

# Servingness in Engineering Higher Education: The Crucial Role of Latine/Hispanic Teaching Focused Faculty

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#### Introduction

This is a full research paper. In higher education institutions, Latine/Hispanic teaching-focused faculty (who devote at least 50% of their position to teaching) are integral to creating equitable and inclusive environments for Latine/Hispanic students. While Latine/Hispanic enrollment rates and bachelor's degree completion in engineering have continued to rise over time [1], data indicates that in comparison to white students, both rates for leaving STEM disciplines and college dropout rates for Latine/Hispanic students in STEM are significantly higher [2]. These disparities (covered more in the background section) indicate a need to better understand what is working in supporting Latine/Hispanic students in engineering higher education and what is responsible for pushing these same students out of the engineering field.

Our project examines the labor of servingness [3], which to our knowledge, has not yet been discussed in the engineering education literature and, in particular, has not been examined with our study population of Latine and Hispanic teaching-focused faculty. Servingness, which is defined as institutionally supporting the academic success, cultural inclusion, and institutional needs of minoritized student populations, is work that Latine/Hispanic teaching-focused faculty enact within higher education engineering departments. We analyze this concept through in-depth qualitative interviews and narrative inquiry [4] methods with seven Latine/Hispanic engineering teaching-focused faculty at various institution types ranging from community colleges to R1 universities (while drawing on a larger sample of 19 STEM teaching-focused faculty). This data has previously allowed us to interrogate the pathways to the professoriate for these individuals [5], including their experiences with mentorship and issues along the pathways related to a lack of servingness in higher education institutions. In this paper, we further the analysis by questioning how the work of Latine/Hispanic teaching faculty members in their current positions relates explicitly to serving Latine/Hispanic student populations.

This project is part of a more considerable multi-campus research effort focused on equity in the STEM faculty hiring process, specifically for Latine and Hispanic teaching-focused professors (Funded by NSF award #2113355). Our component of the larger grant initiative is designed to support the broader effort by qualitatively analyzing the experiences of Latine/Hispanic TFF who have successfully navigated the pathway to the professoriate and are now in the early stages of their professional careers. By better understanding how this population benefits students beyond what is formally required, we aim to indicate to colleges and universities the unique and meaningful support these professors offer their students.

Our analysis finds that this population of engineering faculty, through their service and teaching, create and design spaces/programs that profoundly work to provide a foundation for the inclusion and retention of Latine/Hispanic students within their discipline. Additionally, they provide a crucial source of mentorship and role-modeling for students who share identity characteristics with them (including gender, ethnicity/race, social class background, first-generation student status etc.), characteristics that are minoritized in both engineering education and the engineering workforce. This mentorship validates culturally diverse students

[6], [7], [8] in the engineering field, where the professoriate remains predominantly white and male. This mentoring and advising work is often done without institutional recognition. Through our research, we have found that teaching-focused Latine and Hispanic Faculty prescribe it as a way of altruistically giving students support that these faculty did not have along their pathways or reciprocating the support that they did have. We conclude by providing recommendations to colleges and universities looking to increase the servingness and well-being of their Latine/Hispanic students and faculty.

#### Background

#### Note on Terminology

We explicitly use the pan-ethnic labels "Latine" and "Hispanic" to describe individuals of Latin and Spanish American descent, respectively. This choice reflects our commitment to both gender inclusivity and linguistic accessibility. While terms such as "Latino" and "Latina" are masculine and feminine forms of describing this same population, some scholars have adopted the gender neutral term "Latinx." However, "Latinx" can be linguistically challenging for Spanish speakers. As such, we use "Latine" to be both linguistically and gender inclusive. When reporting interview data, we use our participants' chosen terminology to honor their views and perspectives.

## **Garcia's Servingness**

Our project looks at the work of teaching-focused faculty in STEM departments through the lens of Garcia et al.'s [3] *Multidimensional Conceptual Framework of Servingness in HSI's*<sup>1</sup> to ascertain and analyze where and how this subset of faculty's work contributes to servingness. The framework of servingness derives from Garcia et al.'s [3] systematic review of 148 research articles and book chapters that had previously conceptualized servingness at HSIs. While not all of our sample of faculty were teaching at HSIs, we find the framework applicable and valuable as it has analytical weight in studying both faculty experiences being served (or not served) on the pathway to the professoriate, as well as their experiences serving students of Latine/Hispanic backgrounds (whether at HSIs or otherwise). The conceptual framework itself identifies four themes of servingness, namely [3]:

(1) Outcomes: Both **academic outcomes** such as GPA, graduation rates/timelines, retention, course enrollment patterns, transfers etc.; and **non-academic** outcomes such as racial identity development, academic self-concept, engagement on campus, civic engagement, and sense of belonging

(2) Experiences: Include **student experiences** with campus racial climate, microaggressions, friendships on campus, interactions with faculty/staff, and speaking Spanish. Additionally, **non-student experiences** within the institutions which encompass faculty, staff and administration's experiences with campus climate, microaggressions, isolation, exclusion, inclusion, mentoring, and serving as institutional agents.

<sup>&</sup>lt;sup>1</sup> An HSI or Hispanic Serving Institution is an institution of higher education that has at least 1% of the undergraduate full-time equivalent student body that self identifies as Hispanic or Latine. Importantly while our project does not only cover HSIs, much of the literature on servingness is centered on HSIs.

(3) Internal Organizational Dimensions: This theme focuses on leadership and decision-making, culturally relevant curriculum or pedagogy, and culturally relevant practices within institutions.

(4) External Organizational Dimensions: Include local, state, and federal factors and policies that influence institutions of higher education that originate outside of the institution itself (e.g., California's Proposition 209, which prohibits state institutions from considering race, sex, color, ethnicity or national origin in hiring or admissions processes would be an example of an external factor effecting institutions of higher education and HSI's in particular).

#### Extant issues impeding servingness

Garcia [9] offers a critique of the Title V grant-seeking and implementing process (which is a critique that resonates with our own experiences in the space), stating that there is often confusion as to what being an HSI means at every level of the process including grant seekers, grant implementers, external reviewers, and federal agency reviewers. HSI's are by their very definition, institutions that enroll Latine and Hispanic students; what is now fundamentally at question in the world of HSI's and at universities with Latine/Hispanic student populations is how to conceptualize and meet the call to *serve* the students which they enroll.

While HSI grant funds can allow institutions to engage in creative and innovative support mechanisms for minoritized students, they are often [10] used to combat financial precarity, opportunistically pool funding, increase institutional legitimacy, and engage in programming that supports 'all students.' Others [11], [12] posit that institutions have used Latine students as a commodity to gain HSI funding, then using these funds on broader campus projects, which have an unclear impact on serving and aiding Latine student populations. Effectively, this open-endedness in grant spending requirements can and does lead to an implementation that often does not focus on directly supporting Latine/Hispanic students but hopes to support Latine/Hispanic students by supporting 'all students.' This approach to programs intended to address racial inequity in higher education leads to a disservice to students caught in the disconnect between grant aims and institutional goals.

One other major issue stems from the disparity between Latine/Hispanic faculty to students. ASEE [13] claims Latine/Hispanic professors accounted for only 5.4% of assistant professor engineers. This number is disparate mainly to the number of Latine/Hispanic students awarded engineering degrees, especially considering the significant increase in degree attainment from 7% in 2010 to 13.6% in 2021 [14]. While the number of Latine/Hispanic students is rising, there also still exist issues with high dropout rates when compared to non-underrepresented minoritized students [15], [16]. Others in the field of engineering education have highlighted that Latinas in engineering in particular, one of the lowest populations numerically, face even steeper cultures of exclusion when entering a discipline that is dominated by men [17].

#### **Research Questions**

In this paper, we interrogate how Latine/Hispanic engineering TFF's contributions, both formal and informal, contribute to and are constrained by Garcia's four facets of servingness. This leads us to our two primary research questions. First, **what motivates Latine/Hispanic** 

TFF to foster servingness for Latine/Hispanic students, and how are they contributing to this effort? Second, what are Latine/Hispanic TFF's perceptions of the internal support they receive from their institution and external organizational forces? Notably, we designed these two research questions around Garcia's [3] framework of servingness, wherein the first research question addresses how Latine/Hispanic TFF contribute to both student outcomes and experiences (both academic and non-academic), while question two centers on their experiences with internal organization dimensions and their role as institutional change agents.

### Data & Methods

Our data emerged from 19 semi-structured interviews [18], [19] with Latine/Hispanic teaching-focused faculty in STEM departments across multiple higher education institutions in the United States. In this study, we focus on the experiences of a subset of seven TFF in engineering departments at different stages in their careers. Individuals in the sample had PhDs in engineering or engineering education and were currently teaching faculty in engineering departments, focusing primarily on discipline-based research (as opposed to engineering education or STEM education focuses). Additional participation criteria for the study included (1) individuals must self-identify as Latino/a/x/e or Hispanic, and devote at least 50% of their time or effort to teaching (or teaching two or more courses per term). Individuals were recruited through both our research team's networks, as well as broad advertising through national organizations such as the American Society for Engineering Education.

Descriptive Statistics of TFF in our sample	Freq.	
Gender		
Men	2	
Women	5	
Institution Type		
Community college	1	
Baccalaureate/Masters	2	
Research 1 University	4	
Immigration PhD Status		
International Student	4	
Domestic Student	3	

Table 1: Descriptive Statistics of Our Sample of Teaching-Focused Faculty

This is our second paper focusing on the engineering subset of our interviews; engineering continues to have the lowest representation of women and Latine and Hispanic faculty in STEM [5]. Our two-hour interviews utilized a narrative inquiry [4] technique which focuses on participant lived experience as data, were conducted via Zoom, and were recorded for further transcription and analysis using Otter.ai and ATLAS.ti, respectively. Interviews were conducted by the first author primarily in English, with occasional use of Spanish. Each interview focused on exploring these faculty's experiences leading up to the professoriate role [5] and their experiences in their current positions as Latine/Hispanic STEM TFF. Our full interview protocol is included in *Appendix A*.

To provide a more holistic approach, our analysis involved a deductive thematic analysis [20]. Authors one and two deductively coded the transcripts using the four constructs of servingness in Garcia's [3] Multidimensional Conceptual Framework of Servingness in HSIs as a priori codes. After the initial coding, we engaged in an iterative process of thematic analysis, examining the general patterns and relationships to generate broader overarching themes that captured the nuances in our participants' experiences. Table 1 (*previous page*) outlines the descriptive statistics for our sample.

#### Findings

## Commitment to holistic student success

Teaching-Focused Faculty, by the nature of their position, have a professional duty and pre-existing commitment to teaching. As institutional actors, they are positioned to impact students academically and culturally. They are often, if not always, responsible for a higher teaching load than their research-focused faculty counterparts. Additionally, they are often the most accessible point for teaching and learning to their students and departments. Many of our participants are tasked with redesigning courses, leading research groups/campus organizations, and teaching multiple courses per term. Many go beyond these calls to design spaces of equity and inclusion for marginalized student populations. Marcos, an engineering faculty at a state university, describes his drive toward service, stating:

I remember one of my colleagues who said... you're going to be asked to do a bunch of stuff [because of my identity as a Latine Man]. So be careful and learn to say no. But no, yeah, well [sic], I guess it's sort of like I'm here for the service element. So I don't like saying no, would be against my motivation for being here. – Marcos

We see this as an essential alignment of TFF with the first two pieces of Garcia et al.'s [3] framework of servingness, namely, student outcomes and student experiences. Essentially, these professors are devoted to bettering both outcomes (academic and non-academic) and the experiences of students on their campus, two of the primary themes in Garcia et al.'s [3] framework of servingness. One aspect worth highlighting when creating institutional change is the type of institution itself. In the case of Marcos or others in our sample who are at either community colleges or primarily baccalaureate institutions, the service capacity is more significant than those at research-intensive institutions where (while being a professor focused on teaching primarily) there is an expectation of research.

Further, in terms of student experiences, participants describe acting as cultural touchpoints for their students. While not all Latine/Hispanic students are bilingual, we have consistently seen the use of language to create rapport and comfortability with students, particularly those for whom Spanish is their first language, as Thalia, a Mexican woman professor of engineering at a community college, demonstrates:

I think it makes me, I hope, it makes me a little less intimidating for those students that are not as comfortable with their English and that they can sometimes get stuck with a word... and also just that they know that culturally, even if I'm not speaking Spanish, they kind of feel like maybe I get them a little more. – Thalia

These kinds of cultural touchpoints are not limited only to language. Our respondents describe connecting with students based on various shared identity characteristics such as gender, culture, family structure (i.e., motherhood), and social class background. These types of cultural connections are valuable in that they show students that there are successful individuals who come from similar backgrounds and who have navigated their pathways previously [21]. Others have argued that this form of identity role-modeling is critical for underrepresented students in STEM in terms of promoting belonging and success [22].

Additionally, these faculty members understand and reciprocate the importance of mentoring, especially when there is some form of cultural relevance between the mentor and the mentee. Alejandra describes the importance of these mentoring relationships, particularly when entering her (predominantly white) graduate institution as an international student, stating:

There was nobody who was Latinx in my whole entire program. But I did know about a professor who was in technology. And so, I actively looked for her... She actually became one of my closest mentors because we could just talk as we are without like, any judgmental things going on. I could use my spanglish freely, which was a big deal for me... so talking to her, and her just helping me understand that there was, there was a place for me. – Alejandra

There are countless other examples of our research participants describing similar situations of seeking culturally relevant mentorship and reciprocating these relationships to students in their faculty positions. These interactions with students can range from simply stating their cultural backgrounds or aspects of their biography as an introduction to their students drawing on funds of knowledge [23] that students come into institutions with during the creation of projects and assignments (see [5] for an analysis of how this intervention plays out), and both formal and informal mentorship which validates minoritized student experiences. Researchers have posited that this kind of culturally relevant pedagogy [24]can serve to affirm student's cultural identities while at the same time promoting their academic success. Further, these forms of support have been argued to be integral channels of assistance and validation for minoritized students in academia, especially those entering spaces where they are minoritized further in numerical terms [7], [8].

We find relevance in previous research on the idea of the null curriculum [25], or the idea that what we *do not* teach in the classroom influences through its absence, in that when students are not engaged with topics and subject matter that is relevant to their lives a vital aspect of retention is ignored. For higher education institutions to meet their often-stated goal of creating diverse and equitable learning environments for all students, significant work must be done to engage students. We argue that TFF are well equipped for and are already committed to meeting those goals of servingness relating to academic and non-academic success as outlined by [3].

# **Changemaking and Internal Organizational Dimension**

Because they desire to be agents of change at their respective institutions, Latine/Hispanic TFF find themselves doing work beyond their contractual assignments. Additionally, due to the lack of diversity in engineering departments, these faculty are often asked to take on additional duties, notably by serving as representatives of their identity. Below, we describe the hidden labor and cultural taxation [26] Latine/Hispanic TFF experience in engineering departments.

# Hidden Labor

Our participants report using their personal time to mentor students in multiple capacities, including in one-on-one and large group formats. Luz, a Colombian-American TFF in a baccalaureate-granting institution, served as an advisor for the Society of Women Engineers at her campus and was heavily involved in an effort to embed entrepreneurial opportunities into the engineering student experience. She describes her eagerness to help all students who ask for her assistance. However, when reflecting on her teaching, service, and research balance, she recognized that, in addition to teaching, she was dedicating large portions of her time to service work.

I did this tally of like, how many hours of service do I spend? I went and did a presentation, I can't remember which campus it was, but about what it means to be a faculty member. And they have this research, service, and teaching, right? And like, how much time do you spend, like, well it's a third, a third, and a third, except that you sit and count and it's like 60 hours of service. All these things are like, Oh, my God. And I think at that point, when I did that, I was like, I can't do this, right? Like I have to step away. It can't be just me. - Luz

Similarly, Jessica, a Mexican-American TFF at a research-intensive university, reports having multiple commitments, much of which do not count towards her evaluations and promotion for tenure. She expresses her institution's reluctance to acknowledge and value her service-oriented contributions to the success of her students.

I'm trying to do teaching, service, run a program, and submit research proposals...I'm never going to get credit for these programs that doesn't show up anywhere on my evaluations. And I remember when I was applying for something. Oh, it was for promotion. And I was advised to take all of my administrative work off of that. Presumably because it didn't count for anything, like nobody cared, even though that was most of my job most of my time, so there's just the really reluctant to change the model or to make a model more flexible. The fact that I have to do so much teaching even though I'm doing all these other things is because there is no contract model for a non tenure track person to do other things. And I literally was told you have to run this program in your spare time. This thing that takes up most of my time has to be in my spare time because it cannot go on my contract because of my title. - Jessica

Both Luz and Jessica's experiences with hidden labor highlight Latine/Hispanic TFF's eagerness to cultivate a rich experience for their students, even when this additional work is not recognized. These examples underscore the need for institutions to value the hidden labor that Latine/Hispanic TFF do by including their commitments to additional service in tenure evaluation criteria. Doing so would encourage all faculty to engage in meaningful servingness at their institutions.

# It's Always Me

Due to the limited resources of time and funds, as well as a lack of diversity in engineering departments, many Latine/Hispanic TFF are asked to take on additional responsibilities that would otherwise be more evenly distributed amongst faculty in their respective departments if resources and diversity were present. Consider Marcos, a Mexican-American TFF at a

baccalaureate-granting institution, who reports experiencing high levels of cultural taxation [26] as a result of his identity.

I've always been that Hispanic dude in engineering that they need...I'm the first one they reach, reach out to me, I have a hard time saying no. They've told me you gotta learn how to say no, like, I know, I'm learning that...But when it comes to ECS, it's just me, I remember one of the VPs in the universities like, this is like the fifth of it, they see you as like, because you need a Hispanic in engineering. Like, make the connection dude. Like, as a, it's not that I don't want to be here. It's just, it is hacking on time. - Marcos

Marcos is encouraged to represent his identity within the engineering space, highlighting its value in this environment. However, the scarcity of other Latine/Hispanic faculty in engineering departments at his institution is alarming and underscores the need for greater departmental and institutional support. Increasing the number of faculty members who identify as Latine/Hispanic would help distribute this daunting responsibility more equitably, ensuring that it does not fall on an individual faculty member. Notably, Marcos' institution is the only institution in our sample that is actively considering including cultural taxation as part of tenure and promotion materials.

#### **Discussion & Conclusion**

Overall, these teaching-focused engineering faculty serve as exemplars of servingness, and by learning from and supporting them, institutions can enhance both academic outcomes and the cultural climate on campus for Latine/Hispanic students. Previous research highlights that TFF serve to increase a university's internal capacity for continuous adaptation to the often shifting higher education environment to meet student institutional needs adequately [27]. While researchers posit that teaching professors can and do act as change agents in institutions of higher education [28], [27], others highlight that STEM departments are still highly resistant to change in their approach to teaching [29],[30]. Our work here affirms that engineering TFF are serving in the capacity of meeting student needs academically but goes further to show the oftentimes unrecognized and underappreciated aspects of servingness they do in terms of supporting non-academic outcomes. By serving as role models and mentors to students and showing that their culture does indeed have capital in academic spaces, they provide an example to all students, particularly Latine students, who continue to be severely minoritized in engineering. While in many ways, this research is exploratory; it is also the first to look at the role of Latine and Hispanic TFF in engineering as change agents under Garcia's [3] framework of servingness.

In answering our research questions, our findings indicate that Latine and Hispanic TFF are committed to improving outcomes and experiences of student success, both academically and otherwise. In terms of student outcomes they TFF go above and beyond their job description to provide service to their students through course redesign, integrating active learning, and being general advocates for teaching and learning innovation within their departments. In terms of student experiences, they provide an essential yet oftentimes taken-for-granted service of being positive role models for minoritized students and providing culturally responsive mentorship. Their motivation for engaging in these transformative processes are often stated to come as wanting to provide a reciprocation of the positive experiences that they had on their pathways, or as a remedy to issues that they faced.

#### Servingness in Engineering Higher Education

In terms of our participant's perceptions of the internal support they receive from their institutions and external organizational forces, results indicate that they often feel that their work towards servingness is underrecognized or invisible. This finding is in line with previous literature on faculty in marginalized faculty in academia [31] which found that faculty of color were spending more time on service, with less capacity for work that counted towards tenure and promotion. This invisible labor often results from individuals being the only representatives of their ethnic background in their department and a genuine commitment to making change within their institutions. This aspect of the Latine and Hispanic academic experience can be remedied in a few ways, which we expand upon.

In many contexts, state and federal governmental policies may impact departments' ability to increase Latine/Hispanic TFF faculty pools. However, we assert that there are strategies that can be implemented in engineering departments to cultivate a more supportive environment, effectively breaking down barriers for these faculty. Our recommendations are threefold. First, we urge higher education institutions to recognize cultural taxation [26]. These faculty members engage in work that goes beyond their job description and can and should be recognized in tenure and promotion processes. We only have one participant who describes this process in their university (across our sample of 19 interviews in the broader STEM space). It is impossible to ignore the current political climate within the United States regarding attacks on diversity, equity and inclusion initiatives; we argue that it is now more important than ever to recognize contributions to student outcomes and experiences. In terms of Garcia's [3] framework of servingness, as external organizational pressure to roll back diversity and equity initiatives becomes more intensive, if colleges and universities intend to meet their stated institutional commitments to diversity and student success, internal organizational dimensions must compensate.

Second, participants described the efficacy of early-career mentorship programs in fostering Latine/Hispanic STEM faculty communities. Research on discipline-based learning communities has uncovered the effectiveness of community building in helping early career faculty transition into their professoriate roles [32]. These communities are essential in facilitating cultural change and can serve the critical role of retention and inclusion of these faculty members. With structures of mentorship and community in place, early-career faculty will have an easier time transitioning into their roles as institutional actors while also alleviating the feelings of isolation inherent in being marginalized within their departments.

Finally, hiring Latine/Hispanic faculty should be increased to alleviate the already significant burden placed on existing faculty, who are often their department's sole Latine/Hispanic representatives. We agree with [33], who argues that faculty 'fit' in hiring decisions often reinforces idiosyncratic preference while circumventing diversity. We also agree with [9]'s argument that transformative shifts in HSIs will not happen without a shift in organizational culture that reinforces the work of individual actors in their capacity to serve students. In summation, we posit that institutions already have valuable cultural change agents in place; however, they lack the structural support and recognition they require to effect change on a large scale. Meeting the high bar that higher education institutions have set for their student's diversity, equity, and inclusion can in part, be remedied by creating greater parity in who is taught with who is teaching.

#### **Future Research**

Our work here is a brief foray into the servingness of Latine/Hispanic TFF professors in Engineering for their Latine/Hispanic students. We want to be sure that future researchers in the space are cognizant of the critical and unique role of TFF as institutional agents of change. We plan to further our research within our project by focusing on broader STEM TFF, as we have already collected the necessary data. We also want to increase the sample size of our engineering interviews, as while the number of Latine/Hispanic faculty is relatively small, a more representative sample can and should be collected. Additionally, our research team plans to conduct analyses on multiple axes of our data. The ones we find most interesting are institution type (i.e., in community colleges where everyone is a TFF, institutional constraints are different than at R1 institutions where TFF are a small subset), and the immigration status of TFF (the experiences of international PhD students were significantly different from domestic students). Future papers from our research team cover the topics of culturally relevant mentorship, faculty fit, and the climate of engineering departments for Latine/Hispanic TFF.

#### Limitations

We hope to increase servingness for individual students, who as a group of students, are of course not monolithic. As an illustrative example, while the first two authors of this paper might share an ethnic background and a pan-ethnic label (in this case Latine), our family immigration histories, cultural background, social location, and educational trajectories differ significantly. In official government documentation, we, like the estimated 3.7 million Hispanic/Latine students currently enrolled in postsecondary institutions [34], are homogenized under the umbrella terms of Latino/Hispanic. This homogenization of students can serve to essentialize their experiences, erasing key context that is necessary for any actual equitable outcome. Without cognizance of this context, policy mandates and demands for change will not produce equitable outcomes [9]. Pushing for lasting institutional change without this context is akin to navigating using a map without topographical detail; you are more likely to waste time circumventing mountains than you are to make meaningful progress.

The pathway to transforming educational institutions from Hispanic-enrolling to Hispanic-serving is plagued with many of the same limitations that all reform efforts in higher education have. Lack of financial support is the ever-present specter that looms large over efforts to provide meaningful and lasting change in our institutions. However, utilizing currently existing resources of change (i.e., TFF) offers a powerful and underrecognized avenue for driving equitable and enduring change in our institutions.

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## References

- [1] National Center for Science and Engineering Statistics, "Special tabulations of the National Center for Education Statistics, Integrated Postsecondary Education Data System (IPEDS), Completions Survey, provisional release data," National Science Foundation, 2022. [Online]. Available: <u>https://ncses.nsf.gov</u>.
- [2] C. Riegle-Crumb, B. King, and Y. Irizarry, "Does STEM Stand Out? Examining Racial/Ethnic Gaps in Persistence Across Postsecondary Fields," *Educational Researcher*, vol. 48, no. 3, pp. 133–144, 2019. Doi: <u>https://doi.org/10.3102/0013189X19831006</u>.
- [3] G. A. Garcia, A.-M. Núñez, and V. A. Sansone, "Toward a multidimensional conceptual framework for understanding 'servingness' in Hispanic-serving institutions: A synthesis of the research," *Review of Educational Research*, vol. 89, no. 5, pp. 745-784, 2019. Doi: <u>https://doi.org/10.3102/0034654319866265</u>.
- [4] F. M. Connelly and D. J. Clandinin, "Narrative Inquiry," in *Handbook of Complementary Methods in Education Research*, 3rd ed., Routledge, 2006.
- [5] J.L. Henry, E. Fuentes-Lopez, and N.T. Buswell, "Illuminating the Pathways of Latine and Hispanic PhDs into Engineering Teaching-Focused Faculty Positions" in *2024 ASEE Annual Conference & Exposition*, Jun. 2024.
- [6] L. I. Rendón, "Validating culturally diverse students: Toward a new model of learning and student development," *Innovative Higher Education*, vol. 19, no. 1, pp. 33-51, 1994. Doi: <u>https://doi.org/10.1007/BF01191156</u>.
- [7] P. Gándara, *Over the Ivy Walls: The Educational Mobility of Low-Income Chicanos*, Albany, NY, USA: State University of New York Press, 1995.
- [8] K. A. Griffin and P. R. Bennett, "The impact of mentoring relationships on the retention of students of color in STEM fields," *New Directions for Higher Education*, vol. 2013, no. 163, pp. 87–96, 2013. Doi: <u>https://doi.org/10.1002/he.20064</u>.
- [9] G. A. Garcia, *Transforming Hispanic-Serving Institutions for Equity and Justice*. Baltimore, MD, USA: Johns Hopkins University Press, 2023.
- [10] S. Aguilar-Smith, "Seeking to Serve or \$erve? Hispanic-Serving Institutions' Race-Evasive Pursuit of Racialized Funding," *AERA Open*, vol. 7, 2021. Doi: <u>https://doi.org/10.1177/23328584211057097</u>.
- [11] V. Law, and S. Contreras Jr., "Defining Servingness: A Critical Evaluation of the Extent to which Texas Tech University Serves Latinx Students," [Thesis], 2023. [Online]. Available: <u>https://ir.vanderbilt.edu/handle/1803/18274</u>.
- [12] G.A. Garcia, "What Does it Mean to be Latinx-serving? Testing the Utility of the Typology of HSI Organizational Identities," *Association of Mexican American Educators Journal*, vol. 11, no. 3, Art. 3, 2017. Doi: <u>https://doi.org/10.24974/amae.11.3.363</u>.

- [13] American Society for Engineering Education, "ASEE Faculty Gender, Race & Ethnicity IRA 2018." Accessed Feb. 4, 2024. [Online]. Available: <u>https://ira.asee.org/faculty-gender-race-ethnicity/</u>
- [14] SHPE (Society of Hispanic Professional Engineers), "Engineering Degree Attainment for Hispanics is Key to Closing Critical US Job Gap," SHPE. [Online]. Available: <u>https://shpe.org/news-posts/el-pais-article-feature/</u>. [Accessed Jan. 14, 2025].
- [15] B. Toven-Lindsey, M. Levis-Fitzgerald, P.H. Barber, and T. Hasson, "Increasing persistence in undergraduate science majors: A model for institutional support of underrepresented students," *CBE—Life Sciences Education*, vol. 14, no. 2, ar12, 2015.
- [16] F. Contreras and G.J. Contreras, "Raising the Bar for Hispanic Serving Institutions: An Analysis of College Completion and Success Rates," *Journal of Hispanic Higher Education*, vol. 14, no. 2, pp. 151–170, 2015. Doi: <u>https://doi.org/10.1177/1538192715572892</u>.
- [17] M. M. Camacho and S. M. Lord, *The Borderlands of Education: Latinas in Engineering*, Lanham, MD, USA: Lexington Books, 2013.
- [18] H. R. Bernard, *Research Methods in Cultural Anthropology*, Newbury Park, CA, USA: Sage, 1988.
- [19] R. Zazkis & O. Hazzan, "Interviewing in mathematics education research: Choosing the questions," *Journal of Mathematical Behavior*, vol. 17, no. 4, pp. 429-439, 1999.
- [20] C. Auerbach and L.B. Silverstein, *Qualitative Data: An Introduction to Coding and Analysis*, vol. 21. New York, NY, USA: NYU Press, 2003.
- [21] M. Bañuelos and G. M. Flores, "I could see myself': professors' influence in first-generation Latinx college students' pathways into doctoral programs," *Race Ethnicity and Education*, vol. 0, no. 0, pp. 1–21, 2021, doi: 10.1080/13613324.2021.1969906.
- [22] N. Aish, P. Asare, and E. E. Miskioğlu, "People like me increasing likelihood of success for underrepresented minorities in STEM by providing realistic and relatable role models," 2017 IEEE Frontiers in Education Conference (FIE), pp. 1–4, 2017. Doi: https://doi.org/10.1109/FIE.2017.8190454.
- [23] L. C. Moll, C. Amanti, D. Neff, and N. Gonzalez, "Funds of knowledge for teaching: Using a qualitative approach to connect homes and classrooms," *Theory into Practice*, vol. 31, no. 2, pp. 132–141, 1992.
- [24] G. Ladson-Billings, "Toward a theory of culturally relevant pedagogy," American Educational Research Journal, vol. 32, no. 3, pp. 465–491, 1995. Doi: <u>https://doi.org/10.3102/00028312032003465</u>.
- [25] E. W. Eisner, *The Educational Imagination: On the Design and Evaluation of School Programs*, 4th ed. Upper Saddle River, NJ: Merrill, 2002.

- [26] A.M. Padilla, "Ethnic minority scholars, research, and mentoring: Current and future issues," *Educational Researcher*, vol. 23, no. 4, pp. 24-27, 1994. Doi: <u>https://doi.org/10.3102/0013189X023004024</u>.
- [27] B. Sato, *Professors of Teaching: Lessons Learned from a Unique Teaching-Focused Faculty Model*, Mathematical Association of America, May 23, 2024. [Online]. Available: <u>https://maa.org/math-values/professors-of-teaching-lessons-learned-from-a-unique-teaching-focused-faculty-model</u>
- [28] A. N. Harlow, S. M. Lo, K. Saichaie, and B. K. Sato, "Characterizing the University of California's tenure-track teaching position from the faculty and administrator perspectives," *PLoS One*, vol. 15, no. 1, p. e0227633, Jan. 2020.
- [29] M. Stains, J. Harshman, M. K. Barker, S. V. Chasteen, R. Cole, S. E. DeChenne-Peters, and A. M. Young, "Anatomy of STEM teaching in North American universities," *Science*, vol. 359, no. 6383, pp. 1468–1470, Mar. 2018.
- [30] M. Wilton, J. Maloy, L. Beaster-Jones, B. K. Sato, S. M. Lo, and D. Z. Grunspan, "Instructional Influencers: Teaching Professors as Potential Departmental Change Agents in Diversity, Equity, and Inclusion," *CBE—Life Sciences Education*, vol. 23, no. 3, pp. 1–14, 2024, doi: 10.1187/cbe.24-03-0102.
- [31] S. S. F. N. R. I. Group, "The Burden of Invisible Work in Academia: Social Inequalities and Time Use in Five University Departments," *Humboldt Journal of Social Relations*, vol. 39, pp. 228–245, 2017.
- [32] M. W. Washburne, J. Trejo, R. E. Zambrana, M. E. Zavala, A. Martinic, A. Riestra, T. Delgado, S. Edwards, T. Escobar, D. Jamison-McClung, M. Vazquez, I. Vera, M. Guerra, D. I. Marinez, E. Gonzalez, and R. L. Rodriguez, "Early career Latinas in STEM: Challenges and solutions," *Cell*, vol. 186, no. 23, pp. 4985–4991, 2023.
- [33] D.K. White-Lewis, "The facade of fit in faculty search processes," *The Journal of Higher Education*, vol. 91, no. 6, pp. 833-857, 2020.
- [34] Institute of Education Sciences, National Center for Education Statistics, "The Condition of Education 2022," U.S. Department of Education, 2022. [Online]. Available: <u>https://nces.ed.gov/programs/coe/</u>.

# Appendix A: Interview Protocol

**Part A (Pathways)** \*Grand Tour Question\* We want to hear about your pathway to your current position. Tell me about the people, things and organizations that were influential in your pathway. Ending with your job decision.

- 1. (Social) Tell me about your peers in graduate school?
  - a. Was your program competitive? If so how did that affect you?
  - b. Were there people that you relied on? Tell me about those people?
  - c. Were there other Latine or Hispanic people in your program? Students/faculty?
  - d. Did you find any support from campus/national organization?
- 2. (Social) Did you exit your graduate program with a reliable social network of peers/mentors?
- 3. (aspirational) Talk to me about your parents or guardians experiences with educationi. Do you have any siblings? Did they go to college/university?
- 4. (familial) In what ways did you find familial support during your educational journey?
- 5. (aspirational) Tell me about the most significant challenges and barriers that you faced in your educational journey
- 6. (aspirational) Why did you decide to pursue an academic career?
- 7. (navigational) Have you ever experienced any difficulties navigating the bureaucratic side of higher education? (e.g., application process, financial aid).
  - a. What resources, if any, helped you navigate these processes.
- 8. (navigational) How comfortable did you feel working with faculty, staff and administrators?
  - a. Has this changed throughout your educational journey, into your career? Why do you think this has changed?
- 9. (linguistic) Do you speak multiple languages?
  - a. Has speaking multiple languages been useful for you outside the home? Specifically in academia? How?
- 10. (resistant) Were there instances of discrimination or tokenization, or microaggressions that you can recall during your graduate program, and/or faculty position?
  - a. How did you handle these experiences?
  - b. Looking back would you have handled it differently?

# Part B: Experiences in Current Position and the Transition Process

Grand Tour Question: Tell us your experiences in your current position?

- 11. How would you define Equity?
  - a. Was there ever a time in your academic career when you thought about diversity or equity differently?
- 12. Tell me about your campus. Who are the students on your campus? How accessible is your office to your students?
  - a. Do you think your university sufficiently serves its Latine and Hispanic students? If so, in what ways?
- 13. Do you discuss (in general) race and ethnicity in your classrooms or lectures?
  - a. Do you discuss your own identity with your students? Why?
  - b. If not, do your students know that you identify as Latine or Hispanic?
  - c. Do Latine students often approach you because you share a similar identity?
- 14. Tell me about your teaching philosophy?
  - a. Do you feel equally valued as other members of your department?
  - b. How is your teaching evaluated? Are requirements for tenure clear?
- 15. Do you feel that you fit in with your department? In academia?
  - a. In your teaching-focused role?
- 16. How do you feel the university could best support you.