How Faculty Negotiate "Inclusive Educational Practice" in Computer Science

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ABSTRACT

This paper builds from over a decade of engagement with an equity-focused initiative, the Computing Alliance for Hispanic Serving Institutions, an effort to both transform and supplement the educational experiences of computing students attending HSIs. This grassroots effort engages faculty, primarily department chairs in computer science and computer engineering programs at Hispanic-serving Institutions, in developing and implementing research-based educational practices to support the recruitment, retention, and advancement of Hispanics in computing fields. While we have addressed how CAHSI activities influence student experiences in becoming computer scientists in other work [1,2,3] we turn to the faculty to understand how faculty at Hispanic Serving Institutions act on their roles as educators at institutions with traditions of inclusive missions in a technical field. The research questions that direct the paper are:

How do faculty perceive their role in educating underrepresented students in STEM?

How do institutional contexts and current events in computing education constrain and support faculty action towards equitable practice in computing?

KEYWORDS

Faculty perspectives, equity, teaching and learning, qualitative research

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Introduction

"Institutions should leverage the increasing interest in computer science and related fields, among both non-majors and intended majors, to engage, recruit, and retain more women and underrepresented minorities into the field and help address the diversity problem proactively."

The National Academy of Sciences proposed institutions could mobilize under the current U.S. phenomenon of booming enrollments in computer science to diversify the student population, and ultimately, the workforce of technical professionals [4]. In this era of booming enrollments, it is particularly important to consider policy and practice that supports equity and promotes CS for all learners, as financial, space, and human resource constraints make rigorous standards for admission seem necessary for managing growth [4]. Yet narrowing the pool of prospective students based on traditional metrics of academic merit may limit the diversity of computer science students, as African American, Hispanic/LatinX, Native American and Pacific Islanders are less likely to have familial experience with college, and more likely to attend K-12 schools negatively impacted by poverty and teacher turnover.

Broadening participation in computer science has become a movement to provide opportunity to those who are underrepresented in the field, defined in the United States context as individuals belonging to one or more demographic groups currently participating in computing less than would be expected compared to their prevalence in the population. Broadening participation activities may take an additive approach, where the goal is to *complement* or *supplement* experiences of students with (historically) less access to high quality learning opportunities, or they may take a *transformative* approach, which shifts the common experience of students towards more inclusive practice, at once transforming the field and the experiences of students [5].

Computing departments may have intentions to diversify, yet the ways in which booming enrollments influence departmental culture—larger class sizes, greater pools of students to advise, less space for student interaction, competition for courses—may be at odds with these goals. The compounding issue of shrinking state funding for state institutions (like the HSIs under study) exacerbates the problem [6] Yet faculty,

particularly faculty from HSIs, must consider how to support inclusive educational practices under these circumstances to promote their students' success. In this study, we address how faculty consider their roles in promoting inclusive educational practice, and consider how institutional, and temporal contexts influence their work towards equitable education for underrepresented students.

Context of the Study

This paper builds from over a decade of engagement with an equity-focused initiative, the Computing Alliance for Hispanic Serving Institutions, an effort to both transform and supplement the educational experiences of computing students attending HSIs. This grassroots effort engages faculty, primarily department chairs in computer science and computer engineering programs at Hispanic-serving Institutions, in developing and implementing research-based educational practices to support the recruitment, retention, and advancement of Hispanics in computing fields.

While we have addressed how CAHSI activities influence student experiences in becoming computer scientists in other work [1,2,3] we turn to the faculty to understand how faculty at Hispanic Serving Institutions act out their roles as educators at institutions with traditions of inclusive missions in a field that historically recruits from “high performing” student populations [7,8] We view the cultural tensions between these two concepts, inclusive practices of HSIs versus selective, sometimes exclusive cultures of computer science [9] as vibrant for understanding how inclusion is negotiated in computer science higher education departments at HSIs. The research questions that direct the paper are:

1. How do faculty perceive their role in educating underrepresented students in STEM?
2. How do institutional contexts and current events in computing education constrain and support faculty action towards equitable practice in computing?

Theoretical Foundations

The authors utilize a socio-cultural approach to the study of teaching and learning computer science [10,11]. We build on the notion of “identity development” [12,13] in the field, and the role more capable others have in shaping knowledge acquisition, development of repertoires of practice, and the “ways of thinking” supportive of success in the field [14, 15]. We acknowledge that some attempts to diversify computing may perpetuate deficit, rather than promote asset-based thinking about students' capabilities—we tried to focus on inclusive pedagogical practices in this paper that showed faculty acknowledgements of student needs, rather than assumptions of difference that can lead to victim blaming or continued oppression of underrepresented students [16].

Methods

This paper is part of a mixed-method research project that benefits from 10 years of affiliation with the Computing Alliance for Hispanic Serving Institutions (CAHSI). Data for this work were generated in site visits to two of the member institutions, both considered “Hispanic Serving Institutions” because of the proportion of their students who identify as Hispanic/LatinX. Site visits included the following data collection strategies:

1. Course observations using the Teaching Dimensions Observation Protocol (TDOP) (approx., 10 per institution)
2. Peer led team learning session observations at each site (n=4 site A; n=2 site B)
3. Faculty interviews (n= 7, site A); faculty and staff interviews (n=7, site B)
4. Student focus groups, (n= 5 site A; and n=6 site B)
5. Interviews with student leaders (e.g., President of ACM chapter, etc.) at site A (n=5)

Interviews were audio recorded and transcribed verbatim. Seventeen faculty and staff interviews were the primary source of data for this paper, while observations, focus groups with students, and interviews with student leaders were used as secondary sources for triangulation of data [17].

Data analysis began with both authors reviewing each interview, then meeting to collectively develop a code book, using passages from the interviews as exemplars for each code developed. The team co-coded four interviews and separately coded the remaining interviews.

Codes were developed both deductively and inductively, with theory informing the development of codes while emergent themes were simultaneously considered for analysis. Theory regarding equity, diversity, inclusive pedagogy, mentoring, and identity development in computing informed code trees. The lead codes under which related themes were subsumed were:

6. Departmental growth and change
7. Climate and belonging
8. Student success
9. Student preparedness
10. Institutional and computing pathways
11. Pedagogy/teaching and learning

We report on our themes privileging faculty member voices, though triangulated evidence supports the “self-report” nature of this qualitative study. In other words, student focus groups, observations, and document analyses are used as secondary sources to ensure the self-report is accurate, when appropriate. For example, focus groups with students indicate they go to faculty members with personal and professional concerns, which supports the quotes below regarding mentoring and support.

Results Question 1: Faculty views on their role in education for underrepresented students

Faculty held varying views on their role in supporting underrepresented students within computing departments. A small number of faculty adopted a deficit-based approach that underrepresented students are somehow “lacking” and/or might not be capable of successfully completing computing degrees. However, even this perspective was often more nuanced, and the overwhelming majority of faculty viewed their role as providing

the support that students need to be successful in their degree programs. This support took three forms: 1) helping students to navigate complex institutional and computing pathways, 2) providing mentoring and support for students, and 3) understanding the complexity of students' lives.

Navigating institutional and computing pathways

Because many students in CAHSI departments were the first in their families to attend college and came from underserved communities with limited or no access to computer science in their K-12 education, most faculty viewed their role as helping students to navigate unfamiliar computing and higher education pathways. Many faculty felt that it was important to provide students with clear pathways so they would not become "lost" in the computing department.

"We have a diverse population of students. Sometimes they come from underrepresented communities and underserved communities as well. So they do not have too much exposure. So when they come in, they sometimes, kind of, are lost. So, to make them successful, we have to mostly communicate with them, talk with them, and provide them a clear path of things and to tell them what lies ahead and motivate them.

That's the only thing I believe that works."

Students often had little previous exposure to computer science or computing careers, so faculty also felt it was their responsibility to prepare students for the workforce and life after the university. Many faculty took it upon themselves to advise and guide students towards graduate school or professional positions. For instance, one professor invited a career counselor to come to one of his courses on two separate occasions to discuss resume development, cover letters, and interviewing techniques for computer science positions. Students were required to create a resume and conduct a mock interview as part of the assignment. Faculty also personally advised students who did not have the social capital to easily traverse graduate school trajectories, serving as institutional brokers to share knowledge and provide resources to help students navigate graduate school pathways. For example, one faculty member commented in her interview that she had just advised a student about graduate school and encouraged him to apply.

"It happened like a half hour ago, there was a student here, I was pushing him to apply for graduate school. He was very smart, very motivated, but because sometimes they haven't gone through the process, he didn't know he needed to apply early. Actually, he's going to graduate next spring. He should apply now. He didn't know it. But always, I advise them to look for job early, I advise them to think about it."

Similarly, some faculty rejected traditional notions of success that rely on quantitative metrics, such as completion rates, and, instead, considered student success to be students who have achieved their own personal goals and positively contribute to society, as mentioned in the following comment from a computer science chair. In this definition, success is personalized and individualized and defined by the student and not defined by an external metric or committee.

"So if the student reaches his or her goal and is able to contribute to society, I think that would be student success. Not just graduating. Because if you graduate and don't get a job ... if you get a job, I'm not sure that's success because he or she may not like it. So it has to be something that is his or her goal and be able to do that job to contribute

to society. I think that would be considered student success. I'm hoping the students get to that. It's difficult to define student success. Everyone has their own definition, it's not easy.

Another aspect of helping students to navigate computing pathways, was helping students to explore their fit with computing and to find their place within the complex array of computing possibilities. Some departments had instigated different degree pathways with varying amounts of math requirements with the goal of preparing students for different types of careers within computing (e.g., a computer science degree for software developers and a computer technology degree for homeland security professionals and domain expert technicians, among other career possibilities). Other departments created different tracks that students could explore and specialize in with a graduate degree, such as a master's program in Data Analytics. With these distinct possibilities, faculty and career counselors could advise students on the path that best fits their interests and goals.

"When students are faltering ... Even when they're Computer Science, they know they want to do something with computers, but they just don't know what. Okay, is it Information Science, or is it Computer Science? I've developed a little chart so they can see the differences.

"You've got to have those strong math skills, how are your math skills? Do you enjoy math?" Those kinds of things that hopefully can help them, once they start thinking about it." (career counselor)

Providing mentoring and support

Faculty also saw it as their responsibility to provide mentoring and support to their students as many of them came from underserved communities. One faculty who had worked at three different institutions commented that he had much more interaction with students in his current department and felt a greater need to provide support for them than he had at his other institutions which served less diverse populations.

"Actually this is my third school, very different. My first school was a state university but it's Midwest and lots of white students and also very diverse, many migrants. My second school was a private institution and majority are white graduate kids from very affluent families. The third one is my current school. Most of our students are underserved students. And they're probably most of them are first-generation college students. For example, for my current school, I really try to be motivational. I just let them feel I'm one of them. I really want to help them. I have more interaction with my current students compared to my first two schools."

Beyond the need for basic mentoring and support, faculty also discussed the importance of providing opportunities for students to engage in professional practice to form a community with other computer scientists and to develop a professional identity. Many faculty engaged in research with undergraduate students and encouraged them to take advantage of opportunities to engage with the larger computing community, such as attending and presenting at professional conferences. This type of professional mentoring and support encouraged some students to pursue graduate school.

"Most of the interactions here are academic oriented. For example, I really encourage students to have some research opportunities. I really encourage some of them to work with me and to submit their research results to an international conference or national conference. Give them lots of encouragement on how to present at an international conference or national conference. I am constantly reminding them, 'Hey, you know

I have some money I can support you.' Like CAHSI right? CAHSI has generous support. I encourage some students to go. For example, one of my students he just went to the Washington DC to present his research in an emerging researcher national conference. He was an undergraduate student last year and then because of our interaction and because of his own motivation he is now our graduate student."

In this way, faculty not only provided emotional and social support to students, but also academic and professional mentoring and support.

Understanding the complexity of students' lives

Because most students were from underserved communities, many faculty felt that it was important to understand their students and the complexity of their lives. Many students had transferred from community colleges or other institutions, were non-traditional aged, first-generation college students, low-income, and some of them supported families. Faculty tried to understand students' complex and busy lives, often viewing this complexity as an asset, and not a deficit. "These are the best students I ever had because they really are motivated because they already spend so much effort just to come to the school.

Working part time, and then trying to pay the bills, then they have to make an extra effort to come to school, so they are already motivated. So it's much easier and you get to teach people who are already motivated.

So much easier in that aspect and I really enjoy it."

Many faculty also made an effort to be accessible and available to students outside of class sessions and office hours. Faculty realized that students had many stresses beyond their academic work and that they might need a supportive person in their department to discuss these issues.

"A lot of them talk about a lot of issues and some of them might be stressed out, some may have issues at home. We've talked a little bit here and there. I have an open-door policy, so they can come ... I have office hours for advising, but they can always walk in if I'm available, I'll tell them to come in. So they come in for advice."

Understanding the complexity of students' lives also prompted faculty to adopt an equity-based perspective in their courses and in their interactions with students. For instance, a professor at one institution contrasted the approach towards students in his department with that of other departments. Faculty in his department sought to understand students' perspectives and to support their persistence and success, in contrast to the lack of care and support found in many departments.

"So to understand from a students' perspective, sometimes they come in and they say that they were not able to do a homework on time. I mean, as an instructor you can just say 'okay, I follow the syllabus, I give them a zero and I'm done with it.' But then, we have to go a little deeper and understand why the student was not able to do it. Because there might be other issues that are beyond the control of the student. Of course, we cannot accommodate everything but as a human being and trying to help the students, this is a different type of campus."

Question 2: Institutional contexts that constrain or support faculty toward equitable practice

While faculty cultivated equitable student learning and support, institutions also cultivated environments that facilitated faculty engagement in these practices. Institutional contexts supported equitable environments and practices in ways that were deliberate and intentional and in unintentional ways that

were byproducts of the nature and character of the Hispanic-Serving Institutions. Although, most of the ways that institutions supported faculty were deliberate, suggesting that even diverse institutions need to intentionally cultivate environments that are equitable for diverse learners. The ways that institutions supported equity were through: 1) providing resources for faculty to support students, 2) promoting curricular changes that advance equity, and 3) providing inclusive leadership. Contextual factors such as the small size of the departments at the research sites was an unintentional source of support for faculty, but also an emerging constraint with the growth of computer science enrollments in recent years.

Providing resources

Institutions and departments provided resources to enable faculty to support underrepresented students. Some of these resources were formal programs to support first-generation college or other underserved students. These programs often placed faculty in a formal mentoring role to students and created a peer mentoring network as well. A comprehensive support program on one of the campuses also distributed a regular "newsletter" that contained information about scholarships, internships, and other opportunities. This newsletter was also distributed to faculty so they could provide better advising and make their students aware of these opportunities. Institutions offered other supports to reinforce student learning, such as peer-led team learning and tutoring, to reinforce faculty classroom instruction.

Because the campuses of many Hispanic-Serving Institutions are commuter campuses, there is often not a place for students to go in between classes. Faculty on one campus noticed that students were spending time in their cars between classes and so they remedied the situation by providing a common area in the department for students to eat, study, and socialize during their down time. A faculty member described the situation:

"You can see a lot of students sitting in their car in the parking lots. Then I talk to a few other faculty at the same time. The students don't know where to go outside of class. So they come in, arrive, Los Angeles traffic is pretty bad. When they come here, they just sit outside. It's a lack of getting together in a common room, or the union, or any lab... So, there's a lack of sense of community as well. That pertains to it being a commuter campus, not too many people stay around. So if you can help in that aspect, like we have a cyber security lab upstairs in the library. We open it up to other students as well. We ask them if you can come in, have some lunch, sit there, talk with other students, get help with homework, be part of the community, so if we can do that, then students become a lot more successful."

A professor from a different campus affirmed that the commuter campus aspect of HSIs interfered with students' ability to form communities and places a constraint on students' time. As students spend more time commuting to-and-from campus, they also have less time to interact with their peers and faculty.

"Well for our students, it's a little bit more difficult because we are not a traditional university and we don't have dorms. Our students, a lot of them come from economically disadvantaged families. So for one thing, they have a commute back and forth and that takes up a lot of time.

Some students told me that it may take four hours, every day, to come here and then to go home. And also, because there's no dorms, there's a lesser chance for them to interact with their peers. So we try to improve that, we've used student lounges, and that gave the students a place to meet, to socialize. But compared to a traditional university, that's a weakness."

Promoting curricular changes

Because many students lacked prior exposure to computing in their K-12 education, departments initiated curricular changes to support students. Faculty changed curricula, taught introductory, preparatory courses, and advised students of the appropriate coursework they would require based on their background experience. The preparatory CS-0 course emphasized an introduction to algorithmic thinking and computer science. One of the goals of the course was to introduce students to problem-solving techniques that they would utilize throughout the computer science degree, as mentioned by a faculty member.

"It's a good question that I can ... The 115 course, it really is to try introduce them the concept of problem solving, how to solve problems with some software kind of built in, but really trying to get the problem solving a little bit more ingrained in how they approach things."

In addition to providing a pre-computer science preparatory experience, students still struggle with the math requirements of the computer science degree. Many students were returning learners or had not had adequate math preparation in their earlier education. Faculty must communicate frequently, including across departments, to ensure a continuous, curricular pathway that works for students with limited computing or math backgrounds. A department chair stated:

"One of things is students lack of preparation and that's what we have this CS0, but still the math is one of things that is causing a little issue for the students. We do have these remedial courses, but as I mentioned.... And I talk to the math department, , what did you cover?.... We have faculty, CS0, CS1, CS2, CS3 talk to each other. CS1, I tell them what are the problems that we have CS1? Let's add them to CS0. We make sure [math curriculum] is reflected in the previous courses, because if we don't do it all the way [through], it will cause a problem."

One of the ways that departments and institutions ensured student success was to focus attention on student advising and mentoring, especially for math pathways in computer science, as described by an assistant dean. Math pathways were vitally important to students who may have lacked access to rigorous math opportunities in their previous education.

"So the university has a faculty mentoring program where each college kind of allots different faculty to mentor incoming students and so that's one way that computer science majors are able to sort of identify, in the beginning, their interests and be paired up with a faculty member in computer science hopefully that is able to sort of guide them on that beginning track. We also have mandatory advising for all of our first-year students, central advising by a college advisor that kind of makes sure they're on the right track. The hardest part and the part where student support plays a big role is the math for our students. Most of our students come in at college algebra level, sometimes even developmental, which makes it hard because the first CS course in the major requires them to be at a certain level and so they've got to be credit or enrolled in Precalc track or finished with track and the Precalc portion and so a lot

of students aren't able to get the flavor in the first class until second, sometimes third semester."

To support students in the major, institutions and departments also focused on adopting high-impact practices to improve student engagement and learning outcomes. In some cases, this involved individual faculty adopting high-impact practices in their particular courses, such as implementing research modules or other in-depth, open-ended learning experiences. For instance, in one of the departments, the capstone course focused on student research projects and weekly student presentations. In this way, students gained experience with extended projects and gained comfort with presentation skills that more closely modeled a professional workplace than traditional instructional methods.

Providing inclusive leadership

Another way that faculty were supported in their work in educating underrepresented students was through inclusive departmental leadership that focused on student and faculty development. Inclusive leadership was equity-focused and student-centered, yet also focused on supporting faculty in their work with students. A faculty member noted that his chair motivated and inspired all of the faculty in the department to be student-centered. Departmental leadership also helped to set the tone and climate for the department, creating a positive space for both students and faculty.

"We have a great chair who really motivates all of us to work hard. He's the one really to fight for us. Sometimes I feel like he's the one we really feel we like this department. So he has lots of money so the students can travel to conferences. I guess that's something I feel very fortunate for. I am really happy to work under his leadership. Our faculty is we are all busy with our own teaching but we are very supportive to each other."

Inclusive leaders also supported their departments in their interactions with the broader institutions. For instance, inclusive leaders advocated for resources, such as more tenure lines or funding, for the departments to support their students and faculty.

"They have the department chair meeting at our institution. They call it every month. Our chair is very vocal in that meeting, always fighting for our department .... He's very active and good at fighting for our department. He's really trying to hire more faculty."

Other faculty commented that the departmental leadership provided a safe space where they could grow and develop professionally. For example, one faculty member commented that he had made some mistakes early in his tenure in the department, but he was allowed to learn and develop from those early missteps.

"It's a small department and I like it a lot. After my PhD program I directly came here and I made some mistakes. I received a lot of help from the department; from the chair, peers, you know. This is a small department; really nice. Everybody is really nice. Also you can see this, we have a very diverse faculty body here and everybody is very nice. We have a new faculty coming and it's a woman."

Therefore, departmental leadership was essential in setting a supportive climate for faculty where they could have positive peer relationships and positive student-faculty interactions. In this setting, faculty growth and development was prioritized along with student success.

Student enrollment and department size

Department size at the Hispanic-Serving Institutions served as both a support and a constraint on professor's ability to serve underrepresented students. Small departments offered small class sizes which fostered more student-faculty interaction and better student advising. Faculty were more able to advise students on professional pathways in addition to academic topics. Small departments also facilitated a positive departmental climate through generally friendly interactions among faculty and students.

"I think [the department] is very friendly and relaxed. We don't have very big classes, so we focus on small classes. So my biggest class is less than 40 students. So I can quickly get familiar with every student. So they also feel free, they're not nervous when they see me. Yeah, they feel free to ask me questions, and we also communicate on other things, in addition to the course topics. Maybe some students, they are looking for job. I will provide some suggestions. And some student preparing for their interviews. I will also give some information about this."

Another faculty member commented that a small department facilitated more student opportunities for undergraduate research.

"I think we are really good at interacting with students. We have small class-sizes, and our faculty are really engaged with the students. For undergrad research, you probably don't see any other university that has this high-intensity of undergrad research. I know every faculty is involved, is working with some number of undergrad students, doing some research topic. And the result is phenomenal. We have a lot of undergrad student publications and they got published, they go to conferences, it's all peer-reviewed conferences, it's not just some random conference. So they got to present and to publish their work at proceedings and in scientific journals. I think it's really phenomenal, compared to some other universities."

However, a small department and under-resourced institutions provided many constraints in a time of booming computer science enrollments. Departments lack faculty to teach the increasing number of course sections. Departments also lacked space, funding, and other resources to accommodate the enrollment shifts.

A chair discussed the lack of space and resources to adapt to rising enrollment, but also to meet faculty research interests and needs.

"Space is almost impossible to get. They are doing some reconstruction on lots of areas. When the new building gets built, we hope to gain some space so we can expand. We need some additional computer rooms and we need some additional labs. We've got people working in AI and robotics, and all we have, really is one little room where we've got the computers. They all have to figure out how to work through that space.

An additional lab or two for the faculty, especially the robotics part, because they have so many students."

Besides creating squeezed spaces and resources, rising enrollments created a burden for faculty in small departments. Faculty had to take on unreasonable advising loads that hindered their ability to provide the type of student-centered, highly personalized advising that many faculty in CAHSI departments have provided in the past. A department chair described how his advising load is currently 300 students on top of all of the other responsibilities that come with the chair position.

"I usually have advising time that I do, every student has to come here for advising. Once a semester at least to advise for their courses. I used to get all of the students a couple of years ago. It became too much, so I get maybe 300 hundred that come to me and then others go among other faculty. They all come to me, so I advise them one by one. We have this folder to see what we're going to advise, so we know exactly who advises what, when and what to track. We've shared this folder with all of the

faculty. Especially when the schedule comes out for next semester, that's when they come more than before because they want to see what courses they have to take next semester."

Departments also had to employ more adjunct and part-time faculty to meet the growing demand for course sections. However, part-time faculty do not lessen the advising burden on the tenure-track faculty. Part-time faculty also do not engage in the service or shared governance commitments of tenure-track faculty.

"So the thing is we take help from a lot of part timers. So we have I think more than ten part timers. So they can teach a few courses. But they do not do any advising or any other work that faculty has to do. Then in terms of finances, this is a state university so the state gives the funding and then it comes down to the college and the college decides which department gets what. Everyone understands it but due to financial constraints we are being held back. We are trying to make the best of whatever we have." We're expanding of course. We have too much course load to actually balance. So that effects our advising and meeting all the students outside of classroom."

The faculty member continued to explain that the department also has new degree pathways and programs that are just beginning and will need to be staffed as well. The growth of degree programs and student enrollment has placed constraints on faculty and their ability to adequately serve students.

"And then we have new programs coming in as well. So right now we have four programs and are supposed to start a Masters of science in cyber security next fall. So we will have five programs with six faculty members –that cannot be promising."

Other Constraints

The institutional contexts of HSIs themselves also provided constraints on the ability of faculty to adopt a student-centered, equity-based approach. In a time when computer science enrollments are booming and placing pressure on CS departments, the overall institutional enrollment of some HSIs is declining. For instance, the chair of one of the departments discussed this paradox.

"Well, I think the biggest problem we have is that the university seems to be strapped for funds all the time. They're not giving sufficient funds to our departments so that we can support travel and those kinds of things the way we should. In fact, this year, earlier, we were told there could be a five percent reduction. Then there was some additional money that is generated from course fees. We've always received a pretty good amount there that helps us fund our labs and our senior projects and things like that. The dean has had to shift a lot of that money to something else that didn't get funded. I guess this year I'm really being very careful in terms of what I can approve and what I can't."

Discussion

Results indicate that faculty at Hispanic Serving Institutions have developed strategies for supporting their diverse students in the computing field, and that institutional and temporal contexts can support and inhibit inclusive educational practices. Faculty-student relationships are necessary for developing nurturing computer science learning environments [17] and thus faculty perspectives are important for considering how to recruit, retain and advance a more diverse student body in computing. While our data were collected at HSIs and may be most applicable to faculty in these settings, we submit that lessons learned in this effort may be applicable to other types of institutions, and could inform larger, more systemic efforts to broaden participation in computing.

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