

Work-in-Progress: Evaluating the impact of changes in DEI programs, policies, and initiatives on graduate student experiences across three HSI universities

Dr. Adrian Rodriguez, The University of Texas at Austin

Adrian Rodriguez is a Senior Engineering Content Developer for zyBooks, a Wiley brand and a Lecturer in Mechanical Engineering at The University of Texas at Austin. His research interests include engineering education, multibody dynamics, contact and impact with friction, electro-mechanical systems, and nonlinear dynamics. He earned his B.S. degree in Mechanical Engineering from The University of Texas at Austin and his M.S. and Ph.D. degrees in Mechanical Engineering from The University of Texas at Arlington.

Andrea Lidia Castillo, Arizona State University

A.Lili Castillo is a second-year graduate student in the Engineering Education Systems and Design PhD program at Arizona State University. Lili is a recipient of the 2022 National Science Foundation's Graduate research fellowship. Her research interests include engineering identity formation, high-impact learning experiences, and Latino/a/x & first-generation college student pathways in engineering. Through her research, Lili hopes to amplify the voices of historically underrepresented populations in engineering to foster an inclusive space in engineering education for diverse students through asset-based and culturally relevant approaches.

Dr. Ashish D Borgaonkar, New Jersey Institute of Technology

Dr. Ashish Borgaonkar works as an Assistant Professor of Engineering Education at the New Jersey Institute of Technology's (NJIT) Newark College of Engineering (NCE) located in Newark, New Jersey. He has developed and taught several engineering courses primarily in first-year engineering, civil and environmental engineering, and general engineering. He has won several awards for excellence in instruction; most recently the ASEE-MAS 2025 Distinguished Teaching Award, the Excellence in Lower Division Undergraduate Instruction, and the Saul K. Fenster Award for Innovation in Engineering Education. His research focuses on preparing the next-generation STEM workforce through student academic enrichment and workforce development training programs. For this, he has received multiple federal, state, local, and foundation grants. He is the Founding Director of NJIT's Grand Challenges Scholars Program. He also has worked on several research projects, programs, and initiatives to help students bridge the gap between high school and college, community college and university, as well as to prepare students for the rigors of STEM education, especially mathematics. He is also involved in various engineering education initiatives focusing on the integration of novel technologies into the engineering classroom, and excellence in instruction. His additional research interests include water, and wastewater treatment, stormwater management and pollution control, civil engineering infrastructure, and transportation engineering.

Work-in-Progress: Evaluating the impact of changes in DEI programs, policies, and initiatives on graduate student experiences across three HSI universities

Abstract

A university is designated as a Hispanic-serving institution (HSI) when at least 25% of the undergraduate student population self-identifies as Hispanic/Latinx, of which half must have a low-income background. Even though institutions are emphasizing and making great strides in how they serve their students, graduate students are often omitted from the conversation. The challenges faced by first-generation college students (undergraduate and graduate) are exacerbated due to recent legislation in some states putting forth anti-DEI measures. In particular, it is known in the literature that first-generation graduate students face challenges in exercising their social and cultural capital, navigating social processes, and maintaining persistent beliefs. First-generation students have lost many of the support mechanisms that were previously made available to them, and they must seek out other resources, if any, such as student organizations and student success programs with significantly lower or in some cases, no budgets [1]. Students may also be forced to rely on grassroots efforts to build their own support systems and lead DEI efforts, understandably at a much smaller scale. Without intentional effort to serve graduate students at HSIs, these students are left with an ongoing lack of institutional support. This paper presents a plan to recruit, interview, and compare the experiences of 9 first-generation graduate students in STEM majors from three, 4-year HSI universities to understand how potential changes in resources and support systems are affecting their degree progression in light of emerging anti-DEI policies. University A resides in a historically conservative state where anti-DEI legislation was passed, University B also resides in a historically conservative state, but with access to DEI programs, and University C resides in a liberal state with similar access to DEI programs. Despite having an HSI designation, the political climate of each state plays a significant factor in those student experiences. For students at University A, there was a keen interest in understanding the barriers and obstacles students faced as a result of newly passed anti-DEI legislation. At University B, recent state budget cuts have resulted in the closure of a satellite campus and reduced students' access to scholarships. University C is not facing similar legislative pressures; therefore, its students will provide a strong perspective on the impact of DEI initiatives. Despite this proposed group structure, today's political climate is volatile and still evolving, which may affect the overall study and its findings. Thus, this study will serve as a pilot to uncover initial findings based on the current DEI landscape at each institution. Semi-structured interviews will be used to uncover the ways first-generation graduate students navigated graduate school and leveraged institutional resources to support their persistence beliefs. The data will be analyzed using thematic analysis to allow for common themes among the students' experiences and beliefs to emerge within and across institutions. The results from this study aim to inform other universities, minority-serving or not, about the importance of maintaining their DEI initiatives and provide insight into effective institutional support mechanisms for first-generation graduate students. Furthermore, the experiences of these graduate students will shed light on policy changes needed for institutions to effectively serve all their students, particularly graduate students, within the context of their state legislation.

Introduction

In 2003, a pivotal U.S. Supreme court case, *Grutter v. Bollinger*, found that a student admissions process that favored underrepresented minority groups did not violate the Equal Protection clause of the 14th amendment [2]. In other words, *Grutter v. Bollinger* found that race-based considerations for college admission were constitutional as long as it was one of many factors considered by admissions committees. Since the *Grutter vs. Bollinger* decision, initiatives focused on diversity, equity, and inclusion (DEI) have become integrated within the higher education system. Research has helped inform the development and implementation of DEI initiatives within U.S. higher education institutions. For example, Kearney, Wilson, and Ramirez [3] found that mentorship opportunities and the recruitment of minority faculty and staff are key factors in the deployment of successful DEI programs and practices. Universities that hire a diverse faculty group to teach its underrepresented student population experience higher graduation rates, as found by Stout et al. [4]. Additionally, first-generation students are better supported in their graduate programs when effective training and tools are employed for their DEI leaders and institutions [5]. The implementation of effective tools and trainings has led to an increased sense of belonging, which is attributed to greater enrollment retention and persistence levels among first-generation and minority students [6].

However, the advancements from the last 20 years were halted in 2023 with the U.S. Supreme Court's decision to overturn *Grutter v. Bollinger*, which removed the consideration of students' racial identification in student admissions. This has led to anti-DEI legislation efforts across many states in the U.S. As of May 2024, 38 states have introduced bills aimed at eliminating DEI programs and practices, of which 11 bills are now signed into law and two more are expected to be signed in the near future [1]. Institutions in the affected 11 states (nearing 13 states) are left in a precarious situation that forces first-generation students (both undergraduate and graduate) to face an uncertain future. Students must defer to other support systems, and build their own through grassroots efforts, or self-determination to complete their graduate degree program [1], [7]. Here, a grassroots effort is defined as a group of students that advocate issues and initiatives concerning first-generation graduate students with the goal of instituting change at the program and/or university level. Stressful events in the past, such as the H1N1 virus, 9/11, and COVID-19, created abrupt changes to academic support systems and negatively impacted underrepresented graduate students [8]-[10]. In many ways, the elimination of DEI initiatives has created a stressor for first-generation graduate students as mentors, tutors, and advisors have been reduced significantly. For example, Koning, Samila, and Ferguson [11] found that participation among women in the medical field was negatively impacted when DEI support was lost. Additionally, the lack of resources was found to affect student identity and sense of belonging among historically underrepresented groups [12]. The presence and continuation of DEI initiatives are critical to ensuring that graduate first-generation students have access to the support necessary to help them persist and succeed in their degree.

When there is a deterioration of academic support systems, students will be forced to seek out external means of support. Without the proper support systems within the institution, students can become isolated and unable to build the necessary support networks to persist [13]. It is crucial to gain a better understanding of the current challenges that first-generation graduate

students are facing as a result of current anti-DEI legislation. The present pilot study aims to explore the range of experiences first-generation graduate students undergo at three HSI's located in three different states and are undergoing different outcomes since the Supreme Court's decision. At the time of writing, the current political climate is volatile and still evolving, which could influence our overall study and findings. For example, University C residing in a liberal state with current access to DEI programs may not actually be safe from anti-DEI legislation if effected by further changes at the federal level. By understanding the implications anti-DEI legislation is currently having on first-generation graduate students in STEM at HSIs, we can begin to address the ways institutions can better support and serve their graduate students while abiding by the law. Additionally, the results from this pilot study aim to inform other universities, minority serving or not, about the importance of maintaining their DEI-focused initiatives and provide insight into effective institutional support mechanisms for first-generation graduate students.

Background

A first-generation student is defined by the US Department of Education (USDOE) as “an individual both of whose parents did not complete a baccalaureate degree; or in the case of any individual who regularly resided with and received support from only one parent, an individual whose only such parent did not complete a baccalaureate degree” [14]. This definition is commonly simplified when cited in the literature to classify students as first generation whose parents did not earn a bachelor's degree [15]-[17]. The term first-generation student is often associated with undergraduate students, where federal aid and academic success programs at universities are made available to support this student population. However, it can be reasonably assumed that a first-generation undergraduate student is still first generation when they pursue graduate study; these students face similar, if not the same, challenges as a graduate student. It should be further stated that the proposed study in this paper does not consider students that were non-first-generation as undergraduates who went on to pursue a graduate degree that their parents did not earn. Despite the possibility of having similar support systems to traditional first-generation students, such a comparison and investigation is beyond the scope of this work.

A survey of the literature on the experiences of first-generation graduate students reveals two overarching themes: personal support systems and academic support systems. It is interesting to note that the types of support systems uncovered from the literature were similar for both engineering and non-engineering STEM disciplines [18]. In other words, the personal and academic support systems that first-generation graduate students rely on are irrespective of the STEM discipline and deeply rooted in the first-generation background of this student population. Personal support systems comprise of family, friends, and fellow peers. For example, Artiles et al. [19] found that building a network of peers can help underrepresented students transition into graduate school and increase their sense of belonging. Similarly, creating their own community of underrepresented graduate students is a new skillset that is critical to their success since this is less prevalent in graduate school [20]. However, some graduate students may find it difficult to belong or struggle participating in affinity groups or student organizations; the authors were

unable to determine why students didn't attend events or rely on those systems [10],[21]. Students are forced to adapt, find opportunities to work together, and develop alliances with both students and faculty [20]. Just as students rely on institutional agents, family and friends also play a critical part of that support system, as noted by Crumpton-Young et al. [7]. However, support from family and friends can be limited, especially when one considers the scope to which first-generation college students' families and friends may have of graduate school and its various processes. First generation graduate students may face challenges connecting their family and their education for the purpose of support, such as challenging cultural gender norms and struggling to exercise their social and cultural capital. Kohler [17] mentions that students navigate gatekeeping within graduate programs or alienate their identity in order to persist. Additionally, there are cases where students' cultural backgrounds expect men to work or pursue an education while women are expected to stay at home and raise the family [17],[22]. As a result, familial support among first-generation graduate students can vary. Graduate first-generation college students may need to lean on a combination of personal and academic support systems to reach a necessary level of support needed to fuel their persistence in their degree program.

As first-generation graduate students become the first in their families to navigate post-baccalaureate degrees, they lean on various support systems within their institutions to learn and navigate the various processes and procedures needed to be successful in their degrees. Academic support may come from key personnel, such as mentors, tutors, and advisors. These key individuals may reside within the students' program, department, and institution at large. Having access to knowledgeable individuals within their institution is critical for first-generation, graduate student success. Initiatives that focus on diversity, equity, and inclusion of marginalized populations provide an accessible and meaningful space that supports groups, like first-generation students. These students are often self-driven to seek out faculty and mentor support [19], [22]. It is individuals like faculty and mentors who understand the academic landscape and offer the first line of information. Frantellizzi [23] also found that first-generation female doctoral students lacked career counseling, and more was needed within degree programs. Providing students with access to additional tutoring and mentoring can help reduce the challenges with transitioning into graduate school [7], [19], such as adjusting to the coursework-research balance [21]. With research being a core focus, the relationship between students and their research advisors is critical to their persistence in their program and fostering a healthy academic career [24]. The opportunities for fostering the support discussed here go back to the institution and the state policies that provide the resources to serve first-generation students. The study proposed in this paper aims to highlight the negative impact these students are experiencing from the lack of institutional support and prompt changes at the state level to regain those support systems.

In the sections that follow, the methods surrounding the proposed study will be presented. This is followed by a description of the planned study, including the student recruitment process, evaluation protocol, and proposed timeline. Then, the next steps and future work will be discussed. A copy of the interview questions is included in the Appendix section.

Methods

This study is focused on highlighting the experiences of first-generation graduate students in STEM as it relates to the effects of anti-DEI legislation on their ability to persist in their degree program. Recruitment will utilize purposeful sampling to target graduate students who are first-generation and in a STEM discipline. Three specific universities will be targeted because of the current political climate in their state. University A resides in a historically conservative state where anti-DEI legislation was passed, University B also resides in a historically conservative state, but with access to DEI programs, and University C resides in a liberal state with similar access to DEI programs. Despite having an HSI designation, the political climate of each state plays a significant factor in those student experiences. For students at University A, there was a keen interest in understanding the barriers and obstacles students faced as a result of newly passed anti-DEI legislation. At University B, recent state budget cuts have resulted in the closure of a satellite campus and reduced students' access to scholarships. University C is not facing similar legislative pressure; therefore, their students will provide a strong perspective of the impact of DEI initiatives.

Graduate students will be invited to participate in the research study through an email sent by institutional leaders to share with STEM graduate students. This email invitation aims to target about 75-100 students at each institution. These interested students will receive a copy of the Research Information Sheet and a demographics and general interest questionnaire. The questionnaire will serve as a screening process that will allow the research team to select a diverse group of participants to include perspectives from various disciplines and lived experiences. It is expected that this will yield a 25% response rate, or about 18-25 students at each institution. From this pool of students, final eligibility for the study will be determined and a total of three students will be asked to participate in semi-structured interviews at each institution, amounting to nine total participants. These three students will be sent a pre-interview survey and will be expected to respond prior to the semi-structured interview. The pre-interview survey will consist of questions probing for affective measures. Specifically, questions surrounding their sense of self and sense of belonging at their institution will be a part of the survey. The responses to the pre-interview survey will serve as a gauge for participants' current state at their institution. The semi-structured interviews will be used to uncover the ways first-generation graduate students navigate graduate school and leverage institutional resources to support their persistence beliefs. Interviews will take about 60-90 minutes and will be conducted by at least two research team members. Interview questions are outlined in the Appendix section.

Thematic analysis will be used to analyze the data as outlined by Nowell et al. [25]. Interviews will be transcribed and reviewed for accuracy by at least one researcher and the respective interview participant. Each researcher will review the transcripts to get familiarized with the data. Researchers will use in vivo coding for their first round of coding. The researchers will analyze the interviews by creating codes related to, but not exclusive to, the research question. The initial codes are intended to be emergent, to be developed by the participants' voices. Specifically, the researchers will be looking to highlight the various ways participants described their experiences with and feelings towards changes in support systems on campus. Second round of coding will use axial coding to condense the original codes into their most

parsimonious version by reducing redundancy and determining the most salient topics [26]. The refined codes will serve as preliminary themes.

As researchers undergo the coding process, they will keep memos. The analytical memos will be used to track any connections researchers see among participants, denote any thoughts or reflections that arise as a result of coding the transcripts, and provide rationale for any decisions made [26]. Once all transcripts have been coded, the researchers will meet to discuss the categories of codes they have created and any relevant memos. Themes will be developed based on the categories of codes discussed by the researchers. The themes will function to capture overarching thoughts, feelings, and experiences among the participants. The researchers will compare and contrast their category of codes to determine the most salient topics, looking within and across institutions. The themes will be reviewed until a team consensus has been determined. The themes will be properly named to encompass the essence of the categories of codes and will be synthesized in a codebook for our future full paper.

Plan of the study

The following list presents the order of research activities and procedures in chronological order. Brief descriptions are provided where necessary. All surveys and interviews will be completed at the participant's location of preference.

Recruitment of participants

- A participant recruitment email will be shared with the Graduate Engineering Council and Engineering Student Services. [Deliverable – EMAIL]
 - Each group will send out an email in their respective newsletter to their respective listserv.
 - The study team will collect emails of potential participants interested in participating in the study.
- Research information sheet (RIS) [Deliverable – DOCUMENT]
 - The RIS will be provided electronically via email to potential participants.
- Demographics and general interest form [Deliverable – SURVEY]
 - Potential participants will receive an email with a link to the survey.
 - The survey will be administered and completed electronically using Qualtrics.
 - The survey is expected to take about 10 min. to complete.
 - The survey questions will be used for screening potential participants so that they fit the inclusion and exclusion criteria for the study.

Start of evaluation

- Pre-interview questionnaire [Deliverable – SURVEY]
 - Participants will receive an email with a link to the survey.
 - The survey will be administered and completed electronically using Qualtrics.
 - The survey is expected to take about 10 min. to complete.
 - The survey questions are intended to gauge participants' current state of identity and sense of belonging in STEM.
- Semi-structured interview [Deliverable – INTERVIEW]

- Participants will be emailed to schedule the interview that is convenient for their schedule and during normal business hours.
- The interview will be conducted electronically using Zoom
- The interview is expected to take about 60-90 min.

Proposed timeline

Table 1. The proposed timeline of this study and a short description of activities.

No.	Timeline	Activity
1	Nov 2024 – April 2025	Finalize the methods, identify survey instruments, and submit the study for IRB approval at respective institutions.
2	January 2025 – May 2025	Collect student data and identify student populations for recruitment and engagement.
3	March 2025 – June 2025	Recruitment and selection of students for interviews.
4	April 2025 – August 2025	Student interviews
5	May 2025 – October 2025	Data analysis and determining common themes.
6	June 2025 – November 2025	Work on finalizing the study and identify the need for additional research and data collection.
7	June 2025 – February 2026	Work on a full paper to communicate important findings to wider education community.

Conclusion

The goal of this study was to compare the experiences of first-generation graduate students across three different HSIs to understand how potential changes in resources and support systems are affecting their degree progression in light of emerging anti-DEI policies. The findings from this study will aim to underscore the ways DEI initiatives and support systems play an important role in first-generation graduate students' success pathways. Additionally, we will highlight any recommendations from the participants on effective institutional support systems and mechanisms that have positively contributed to their degree progression. The experiences of participating graduate students will shed light on policy changes needed for institutions to effectively serve all their students, particularly graduate students, within the context of their state legislation. Our next steps are to follow the proposed timeline detailed in the section above to publish a full paper in a future ASEE conference.

References

- [1] S. Malcolm, "Strengthen the case for DEI," *Science*, vol. 383, no. 6690, Mar. 28, 2024. [Online]. Available: <https://doi.org/10.1126/science.adp4397>. [Accessed: Dec. 29, 2024].
- [2] "Pivotal moments in higher education DEI," *Insight into Diversity*, Sept. 17, 2023. [Online]. Available: <https://www.insightintodiversity.com/pivotal-moments-in-higher-education-dei/>. [Accessed: Dec. 30, 2024].
- [3] K. Kearney, C. D. Wilson, and E. Ramirez, "Overcoming barriers of incorporating diversity, equity, and inclusion initiatives in nursing schools," *Journal of Nursing Education*, vol. 63 (1), pp. 1-4, Sept. 2023.

- [4] R.H. Stout, C. Archie, D. Cross, and C. Carman, "The relationship between faculty diversity and graduation rates in higher education," *Intercultural Education*, vol. 29 (1), pp. 1-19, Mar. 2018.
- [5] H. Murzi, Y. Cao, N. Huggins, and A.N. Leal, "Sustainable racial equity: creating a new generation of engineering education DEI leaders," in *2024 ASEE Annual Conference & Exposition*, Portland, Oregon, USA, June 23-26, 2024.
- [6] M.C. Murphy, M. Gopalan, E.R. Carter, K.T.U. Emerson, B.L. Bottoms, and G.M. Walton, "A customized belonging intervention improves retention of socially disadvantaged students at a broad-access university," *Science Advances*, vol. 6, no. 29, July 15, 2020. [Online]. Available: <https://doi.org/10.1126/sciadv.aba467>. [Accessed: Jan. 5, 2025].
- [7] L.L. Crumpton-Young, S. Etemadi, G.E. Little, and T.D. Carter, "Supportive practices used with underrepresented minority graduate students," in *2016 ASEE Annual Conference & Exposition*, New Orleans, Louisiana, USA, June 26-29, 2016.
- [8] V. Perez, M. Udden, S. Galea, A. Monto, and A. Aeillo, "Stress, adherence to preventive measures for reducing influenza transmission and influenza-like illness," *Journal of Epidemiology and Community Health*, vol. 66 (7), pp. 605-610, July 2012.
- [9] K. Khunti, L. Platt, A. Routen, and K. Abassi, "COVID-19 and ethnic minorities: An urgent agenda for overdue action," *BMJ*, vol. 369 (2503), pp. 1-2, June 2020.
- [10] B.A. Walsh, T.A. Woodliff, J. Lucero, S. Harvey, M.M. Burnham, T.L. Bowser, M. Aguirre, and D.W. Zeh, "Historically underrepresented graduate students experiences during the COVID-19 pandemic," *Interdisciplinary Journal of Applied Family Science*, vol. 70 (4), pp. 955-972, Oct. 2021.
- [11] R. Koning, S. Samila, and J.P. Ferguson, "Who do we invent for? Patents by women focus more on women's health, but few women get to invent," *Science*, vol. 372, no. 6548, Jun. 18, 2021. [Online]. Available: <https://doi.org/10.1126/science.aba6990>. [Accessed: Dec. 29, 2024].
- [12] M.J. Chang, J. Sharkness, S. Hurtado, and C.B. Newman, "What matters in college for retaining aspiring scientists and engineers from underrepresented racial groups," *Journal of Research in Science Teaching*, vol. 51 (5), pp. 555-580, May 2014.
- [13] S.L. Rodriguez, R.J. Perez, and J.M. Schulz, "How STEM lab settings influence graduate school socialization and climate for students of color," *Journal of Diversity in Higher Education*, vol. 15 (1), pp. 58-72, 2022.
- [14] U.S. Department of Education, "Higher Education Act of 1965, 1998 Higher Education Act Amendments, Subpart 2—Federal Early Outreach and Student Services Programs, Chapter 1—Federal Trio Programs, SEC. 402A. 20 U.S.C. 1070a–11," Jan. 1998. [Online]. Available: <https://www.ed.gov/sites/ed/files/about/offices/list/ope/trio/triohea.pdf>. [Accessed: Dec. 30, 2024].
- [15] C.A. Lundberg, "Predictors of learning for students from five different racial/ethnic groups," *Journal of College Student Development*, vol. 53 (5), pp. 636-655, 2012.
- [16] M. Vuong, S. Brown-Welty, S. Tracz, "The effects of self-efficacy on academic success of first-generation college sophomore students," *Journal of College Student Development*, vol. 51 (1), pp. 50-64, Jan.-Feb. 2010.
- [17] S.L. Kohler, "Persistence personified: Understanding the experiences of female first-generation doctoral students," Ph.D. dissertation, Grad. Prog. in Ed., Culture & Society, Rutgers, The State Univ. of New Jersey, New Brunswick, NJ, 2023.

- [18] L.L. Phillips and R.L. DeLeon, "Living testimonios: How Latinx graduate students persist and enact social justice within higher education," *IEEE Transactions on Professional Communication*, vol. 65 (1), pp. 197-212, Mar. 2022.
- [19] M.S. Artiles, J.M. Cruz, S.A. Blackowski, H.M. Matusovich, S.G. Adams, and G. Lee-Thomas, "The rising doctoral institute: Preparing minority students for the transition into the engineering Ph.D.," in *2021 ASEE Annual Conference & Exposition*, Virtual Meeting, June 26-29, 2021.
- [20] L. McAfee and D. Ferguson, "Status and experiences of minority graduate students, postdoctoral fellows, and faculty in science technology engineering and mathematics disciplines," in *2006 ASEE Annual Conference & Exposition*, Chicago, Illinois, USA, June 18-21, 2006.
- [21] C.P.G. Berdanier, J. Urbina, R.F. Hamilton, C.L. Cohan, T.L. Peeples, and C.H. Reed, "Capturing first- and second-year master's engineering students' perceptions of support in their transitions to graduate school," in *2024 ASEE Annual Conference & Exposition*, Portland, Oregon, USA, June 23-26, 2024.
- [22] S.K. Gardner and K.A. Holley, "'Those invisible barriers are real': The progression of first-generation students through doctoral education," *Equity & Excellence in Education*, vol. 44 (1), pp. 77-92, Feb. 2011.
- [23] A.J. Frantellizzi, "Female first-generation doctoral students in science engineering and health fields opportunities and experiences," Ph.D. dissertation, College of Community and Public Affairs, State University of New York at Binghamton, Binghamton, NY, 2021.
- [24] G.C. Fleming, S.A. Cobb, and M. Borrego, "Professorial intentions of engineering PhDs from historically excluded groups," *Journal of Engineering Education*, vol. 113 (3), pp. 667-694, July 2024.
- [25] L.S. Nowell, J.M. Norris, D.E. White, and N.J. Moules, "Thematic analysis: Striving to meet the trustworthiness criteria," *International Journal of Qualitative Methods*, vol. 16 (1), Dec. 2017.
- [26] J. Saldaña, *The coding manual for qualitative researchers*. Arizona State University, USA, 4th ed., 2021.

Appendix: Interview questions

Student Motivations, Interests, Goals

1. Can you tell me about your journey into STEM and your graduate degree?
 - a. (optional) How do you think your upbringing shaped the decisions you made about your education and career goals?
2. What motivated you to pursue a degree in ____?
 - a. What is your research focused on?
3. What do you hope to do after you graduate with your degree?
4. How do you think your identity as a first-generation graduate student has influenced your goals and aspirations?
5. Can you tell me what the culture of your program is like?
 - a. What kind of resources and support do you receive from individuals in your program?
 - b. What would you say is the culture of your institution?
 - i. Is it similar to the culture of your program?
 - c. Do feel that the resources and support you receive are adequate (or maybe different) from your non-first-generation peers? Can you give me an example?
6. You noted in the intake form that neither of your parents have received a bachelor's degree or higher. Is that correct? Can you tell me more about what it's been like navigating higher education as a first-generation graduate student?

Institutional support

1. Are you engaged with any institutional resources?
 - a. If YES:
 - i. Can you describe the ways you engage with this resource?
 - ii. Do you feel supported by this resource?
 - iii. What suggestions would you give to improve the ways this resource can support students like you?
 - iv. What other types of resources do you wish were available to you?
 - b. If NO:
 - i. Is there a reason why you have not engaged with any institutional resources?
 - ii. Do you know of any resources targeting graduate student success?
 - iii. What types of resources do you wish were available to you?
 - iv. What suggestions do you have for existing resources so that they can better support students like you?
2. What factors do you feel have influenced your ability to access institutional resources?
 - a. (For University A) As you may be aware, Senate Bill ## passed last year and became effective on Jan. 2024. This terminated the funding of DEI offices and programs, and forced those offices to close. Has this state legislation influenced your ability to access institutional resources?
 - b. (For University B and C) Approximately 11 states in the U.S. have signed into law or introduced bills that terminated the funding of DEI offices and programs, and forced those offices to close. If similar legislation were to pass in your state, would it influence your ability to access institutional resources?

3. Have there been any key personnel or groups that have supported your ability to persist in your degree? Tell me more...
 - a. How has their support varied from other institutional personnel?
 - i. *(e.g., academic advisors, program chairs, faculty, staff, librarians, peers in program, peers in other programs, peers in student organizations.)*
 - ii. *(Can expand to discuss family, significant others, etc.)*
4. Do you feel that your institution has supported your goal of _____/aspiration to _____?
5. Have you ever transferred advisors, schools, or degree programs during your graduate degree?
 - a. If YES, tell me more about what led up to this transition.
 - i. How would you describe the difference between your previous advisor/school/degree program and your current one?
 - ii. What forms of support are you receiving from your current advisor/school/degree program that you did not receive from your previous advisor/school/degree program?
 - b. If NO,
 - i. Did you consider transferring, but felt that you couldn't? (e.g., it would take longer to graduate, were pressured not to, it would disappoint other people, etc.)
 - ii. What forms of support are you receiving from your current advisor/school/degree program that have kept you from transferring?
6. Do you feel that your institution has properly supported your success as a first-generation graduate student? Tell me more...
7. Do you feel the state's political climate has influenced your institution's ability to support you as a graduate student? Tell me more...
 - a. How has your ability to conduct research been influenced by the state's political climate?
8. You mentioned that your research is in _____. How have your research pursuits been influenced by your state's political climate?
 - a. For example, has your access to funding been positively or negatively affected?