

Exploring the Research Enterprise in a Hispanic-Serving Institution: A Systems Thinking-Informed Case Study of Graduate Advising in an Engineering College*

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Hispanic-Serving Institution (HSIs) hold much promise for increasing access to graduate education, yet little is known about their research enterprise and the experiences of their graduate students. This case study interviewed seven stakeholders in one HSI's engineering college and employs a systems-thinking approach to uncover how this institution balances the needs of its graduate students with its institution's research support. Our findings reveal a complex relationship between this institution's research enterprise and its graduate advising activities, as maintaining the HSI's teaching mission while accommodating research activities creates limitations and mixed messaging. However, we also found that building research collaborations with other high research status institutions can provide more resources and opportunities beyond what the HSI institution can provide. Overall, our study highlights the importance of understanding the dynamics between research and teaching missions in HSIs in any effort to increase research and promote graduate education in such contexts.

Keywords: graduate advising; research enterprise; Hispanic serving institution

1. Introduction

HSIs hold significant promise to improve the representation and engagement of Hispanic students in graduate STEM education due to their high levels of Hispanic student enrollment [1], higher than average levels of Hispanic faculty and mentors [2], and their unique positioning to leverage the cultural competences of its Hispanic communities [3, 4]. The research enterprise, which we define as an institution's research activities, research management, and research funding, is integrally related to the graduate population of HSIs since it provides the research opportunities needed to complete the degree and the funds that will support graduate students' work [5]. Yet little is known about the research enterprise within HSI.

The research enterprise can bring many benefits to a university's community. In addition to building graduate programs, engaging in research fosters critical thinking among its participants, develops

analytical skills, and offers hands-on learning opportunities for both faculty and students alike [6]. The impact of obtaining skills by engaging with research goes beyond the research endeavor itself, extending to the instructional missions of these institutions by having faculty teach content while engaging with the state-of-the-art content of such field [7]. Given the benefits of the research enterprise more broadly, it is critical to better understand how research activities impact graduate students, faculty, and administrators of an HSI institution as part of ending the dearth of Hispanic talent completing graduate STEM degrees [8].

Examining a single case site using an exploratory approach and a system thinking perspective, we answered the following research questions: (1) What is the relationship between the research enterprise and graduate advising at an HSI? (2) How does this relationship impact graduate student persistence at an HSI?

2. HSIs and Research Engagement

HSIs have led the way in providing access to higher education for the US Hispanic community [9] and

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likewise hold much promise to improve the representation and engagement of Hispanic people in graduate STEM degrees [4, 10]. Although much research is devoted to understanding the role of HSIs in undergraduate Hispanic students' success, significantly less is known about the ways they improve Hispanic student access to graduate education in STEM in particular. This lack of research is likely because less than half of HSIs offer graduate programs [1]. Thus, although enrollment can be limited, understanding the experiences of graduate students at HSIs can provide critical insights into the Hispanic population STEM PhDs. At the graduate level specifically, HSIs with high levels of Hispanic faculty can greatly benefit Hispanic students. Students who share identities with their mentors develop deeper connections based on a shared cultural understanding. Therefore, investing in the development of such relationships or in the contexts where these relationships are more likely to occur can significantly impact Hispanic students [11].

HSIs are uniquely poised to legitimize the different forms of capital that Hispanic STEM students engage in through the many cultural accommodations they make – allowing students to showcase different ways of knowing and strengthening their academic outcomes [12]. Opportunities within these contexts can link to Hispanic students' cultural heritage communities, and HSIs can be uniquely equipped to leverage students' various social identities [13] and make the hidden curriculum that can be particularly impactful on Hispanic students more accessible [14]. The outcomes of such opportunities are endless, in-depth participatory research possibilities in STEM, along with Hispanic students connected to their cultural heritage communities.

Engaging in research at HSIs has also shown benefits at the undergraduate level. Research engagement can foster positive student outcomes for Hispanic students, such as increased retention due to an environment with higher Hispanic representation [6], and research opportunities for students at HSIs can lead the charge to a higher engagement and participation of Hispanic talent in STEM.

While engaging in research can benefit its populace, it can come at a cost for these institutions. This pursuit of research excellence can compromise an HSI's institutional identity, from Hispanic-serving to Hispanic-enrolling. Only seven HSIs nationwide are classified as a 'highest research activity.' The majority of these research-intensive HSIs started as PWIs first, and many retain their whiteness despite their above-threshold Hispanic enrollment [3]. Given the population rise of Hispanic people in the US population, this fact comes as no surprise.

The pursuit of resources to support research can often lead to institutions forgoing their service duties to Hispanic students and faculty [3]. Prior work has shown that research-seeking HSIs often end up with a policy environment that documents mixed messages and conflicts between institutional missions emphasizing access and diversity and the values driving resource streams [15]. Institutions that espouse commitments to diversity and access are subject to pressures for prestige. Despite these concerns, we argue that thoughtful engagement and continuous evaluation of research activities within HSI contexts can lead to fruitful outcomes and, ultimately, the decolonization of STEM.

3. Graduate Education as a Function of HSI Context

Graduate education is structured via policies and practices set by each Department, College, and University [16]. These policies and practices influence how graduate education and the research enterprise are practiced/supported across different institutional contexts. HSIs offer an environment where positive graduate experiences for Hispanic students can flourish. For example, minoritized students in engineering, in particular, have been found to have often more difficulty advising relationships due to cultural clashes or a lack of fit [17]. And given the nature of engineering work, building a close and intentional relationship with faculty members has been shown to directly lead to positive educational outcomes at the graduate level [18–20] and a learning experience that is aligned with their career goals [21–24]. Yet these working relationships ultimately respond to practices and constraints often dictated by disciplinary and program traditions [25], making HSIs a promising space to foster the persistence of Hispanic graduate students.

Graduate training, while influenced by disciplinary traditions, is often managed by the department under the constraints imposed by both the department and the institution (e.g., resources availability and allocation) [26–29]. The departments in which the programs reside, the colleges that govern them, and the graduate schools that oversee them ultimately define policies and norms that impact how students interact with faculty within the context of their research. Studying these can help understand how to best leverage the learning activities at graduate levels while achieving research productivity.

4. Framework

Our analysis is informed by a systems-thinking approach. Systems thinking is a holistic approach to analysis that focuses on how a system's parts

relate to each other and how these systems work over time and within their larger contexts [30]. It can also be described as a metacognitive strategy that flexibly frames and reasons problems without clear solutions across multiple dimensions [31]. These problems or systems often have various feedback loops {Richardson}. By describing the issues and extracting knowledge and beliefs from them, systems thinking allows us to see them as complex systems with interconnected variables [32, 33]. These feedback loops help us determine how different parts of a system interact and how changes to one part of the system can affect the whole system. Using multiple loops, we explain the myriad interactions present within a real-world context and test hypotheses leading to the dynamics of systems as well as how systems can change over time.

Although systems thinking models will never represent the real world exactly, given its dynamic complexity, they can help us take a holistic, iterative, and adaptive approach to understanding complex social systems [34]. This versatility has led to systems thinking being used in a variety of fields, including business, education, engineering, and public policy. Traditionally in engineering education, systems thinking has been used as a tool for students to understand complex systems [31, 35]. We argue that it can be used beyond the understanding of complex systems to understand academia itself since it can help enlighten the potential organizations have to change and excel [36] by taking participants' perspectives and considering the interconnections and dependencies that cut across their experiences in such institutions. Thus, this study expands on the use of systems thinking in engineering education by employing it as an analytical lens through which we identify and describe the relationships that impact research participation at this HSI institution and preempt multiple causal loops that can help us understand the research enterprise given the various stakeholders' points of view.

5. Methods

To achieve our objectives, we implemented case study methods where the HSI, which we called Engineering MSI, was treated as a single case and bounded the contemporary and uncontrollable context [37] as the current moment in time in the engineering graduate programs. Furthermore, our qualitative approach centered the voices of the people within the system using additional data sources to help contextualize their perspectives [38]. Our study relied on three main data sources: (1) interviews with students, administrators, and faculty; (2) publicly available written policies rele-

vant to promotion and tenure, graduate program manuals, and faculty roles and responsibilities; (3) and publicly available enrollment data. This study was conducted in accordance with human subjects research.

5.1 Data Collection and Sample

The institution selected for this study was a 4-year or more land grant and Hispanic serving institution located in a small-sized city serving more than 13,000 students. Specifically, we analyzed graduate student, faculty, and staff interview data from engineering departments. We interviewed seven participants (further detailed in Table 1), all affiliated with the institution at the time of data collection. Participants were recruited similarly across the institution via snowball sampling to achieve purposeful representation at different organizational levels. The names and identities of both participants and the institution are omitted to protect their anonymity. Interviews were conducted in Spanish or English depending on individual participants' comfort level with the language. We developed the interview protocol focusing on the research activity, graduate advising, and graduate student experiences.

We asked participants questions such as: (a) Do you receive any encouragement from the institution to participate in research? and (b) Do you have any constraints on how you use your research funds to support yourself to finish your degree? (c) How is your relationship with your advisor? Questions such as these emphasized critical elements related to our research. A two-member research team conducted the interviews, which ranged from 45 to 60 minutes in length. As elicited from the interviews, we also leveraged the institution's written policies to help contextualize our findings.

5.2 Data Analysis

We analyzed the data using a thematic coding approach which allowed for the emergence of participants' specific perspectives on the relationship between the research enterprise and graduate advising relationships at this institution. Then, we classified excerpts into subthemes, followed by themes' contextualization using the written policies and documentation that guide this process which helped us draw connections between the emergent

Table 1. Self-Reported Participant Demographics

| Characteristic | Detail |
|-----------------------|---|
| Sex | Male: 4 Female: 3 Graduate Student: 2 |
| Organizational Status | Faculty: 3 Administrator: 2 |

themes and subthemes. Next, we used systems thinking as an approach to organize the resulting themes and subthemes by considering the interconnections and interdependencies across elements as described by participants resulting in causal loop diagrams that identify the feedback loops in the phenomena and by clarifying the influences and underlying dynamics over time. Finally, we tested our findings through a research team debrief with institutional affiliates and member checking to clarify the relationships found to solidify the quality of our findings. The authors are all female, three of them are Latinas, and one is a White woman. Three are faculty in engineering, and one is a graduate student in Higher Education. These identities, in combination, provided varying perspectives from both organizational roles and personal identities that helped interpret the findings across multiple viewpoints.

5.3 Context Description

Engineering MSI is currently classified as a large program master's level institution with a medium undergraduate population. Per our interviews, they are currently working towards becoming a more research-focused school with several doctoral programs emerging within their engineering disciplines. Engineering MSI is a land grant university that serves an overwhelming majority Hispanic undergraduate population with a significant low-SES and first-generation student body. Its undergraduates traditionally complete over 180 credits as required for their plan of study and also possess substantial undergraduate research experience. Given their over-prepared background, these alums are readily hired or accepted to graduate programs in high-caliber research-intensive institutions. Engineering MSI is the top US undergraduate institution for Hispanic engineers who eventually obtain a Ph.D. Enrollment in the various engineering graduate programs is still low enough that not all graduate courses can be offered every semester. In combination the funding term limits and students' inability to enroll in all needed courses as needed, Engineering MSI often has graduate students leave without completing the degree because they reach their funding term limits without having completed their coursework.

5.4 Limitations

Our study has some specific limitations. First, it is not comprehensive across all departments within the case site institution. However, the goal of our study was to examine perspectives within the college of engineering, so it was appropriate that our sample focuses deeply on that population. Second, we focused on a single institution, and we recognize

that every HSI institution is unique. Engineering MSI is a Medium Master's level institution and reportedly striving to increase its status on the Carnegie rankings, and our findings are thus most applicable to contexts sharing similar positions and aspirations. Finally, although our sample is limited, the data collection was interrupted due to COVID lockdowns. However, despite the small sample size, the study was able to achieve organizational diversity by including perspectives from graduate students, faculty, and administrators. Additionally, the study's focus on an HSI allowed for a unique perspective on the experiences of Hispanic students in graduate education, which is an understudied population. Therefore, while the sample size is limited, the study provides valuable insights into the experiences of graduate students and the research enterprise at HSIs from the perspective of the Hispanic community.

6. Findings Relative to Participant Perspectives on the Research Enterprise and Retention

Our findings showed three main perspectives on how the research enterprise worked at the institution representing the student, administrator, and faculty vantage points. The student perspective showed a feedback loop where advising quality impacts students' general performance, which impacts research output which starts the cycle again. A lack of time and support from the advisor ultimately hindered the research outputs. The administrator perspective showed a feedback loop where limited research outputs are associated with a lack of institutional support for research and an increasing reliance on teaching loads for faculty. The faculty perspective showed us a feedback loop that tied all of the mentioned elements together.

6.1 Student Loop

The three key elements of the feedback loop experienced by students are: advising support and quality, which consists of students' perceptions of the advising they receive towards the completion of their graduate degree; student performance, which consists of students' perceptions of their ability to perform at their desired level in research or progress towards their graduate degree; and research outputs, which consists of students' perceptions of their research outputs towards the completion of their degree (see Fig. 1). Among these, we found both positive and negative interactions.

In a negative interaction, a student shared their concerns about not having the proper support from the advisor and guidance to complete the dissertation and get feedback about the progress made

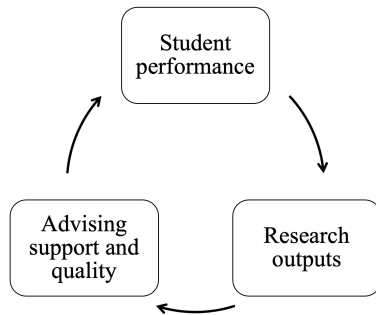


Fig. 1. Student Systems Loop.

during a semester. The student explains how his process had to be self-guided because of the lack of support and how this lack of guidance limits their performance:

“The whole semester, I didn’t get any response (from my advisor), and that wasn’t cool. I was trying to figure out how to work on my thesis proposal to get it done in time. And I never got a response until the final days of December. It’s kind of difficult to work toward something; it is only myself trying to figure it out.”

As the student asserts, lacking proper support and guidance during this proposal stage is keeping them from completing their program and impacting their time to degree. The student further explained that the faculty or the department should be the one to provide information about the milestones necessary for degree completion, including the required steps to move forward with their thesis:

“I think maybe one thing that could help me is just having the faculty or the department help me develop my game plan on how to tackle a thesis or master’s degree. What are the key factors you need to know when coming into that? [Providing support] for people that don’t know similar to me. If you know beforehand what to expect, maybe you can figure them out or just reach out to the people who know so that you have people that can guide you through the process.”

The student states that not having this support makes their journey unnecessarily challenging. Although the advisor is often the primary pain point for students, they also recognize their challenges are a consequence of the institution not having enough resources. Frequently advisors or other mentors are overbooked, and they cannot offer students the help they need at an appropriate time. When we asked students what they seek from mentors to meet their needs as advisees, they stated:

“I think that the people that we have for mentoring they’re usually so booked with things to do because there are so few resources available that you don’t get that quality time that you actually need when working on something that you’ve never done before. I have a lot of questions, and many of them don’t get answered. Or there are questions that I didn’t even know I had. So, I have to figure it out on my own.”

Per this quote, not having timely support is keeping students from accessing clear guidance about the degree expectations and steps they need to follow to make progress. As they share, it is difficult to learn on their own what milestones are required to advance in their degree. Although the students are not necessarily aware that research outputs drive resources (an aspect faculty will articulate in the next section), they see the connection where they don’t progress as a consequence of limited mentoring availability, which they see as a consequence of lacking institutional resources.

As a positive aspect of the cycle, students express they learned how to find ways to overcome the lack of support and have a positive attitude despite the constraints:

“I think another thing we have is that we’re resourceful. Since we don’t have all the resources available, we make the most of what little we have. So, there are not many excuses not to do things. It just poses a challenge that you have to figure out how to work with.”

As the students articulate, they learn to navigate the process on their own and figure things out. Some students provided us with examples of how they learned to find support outside of their advisors and discovered resources outside their department to advance their dissertation while managing anxiety, uncertainty, and stress. Although these opportunities are beneficial for the students, they were described as sporadic, and the timing often not fitting their schedules:

“I get a lot of help. Just yesterday, I participated in a workshop about the dissertation process and the defense. We talked about the process and how to manage the PowerPoint in the defense, and they also gave us tips about anxiety and how to manage professor feedback. Overall, it was a good activity, and I think we should have more activities like that. It is difficult for working students to attend those activities. So, if we have more, everyone can have the opportunity to attend.”

The following quote also demonstrates students being limited in courses available for enrollment “Although I am very satisfied with my program, it would be nice to have more options when choosing courses to learn more.” So, in sum, what we observe with respect to the students is limited room for how to progress. They describe having both limited access to courses and their mentors, but they also frame these challenges as enabling them to persist in the degree through self-directed persistence and using every available resource to them to maximize their progress. Although they recognize a lack of resources for both graduate education and research as central to impeding their needs from being met, they do not let that keep them from progressing.

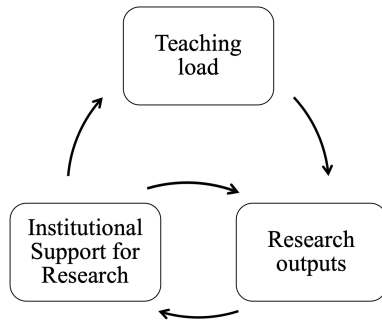


Fig. 2. Administration Systems Loop.

6.2 Administration Loop

The three key elements of the feedback loop experienced by administrators are research output, which consists of administrators' perceptions of the research outputs of faculty in their department; institutional support, which consists of administrators' perception of their institution's support for research activities; and teaching load, which consists of administrators' perceptions of the teaching load distributed across the department. These elements' prevalence does not mean that other aspects of the research enterprise are not relevant but rather that these are the most salient for administrators. As shown in Fig. 2, research outputs and institutional support influence each other and intersect with teaching.

Research outputs are directly related to institutional support because research outputs can generate institutional support in the form of overhead funding, but it takes institutional support to generate research outputs. For example, additional professional development may be needed to support students' research skills in the institution's transition to enrolling more doctoral students and setting higher research expectations. However, this could compete with other institutional support needs. An administrator described tensions in institutional support and creating doctoral programs:

"When there is no money for infrastructure and supporting workers' improvement, things get stuck. Students don't get exposed to what they really need in graduate education. Professors don't get the funds to travel to conferences, and they have to fund everything independently. And people are expected to work for free basically. We don't even have money to print a brochure. How can a graduate program grow?" – *Graduate Program Coordinator 1*

At the same time, research outputs can generate institutional support by being a source of funding for the university. Yet the administrators recognize that sustaining research requires providing faculty with the time to account for applying for proposals:

"When you run a research project, you're required to cover different stages. It is easy for the institution to say

that they want to support research, but it also has to be done. If you support research, you need to give time to do it and to write proposals. If you have to teach three courses per semester, there is no time to write proposals." – *Program Chair*

This program chair also communicated the difficulty of pursuing research when the infrastructure of the institution didn't provide them with the resources necessary to do so:

"Given the university's characteristics, size, and classification, there are just a few peer institutions. When I took over as chair, I tried finding some, and it was very difficult. If we want to go from 'very high undergraduate' to 'research level,' we have to invest in research infrastructure." – *Program Chair*

Institutional support and research also directly link to teaching load because teaching reductions are intended to offset research workloads. One of the primary responsibilities of Departmental Administrators is to assign teaching. This responsibility means ensuring that all of the necessary classes can be offered by assigning faculty to teach them. Undergraduate courses are often prioritized since they involve more students. The teaching load is in tension with the research because engaging in research means faculty would get a reduced teaching load, but there is not always enough faculty to teach the courses needed. One administrator said:

"Right now, the department has 122 sections/classes, including research, and there are four per professor, so everyone is over their capacity. The majority have additional compensation. However, the workload it brings does not compensate for the compensation." – *Program Chair*

This quote demonstrates the challenge of meeting the teaching demand with the faculty available and how research reduces faculty availability to teach. A staff member further elaborated on how teaching load demands can impact graduate experiences:

"The majority of our [graduate] students are in the thesis writing phase. They took all the courses. So, if we have just a few new students, it is difficult to open courses just for them." – *Graduate Program Coordinator 2*

There is a policy that determines how many students are needed to run a course, particularly if the course is not a required course. For undergraduate courses, 30 students must be enrolled in a section. For graduate courses, 15 students must be enrolled in a section.

6.3 Faculty Loop

In the case of faculty, we see the student and administrators' perspectives combine and interact. The key elements of the feedback loop experienced by faculty are student limitations on performance, which consists of faculty perspectives on their

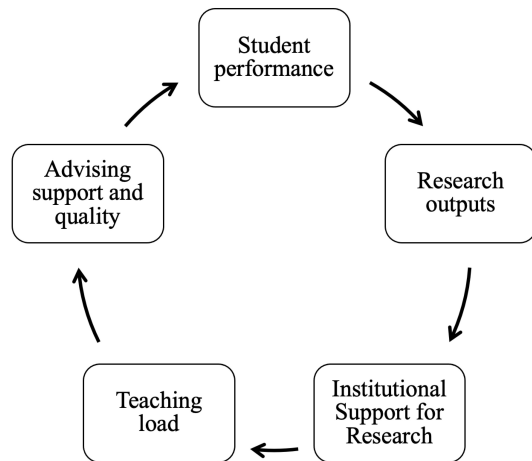


Fig. 3. Faculty Systems Loop.

graduate students' research and degree progress; research outputs, which consists of the faculty member's perception of their own research outputs; institutional support for research, which consists of their reflections of the institution's support for their research endeavors; teaching load, which consists on their perspectives on their teaching load but also the compromises they make due to their teaching load; and finally advising support and quality, which consists of their perceptions of their ability to advise and support their graduate students properly (see Fig. 3).

The faculty described the interaction between student performance and advising support as connected since they believe their students are indeed equipped to perform good research. However, they indicated that students' ability to do good research only occurs when they have proper advising and direction. One participant described having 50% release time in his first semester and using that time to advise a student and work heavily on research:

"I remember my first and second semesters in which I was only working on classes, writing papers, and advising one graduate student. Well, I treated him like a Ph.D. student. He had three papers as a master's student. By his defense, only one of those three papers was [under review] because the other two were already published. So, he got a really dense experience, but [that was] because I had time." – *Associate Professor*

The faculty mentioned some specific challenges of working in this institution, including its bilingual status. It tended to attract students whose main language was Spanish, and often their English capabilities were not fully developed at the level required for publishing research. This gap typically required a significant amount of time spent on editing research outputs:

"One of our main limitations is that most of our students come from Latin America and primarily

speak Spanish, so they lack good English skills. And that lack is really time-consuming because you not only have to correct the papers on content so they make sense, but you also have to correct the English." – *Professor*

Faculty also described that traditionally the students who stayed in their graduate programs often lacked the qualifications for being admitted to a higher-ranked institution:

"It's really hard to convince a grad student to stay in [this geographical area] when they can get a better education elsewhere. In the mainland US, particularly for Hispanic students, they get everything, and they get great scholarships. So, those who stay here are those whose grades are not the best. I know that that will require more of my time, but I have no problem. On the contrary, I feel that I'm providing them something better than what they were able to achieve on their own and so that that makes you feel good and that [feeling] compensates for [the extra time]." – *Professor*

This faculty member provided examples of ways to build research support that is not only sustainable but mutually beneficial for institutions that want to recruit students at this institution:

"We'll do some collaborative research, but it's frustrating. Because if the [PWI]s would give us something back, we will be able to establish better collaborations. In one of the projects I led with a [PWI], we co-led the partnership through an NSF Program. It was very enriching because this institution would come to collaborate with us, and then our students would go there, do some research and come back. So, the professors at this institution met the students and worked with them. And sometimes, [our students'] undergrad GPAs were not great. However, since they had met [and worked with] the students, they accepted [them into their doctoral program]." – *Professor*

In sum, we observe that faculty are exposed to both the student and administration loops and feel the pressure to perform from both sides.

7. Discussion and Implications

Our study aimed to address two research questions: (1) determine the relationship between the research enterprise and graduate advising at an HSI and (2) how this relationship impacted graduate student persistence at this institution. Using a systems-thinking perspective, we found that the graduate students, the faculty, and the administration were all connected to the research enterprise at different stages of a large loop in the research process. However, each stakeholder group was only exposed to certain parts of the loop and was unaware of the other parts of the system working against their objectives. The research enterprise also had direct relationships to graduate student retention. We can draw several conclusions from this study to yield

insight into the research enterprise in other similar institutions.

Our study found that the policies at Engineering HSI limited where and how research took place. Specifically, we found that the policies of Engineering HSI focused on maintaining the teaching mission of the institution either intact or growing such that research activities had to be accommodated to where and when they could fit. This split environment of both aiming to expand the graduate programs while maintaining policies that limit research created a mixed messaging environment that limited the overall research enterprise. These findings align with prior research, which has shown how HSIs are often at the crux of balancing their mission to serve access and diversity purposes [39] while competing with external forces pushing them towards prestige-seeking activities [40].

At the crux of these competing priorities, we find the faculty aiming to balance both pressures as received through the mixed messaging of the institution. Faculty in our study wanted to pursue research but were often overloaded with teaching. These findings differ from prior work on HSIs, which has shown faculty struggling with the institution's identity as it transitions towards a more present research focus [3, 41]. We believe this difference is likely due to the fact that despite this institution's propulsion towards research, its demographics have not changed, and it continues to serve a high majority Hispanic population (<90%). Therefore, the faculty at Engineering MSI see their ability to conduct more research as opening more opportunities for Hispanic student empowerment. This aim of wanting administrative support for research activities aligns with prior work, which showed that ultimately administrative support for research at HSIs led to better mentoring practices for its students [6].

Concerning the graduate student experience, we conclude that the graduate students are indeed stepping up to the challenge of conducting research at this institution. They recognize the limitations of doing research at engineering MSI but turn those challenges into a motivator for developing resilience: "we make the most with what little we have." Per the faculty, PWIs who recruit at engineering MSI take note of this attitude and value it in this institution's alums. It is the primary reason why faculty state that PWIs 'come and take' their students whom they've trained to be resourceful and give nothing back. The concept of research mentoring being a value add in HSI institutions has been studied before, and our findings align with prior work in this space [6]. However, the development of doctoral student traits in HSIs being unique

and valued by PWIs is an added nuance to the existing conversation.

Our findings show specific implications for HSIs and their research enterprises. First, our findings showed an administrative understanding of the mixed messaging in its policy and its initiatives for growth. As all parties agreed, an institution can't merely change one aspect of policy without first evaluating such aspect's impact and alignment with other policies in place. For a successful transition, institutions must ensure that the resources necessary to enact such change are in place. Second, institutions looking to transition towards a more research-intensive institutional status must obtain administrative buy-in toward research activities. Because research activities must be accompanied by resources (both financial and time availability), institutions would do well in understanding these true costs of a status shift and ensuring the administration in place is willing to make resource concessions towards research growth. This understanding must be reached by evaluating the actual gains of enabling research, including strengthening the undergraduate programs by enhancing the student experience and supporting the local community by providing access and connections to research projects that impact them.

Finally, our findings showed that building research collaborations with other institutions established in high research status can allow for more resources to be leveraged and for synergistic opportunities whose impact can extend beyond the capabilities of the HSI institution. Based on the faculty perspective, the institution in our study actively wanted to develop collaborations with PWI institutions to bring in resources and further research without necessarily taxing the system for policy change. Therefore, to achieve change towards higher research activities does not strictly mean that policy changes and administrative buy-in need to be put into place. Sometimes, merely connecting with PWI institutions in an equally beneficial relationship can be a way to move research activities and capacities forward with less resistance. Therefore, institutions looking towards moving to a higher research status can consider the possibility of collaborations with higher research status institutions to initially increase their research capabilities before engaging in institutional change and reform.

8. Conclusion

In conclusion, this case study sheds light on the unique challenges and opportunities that Hispanic-Serving Institutions (HSIs) face in their efforts to increase access to graduate education and build a thriving research enterprise. By taking a systems-

thinking approach and exploring the experiences of stakeholders at one HSI's engineering college, the study reveals the complex interactions that exist between faculty and graduate student needs, and institutional research support. The findings suggest the importance of administrative buy-in and resource allocation into the research activities as a key consideration for HSIs looking to successfully balance the competing demands between its research and teaching goals. Additionally, building

research collaborations with higher research status institutions can allow for more resources to be leveraged and can lead to synergistic opportunities that extend beyond the capabilities of the HSI institution in an effort to enhance their research profiles and better serve the needs of their graduate students in the years to come.

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