"I am coming from the same situation:" Connections between teacher identities and social justice within secondary computing education

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Abstract—Teachers are agents of change, yet little is known about how computing teachers' identities motivate change and propel justice-related work. To fill this gap, we developed case studies of four experienced high school computing teachers, analyzing data from teacher interviews and workshop participation. We found that teachers related to their students through personal experiences and undertook computing course teaching and designing course pathways to broaden and deepen participation. Based on these findings, we recommend that teacher professional learning programs be designed to connect teacher identities and their role in furthering social justice within computing education.

Keywords—teacher identities, social justice, secondary computing teaching, professional development

I. INTRODUCTION

With recent calls within computing education to integrate social justice issues and teach computer science (CS) as non-neutral and political [1, 2], computing teachers are tasked with not only teaching technical concepts but tying them with issues of race, gender, sexuality, and other axes of oppression. However, most scholarship around teaching and teachers has involved understanding teachers' pedagogical needs to teach technical concepts (e.g., [3]). Only recently have design efforts that critically approach the discipline emerged through curricular and pedagogical frameworks [1, 4] and professional development programs for educators [5]. As a result, the role that nuances such as teachers' experiences, backgrounds, and beliefs play in achieving social justice is ripe to be explored.

Though only a few studies have examined how teachers' identities influence educators' beliefs and classroom practices in computer science [6, 7], the findings suggest a strong connection between identity and teaching for social justice in computing. Prior work in teacher education, specifically within computing education, has highlighted the need to support White teachers in recognizing their role in integrating issues of racial disparity within computing [6]. Another study examined how women teachers of color bring justice-oriented and abolitionist commitments to their high school classrooms [7]. While such studies highlight the role of teachers' racial identity and lived experiences in doing social justice work, it is evident that the intersectional and multidimensional nature of teacher identities warrants further examination. There is a need to probe how other dimensions such as nationality, socioeconomic status, and gender intersect and inform social justice work that teachers may undertake or not.

This paper reports on a study guided by a research question: *How do teachers' experiences, backgrounds, and identities interact with their undertaking of social justice work within the discipline?* In response, we developed four case studies of high school computing teachers using interview and observational data from their participation during a workshop session [8]. Below we elaborate on our theoretical framework, the study's context and our relational positionality, data collection and analysis, results, and discussion.

II. THEORETICAL FRAMEWORK

For the most part, teacher programs for preparing secondary computing teachers have been notoriously colorblind [1, 6]. Rising concerns within computing education–both in terms of broadening participation and how the discipline is introduced as neutral and apolitical–necessitate teachers engaging in social justice work within computing. Teachers must engage critically with the discipline, asking questions about computing and its interaction with marginalized communities and societies. Our theoretical framework expands beyond cognitive frameworks to capture and analyze aspects of teacher identities and their role in dismantling the neutral façade of the discipline [9]. Drawing from sociocultural and sociopolitical theories of teaching and learning [10], we build on existing but limited work on teacher identities and their influence on teachers' uptake of social justice work within computing education.

We draw from a conception of identity defined as stories or narratives people tell about themselves and others [11]. We conceptualize teacher identities as multidimensional and consisting of different intersectional aspects such as gender, race, sexuality, socioeconomic status, age, geography, social interests, and familial histories [18]. Given the predominance of White teachers within the broader teacher population, some

studies have focused on how Whiteness shapes teachers' learning of their racial identity and how they relate to students, particularly of color, within their classrooms [6, 12]. Research also calls for further complications of the category "White" to include other aspects such as socioeconomic class and gender [13]. Further, Philip and Benin argue for a closer look at other aspects of racial dynamics and how that plays out in teacher preparation programs [12]. Bukor adds to the teacher identity scholarship by highlighting the intertwined nature of teachers' personal and professional identities [14].

This study builds on the understanding that computing teachers specifically take on social justice stances in relation to their personal identities and stories. These stories overlay and intersect different aspects of teacher identities. Further, identity stories are not static but relational, dependent on the school context, political climate, and relationships with colleagues and students. Just as teachers' personal stories inform professional actions, our analysis aimed to describe how teachers' stories, along different lines of identities, influence their stance towards social justice in computing education.

III. POSITIONALITY STATEMENTS

The first author, who identifies as a cis-woman of color born and raised in a South Asian country, participated in the workshop as a researcher. She attended organizing meetings to learn about the project and supported data collection and analysis during the implementation. She interviewed three of the four teachers and facilitated a session during the workshop. The second author, who identifies as a White cis-woman born and raised in the U.S. by immigrant parents, was the lead researcher in this project. Before her research career, she was a high school C.S. teacher. She knew all four participating teachers from her engagement with the Exploring Computer Science (ECS) teacher community. The third author, who identifies as a White Jewish trans-man born in Ukraine and raised in the U.S., was also a high school C.S. teacher. He participated in the workshop and facilitated a session. He has engaged with the ECS community as a graduate student researcher for the last five years. He knew all the participant teachers from prior professional engagements. Altogether, the authors brought in perspectives from different places of relationality and power concerning the project, making the findings more reliable [15].

IV. RESEARCH DESIGN

The study was situated in a teacher workshop organized by the CS4All state initiative in a northwestern US state. The workshop intended to bring teachers together to brainstorm potential gaps in realizing just computing education within the state and ways of addressing them within and outside the classrooms. The workshop organizers, including the second author, invited ECS teachers in the state who had completed full two years of teacher professional development. Seven teachers state-wide were invited; four among them, from diverse geographies, agreed to participate. As part of the study's Research Practitioner Partnership (RPP), one of the teacher participants, Tirana Elbadwi (pseudonym), further

joined the research team led by the second author to design the workshop. However, she also chose to avoid designing or knowing details of sessions facilitated by others, including the one being analyzed for this paper, to "not to spoil the surprise."

The study design included three parts for the teachers to engage: interviewing pre-workshop, responding to a pre-work prompt, and participating in the workshop. All four teachers were interviewed to capture their personal and professional experiences, backgrounds, and perceptions of doing social justice work within computing education. Two weeks before the workshop, as a part of pre-work, teachers read the introductory chapter of Ruha Benjamin's *Race after Technology*[16] and reflected on their sociocultural backgrounds on a shared online Jamboard. Owing to the RPP, senior researchers and participating teachers jointly attended the workshop. The workshop session involved all the participants sharing their pre-work responses in two small groups, then discussing computing education and related social justice work. The instructional activities of the pre-work and workshop session had been piloted earlier with educators at computing education and learning sciences conferences. However, this was the first time it was employed to engage high school teachers in a professional development and research project.

V. DATA COLLECTION AND ANALYSIS

The study involved analyzing data from three sources: pre-workshop interviews, teacher responses to pre-work, and transcripts of session audio recordings. The first and the second authors interviewed the four teachers before the workshop. Further, we collected their pre-work and audio-recorded the related workshop session. While interviews led to text transcripts, observational data included transcripts of audio recordings and teacher-generated pre-work responses. All three authors analyzed the data jointly and developed a case study for each of the four teacher participants [8].

We worked towards establishing reliability of reported findings by collaborating on case-study generation and reporting, both among the authors and with the participant teachers. The three authors independently reviewed the data log consisting of both interview and observational data and met to discuss their interpretations, emerging narratives, and cross-cutting themes. In alignment with the interpretive nature of this analysis and its epistemological roots, this analysis was conducted with Small and Calarco's [17] criteria for high-quality qualitative research: exposure, cognitive empathy, heterogeneity, palpability, follow-up, and self-awareness. The second and third authors' ongoing relationship with teachers, in addition to detailed semi-structured pre-workshop interviews, allowed sufficient exposure (i.e., a significant number of hours spent interacting with the participants) and made room to analyze data with cognitive empathy to account for "the degree to which the researcher understands how those interviewed or observed view the world and themselves—from their perspective" [17, p.23]. Further, this approach allowed us to conduct interviews and develop case studies with palpable and concrete details instead of discussing ideas in abstract terms. Furthermore, the

state-wide call and recruitment of the four teachers provided a degree of heterogeneity in the dataset regarding diverse contexts, backgrounds, and experiences reflected in the narratives below. The research team worked towards being self-aware of our presence in the setting and how it may have shaped teacher participation. Follow-up with teachers after developing their cases further strengthened our narratives.

Below we present narrative accounts of each teacher as they relate to their identities along multiple axes. Then we discuss themes of how their vision for social justice work within their teaching contexts was connected to their identities.

VI. RESULTS

A. Tirana Elbadwi

Tirana was born in Alexandria, Egypt, to a progressive Muslim family. Very early in her life, she resisted her relatives giving her nicknames of their choice, for which her grandmother called her as being "headstrong." Tirana made similar, unconventional choices, such as studying CS when it was rare for girls to pursue that path, marrying a partner raised in a different country, and later jointly moving to the United States to build a professional career. As an immigrant in the U.S., she continued to observe and challenge gender stereotypes, fight imposed identities, and resist simplifications. Tirana insisted that her neighbors, students, and colleagues call her by her first name instead of giving her anglicized nicknames.

Tirana's personal struggles across national contexts, as a young girl, later as a Muslim woman and an immigrant, have fueled her desire to fight for equal opportunities within her computer science classrooms. Actively connecting her experiences with her struggles to get jobs in Egypt upon graduation to her observations of "systemic inequity" in the U.S., she invested her efforts in building a computer science pathway in her school by having an eye for equity and demographics—for who is in her classroom and who is missing. With a 4-year course of study, Tirana wants her students to develop the same level of comfort as she had with computing and later get to the economic opportunities offered by the field.

B. Maya Balbin

Maya's upbringing was similarly colored by an immigration story, one of her father's, who had moved to the US from the Philippines. She was very aware of her father's struggles securing a job in the US and how computerization across different areas left her father with very few options after several years and having to take up a custodial job at a school. She identifies as a first-generation student whose mother graduated from college at the same time as her. Maya continued to obtain her graduate degree and teaching license and started teaching. Growing up, Maya struggled with her Filipino last name and the bullying around it. However, in high school, with the help of a teacher, she started identifying her uniqueness in her cultural heritage, where she recognized the role of teachers in shaping learning for students. Maya began as a journalism teacher in a high school following her teacher certification after graduating from a four-year public university (after

transferring from a two-year community college for financial reasons). She quickly integrated computers and computing by presenting the school newspaper as a website and leading students to do data analysis of the school budget.

Maya's experiences and the influence of her father's story significantly shaped her trajectory, shifting into becoming a computer science teacher and even advocating for computer science education. She was keenly aware of the opportunities computing was opening as she launched her teaching career in Cupertino, California. Even though she did not teach computer science in Cupertino, in her move to a neighboring state, she quickly noticed a lack of computer science courses and felt it was not "just right" that students did not even have the option to take such courses. Maya immediately advocated for and introduced an introductory computing course in her high school. Once again, noticing the diversity among students, racial, gender, and socioeconomic backgrounds, she identified how the course was not providing students with meaningful contexts to learn and develop an interest in computer science. Maya switched the program to offer the ECS course. Since then, she has also been developing recruitment strategies, such as talking to student clubs to recruit racially diverse and marginalized students into her class. She plans to discuss with them the harm computing tools cause if marginalized voices are missing in the design and development teams. As a literacy and journalism teacher, Maya identifies computing as a "literacy" that must be democratized and diversified.

C. Jayden Magaz

Jayden is a recent immigrant born in Mexico City, Mexico. Before moving to the U.S., he studied Architecture and taught technology (I.T.) in middle and high schools. Since then, Jayden has advocated for computers as a tool for students to realize their interests. He took on a teaching job in the U.S. and has taught various subjects, from Spanish to science to computer science, in a small, bilingual, rural high school. He is acutely aware of the disparities through his personal experiences, especially as he raises his children in the U.S. As a family of non-U.S. citizens, Jayden is frustrated at the barriers that come in the way of his children realizing the American dream.

Jayden's observations and experiences as an immigrant while teaching in a Latino-majority school have him advocate for his students and their futures. Although he adopted ECS as a part of his effort to support his students with C.S. classes, he has been struggling to think of ways of deepening the relevance to his students and their contexts. Further, he is observant of the power dynamics in decision-making in his school that are coming in the way of continuing programs like these. He recognizes how a school district leader, a White woman, makes decisions based on her children's experiences in these courses and their excitement for novel ideas instead of considering the broader student community's experiences and outcomes. Jayden is struggling to figure out how to break these barriers and support students with what they need to succeed.

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D. Carter Duncan

Carter is a White teacher born in Eugene, Oregon, who highlighted his European lineage as a part of his identity. When working with other teachers during the workshop, he wondered about "sharing his life experiences" while recognizing his privileged position as a White man on the identity wheel. Further, he articulated his struggle as "White shame." He described his surprise at how the cultural expectations around gender pronouns had developed when he returned to the Pacific Northwest to continue teaching after moving between the West and East coasts of the United States. He was worried that he would be mistaken for misgendering his students. Though many aspects of marginalization were new to Carter, he willingly and earnestly engaged in learning more with and alongside his colleagues during the workshop. For instance, during an identity-wheel activity, Carter asked for clarification on what "neurodiverse" meant in the context of the activity.

Carter's strong identity around being a physics teacher was the basis for much of his engagement in thinking about equity and social justice in computing. This burgeoning engagement with social justice in computing was evident in the questions he posed during the workshop and the interview. In many cases, he discussed doing justice work in terms of "connecting with students" with limited details about including multiple student identities in the classroom. While Carter envisions computing to be a part of the school culture as a way to teach all students, he verbally wonders aloud how to make this work. Furthermore, Carter teaches at a school whose neighborhood history is part of the legacy of segregation in the local area and includes his own family. He takes the issues of race and social justice very seriously, and his history has an ongoing influence on how he engages with justice-related issues in education and the community where he lives.

VII. Discussion

Current efforts to broaden participation in computing rarely account for the importance of teachers' identities as a motivating force for providing a just computer science learning experience for all students. This study describes how four teachers' unique identities profoundly impacted their beliefs and motivation for teaching students, particularly those from historically underserved groups. As evident from the teacher cases, teacher identities not only provided the catalyst for their *why* for teaching high school computer science but also served as a powerful driving force for interrogating and advocating for social justice as the North Star for computer science education. For instance, Tirana, Maya, and Jayden shared immigration stories as central to their identity. They linked their particular narrative to their commitments to providing engaging and relevant computer science access to high school students. Maya and Jayden's upbringing in poor households further pushed them to advocate for computing courses in the schools in the first place. For Tirana, working towards having diverse classrooms representative of her school demographics was based on her experiences learning computer science as

one of the few female students. Further, her transition to the U.S. has led her to acknowledge other disparities along socioeconomic class and race, prompting her to set up a 4-year pipeline of computing courses in her school. Overall, the cases highlight the need to make room for teacher identities' multidimensional and intersectional nature [18] to emerge while supporting teachers to do social justice work within computing.

This study revealed that the workshop design initiated the sharing of these intersectional identities, which then fostered discussions around social justice issues related to teaching computer science. The Wheel of Privilege adopted during the activity was one such shared object that brought this complexity to the public, shared space allowing teachers to reflect and observe. As teachers reflected on their identities and associated privileges or oppression, they continuously connected to their students' identities and experiences. These discussions uncovered key tensions, such as addressing feelings of "white shame" in addressing systemic topics around Privilege and oppression in computing. These cases make evident the need for teacher support in navigating their identities and positionalities as computer science teachers while understanding their role in shaping students' experiences.

VIII. Limitations and Recommendations

This study examines teachers' participation in a short workshop on social justice in computer science education. While drawing from a small group of teachers, the findings suggest that teacher identities are a generative and powerful force that shapes their approaches to broadening and deepening computing education in classrooms. Professional development experiences for teachers would benefit from connecting teacher identities to efforts to broaden participation.

With attention to educators' identities only recently studied, this is one of the first studies to probe how high school teachers' identities relate to their social justice commitments. The field would benefit from additional teacher identity studies in other contexts to further draw out nuances. We recommend that future studies extend this research and explore how these identities shape teachers' actions and pedagogical approaches within classrooms. Such future research can also reveal the challenges teachers may face on the ground, enacting actions aligned with social justice issues in computing classrooms.

Acknowledgment

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