

“Just let me”: Experiences of Historically Marginalized Students in the Computer Science Department at an Urban Public University

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Abstract— The University of Massachusetts in Boston (UMB) is the most ethnically diverse public university campus in the New England region of the United States. Student enrollment in the Computer Science (CS) department closely mirrors the ethnicity-related demographic statistics of the university as a whole, with more than half of CS majors identifying as students of color, bucking national trends. Students who identify as male in our department outweigh those who identify as female five to one, however: a ratio that is in line with national and global trends. These two phenomena place our department in an interesting place for diversity, equity, and inclusion research: we boast extremely strong inclusion rates for students of color in CS, but still struggle to recruit and retain women in our programs. An exploratory phenomenological case study of participatory action research was used to investigate the lived experiences of students from various backgrounds and gender identities within our department. Salient thematic codes were analyzed with dual purposes: 1) informing suggested improvements for the department for recruiting and retaining students of color and women, and 2) ensuring student participation and inclusion in the creation of new course evaluation questions that aim to gather more data about students' experiences across the entire department. Salient themes from the focus group included gender-neutral and ethnicity-neutral based experiences, the importance of female advocates and mentors, and international status concerns.

Keywords—diversity, inclusion, gender, ethnicity, education

I. INTRODUCTION

The University of Massachusetts in Boston (UMB) is an urban public research university with approximately 16,000 students and 1,100 faculty across 10 colleges. Among the 35 universities, colleges, and community colleges in Boston, UMB is the only public research university. It is the most ethnically diverse public campus in the New England region. About 59% of undergraduates are first-generation college students, many of whom are children of immigrant parents. More than half of the students on campus identify as students of color (SoC) and our computer science department welcomes a similar percentage of self-identified SoC.¹ 58% of undergraduates at the university identify as female. However, women are underrepresented in the College of Science and Mathematics, especially the Computer Science (CS) department.

SoC are well-represented in our department, bucking national trends [1]. We recognize that the underrepresentation of women in computer science is still a prevailing issue. We actively work to maintain an inclusive environment for all and want to understand the causes of the discrepancy between university population ratios and department-level ratios of women. Hypothesized reasons include the potential for improvement in teaching practices, curriculum, and outreach as they pertain to female students and faculty. We also want to ensure that women currently working and studying in our department perceive the environment to be inclusive and welcoming. Therefore, one overarching goal of this research is to gather data on those practices, policies, and perceptions as they currently exist to further inform and

execute a strategy for welcoming more women, both students and faculty, into CS at UMB. Simultaneously, we aim to continue improving the culturally aware environment reflected in our enrollment numbers of Students of Color (SoC). The result will ensure that the entirety of the CS department is abundantly aware of, inclusive for, and welcoming to women and students of color.

II. RESEARCH DESIGN

A. Research Questions

1. What elements of our CS courses and department are most important for students who identify as women and students of color?
2. Which elements contribute positively or negatively to those students' experiences in our department?
3. What questions can be added to our course evaluations to measure student perceptions of these elements?

B. Background

We aimed to collect and evaluate data to identify opportunities to improve the experiences of students who are members of groups that have historically been marginalized in the field of computer science: students who identify as women and students who identify as people of color. There are currently no structures in place in our department by which we can examine students' perceptions of classes and coursework with this specific lens. We recognize the ongoing value of student perspectives in these areas, and therefore incorporated questions relevant to this goal in our traditional end-of-course evaluations, which take place every semester. Rather than adding pre-generated questions to our evaluation questionnaires, such as those suggested at the University of Denver [2], CS faculty have identified and emphasized the importance of including questions that the students of those populations themselves feel to be indicative of their values and perceptions. As such, we conducted participatory action research (PAR) with the students of our department in order to identify the new evaluation questions. We documented and analyzed the beliefs and opinions of students regarding their lived experiences in the Computer Science department.

C. Research Methods

An exploratory phenomenological case study was used to compare participant experiences. The lived experiences of students from various backgrounds and gender identities lend themselves not only to description but to an interpretive process in which the researchers extract meaning [3]. As stated in the rationale section, participatory action research (PAR) was selected as the most appropriate framework for the study given the nature of the research questions and the department's desire to incorporate student input for new evaluation questionnaires. The source of qualitative data was a focus group comprised of students who self-identify as women and/or students of color. Focus groups are more conducive to PAR since they engender

¹ See Limitations section for more detail on SoC vs. BIPOC descriptors as they pertain to this particular study. Also: the department data collection does not distinguish between East Asian, Southeast Asian, and other Asian

subgroup descriptors; students in those populations are combined in the “Asian” category, which is problematic for this study since many Southeast Asian students identify as people of color.

This work was supported in part by the Restorative Justice Commission at the William Monroe Trotter Institute.

more involvement from the students traditionally viewed as “subjects.” While a survey would engender valuable individualized feedback unique to each student, it would also preserve the paradigm of “We ask the questions; you give the answers” that PAR attempts to renounce and was therefore deemed inappropriate for this particular study. Surveys are convenient but not conversational, whereas PAR “emphasizes dialogic engagement” [4, p. 2]. PAR seeks to “replace an ‘extractive’ imperial model of social research with one in which the benefits of research accrue more directly to the communities involved” [4, p. 1]. In this case, evaluation questions that seek to inform departmental faculty of areas that can be improved for particular student communities should incorporate those same communities in their creation. PAR also has a strong history in research education that sought to promote curricula and pedagogies that are anti-sexist and supportive of “working class and Indigenous students whose lives, cultures, material circumstances and social exclusion were unrecognized by ‘mainstream’ schooling” [5], rendering it especially apt for our research goals. A focus group was selected over in-depth interviews since group interaction was likely to “stimulate a richer response or new and valuable thought” [4, p.10]. Not all of these outcomes came to pass, as noted in the limitations section.

To begin the focus group with minimal pressure on participants to speak up individually, participants were asked to contribute to a word cloud via a QR code from Mentimeter.com, the anonymous results of which were displayed for the entire room to see. Both word cloud prompts contained open-ended experience-based questions. The first prompted the students with the text “Being a woman in the Computer Science department at UMass Boston is...”. Male students were asked to abstain from answering this question, but they were welcome to weigh in on the ensuing discussion. The second prompt read “Being a student of color in the Computer Science department at UMass Boston is...”.

D. Focus Group Recruitment and Composition

Recruitment fliers were posted around our department offices and emailed to the listserv of all 951 students in the Computer Science department. These fliers encouraged students who identified as women or students of color to “Be heard: Evaluate the evals!” and included a QR code to initiate the inscription process for the study. Based on that data, researchers planned to create multiple focus groups: one for undergraduate students who identified as Black or Indigenous, one for undergraduate students who identified as women, one for graduate students who identified as Black or Indigenous, and one for graduate students who identified as women.

18 students who identified as women and/or students of color responded to the recruitment survey, total. Given the small number of willing respondents, all 18 were invited to a single focus group. Seven students participated: 6 students of color, 1 white student; 5 women, 2 men;² 4 undergraduate, 3 graduate students. Of the students of color, 2 identified as Black, 3 as identified as Southeast Asians of color, and 1 identified as multiracial. The focus group took place on May 23, 2023, on the UMB campus.

TABLE I. GENDER AND ETHNICITY OF PARTICIPANTS

| Participant | Self-identified Gender | Self-identified Ethnicity | Rank |
|-------------|------------------------|---------------------------|---------------|
| 1 | Female | Southeast Asian | Graduate |
| 2 | Female | Southeast Asian | Graduate |
| 3 | Female | Southeast Asian | Undergraduate |
| 4 | Female | Multiracial | Undergraduate |
| 5 | Female | White | Undergraduate |
| 6 | Male | Black | Undergraduate |
| 7 | Male | Black | Undergraduate |

Recruitment of target populations was met with limited success. Ideally, we would like to have separate focus groups for women and for students of color, and for graduate and undergraduate students. Still, the participant group offered valuable insights that the department can use to continue and improve broad participation in computing for historically marginalized groups.

III. RESULTS

Salient statements made by participants in the 96-minute discussion were codified into unique topics. 13 individual themes emerged; those themes were further coded into categories.

TABLE II. FOCUS GROUP CATEGORIES AND THEMES

| Thematic Category | Thematic Code | # of references in group |
|-------------------------------|---|--------------------------|
| Gender-based experiences | Neutral experience | 6 |
| | Societal sexism | 7 |
| | Strong female advocates | 5 |
| | Perceptions of how few women are in undergraduate courses | 2 |
| Ethnicity-based experiences | Ethnicity-neutral experience | 1 ^a |
| Citizenship-based experiences | International student challenges | 3 |
| | Financial Concerns | 1 |
| Reasons for leaving CS | Pace too fast | 4 |
| | Lack of prior exposure to CS classes | 1 |
| Course-level perceptions | Importance of small group discussions | 2 |
| | Course suggestions | 1 |
| Department-level perceptions | Insufficient departmental connections | 5 |
| | Insufficient departmental resources and personnel | 1 |

^a Unanimous agreement

A. Gender

The word cloud and breakdown of response codes for the theme of Gender-based experiences are below.

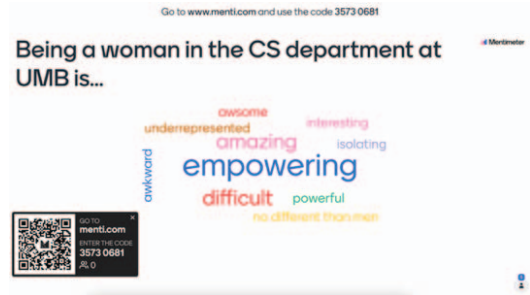


Fig. 1. Women’s Experience Word Cloud

1) *Theme: Gender Neutral Experience:* While there were references to isolation and underrepresentation in the anonymous word cloud, in the discussion, female students voiced only gender-neutral experiences in the department. One female Southeast Asian undergraduate participant stated, “I personally never struggled with being a woman in computer science. I never had to, like deal with

² All participants self-identified as cisgender men and women. All gender descriptors in the study are in line with participants’ self-identification.

anything regarding my gender. My teachers... they have always given me opportunities just like anybody else.” Another participant, a Southeast Asian female graduate student, agreed and elaborated:

I also never had a problem because I'm a woman. And it's empowering to be a woman here. I see four girls in our lab; four PhD students. It's so encouraging for me... because sometimes I thought that computer science is more for men, because... I don't know. I don't know why I thought that. But now that I see that women are doing great in this department, I'm just like, OK, it's not. I was wrong.

2) *Theme: Societal Sexism:* The perception highlighted by that student, that “Computer science is more for men,” was not, however, a novel idea for any of the participants. While their stated experiences at UMass Boston did not support the claim, there was unanimous agreement that society has historically promulgated that notion that women don't belong in computer science. When participants were asked why the idea that “computer science is for men” still exists despite their personal experiences in our department, a Southeast Asian female undergraduate student answered, “Because outside, men are given more chances. It's not just about America or about CS. When we hear that ‘Women are less,’ it's like a worldwide problem.” In response, another Southeast Asian female participant agreed, “We have this universal stigma in society where it's like... passed on for generations.” Another female participant, an undergraduate international student who identified as multi-racial, articulated her experience:

When I was growing up, the teachers were really great, but there was [the idea that] math is for boys, and medicine is for girls. Just because math requires logic, you can't just memorize everything, you have to understand the concepts. My teachers always pushed me to be a doctor, to take biology classes [for medicine]. I was so confused, I thought maybe I can just take [both] biology and math. I was interested in math, and I wasn't very interested in biology. But just let me. I can do both.

Women's frustration with the limitations unfairly and summarily applied to them is nothing new. The sexist viewpoint that women cannot excel in technological fields has been documented in schools [7] and in the workplace [8]. This particular student wanted to focus her studies on math, but societal expectations, voiced via faculty members at her secondary school, demanded that she study biology. In the focus group, the participant shifted from simply sharing her story to imploring her past teacher as if the individual were in the room currently, years after the original exchange had taken place. The frustration and pleading borne of simultaneous confidence in her abilities and being in a subordinate position were unmistakable: “But just let me. I can do both.”

3) *Theme: Strong Female Advocate:* The same student continued,

I was very glad that I had a mother who pushed me to choose my own field. Not everyone has parents who appreciate women's interests or want to foster them. [Some parents] just have those ideologies they learn from their own parents that ‘women can do this, men can do this.’

The idea that other women inspired and helped these female students in their chosen academic paths was a strong component of the larger discussion. Mothers and teachers were both mentioned as advocates for female students but were not the only ones that the participants highlighted as influential in their decision to enroll and remain in a CS program. A Southeast Asian female undergraduate participant spoke specifically about the Vietnamese student leader of the recently formed “Women in Computer Science” (WiCS) club at UMass Boston, saying:

She really made a difference in the way I think about what's happening in CS. She took initiative to bring us all together to give us more information about other things happening around campus. She was actively inclusive, bringing people into the fold, and that made a big difference.

As participants noted, not all female students have supportive and empowering parents or guardians. As a result, it's clear that the presence of such helpful individuals and groups on campus are strong supports for gender inclusion in the department.

4) *Theme: Perception of How Few Women are in Undergraduate Courses:* While female graduate students shared perceptions that they were not isolated or outnumbered in their labs, all the undergraduate students vocalized their experiences in men outnumbering women in undergraduate courses. One Black male undergraduate participant stated:

[All of my] classes are filled with guys. The class was packed, but it was mostly all males. It's not like it was a close margin; it was like 10 girls to 40 guys. Then over the semester, people started to drop out, the number of girls significantly dropped. It was probably like 20 guys to like two or three girls.

Such perceptions are in line with the demographic data gathered in Fall 2022: Men outnumber women in the CS department by approximately five to one. Even controlling for enrollment ratios, men are 56% more likely than their female counterparts to complete a CS degree within four years. By this point in the discussion, it was clear that this issue aligned with the worldwide gap between male and female students who choose to study computer science [9]–[13] rather than by any actions within the UMB CS department. When asked explicitly if any instructor, course content, or other component of the CS department at UMB had a negative influence on students in relation to gender, participants were either silent or answered in the negative.

B. Ethnicity

The second word cloud prompt contained the text “Being a student of color in the Computer Science department at UMass Boston is...”. Similar to the prompt about gender, participant responses were varied, with no single theme taking precedence:



Fig. 2. Student of Color Experience Word Cloud

While some students anonymously contributed the words “bias,” “tough,” “leftout,” and “complicated,” no participants were willing to elaborate on those feelings in the discussion. Indeed, the only theme to emerge from ethnicity-based questions was ambivalence. When asked if there were any negative experiences had in relation to ethnicity in our department in any form, participants were silent. Finally, a student offered, “My teachers here have always appreciated me and given me opportunities just like anybody else,” (*female, undergraduate, multiracial*) a statement with which other participants voiced agreement. Participants noted that their experience as students of color in the CS department here was “normal” and felt “the same as other people.” While the demographic data at both the university and department levels supports the idea that students of color are well represented in the department, it is notable that anonymous input did not perfectly align with the spoken (and therefore not anonymous) discussion. In an attempt to further elucidate the ideas behind the negative word cloud contributions, the researchers asked again about experiences in which participants have felt left out or discriminated against. While the topic of ethnicity did not come up in those responses, another area that has historically been associated with ethnicity did emerge as problematic.

C. Citizenship-based Experiences

International student participants in the group had mixed experiences vis-a-vis their citizenship status. Higher tuition prices for international students were lamented by some participants while others stated that they had signed up for the rate that was charged and did not feel the situation was unfair. An out-of-state, but not international, Black male undergraduate student indicated that he was also paying higher rates but understood that since he is a non-resident of Massachusetts, there were logical reasons for this upcharge. Aside from financial concerns, however, a student pointed out a lack of inclusion for international students in initiatives such as the one that led to this research:

I see [so much effort put toward] how to bring engagement for women... indigenous people, people of color. But I don't see any [programs to help] international students. People are reluctant [to help us]. I see why they're reluctant, they don't know how the paperwork works; sometimes it takes lawyers. But I feel like there should be at least one program [for us]: Women, students of color, but international students as well. (*female, Southeast Asian, undergraduate*)

The participant stopped short of classifying the perceived insufficiency of resources for international students as discriminatory, but rather an area that appeared to be ignored by the department and had drastic effects on international students of color and women. She was especially focused on the convoluted process of obtaining an internship as an international student of color. Academic literature corroborates the idea that women and people of color suffer outsized effects from a lack of social capital [14], [15]. In this case, the ability to navigate complex internship application processes is perceived as inaccessible by international women and students of color in our department.

The International Student and Scholar Services group within the Office of Global Programs (<https://www.umb.edu/academics/global/iss>) was vaguely referred to but deemed inadequate, especially for forging connections between international students in CS and potential internship organizations. One participant suggested a possible solution of a faculty-led group in the CS department specializing in workshops and opportunities specifically for undergraduate international students with a focus on academic procedures and internships, indicating that such a solution would go a long way in solving the identified issue. Other participants agreed that such an organization would be helpful.

D. Reasons for leaving CS

While participants were unanimous in their feeling that nothing in the department had a discriminatory effect on them due to their gender, students who were considering switching from CS to an Information Technology (IT) track (with fewer math requirements) did share some experiences with gendered undertones. It should be noted that undergraduate participants generally interpreted “leaving CS” as switching to an IT track degree, but graduate participants interpreted the idea of leaving CS as shifting from a career in software development to a career in research.

1) *Theme: Pace too fast:* Asked if anything in his background inspired a shift from a CS to IT degree, one student answered:

It wasn't because of my background. It was just because the way it was taught; it felt more fast-paced to me. The workload was pretty fast, and the assignments were a little bit too complex for me with that timing. I realized I love coding, but I left [on] my own terms rather than being forced to work on something that I think is beyond me. So, I switched to IT. (*male, Black, undergraduate*)

A graduate student added to that idea, with some contradiction. The following conversation took place:

Student: Maybe the reason why I think that men are more successful in developing in computer science is that they're faster. I can do it, but I cannot do it as fast as they can. Maybe my thing is: I think in a complex way and sometimes I go into detail, which is good for research. When I do research, I'm like: Okay, this attention to detail is helping me. But I'm not good at developing. I can do it, but not as good as others. (*female, Southeast Asian*)

Researcher: It sounds like you're saying that by nature you're more oriented toward going in depth than going fast, and you're finding that that has some consequences on your path and the classes you're in?

Female student: Yeah, exactly. So, I want a research position in the future rather than on a software engineering team or industry.

In summary, the male student who switched to IT did so because he felt the pace of the class was too fast, and the female graduate student who shifted from coding to research did so because she felt she could not keep pace with the male coders. Some female undergraduate students agreed that the pace was too fast for them, at least initially, but found that they rose to the challenge: “I also had the idea to maybe change my major because it was very fast paced for me as well. But I think now I'm able to handle it, and I'm able to go with the flow.” (*female, Southeast Asian, undergraduate*)

2) *Theme: Lack of prior exposure to CS classes:* At least one female student indicated that a lack of CS exposure prior to beginning her academic career at UMB influenced her decision to switch majors entirely, to a humanities track. When other participants indicated that the speed of content delivery was intimidating, she agreed and added:

The computer science classes I was taking were really hard for me. I kind of felt like it was because I didn't really learn any type of [CS] stuff before I came to school. Like maybe if I had had an interest before [now] then maybe I would have done better. I just had to make a change because it was like, ‘These are my strengths,’ you know? (*female, White, undergraduate*)

The phenomenon of female CS students being in the minority is not limited to our department, state, or country. It is not even limited to higher education. Male students outnumber female students in

computer science activities as early as third grade [16]. It is notable that this student did not ascribe her perception to such a phenomenon but rather her own personal preferences and perceived weaknesses. This response arguably dovetails with another phenomenon dubbed “The Confidence Gap” in which women routinely underestimate their abilities across a wide array of subjects and sectors [17].

E. Department and Course Perceptions and Suggestions

After substantial conversation on the aforementioned topics, participants were asked to summarize what could be improved at course and department levels for students of color, female students, and international students. There was a unanimous consensus that at the course level, group work having a space within the class was a good mechanism for students feeling included, regardless of how they identify. Participants agreed that the majority of their connections and friendships that they formed in class were initiated when the professor assigned group discussions, despite the initial discomfort of speaking with strangers. A student said, “I think that’s a positive thing to do, to be forced into groups, because probably we wouldn’t choose to have a group if it wasn’t forced” (*female, Southeast Asian, undergraduate*). Interestingly, all participants agreed that being asked to form their own groups was not helpful and “awkward.” Participants unanimously expressed a preference for the instructor to form the groups for at least the first few weeks of classes. Some research has suggested that there is no significant difference in academic performance between instructor-formed and student-formed groups [18], other studies have indicated that student-formed groups “perform slightly better than the teams formed by the instructors” [19]. Our own focus group results indicate that students of color and female students prefer instructor-formed groups.

Suggested additions and changes at the department level were less uniform. A student suggested a new course to teach students how to effectively monitor news and research in computer science: “That could be a course, ‘Staying up to date on computer science topics.’” (*female, Southeast Asian, graduate*). Other participants agreed that the pace of change in the field was fast enough to warrant an individual course on cutting edge topics.

Participants also suggested that the department hire more personnel to support students with administrative issues throughout the semester, including those that faculty in advisor and leadership roles undertake. One participant said,

I feel like the administrator already has a lot of load on her. And professors are so busy with their own research, with their own personal life. Nobody really wants to like work outside their working hours. ... But I would want the CS department to have assigned faculty just like any other. So that you know you have to cut out to this person and you can [get your paper signed]. (*female, multiracial, undergraduate*)

Another student agreed:

It would be better if we had, like, more people to address students’ questions, because there are times during the add and drop period when students have to line up outside [faculty’s] doors to like, you know, just get enrolled in one of the courses because there’s high enrollment. (*female, Southeast Asian, undergraduate*)

Participants were also unanimous in their support for more robust connections between the UMB CS department and other entities. Bridges were suggested between UMB and industry: “There is amazing research going on, but I feel like there could be more networking between the CS department and the outside world.” Another student elaborated:

I would want the faculty to have more connections to the real-world industries to bring in internships and co-op opportunities for

undergrad, graduate, and PhD students. I feel like some other universities around Boston give that opportunity to students. Let’s say Northeastern: they have like a co-op program. I’ve applied for a lot of internships, the market is not good, that’s fine. But then I’ve seen descriptions which say ‘Northeastern students only,’ and I feel like, ‘Why is my university not connecting with more companies outside and trying to bring them in?’ (*female, Southeast Asian, undergraduate*)

Participants’ desires for departmental connections, however, were not limited to those that reached outside of the university. Some students emphasized the need for more collaboration between the department and other university programs, specifically the Center for Academic Excellence (CAE). One student shared her experience as an employee of that center:

So, I work with the tutoring department at UMass Boston, and other departments have liaisons that specially recommend students to as peer tutors so that other students can get help from them. We have a lot of math courses like, from Math 115 to Math 145, like more than 10, 15 courses. But for CS we [only] have 110, 210, and 240. So, if we are thinking of making outside world connections, let’s start with inside and connect CS departments to other departments who are willing to help. We can offer more courses right now for peer tutoring. (*female, Southeast Asian, undergraduate*)

Combining the fact that participants highlighted the fast pace of course content across the department with the potential for more peer tutors in a university program that is already up and running, the department would arguably be remiss not to make this connection.

F. Evaluation Suggestions

Finally, participants were asked what questions they would add to end of semester evaluations for the CS department. In line with previous discussion in the group, there was little emphasis on gender or ethnicity, even when participants were explicitly directed to frame their suggestions within those contexts. The following question was suggested as additions to the evaluations: “If you could add or remove one specific topic to the course, what would it be?” Students also suggested adding mid-semester evaluation questions in addition to the end-of-semester question sets.

IV. DISCUSSION

While this study did provide important information about student experiences, its validity was impaired by several limitations. These limitations, in addition to the previously discussed limitations of the focus group research method, combine to render the conclusions of the research neither generalizable nor prescriptive, beyond suggestion, for those inside or outside of our department.

A. Limitations

1) Focus Group Size

The muted response to focus group recruitment resulted in varying degrees of limitations in the study. Seven students out of an eligible 951 participated in the focus group, hindering the possibility of group subdivisions by gender, ethnicity, and program rank (graduate vs. undergraduate). Given the extremely low response rate, all respondents were invited to participate in a single study.

2) Focus Group Heterogeneity

Given that essentially every group other than white males has been historically marginalized in the United States, especially in the computer science arena, one focus group to answer these research questions proved to be far too heterogeneous. As a result of the small focus group size, women were asked to share their experiences in front

of male participants, and students of color were asked to share their experiences in front of a white student. Whether consciously or subconsciously, participants may have withheld opinions and perspectives due to discomfort or perceived invalidation generated by this heterogeneous participant makeup [20].

From both a gender-identity lens and an ethnicity lens, participants were unanimous in their *voiced* perception that course in the CS department at UMB provide an equitable experience for all students. Participants were cognizant that students who identify as male in the Computer Science department far outnumber those who identify as female. Results indicated that while students are aware of this gap, they do not perceive any reason for it as originating within the department itself. Still, anonymous *written* word cloud contributions did express sentiments of isolation and other negative feelings, which participants were not willing to discuss in the group. This discrepancy in written and spoken communication of student perspectives lends further credence to the idea that more a homogenous composition of the focus group may have yielded a broader conversation.

3) Lack of Subdivided Data Labels at the University and Department Levels

The demographic data cited in the introduction of this paper were sourced from the university's Office of Institutional Research, Assessment, and Planning [21]. That office mimics the United States Census Bureau in defining someone of Asian ethnicity as "a person having origins in any of the original peoples of the Far East, Southeast Asia, or the Indian subcontinent including, for example, Cambodia, China, India, Japan, Korea, Malaysia, Pakistan, the Philippine Islands, Thailand, and Vietnam" [22]. The panethnic nature of this label has problematic ramifications for the definition and connotation of "Students of Color" both in the current research and in general racial inquiry [23]. Based on (albeit limited) responses to the survey, it is clear that Southeast Asian students in our department identify as students of color. Given the lack of disaggregation in the "Asian" label, however, it is currently impossible to tell if Southeast Asians are underrepresented in our department; all we know is that "Asians" as a group currently outnumber white students and were therefore not considered to be underrepresented for this particular research project. The underrepresentation of this group can, however, be theorized upon reviewing the sheer number of populations grouped under its label (more than 20 ethnicities [24]) and data from other sources that do include subcategories for Asian ethnicity labels [25]. Comparing Asian subgroups' "justification" for inclusion in the label "people of color" results in ambiguity fraught with colorism and institutionalized racism [26], which is beyond the scope of the current research. Including Southeast Asians as SoC in this research may be valuable in that it aligns with those students' self-identification and, most likely, they are members of populations that are historically underrepresented in our department. However, such inclusion may also be considered problematic in that, regardless of researchers' intent to the contrary, it may result in the interpretation of their experiences being representative of all minoritized groups, including Black, Indigenous, and people of color (BIPOC) populations. At minimum, this lack of nuance in ethnicity labels at our university should be addressed before further research is conducted, especially in ethnicity-oriented inquiry. The necessity of such subgroups for Asian populations has also been noted in other research [27].

4) Time constraints

This research project was borne of one of multiple Broadening Participation in Computing (BPC) goals that comprise our department's National Science Foundation BPC plan; namely, "conduct Participatory Action Research (PAR) in order to ascertain which additional questions would best represent student concerns as they pertain to inclusion of women and SoC in the CS department" [28]. The plan has four parts, and the current research project is

included in the first goal of the first part of the plan, with a proposed completion date of Spring 2023. The limitations of this study could have been significantly reduced had more time been available for recruitment.

B. Researcher Positionality Statement

Women and people of color are historically underrepresented not only in student enrollment of Computer Science programs, but also among full-time Computer Science faculty [29]. At the CS department at UMB, there are currently no female faculty of color. Out of 25 total faculty members, there are two female adjunct instructors and three female tenure-track professors, four of whom identify as white and one who identifies as Asian. There is one Black tenure-track instructor and there are two Black adjunct instructors; they are all male. The current research project was organized by a white female adjunct instructor, a white male tenure-track professor, and a white female tenure-track professor; the white female adjunct instructor wrote this paper and led the focus group discussion with the help of the white male professor. Only one Black instructor currently engages in computer science research at our university. As mentioned in our BPC plan, our department is sorely in need of faculty of color, especially women of color, and especially Black women. White researchers questioning and documenting the experience of students of color in a domain in which those individuals had historically been marginalized is certainly a suboptimal arrangement. The creation of a BPC plan and the documentation of these students' experiences, however incomplete, are considered to be a starting point in improving representation and identification of relevant issues in our department. Still, researchers' whiteness in this context arguably resulted in "unwittingly exclusionary" [30] inquiry at best, and "methodological whiteness" [31] at worst.

C. Suggestions

Based on the substantial amounts of targeted input from our focus group participants of color and female students, we put forth the following suggestions for the department:

1. Strongly support the WiCS club. Specific requests from the club president include:

Strengthen ties to CS department. The current club advisor is not affiliated with the department (she works for the university's career center).

Provide opportunities to host meetings and events with CS professors and faculty members in the department to encourage members to engage in club activities, fostering a sense of community among underrepresented individuals.

Create more visibility for the club via posters, T-shirts, etc.

2. Make the connections with CAE: establish tutoring programs for more CS courses.

3. Create a faculty-led group in the CS department (there are already clubs for international students at the university-level) specializing in workshops and opportunities specifically for undergraduate international students with a focus on academic procedures and internships. The student-led women's group for students in CS has provided benefits in the realm of inclusion and confidence for students. Female international students feel excluded from currently extant outreach programs.

4. Develop and publicize stronger connections to industry for student internships.

As noted above, participants did not have gender or ethnicity related questions to add to the evaluations. Still, focus group data does not reflect universal sentiment or consensus among target groups [3]. Given the limitations of a focus group combined with the goal of this research,

we also suggest adding the following question to the evaluations: “Do you feel that your gender, ethnicity, or international status (if applicable) affected your performance in the course? If so, how?” The use of the broad term “affected” will allow for students to voice their own interpretation of things that affected their performance, be they positive or negative, individual (confidence, prior exposure to CS) or linked to the faculty member or course (perceived discrimination). The question, like all on the evaluations, will be optional, so that students do not feel forced to come up with an answer when their reality reflects the gender-neutral and ethnicity-neutral conclusions reached in this focus group.

The CS department at UMB is proud to recruit, educate, and graduate students of color at one of the highest rates in the nation. While we celebrate our success with students of color, there is more work to do. The focus group conducted for this research elucidated both subtle and conspicuous avenues for improvement of student experiences and outcomes within our department, especially for those who identify as women and students of color. University and departmental criteria for distinctions between ethnicity labels require more nuance. Support for the Women in Computer Science Club, strengthened connections to extant campus tutoring programs, the creation of a department-level club for international students, and strengthened connections to industry for student internships are the priorities of women and students of color in our department.

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