Experiences Piloting a Diversity and Inclusion in Computing Innovations Course

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ABSTRACT

With society's increasing dependence on computing innovations—especially technologies that impact decision-making in fields such as healthcare, financial services, child welfare, hiring, safety, and policing —it is increasingly important for the future creators of these innovations to learn how technologies can potentially negatively impact people of different identities and backgrounds. Unfortunately, few universities offer courses designed specifically for Computer Science and Engineering students to explore the issues of diversity, equity and inclusion of computing innovations.

In this paper, we describe a one-semester, 3-credit course that we developed and piloted to address this gap at our institution. We describe the learning objectives, course schedule, in-class activities, and assignments, including pre-class preparation work, reflective journaling, and a capstone project. After significant discussion and activities on unpacking identity, the course covers nine different categories of computing innovations and the potential impacts on different identities. We summarize the resulting student artifacts and reflections, along with the instructors' reflections and steps toward further institutionalizing this kind of learning and reflection in a computer science program.

CCS CONCEPTS

• **Social and professional topics → Computing education programs**.

KEYWORDS

Diversity, Equity, Inclusion, Computing Innovations

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1 INTRODUCTION

Technologies and algorithmic systems increasingly continue to play crucial roles throughout society's varied decision-making situations on humans' behalf. The outcome and impact of technologies used in such settings are influenced by interests, cultures, and identities (e.g., race, ethnicity, class, gender, sexuality, ability) of the developers and technologists. Thus, there is an ongoing call for Computer Science (CS) pedagogy to ensure that the shaping of students' learning and sense-making around the CS field as future developers involve a validation of their identities and intersections (e.g., [16, 28, 44]).

Despite increased awareness of the impacts of identities in computing innovations' social, political, economic, and cultural impacts, few universities offer courses specifically for CS students to gain a clear understanding of their identity, as well as how identity impacts and is impacted by computing, as future creators of computing innovations [45]. In addition, while many CS departments offer ethics and even require their undergraduate students to complete ethics-specific courses for their degrees, the CS field continues to prioritize "technical" skills over "social" skills [37], challenging the inclusion of ethical discussions that "teach students about the relationships between computing, power, and identity" [28].

This paper describes the design of a one-semester, 3-credit undergraduate course focused on exploring the multi-directional relationship between computing innovations and the complex social contexts within which these innovations must operate. By unpacking identity and the diversity, equity, and inclusion challenges that impact those identities, CS and non-CS students reflect on computing innovations and their impacts on people of various identities and backgrounds. Students focus on topics such as software accountability for upholding social and legal expectations, decolonized Human-Computer Interaction practices, and social implications of artificial intelligence (AI) systems. We report on both the pilot and reflections from students and instructors in the pilot experience.

2 RELATED WORK

Our overall course schedule is inspired by Washington's proposed implementation of a Cultural Competence in Computing (3C) program [44]. One of the main components of the implementation includes a three-credit undergraduate course on "Race, Gender, and Computing." The course is comprised of three parts: (1) an introduction to topics such as "race, ethnicity, bias, microaggressions, and historically disenfranchised groups"; (2) class sessions on biases in technologies and development that directly come from the biases discussed in part 1, and; (3) a culminating end-of-semester project where students reflect on a book on DEI in computing and technology, as well as their changed perspectives on the subject.

Several courses have been developed by other scholars in an effort to introduce the 3C movement at their own institutions. For instance, Alvarado designed and implemented an adaptation of Washington's "Race, Gender, and Computing" course at University of California, San Diego in Spring 2021 [5]; our course is inspired by and based on this adaptation as well. Some have created courses with similar overall motives after participating in the 3C Fellows program, which is a cohort-based professional development program for faculty, staff, postdoctoral researchers, graduate students, and professionals interested in contributing to the 3C movement [46]. Examples include Bettin's graduate-level course on the exploration of technological futures grounded in cultural competency, with music as a medium for discussions [8]. Every discussion post leveraged music and accompanying lyrics to frame the main topic or idea of the week on cultural competency. We also acknowledge other 3C Fellows' course deliverables that have gone or are going through implementation, as well as experiences from which have not yet been formally published or reported on.

As a nontechnical course in a computer science curriculum, this course is similar to undergraduate course offerings on computing ethics. Ethics in a computing curriculum can come in the forms of standalone ethics courses [19, 38], a curriculum with ethics integrated across it [13, 25], and modules or lessons that integrate ethics in specific courses (e.g., introductory CS [17, 20], human-centered computing [41], machine learning [39]). Many recent ethics literature unfortunately lack a critical lens to their approach. Specifically, Fiesler et al. found from their analysis of 115 tech ethics course syllabi that "many topics within tech ethics are high level and conceptual when it comes to the impact of technology on society" [21]. We aim to partly address this gap at our institution by approaching our course implementation with a critical lens, taking identity-inclusive approaches in higher CS education to teach students about the power and impacts of computing in conjunction with social science topics (e.g., identity, intersectionality, bias, racism, discrimination) [45].

3 OUR BACKGROUND AND CONTEXT

The authors are a white tenured professor and an east Asian Ph.D. student, both abled cis-women in CS, at a research university in a large suburban location of the eastern United States. The university is considered a predominantly white institution (PWI). Specifically, in our CS department, 10% and 30% of our faculty and undergraduate students respectively are not white or Asian as of 2021.

Before teaching the course, the authors participated in the first cohort of the 3C Fellows program [46]. Our course is a deliverable for the 3C Fellows program, leveraging topics discussed in the professional development to invite computer scientists at our home institution to join us in fostering more inclusive and equitable computing cultures.

4 COURSE OVERVIEW

Our *Equity and Inclusion in Computing Innovations* course is a 3-credit one-semester course at the undergraduate level. We do not require any prior experience in computing or social science for enrollment; the only requirement from the students is an open mind. This course does not require or teach programming. It is designed to introduce students to a number of topics that blend social science, to ultimately gain a better understanding of how and why technologies impact people in different ways. The course pilot was limited to 30 students as a larger class size may have challenged the establishment of a safe discussion space, as well as make it difficult for us to get to know each student as instructors. The class meets in person on campus twice a week for 75 minutes each class period.

4.1 Course Activity Schedule

To achieve the learning objectives (described in Section 4.2), the topics and timeline for the course pilot were established as shown in Figure1. The yellow class sessions (weeks 1-4) were focused on unpacking identity and the diversity, equity, and inclusion challenges that impact those identities. During green sessions (weeks 5, 8, first half of 11, 13, and first half of 14), students primarily worked on a capstone project for the course, which we describe in greater detail in Section 5.3. Finally, peach sessions (weeks 6, 7, 9, 10, second half of 11, and 12) introduced to students the potential impacts of particular kinds of computing innovations on people of various identities and backgrounds.

Week	Tues	Thurs
1	Community buiding Course overview	Identity & Intersectionality with self reflection
2	Identity: Intersectionality Define/Differentiate Diversity, Inclusion, Equity	Identity: Race and Ethnicity
3	Identity: Gender, Sexuality & Intersectionality	Oppression: White privilege, white supremacy, racism
4	Identity: Ability and Accessibility	In-class self reflection Course computing topics Kickoff course project
5	Design Justice Develop project goals Brainstorm project ideas	More project brainstorming People creating change in computing community
6	Book discussion of "Our Reality" book	Facial Recognition Technology
7	Facial Affect Recognition	Surveilance Technology
8	Project Lightning Talks with feedback	Project Plan & feedback
9	Voice Recognition Technology	Voice Reognition Healthcare Software
10	Healthcare Software Consumerable Wearables	Recidivism Software / Predictive Policing
11	Project Progress Presentations & feedback	Child Welfare
12	Hiring Practices Resume & Video-Based Screening	FinTech Applications
Break		
13	Project Group Work time	Final Project Presentations
14	Final Project Presentations	Course Reflections Taking Action

Figure 1: Course Schedule

4.2 Learning Objectives

The course is designed with learning objectives that align primarily with the overall course goals, which we summarize below. At the end of this course, students will be able to:

- *Describe common language/terminologies involved in discussions on diversity, equity, and inclusion (DEI) in computing.*
- *Identify and articulate DEI challenges specific to computing and the innovations developed by the field.*
- *Describe, analyze, and develop approaches to address DEI challenges in computing and its innovations.*

4.3 Assessment Breakdown

The grading scheme is accomplishment-based instead of the commonly used percentage-based. Rather than assigning numeric values to students' academic performance, students' grades reflect how much they completed the coursework (i.e., class participation, journal entries, module project) (coursework description in Section 5) at a high enough quality according to rubrics for each assignment.

4.4 Participants

Our 15 course pilot participants included 2nd to 5th-year undergraduate students in various programs of study, leading to vibrant discussions on DEI challenges that impact computing innovations. 11 students were majoring in CS and Information Systems, 4 of whom were also pursuing a dual bachelors degree or minor(s) in fields outside of CS. The 4 remaining students joined us from other departments, with 3 of the 4 students minoring in CS.

5 OUT-OF-CLASS ACTIVITIES

5.1 Pre-Class Preparation Work

To gain the necessary background for in-class activities, students are assigned a set of readings, videos, and/or exercises to complete prior to convening for class. Each reading and/or video is paired with reflection questions on the content.

5.2 Reflective Journal Entries

A key component of our course is students' reflections on their learning and the topics being discussed. Each student routinely adds to an online journal their written reflections to prompts that we provide as part of pre-class preparation and post-class reflection. These entries are due before every class and received feedback from one of the instructors when graded.

5.3 Capstone Project

As a capstone learning experience from this course, students work individually or in groups on a project. The goal of the course project is for students to gain a deeper understanding of a particular topic of interest related to this course. Through this assignment, students have an opportunity to learn and create a deliverable for the overall purpose of advocating for equity and inclusion in computing innovation. Students are welcome to create deliverables of any kind—whether that be a qualitative interview study, an infographic, or an informative video—as long as they have clearly defined a target community and intended audience for whom the students wish to help address and/or inform of the issues of systematic biases that impact computing environments and technologies. The capstone project involves several milestones that incorporated feedback from the instructors. Every project culminates in a final written report and presentation.

Examples of students' projects from the course pilot included: (1) infographics for communities underrepresented in the tech sector to inform them of algorithmic influences on job search platforms and educate how to best utilize the platforms for a successful job search; (2) an information video about smartwatch sensor inaccuracies for consumers with darker skin tones; (3) an investigation on surveillance technologies used on our campus, which included surveys and interviews with students and the university police; and (4) a website designed to increase awareness on racially discriminating beautification of digital beauty filters.

6 CLASS ACTIVITIES

Here, we elaborate on the activities undertaken by students during our pilot for unpacking identity and DEI challenges, and then learning how specific computing innovations impact people of different identities. Any direct examples or quotes come from the 10 of 15 students who gave us consent to report them anonymized.

6.1 Unpacking Identity and DEI Challenges

6.1.1 **Community building.** Early on, we implemented several activities to create and foster an inclusive, respectful, and supportive classroom environment such that students would be open to vulnerable discussions on topics that they might otherwise feel uncomfortable talking about with peers. The week before the course started, we invited all students to share information about themselves through a shared online 'Who are we?' document, using prompts that asked about the story of their names [7], hometowns, hobbies, and more. We centered introductions in the first week around the students' responses. On that same week, students also shared with peers a picture/item that represents an important part of their identity and explained why. This activity was an adaptation from the 3C Fellows program [46]. Examples of items students brought include pictures of traditional clothing and holiday celebrations of students' cultures, family heirlooms that hold symbolism and stories, religious artifacts, and images of communities that are important to them. Students found that *"there is so much to people that we do not really know about"* and *"can learn more if we step out of our comfort zone,"* and appreciated the unique background and experiences that each of their peers brought into the space.

6.1.2 **Identity and intersectionality.** Our discussion on identity and intersectionality began with the instructors introducing a definition of "identity" from Tatum [43]. Along with our definition introduction, we invited the students to reflect on what other individual characteristics, family dynamics, historical factors, or sociopolitical contexts make up an individual's sense of self. Students then created together a word cloud [3], sharing their most salient identities anonymously. In small groups, students reflected on their reactions to the class's identity word cloud and how (un)aware they are of their various identities daily.

6.1.3 **Diversity, Inclusion, and Equity.** Similar to section 6.1.2, we started with giving students a shared definition of terminology — in this case, "diversity," "equity," and "inclusion." Students were asked to examine how diverse our class is, as well as other academic/social groups they are members of (e.g., department, clubs, friends, family), and also reflect on potential identities that are being excluded or could be reached better. We then followed up with discussions on the difference between equality and equity. Initially, some students did not see any equity issues in the CS department (e.g., perceived diversity solely in terms of domestic and international student demographics), while others believed that CS departments struggle with diversity and inequity in gender, race, sexuality, and more. One student stated, *"The issue I see here is that the identities that do not have equity in our department are the identities that do not hold power and privilege at large in society and we may not feel comfortable advocating for ourselves from a place of marginalization."*

6.1.4 **Race and Ethnicity.** Before our class on race and ethnicity, students in general wrote on their reflective journals that they believed they were engaging with these topics in their daily lives; however, many noted they would like to take more action against racial and ethnic discrimination. During class, students were presented various definitions of race (e.g., [14, 23]) and ethnicity (e.g., [43]) used in the United States, with the overarching message that race is a social construct and that there are no biological rationales involved. Students were also informed of the five main current categories of race (i.e., American Indian or Alaska Native, Asian, Black or African-American, Native Hawaiian or Other Pacific Islander, White) and two categories for ethnicity (i.e., Hispanic or Latino, Not Hispanic or Latino) utilized by the U.S. Office of Management and Budget [33]. Through discussions, both in small groups and as a whole class, students ultimately understood that the various misuses of race and ethnicity contribute to and impact measures such as fair housing, voting right protections, and distribution of resources to marginalized communities [11, 29]. The class concluded with a guest speaker who talked about their work towards racial and ethnic equity in STEM and particularly CS.

6.1.5 **Gender, Sexuality, and Intersectionality.** Pre-class work involved a journal entry, through which students reflected on their gender identity and expression, biological sex, sexual orientation, and more. All but one student identified with the same sex that they were assigned at birth at the time of their journal entries; one student identified as a nonbinary woman. Many students resorted to physical appearances (e.g., clothing, hair, make-up) as a medium for expressing their gender. Some noted that they break gender stereotypes through behaviors not typically associated with their genders (e.g., hobbies, appearance). Two students commented that their role as an *"outspoken leader in CS"* and a well-performing CS student as women broke the *"gender stereotype"* in the field.

We began class by first introducing the gender spectrum to illustrate the distinction between one's gender identity and physical sex, as well as the fluidity and flexibility of gender [1]. Through various media forms (e.g., video, word clouds), we provided students examples of gender discrimination and stereotyping being reinforced in settings such as our daily lives [35] and pop media (i.e., The Achilles Effect) [42]. We also discussed cases in history, such as the women's suffrage movement and the #MeToo movement, when discrimination and marginalization along the lines of gender was viewed as a separate and detached matter from those against other groups (e.g., along the lines of race, sexuality, ability), and the concept of intersectionality was neglected [15]. Particularly with respect to CS classroom environments, we addressed dangers such as deadnaming, misgendering, missing opportunities for representation, and making stereotypical assumptions about a student's "fit" for a department, company, and/or club. We highlighted Ko's call-to-action towards addressing such issues in higher education—examples included reforms of university systems to support non-binary gender identifications and name updates, avoiding misgendering while teaching/learning, and not burdening members of marginalized groups to perform invisible labor [27].

6.1.6 **Oppression: White Privilege, White Supremacy, and Racism.** In preparation for class, each student read about "The Invisible Knapsack," or "an invisible package of unearned assets which I can count on cashing in each day, but about which I was 'meant' to remain oblivious" [30], and kept count of how many of the 26 statements on privilege were applicable to them. We anonymously shared our Invisible Knapsack "scores" through an online poll during class. Our students' scores ranged from 13 through 26, with a mean of 19.5 (n=8, SE=X=1.48; only 8 of 10 students reported their scores), indicating a rather high level of privilege overall. Overall, students reflected on *"just how privileged I am with the amount of power I hold in society based off of factors I cannot control."*

In small groups, students discussed how whiteness and/or white supremacy appears in computing, how their Knapsack scores relate to how they experience whiteness/white supremacy in computing, how (un)intentional they have been to work to dismantle it, and course of actions they could take immediately to begin/continue to dismantle it. Two guest speakers whose works lie in anti-blackness and white privilege in computing shared with our students their motivations for their works. They also shared their perspectives on various issues that contribute the most to the persistence of marginalization and discrimination in higher education CS departments that involve members across all level of power (i.e., faculty, students, staff). In addition, they led discussions with students on the roles future computer scientists can take towards breaking down racial barriers and how university students could also take action. Afterwards, students in small groups discussed which of our department practices exclude, tokenize, and/or negatively impact minoritized racial/ethnic identities and what mechanisms they see in place for safely reporting concerns about department leadership, faculty, staff, teaching assistants, and peers.

6.1.7 **Ability and Accessibility.** Pre-class preparation involved reviewing video interviews with people with disabilities, as well as videos illustrating how people with disabilities have been portrayed in the media. Students discussed what trends they saw in how ability, disability, and accessibility are represented in media and society. Students' conversations also branched out to how people with disabilities have been impacted by COVID (e.g., *"difficulties for deaf [community] to lip read with masks"*).

We shared with students the three dimensions of disability (body structure limitation, activity limitation and participation restriction) [34] and the categories of barriers for people with disabilities

(attitudinal, communication, physical, social, transportation, and policy) [22]. In small groups, students brainstormed examples of accessible design in our society today, including accessible designs in computing innovations. We also introduced *the curb-cut effect*, or laws and programs that are designed to benefit vulnerable groups but often end up benefiting all of society [9].

6.2 Computing Innovations and Their Impacts

6.2.1 **Facial Recognition.** Students began with small group discussions to build common language around facial recognition using a primer article, learning definitions of terms such as face detection, face attribution classification, gallery, and faceprint [10]. Each student then used the "How Normal Am I" interactive documentary to experience how artificial intelligence judges one's face [40], followed by a class discussion. Using sticky notes, the class listed on our classroom boards as many specific examples of how facial recognition is affecting people of different identities, and created a list of considerations citizens, corporations, and politicians should make before adopting a new form of facial recognition technology.

6.2.2 **Facial Affect Recognition.** As a warm-up activity, students conducted a podcast-style discussion interview in small groups, asking each other questions in addition to the following: *(1) What are the most important findings about detecting human emotion from facial expressions? (2) Why do you think companies continue to work on machine learning for facial affect analysis? (3) What are the main uses of these technologies?* Then, each small group selected a facial affect recognition-involving product example to conduct a critical analysis on; examples included Affectiva's Automotive AI [4], Faceception [18], iMotions [26], and Noldus' Facereader [32]. The analysis focused on marketed benefits, perceived risks and whom it would affect, how the risks could be reduced, and any other reactions students had to the technology. Each group presented their critical analysis to the whole class.

6.2.3 **Surveillance Technology.** Our surveillance technology session was centered around a mock trial activity. The class was divided into two groups, with each group taking an opposing side of the issue—'for surveillance' or 'against surveillance'—and prepared for a trial. Each team member took on one of the following roles: an opening statement deliverer who gave a 2-minute opening statement for their side; a lawyer who asked witnesses questions and cross examined the other team's witnesses; two witnesses for their side; and a closing statement deliverer who would give a 2-minute closing statement. The two groups had 30 minutes to prepare for trial. This included developing main arguments and deciding what witness identities would be portrayed to support the arguments, developing questions to ask their own and opposing side's witnesses (limited to two questions each), and developing opening and closing argument statements. The trial then ensued as: (1) opening statements; (2) the case for surveillance; (3) the case against surveillance; (4) closing statements; (5) everyone voting anonymously on who made the best arguments; and (6) the verdict.

6.2.4 **Voice Recognition.** We first conducted an activity inspired by Chin and Robison's report on gender bias in voice AI systems [12]. Students asked gender identification questions from the report to existing voice AI systems and discussed responses: *(1) What is your gender? (2) Are you a woman? (3) Are you a man? (4) Are you non-binary?* Students read about two gender-neutral voice assistant solutions—Q [31, 36] and Sam [6]—and in small groups, answered questions on the systems' overall goals and main approaches, how the makers are evaluating the systems, and the students' immediate impressions of these gender-neutral voice assistants.

Then, each small group designed a poster to propose their own ideas for a voice AI design and system. Each poster included a name for the voice AI system, a catchy one-sentence pitch, main features that made it unique, how their system was more inclusive of identities that existing solutions discriminate against, and what the design process and design team would look like. Each team delivered a short pitch (no longer than 2 minutes) with their poster to present their group's voice AI system in a quick and engaging way to a panel of classmates that served as "potential investors."

6.2.5 **Healthcare Software.** As a warm-up exercise, we created three posters, each with one of the following questions: *(1) What aspects of healthcare are being automated, particularly using AI? (2) How can healthcare systems be harmful and to which identities? (3) Suggested ways to reduce harmful impacts?* Students wrote their answers on sticky notes and added them to the posters, then observed and discussed the whole class' responses via a gallery walk.

Then, students in small groups chose one particular aspect of healthcare that can be helped through automation. Each group created and presented an idea for an automated healthcare technology that would benefit their selected aspect of healthcare. The groups were asked to specify what the imagined technology were exactly providing, what situations in healthcare could benefit and be improved by the presence of the technology, how the technology could potentially harm people of different identities based on how they are designed or used, and how the potentially harmful effects should be minimized by the techonlogy designers.

6.2.6 **Recidivism Software.** This class was set up as a town hall-like discussion where the "citizens" (aka the students) were deciding whether to purchase and use recidivism and predictive policing technologies in their "neighborhood." The class was divided into two sides—citizens advocating for or against recidivism and predictive policing technologies—then we voted on the matter after hearing both arguments. Each group prepared their arguments, supporting them with articles, case studies of users who have been helped or harmed by recidivism technology, or researched statistics. Similar to the mock trial activity on surveillance technology (see Section 6.2.3), the town hall itself began with opening arguments from both sides, proceeded with questions from each group for the opposing side, closing statements, then an anonymous vote on which side each student ultimately agreed with.

6.2.7 **Child Welfare.** Our conversations on technology use in child welfare and protection services focused on how predictive analytics are used to "discover patterns and make predictions about future outcomes" using data [24]. Specifically, we held a Socratic seminar-like discussion where we collectively covered example applications of child welfare technologies one at a time, and the class took turns either asking open-ended question or providing comment with references back to the pre-class readings on the topic. We imposed a respecting discussion environment by encouraging to

ask questions if they did not understand something, not to interrupt their peers, or put down ideas of others.

6.2.8 **Hiring Practices.** First, students completed a mock job interview activity in groups of three. Students took turns being an interviewer, interviewee, and observer. On every turn, the interviewee's emotions were being predicted with an open-source emotion AI tool (if comfortable) [2], while the observer made observations on how the AI tool assessed the interviewee's emotions throughout the interview. They looked for the types of emotions the AI tool predicted and whether its' predictions changed for particular questions. Then, students discussed with their peers how hiring technologies can affect students as potential job candidates, how creators and clients of such technologies can be aware of the power they hold and its impacts on potential candidates, and how we could avoid creating similar issues if creating hiring software. They were instructed to think about these questions from three perspectives: creators of software, clients of software (i.e., companies that make use of the technology), and people impacted (i.e., interviewees).

6.2.9 **FinTech Applications.** As a warm-up activity, students answered several questions on sticky notes on financial technology (Fintech) applications, then added their responses to our class whiteboards to build common language and context. Questions included: *(1) What is the purpose of the technology? (2) Who benefits from this technology? Who is potentially hurt by it? (3) How has the technology been applied in historical contexts? (4) What are the future implications of the technology on society?* Then, in small groups, students created an outline for a 30-minute workshop to increase awareness of DEI challenges in FinTech applications among undergraduate students. Their outline included learning objectives, opening reflection questions, workshop activities, and a concluding activity to summarize and inspire further reflection.

7 REFLECTIONS AND DISCUSSIONS

7.1 Student Course Reflections

The students' end-of-course evaluations and final reflective essays provided insights into the impacts of the pilot course experience on students. We highlight some student reflections here:

"This class in general has provided a really great opportunity for me to refocus on the human side of computer science and more honestly get a much needed break from the technical world."

"This class is what encouraged me to concentrate in artificial intelligence [for my BS-CS degree]."

"Not only do I think technology should be created equitably for all, I now understand how it is not."

"This course has opened my eyes to vulnerable communities I had not considered before (e.g., children via child welfare systems)...this class has made me realize that no one is excused from the potential threats of technology."

"This course has especially impacted my perspective regarding how my identity intersects with my role as a computer scientist."

7.2 Instructors' Reflections

We felt that focusing the beginning of the semester on creating a comfortable, inclusive, and safe environment for vulnerable discussions was key to students' openness to share and reflect in their writings and in class. The college dean also commended us "for creating an inclusive and support environment in your classrooms" based on our student evaluations.

Overall, the student discussions, reflective journal entries, final essays, course evaluations, and capstone projects indicated that the intended learning objectives were achieved well by the activities associated with the chosen course topics. Specifically, we found that assigning reflective journals with prompts for upcoming class sessions, then conducting carefully designed interactive in-class activities that tie back to the journal assignments were critical to getting students actively involved in learning and reflecting on the issues. This way, students had already formulated their thoughts in writing about the pre-work materials (e.g., readings, videos) in preparation for in-class participation. The written reflective journal entries showed throughout the course how much the students were learning about themselves and their identities, as well as the state of DEI in computing innovations and their impacts. Students also commented at the end of several class sessions on how the interactive class activities fostered their participation during class significantly. In addition, we observed enthusiasm amongst the students as they worked on their capstone projects, creatively applying their learning towards taking action and advocacy for equity and inclusion in computing innovations. We were especially happy to see some of our students be inspired by key figures who are fighting against bias in technology (e.g., Joy Buolamwini, Safiya Noble, Ruha Benjamin, Meredith Whittaker) and chose to focus their remaining undergraduate career on joining the movement (e.g., declaring AI as a concentration to study AI bias and ethics).

8 SUMMARY AND FUTURE WORK

This paper describes both the pilot and reflections from students and instructors of a course on *Equity and Inclusion in Computing Innovations*. For our pilot, students were limited to work within the same small group pods throughout the semester due to the COVID pandemic. In future iterations, we intend on creating more opportunities for students to work with different students in different groups throughout the course. Outside of class, we observed an infrequent use of our department communication platform (i.e., Discord) for discussion. We plan to more effectively supplement in-class time and discussion with such platforms outside class.

While our pilot had 15 students, our goal is to reach a larger, broader population of students with future course offerings. We acknowledge that increasing enrollment will require strategies to scale without losing the safe, inclusive, and comfortable discussion space. To broaden participation in this course, we have taken steps to allow the course to count towards our College of Engineering breadth requirement.

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