your project title and reference number in all correspondence with this committee.

This letter has been electronically signed in accordance with all applicable regulations, and a copy is retained within University of
Maryland College Park (UMCP) IRB's records.

UNIVERSITY OF
MARYLAND

INSTITUTIONAL REVIEW BOARD

1204 Marie Mount Hall
College Park, MD 20742-5125
TEL 301.405.4212
FAX 301.314.1475
irb@umd.edu
www.umresearch.umd.edu/IRB

DATE: December 16, 2021

TO: Pamela Duffy
FROM: University of Maryland College Park (UMCP) IRB

PROJECT TITLE: [1796321-4] A Model for Embedded Anti-Racism Instruction in an
                    Undergraduate Technology Design Course
REFERENCE #:
SUBMISSION TYPE: Amendment/Modification

ACTION: APPROVED
APPROVAL DATE: December 16, 2021
EXPIRATION DATE: September 2, 2022
REVIEW TYPE: Expedited Review

REVIEW CATEGORY: Expedited review category # 7

Thank you for your submission of Amendment/Modification materials for this project. The University of
Maryland College Park (UMCP) IRB has APPROVED your submission. This approval is based on an
appropriate risk/benefit ratio and a project design wherein the risks have been minimized. All research
must be conducted in accordance with this approved submission.

Prior to final approval of this project scientific review was completed by the IRB Member reviewer

This submission has received Expedited Review based on the applicable federal regulations. This project
has been determined to be a MINIMAL RISK project. Based on the risks, this project requires continuing
review by this committee on an annual basis. Please use the appropriate forms for this procedure. Your
documentation for continuing review must be received with sufficient time for review and continued
approval before the expiration date of September 2, 2022.

Please remember that informed consent is a process beginning with a description of the project and
insurance of participant understanding followed by a signed consent form. Informed consent must
continue throughout the project via a dialogue between the researcher and research participant. Unless
a consent waiver or alteration has been approved, Federal regulations require that each participant
receives a copy of the consent document.

Please note that any revision to previously approved materials must be approved by this committee prior
to initiation. Please use the appropriate Amendment forms for this procedure.

All UNANTICIPATED PROBLEMS involving risks to subjects or others (UPIRSOs) and SERIOUS and
UNEXPECTED adverse events must be reported promptly to this office. Please use the appropriate
reporting forms for this procedure. All FDA and sponsor reporting requirements should also be followed.
All NON-COMPLIANCE issues or COMPLAINTS regarding this project must be reported promptly to this
office.

Please note that all research records must be retained for a minimum of seven years after the completion
of the project.

If you have any questions, please contact the IRB Office at 301-405-4212 or irb@umd.edu. Please include your project title and reference number in all correspondence with this committee.

This letter has been electronically signed in accordance with all applicable regulations, and a copy is retained within University of Maryland College Park (UMCP) IRB's records.

Generated on IRBNet

UNIVERSITY OF MARYLAND

INSTITUTIONAL REVIEW BOARD

DATE: December 21, 2021

TO: Pamela Duffy; Anges Joseph
FROM: University of Maryland College Park (UMCP) IRB

PROJECT TITLE: [1796321-5] A Model for Embedded Anti-Racism Instruction in an
                           Undergraduate Technology Design Course
REFERENCE #:
SUBMISSION TYPE: Amendment/Modification

ACTION: ACKNOWLEDGED
EFFECTIVE DATE: December 21, 2021
EXPIRATION DATE: September 2, 2022

Thank you for submitting the Amendment/Modification materials for this project. The University of
Maryland College Park (UMCP) IRB has ACKNOWLEDGED your submission. No further action on
submission 1796321-5 is required at this time.

The following items are acknowledged in this submission:

- Amendment/Modification - To add Anges Joseph to the project.

If you have any questions, please contact the IRB Office at 301-405-4212 or irb@umd.edu. Please
include your project title and reference number in all correspondence with this committee.

This letter has been electronically signed in accordance with all applicable regulations, and a copy is retained within University of
Maryland College Park (UMCP) IRB's records.

Glossary

Anti-racism: "the active process of identifying and eliminating racism by changing systems, organizational structures, policies and practices, and attitudes, so that power is redistributed and shared equitably." (CSHA, 2021; Nkrumah, 2022; The CARED Collective, 2020).

Anti-racist: "being critically aware of the existence of racism and understanding how it is systemic" (Pacific University, 2021).

Bias: "disproportionate weight in favor of or against one thing, person, or group compared with another, usually in a way considered to be unfair" (Noel, 2020b).

Critical Race Theory: progressive legal movement, "collection of activists and scholars engaged in studying and transforming the relationship among race, racism, and power;" "challenges the dominant discourse on race and racism" (Delgado & Stefancic, 2017; Pacific University, 2021).

Embedded Instruction: "learning while doing" (Panopto, 2018).

Holistic: characterized by the belief that the parts of something are interconnected and can be explained only by reference to the whole (Lexico Dictionaries, n.d.).

Intersectionality:

"various forms of social stratification, such as class, race, sexual orientation, age, religion, creed, disability, and gender, do not exist separately from each other but are woven together" (Noel, 2020b).

"1) an approach to understanding human life and behavior rooted in the experiences of disenfranchised people; 2) an important tool linking theory with practice that can aid in the empowerment of communities and individuals" (Collins & Bilge, 2020).

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Marginalized: "excluded, ignored, or relegated to the outer edge of a group/society/community" (Pacific University, 2021).

Personal Bias: biases held by an individual usually without conscious awareness.

Positionality: "the practice of a researcher delineating their own position in relation to a research context. A positionality statement can help designers reveal their own biases and understand who they are and how that affects the solutions that they propose" (Noel, 2020b).

Systemic Racism: "complex interactions of culture, policy, and institutions that create and maintain racial inequality in nearly every facet of life for people of color" and Black people (Pacific University, 2021).

Racism: "any program or practice of discrimination, segregation, persecution, or mistreatment based on membership in a race or ethnic group" (Delgado & Stefancic, 2017).

Transformative Research: "a research framework that centers the experiences of marginalized communities, includes analysis of power differentials that have led to marginalization, links research findings to actions intended to mitigate disparities, and has an agenda for change" (Noel, 2020b).

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