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How Non-Tenure-Track Faculty and Staff in Computing Departments in Hispanic-Serving Institutions Empower Undergraduate Students

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Introduction

The purpose of this WIP paper is to explore how institutional agents, notably staff and non-tenure-track (NTT) faculty, in Hispanic-serving institutions (HSIs) can disrupt exclusionary discourses and practices in computing and engineering educational environments, replacing them with those focused on serving students and transforming institutions. Addressing disparities in computing and engineering has been a sustained issue of national concern [1], however little progress has been made [2] [3]. Hispanic-Serving Institutions (HSIs)—defined by 25% or more enrollment of Latinx students—can play an important role in increasing the participation of Latinx and other minoritized populations since more than a third of the nation's Latinx CS baccalaureates are awarded by HSIs [3]. Despite constrained access to funding, HSIs also educate a broad range of students from all racial/ethnic backgrounds, as well as first-generation college, and low-income students [4], [5].

Because the HSI designation is related to enrollment and not institutional mission, many former Primarily White Institutions (PWIs) that have become HSIs may harbor unwelcoming environments that maintain disparities [6]. Especially damaging in STEM cultures, these environments can foster a "weed-out" culture that is disconnected from the values of cooperation and interdependence that are often prized within their students' communities [6], [7], [8], [9], [10], [11]. STEM faculty within HSIs are critical to cultivating inclusive climates and supporting the success of Latinx STEM majors [6]. Latinx STEM tenure-track [TT] faculty can serve as institutional brokers for Latinx STEM students within the university by integrating students into STEM professional networks [12], [13]. With the exception of a few recent studies [14], however, we know less about the role of *staff and non-tenure-track faculty* in STEM students' success in HSI contexts.

HSIs are a critical site for reimagining and transforming access and participation in computing and engineering. To address critical gaps in the literature, we answer the research question*: How do staff and non-tenure-track faculty support student success in HSI computing departments and what are the organizational conditions that enable their success?*

Theoretical framework

In this exploratory work, we draw on Stanton-Salazar's [15] concept of social capital (e.g., access to professional and community social networks, social resources and support) and Yosso's [16] concept of navigational capital (e.g., dispositional knowledge and capacity to navigate organizations as an individual with a marginalized social identity). These interrelated concepts provide a lens for exploring our research question, namely how staff and non-tenure-track faculty intentionally expand students' professional networks and support their navigation of higher education and careers in computer science.

Social capital is a meaningful concept to frame research on the success of minoritized students because it is defined as the critical social resources, networks and support for students provided by institutional agents [15]. For the purpose of this analysis, institutional agents are personnel within higher education systems who are in a position to allocate resources and attention to students [15], [17]. When they act with a goal of transformative change, institutional agents not only provide students with access to vital resources and networks, they also enable the "authentic empowerment" of students from marginalized backgrounds [15]. Empowerment is deeply intertwined with social stratification and social, racial, gendered, and class-based disparities that students face within higher education. Empowerment agents advocate for and distribute resources to students who have been fully participated in institutional and disciplinary discourses and knowledge with the goal of expanding access and transforming institutions [15].

This analysis also employs the concept of navigational capital which emphasizes the cultural assets of Communities of Color that can be employed to "survive and resist macro and micro-level forms of oppression" [16]. While Yosso conceptualizes six forms of capital that form community cultural wealth, navigational capital is the most relevant for this analysis because it refers to the capacity of underrepresented students to navigate exclusionary social systems [16]. In this analysis, we explore how staff and NTTs recognize students' assets and strengths and intentionally support their social capital networks and navigational capacities.

Research design and methodology

We used a qualitative multiple case study method [18], [19] to examine the organizational practices and everyday interactions that contribute to students' accrual of social and navigational capital within three computer science departments. The study sites for this research are three computer science departments in different regional (two in the Southwest and one in the Northeast) and institutional contexts (one is an R1 institution, one is an R2, and one is an emerging R2). Through institutional and program evaluation data, each of the departments has a track record of successful recruitment, retention, and professional development of Latinx and other underrepresented populations within CS.

The data sources for this paper are semi-structured interviews with key institutional and departmental stakeholders. In all, we completed 65 interviews with administrators, staff, faculty, and students. The interviews used for the analysis in this paper include 11 staff members, 22 administrators (including Presidents, Provosts, Vice Provosts, chairs, and deans—some administrators had partial faculty appointments), and 14 faculty (TT and NTT). Identification and selection of research participants was coordinated with and informed by discussions with chairs, key faculty, and staff at each site. Because the research is a case study, we sought participants with the most knowledge of organizational contexts and student success practices. Typically, we sought staff who ran programs, faculty who taught introductory courses or advised student organizations, and administrators most deeply involved in organizational change.

A research team of two to three researchers conducted week-long site visits to each of the three institutions. Semi-structured interviews were conducted individually and in person, with the exception of several follow-up interviews conducted over Zoom. Interviews typically lasted from 45 to 75 minutes and were transcribed verbatim. Interviews focused on key organizational practices, policies, and norms. Example questions included: What is your institution's orientation toward underrepresented student success? To what extent do you feel that the orientation and values of the university are aligned with that of your college, department, program? To what extent has your institution's status as an HSI affected your unit's activities in supporting underrepresented students' success?

Data analysis was conducted using methods outlined by Miles, Huberman & Saldaña [20]. This process involved generating first cycle codes to identify important issues in the data. We then used second cycle coding to organize first cycle codes into larger patterns or themes. First cycle codes were generated based on our research question and theoretical framework (e.g., social capital, assets-based approaches, HSI contexts) and emerging issues that were salient to our participants (e.g., focus on first-generation students, etc.). Second cycle codes identified overarching patterns and unifying themes, such as opportunity structures and affirming cultural identities. This paper focuses on the similarities that emerged among sites because these practices may have the best chance of transferring to other contexts.

Research Findings

Institutional agents in computer science departments used multiple mechanisms to affirm students' social and cultural identities and expand their access to social and navigational capital within higher education and the discipline of computer science. Several themes emerged from this analysis, yet underlying was a focus on recognizing the assets of both students and HSIs.

Recognizing HSI Contexts and Redressing Disparities

The first two themes related to organizational values, and the mindsets underlying institutional agents' work with students. These two themes are grouped together because they were interconnected and both guided student success practices and interactions. Accordingly, institutional agents were deeply aware of their local contexts, saw their work as socially transformative, and implemented initiatives accordingly. Personnel recognized the role of higher education in redressing social inequalities and used their positionality to serve this purpose.

In interviews, staff often commented that they were from the local community and were more aware of the complexity and realities of students' lives at HSIs. Because of this positionality, many staff viewed themselves as advocates for students. For example, a program manager in one CS department who mentored many students commented, "Every student has their own struggle, and they need an advocate. We're a Hispanic-serving institution, and we also have students who are first generation, who don't have that advocate." Institutional agents

recognized that HSIs serve a range of students and sought to recognize those populations and serve them [12], [13].

Institutional agents viewed their institution's HSI status as an asset in serving students, as asserted by a program manager within a CS department who was also from the local community: "First generation are the kinds of students that we really want to encourage 'Yes, you can do this.' And it gives them some comfort that they know that there's other people that have come out of the same culture as they have. So being an HSI is a good thing." Staff and NTT faculty who came from the local community served as role models and felt that they were better positioned to support the large numbers of students from the local area.

Staff and NTTs acknowledged the weight of their work in ameliorating societal disparities and the impact their efforts can have on individual students, as well as their families and communities. For instance, a staff member within a CS department rejected deficit thinking and placed her work within a transformative framework stating: "Sometimes people might say, 'Hey, the students are not prepared, they shouldn't be here.' They're here because they deserve to be here. You have a social responsibility towards not only the student but their family to make sure the student is successful…to guide them through it. When you are helping first gen students, you are changing an entire family trajectory." Similarly, many staff and NTT faculty positioned their work with students as helping to improve the lives of students and families which, in turn, would benefit society overall.

The transformational mindsets and values displayed by institutional agents were deeply student-centered and focused on helping students to grow and thrive within computing. Staff and NTT faculty expressed deep knowledge of HSI contexts and students' lived experiences which enabled their capacity to support students' CS pathways.

Developing Talent and Affirming Students' Social and Cultural Identities

While the first two themes relate to the values and mindsets underlying empowerment institutional agents, the second set of themes relates to how they enacted those values to transform social inequalities. In interviews, many staff and NTT faculty discussed how they enacted student-focused values by cultivating student leadership opportunities, expanding students' access to professional development, and affirming their social and cultural identities.

Many interviewees at the departmental and institutional levels noted that an important aspect of developing student talent and leadership was increasing their access to social capital (e.g., professional networks and career development opportunities), while also boosting their navigational capital. Many discussed how they assume a coaching role with students to encourage and enhance their talents. For example, the director of undergraduate research programs on one of the campuses discussed the importance of student attendance at professional conferences, and just as importantly, preparing students to thrive in those settings. She stated: "The networking, we encourage [the undergraduate researchers] a lot. We do have some funding

to help them travel to conferences. We sometimes need to prepare them because sometimes it's the first time that they have ever been out of the [local region], and so we coach them on how to take advantage of the opportunity, and they thrive."

A critical component of cultivating student leadership was seeking students who may not traditionally be engaged in these activities. Staff and NTTs in all three departments talked about expanding access by identifying students who may typically be overlooked for professional or leadership opportunities. A staff member in one of the departments who is a Black woman, commented: "We seek out those who are underrepresented. I purposely see a minority female or a minority male. I'm like, 'I'm seeking you out…I don't want you to be left behind. What are you doing for internships? Do you know this scholarship is available? I purposely look for these students to say, "You have representation here. Look at me. I'm here so you can get some help, and these opportunities are available to you." Staff and NTT faculty also encouraged student leadership by supporting students in creating student organizations and developing student-led professional workshops and trainings.

Another way that institutional agents enacted transformational values was by undertaking initiatives that built upon their local students' assets. For instance, one campus had a well-developed support program for Spanish speakers. The program offered advising and counseling, mentoring, tutoring, and some general education courses in Spanish. The staff member who directed the program commented on her personal connections to the students she mentors: "I was an English language learner myself. So I know their needs, I know their struggles, I know their fears. I'm a Hispanic student myself…So I think it has to do with my own experience, coming from that background helps me realize, hey, this student needs this, I need to advocate for that. But also they tell me their needs." Through intensive advising and advocacy for the local student population, she enacted her institution's values.

Another way to affirm students' backgrounds and identities was by "humanizing" education, in the words of one staff member, recognizing the humanity, individuality, and uniqueness of each student and their experiences. Staff enacted these values by being "caring," "empathetic," and an "advocate" for students. Some discussed the emotional labor of attending to students' personal or emotional needs while also advocating for their unmet needs with those in positions of more authority within the institution. An advisor commented on she enacted "humanizing" values: "From a counseling perspective, you need to have a caring nature. You need to have empathy. You need to be willing to learn, you need to know a lot about different resources. And if you don't know about it, you need to be resourceful in the times that you need to find a resource for them. So even if the university doesn't have it, okay, let's do some research. What is out there in the community that we could learn from? ….Another thing I had to advocate for is bilingual services." These are a few of the ways that institutional agents enact organizational values in their everyday work with students. Empowerment institutional agents recognized students' talents and assets and intentionally connected them to resources and opportunities to support their learning and growth.

Limitations and next steps

The findings in this paper are suggestive of practices and organizational behaviors that can serve STEM undergraduate students in Hispanic-Serving Institutions; however, the institutional sample is small due to the in-depth nature of case study research. While the institutions are different institutional types and in different regions, they may not be representative of all HSIs. For instance, community colleges were not included in this research. Moreover, the larger study consists of six institutions (two in Puerto Rico and one in California), but the data from only three universities have been analyzed to date. This paper is a work in progress because of ongoing data analysis. We are also still in the process of fully exploring the theoretical framework and implications. The next step of the study will be to analyze the remaining data, and more fully explore the interpretations and implications from this analysis. For instance, one possibility may be the exploration of the balance of different factors in enacting and sustaining transformational change (e.g., shared identities, leadership, organizational pressures, etc). We also intend to share findings with study sites to engage in shared sense-making of the data and research findings.

Conclusion and implications

Our analysis demonstrated how staff and non-tenure-track faculty acted as empowerment institutional agents for undergraduate CS students by affirming students' social and cultural identities, situating their actions within the context of their HSI and local community, and cultivating student opportunities among untapped student populations. Staff and NTTs understood students' strengths, needs, and lived experiences. They provided the informal, emotional labor of supporting students through challenges, encouraging their professional development, and recognizing the complexity of their lives. Empowerment institutional agents intentionally sought underserved students for professional opportunities and leadership roles, thereby increasing their access to social and navigational capital within the fields of computing and within higher education more generally.

This study illustrates the importance of the alignment of institutional mission and values with the work of those who implement strategic plans. Studies of undergraduate STEM education change efforts have found that they may fail, in part, due to the lack of alignment between those leading the change and those responsible for implementing the change [22]. By contrast, our study indicates that when student-centered values are infused across the institution, institutional agents who directly interact with students find it easier to enact change that seeks to transform and humanize educational systems.

Empowerment institutional agents were crucial in brokering access to resources and opportunities for students at HSIs. Staff, who were often women of color, disrupted academic hierarchies and created new systems that elevated and centered populations who have traditionally been excluded within academic departments. Too often, opportunities for academic and career growth are not distributed equally among students in STEM fields due to deficit-

oriented assumptions about their abilities [23]. By identifying and recruiting underserved students, empowerment institutional agents' demonstrated how to begin dismantling the barriers that have hindered students' access to computing research, professional, and career opportunities.

Through their everyday work in mentoring and cultivating student leaders, staff enacted asset-based values. Institutional agents took great care to understand the complexity of students' lived experiences, an effort made easier by the fact that many staff were often from the surrounding community and may have even attended the institution as a student. Shared background, culture, and language helped staff to connect with students and affirm their social and cultural identities. This finding demonstrates the vital importance of hiring staff and NTTs with shared culture and backgrounds of the local student population. It also points to the importance of situating educational research within HSI institutional contexts and local communities, a focus that has been neglected in studies of HSIs [6].

Though staff and NTTs cared deeply about their work with CS students, it may raise concerns that staff and NTTs are themselves marginalized in academe, many of them women of color holding part-time, grant funded, or non-permanent positions [24]. Higher education systems that depend on lower-wage, lower-status institutional agents to do the work of equity are unsustainable. Institutions should espouse values that recognize the assets of students and build upon the strengths of their HSI status while also recognizing and rewarding staff and NTTs for the important work they do by elevating their pay, status, and job stability.

Reinforcing transformational values at the institution, department, and disciplinary levels can advance the creation of inclusive science that cultivates student talent through an asset-based approach [25], [26], [27], [28]. We have identified a few of the interactional and organizational practices that make such change possible. HSIs and computing or engineering departments can support students by recognizing the strengths of the local community, hiring staff and NTTs with shared cultural backgrounds, and elevating the important work of staff and NTTs in creating inclusive educational environments and expanding students' access to opportunities.

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