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Stifling Dissent: Engineering PhD Students' Response when Considering Departing

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Stifling Dissent: Engineering PhD Students' Response when Considering Departing

Abstract

The purpose of this Empirical Research paper presented in *Research Brief* format is to explore engineering students' response when departing or considering departing from their doctoral programs. Although numerous studies of doctoral attrition have been published, attrition rates remain high, in particular in engineering, indicating that the influence of structure and process of graduate education on attrition remains to be understood. This study employed qualitative methods and analysis to understand how graduate engineering students express doctoral discontent which has led them to depart or consider departing, and what was the response (or lack thereof) to this discontent. In particular, we explored engineering doctoral students' usage of 'voice' mechanism to express discontent with several groups including friends, family members, faculty, and university administrators. The main findings that resulted from this study show students' decision to exit or consider existing their program were impacted due to a lack of support, response, and in some cases an active suppression of voice from faculty or graduate department. This study highlights that if institutions seek to learn about the underlying causes of graduate engineering attrition, they need to show a willingness to reflect on the importance of graduate students' feedback and implement self-corrective actions.

Introduction and Related Literature

Graduate schools and graduate administrators rely heavily on the admission process to identify the most academically successful and capable students. Consequently, many institutions believe graduate-level *attrition* (i.e., early departure from a student's intended graduate degree) is not a critical issue and occurs due to student's "choice" not to persist [1], [2]. This premise suggests that doctoral attrition is not a problem with the academic system but with the students themselves. However, scholarship states that for institutions to be responsible for doctoral attrition, "standards rates across time in the system should prevail [3, p.21]." With this in mind, graduate education data that goes back to the 1960s has shown a consistent pattern of doctoral attrition with a slight increase over time [4], [5], [6]. Specifically, the overall rate of doctoral student attrition has consistently been estimated to be between 40% and 60% depending on discipline [7]. More staggering, attrition rates among women and racial and ethnic minorities is considerably higher than 50% [6]. Every doctoral student who departs from their program constitutes a lost investment from funding agencies, departments, faculty, and the students themselves, and also, a loss of talent important for innovation and national competitiveness [3], [8], [9]. Although numerous studies of doctoral attrition in U.S. higher education exist, attrition rates remain high, particularly in engineering, indicating that the influence of structure and process of graduate education on attrition remains poorly understood.

To date, most doctoral attrition scholarship has been focused on humanities and social science disciplines and students [e.g., [2], [3], [10], [11], [12]]. However, there has been a recent increase in the number of engineering education studies that look at graduate attrition in engineering [13], [14], [15], [16], specifically examining attrition through psychosocial lenses. For example, researchers have explored the factors that affect engineering doctoral students' attrition and their overlaying interactions [13], the impact of critical events [15], the influence of costs [14], and the importance of thriving in their programs [16]. Overall, these studies highlight issues related to program culture and environment, advisor–advisee relationships, program expectations, and social interactions that lead to graduate students' persistence, time to degree, and attrition.

Nonetheless, because educational 'programmatic' factors are often interpreted as being objective and not central to the causes of attrition, Sallai et al. [17] investigated graduate engineering organizational structures and explored the root causes of why doctoral engineering students experience problems or are forced to leave their graduate programs. This research study revealed the underlying factors behind common face-value reasons for attrition indicating foundational structural issues contributing to engineering graduate student attrition [17]. Therefore, we seek to continue dissecting the nuances of graduate engineering attrition and fill a gap in the influence of the structure and process of graduate education on graduate students' decision to depart or persist in their programs.

Assuming departing engineering graduate students were allowed to express their doctoral discontent, graduate programs and administrators would likely take notice and implement 'self-corrective' actions, leading to a significantly lower attrition rate and a decline in attrition over time [3]. Yet, since there has been minimal improvement in graduate attrition statistics over the past decades, it could logically signify that graduate students exit without providing reasons for their departure to faculty advisors or administrators due to these entities being the ones causing the issues or fear of retribution [18], [19]. It is critical that the mechanisms for voicing doctoral discontent, and the response to potential departures be relayed through research so that they make attrition statistics relevant, real, and memorable. The purpose of this research brief is to understand how graduate engineering students express doctoral discontent which has led them to depart or consider departing, and what was the response (or lack thereof) to this discontent. In particular, this research study answers the question: ***How and to what end do U.S. domestic engineering doctoral students 'voice' discontent in their doctoral programs?***

Theoretical Orientations

In this study, we consider Hirschman's sociological theory of "Exit, Voice, Loyalty" [20] to capture how doctoral engineering students respond to dissatisfaction with an organization or program. While originally applied to consumer mentality—and noting the problematic tensions in considering students as "consumers"—we find it useful to extend to graduate students as they consider whether to continue to invest in a given program of study, considering the "costs" of persistence [14]. This framework presents three primary responses consumers (in our case, graduate students) use to express their discontent with products or institutions. Extended to graduate school contexts, graduate students can stop "purchasing" a product (i.e., graduate education) and *exit* (e.g., leaving the institution or disengaging from the community) [20]. They can also *voice* dissatisfaction with some authoritative figure (e.g., graduate administrator or faculty advisor) using active communication, such as complaining, protesting, or advocating for change (individually or collectively) [20]. Additionally, despite dissatisfaction, if graduate students have invested heavily in their doctoral education and see no viable alternatives, they may choose to remain *loyal* (e.g., tolerate poor educational/work conditions or continue to participate in a community despite dissatisfaction). Hirschman [20] suggests that individuals or groups will choose one of these responses based on the availability of alternatives, their level of satisfaction, and their investments in the relationship. It is important to note that strategies are not mutually exclusive and can occur simultaneously (e.g., simultaneously exit, voice their concerns, and still be loyal to the institution and self) [12], [21]. Furthermore, as Lovitts [22] reflects, "Given the amount of personal and financial investment graduate students make in their programs, one would expect graduate students to vociferously and vigorously exercise the voice option. Yet, they exit silently and alone [p.30]." Therefore, we use Hirschman's framework as an *a priori* coding schema

to help understand how engineering graduate students express discontent with their doctoral education, and what was the response (or lack thereof) of this dissatisfaction.

Methods

This work is part of a larger IRB-approved, NSF-funded, multiple-methods study focusing on current and former engineering graduate students' considerations of attrition and persistence to understand attrition mechanisms and master's level departure from engineering doctoral programs.

Participants and Recruitment: For this larger study, an initial recruitment email was sent to the graduate student coordinators and department heads of each engineering department at the top 50 engineering PhD-granting universities per ASEE's 2018 Engineering by the Numbers [23]. The recruitment survey asked students several questions regarding their experiences in graduate school and the extent to which they considered departing from their graduate programs. Students also provided demographic information and indicated their interest in participating in a follow-up interview to discuss their experiences in graduate school in more detail. A total of 620 students completed the recruitment survey, and among these participants, 42 were selected to be interviewed. We used purposive maximum variation sampling [24] to ensure participant diversity and enhance the communicative validity of the sample by ensuring as many different voices as possible were represented in our data. We recruited U.S. domestic students (i.e., U.S. citizens or permanent residents) participants since international students' experiences in graduate school tend to be more complex due to cultural and language barriers and visa considerations among other factors (see [25]). Table 1 (Appendix) provides demographic race/ethnicity, gender, and number of years in graduate school information for the interview participants of this study. In this table, we also grouped participants into three categories based on their intention to depart from their program at the time of their interview: *persisters, departers, and questioners*. Participants were grouped into these categories based on their response to an interview question asking them to share their thoughts on leaving their graduate program. Participants who were not explicit about whether they were staying or leaving or who expressed uncertainty about what decision to make were considered questioners.

Data Collection and Analysis: Semi-structured qualitative interviews were conducted to obtain a more complete understanding of the phenomenon and capture more in-depth information regarding graduate student's persistence and departure from engineering doctoral programs [26], [27]. Within the semi-structured format, open-ended questions were used to give participants self-agency to provide rich data or "thick description" of what they interpret as relevant and significant in their experience [28], [29]. Participant interviews were conducted virtually through a secure videoconferencing platform, were audio recorded, and lasted between 60 and 90 minutes. Interview audio recordings were transcribed for analysis using a secure professional transcription service. Each interviewee received a $10 gift certificate from Amazon. The professionally transcribed interviews were imported and coded in a computer-assisted qualitative data analysis software (NVivo). The transcriptions were coded using a qualitative abductive analysis approach [30], employing Hirschman's Exit, Voice, Loyalty Framework [20] to understand how engineering doctoral students respond to decline or dissatisfaction with their educational experience, and the response to this discontent. Coding focused on the semantic content of the interview excerpts, that is, centering on the explicit meanings of the data. After all transcripts were coded, categories with many excerpts were further coded to identify smaller grain-sized themes. Generated codes that emerge from the experience of the participants is ideal instead of forcing participants' own words to fit into theories that were derived from sources outside the actual interview [31].

Limitations: This research has limitations that must be considered. First, interviewees were taken from a pool of current and former engineering graduate students who were willing to speak about their graduate experience, and thus, it is unknown how the findings would differ if those who did not want to be interviewed participated in the interview process. Also, since this work is part of a larger study, it mainly focused on domestic US students, and a great part of them attended during the COVID-19 pandemic. However, participants explicitly acknowledged their graduate experiences before and during the pandemic. Lastly, it is important to mention that the goal of this study is not generalizability, and as such, it should be cautioned against using the findings to determine the 'proportion' of graduate students who voice discontent in their doctoral education. Instead, readers should consider how the mechanisms and responsiveness of graduate students' dissatisfaction translate to their own contexts.

Findings

In analyzing the interview data from our participants, we used the Exit, Voice, Loyalty model as a conceptual framework. For this *research brief*, we present the 'Voice' component to identify how this mechanism was used to express discontent with their doctoral experience and the influence associated with persisting or departing graduate school. The section below focuses on the type of voice approach graduate students who departed or question departing, and the outcome of the response (or lack of) to this discontent.

Expressing Discontent – Voice. As referred to in Hirschman's [20] framework, there are two ways in which voice can be expressed: *vertical* or *horizontal*. Whilst *horizontal* voice is talking to peers, friends, and neighbors, *vertical* voice involves talking to superiors or institutional/departmental leaders. In our study, most of the participants mentioned engaging in horizontal and/or vertical conversations. However, there were a few students who did not engage in these conversations as they were uncertain of the consequences, specifically avoiding discussions with 'vertical' individuals. For example, Grace stated, *"I'm afraid that [advisor] is going to be upset, and I also feel bad because I have this great opportunity, like I'm getting paid for it, not everyone gets paid for grad school and everything. So, I don't want to just throw it away, but I'm also unhappy with how everything's going. So, I'm just... I don't know, I'm just afraid to tell him."* Similarly, Shaun shared this uncertainty, *"You don't really want to do that or bring up that conversation point. Even if you think they might be open ears, but maybe they'll hold it against you later on or something."* Likewise, when asked if she ever talked with anyone else about leaving the program, Mindy responded, *"You want to be strategic about that kind of thing because when you have that kind of talk, if you're taken seriously, it's somewhat of a negotiating tactic as well, and you don't want to go saying it too often… and if you say that too often, people might start thinking, 'You know, maybe it's okay to lose this person'."*

When considering cases of horizontal voice, most students, especially persisters and questioners, mention having conversations about dissatisfaction/leaving the program principally with their friends, family, or lab colleagues. From these conversations, participants alluded to talking to close friends and family for moral support while also seeking academic guidance and comfort from individuals with related doctoral experience. For instance, Aaron reflects, *"I do. Lots with my parents. I'm engaged, so my fiancée and I talk a lot…In particular, my fiancée's dad also...He was working on his PhD in chemical engineering, and he was basically all but dissertation and then ultimately did decide to leave the program. And so, he's been good to talk to because he kind of just gets the position I'm in versus other people obviously, if they're not working on their own PhDs, they might not understand that situation quite as well."*

Additionally, Gwendolyn discusses a similar experience while also highlighting why she might not have discussions with other peers, "*Yeah, so one of my friends in the lab, she came in as a postdoc, and now she's actually a PI…But I talk to her all the time because she's been through it. She actually mastered out of her first PhD program and then went back and got her PhD at a different program. She's been through a lot of it. So I talk to her a lot. I talk to my counselor. I talk to other students in the program sometimes, but I also don't want to get their opinion on it as much because they have a very different experience and very different goals too, so I don't want to either cloud their opinions or bias mine. But I'd say mostly that friend who was the postdoc and now a PI, she's been really helpful to me."*

On the other hand, there were a portion of students who engaged in discussions with both friends and advisors/administrators. These participants, specifically those that had departed their doctoral programs, reflected on the lack of visibility and responsiveness of their advisors, and administrators (e.g., graduate studies directors, and department heads). To illustrate, Yara speaks about the conversation with her advisor and the reluctance to talk to the department, *"Every time I tried to tell [advisor] I was unhappy…she just shut down and would change the topic, and I was told that I was talking too much, and I was complaining too much…and so talking to a department head or someone about this is... I knew at some point it would get back to my advisor and then she just wouldn't be nice about it because there was already so much tension there."*

Despite similar conversations with her advisor, Isabelle expressed reaching out to graduate and departmental administrators, "*The [Director of Graduate Studies] told me that... It sounded like, I just didn't like my advisor and that I was the problem. So he basically told me he wasn't going to help me figure out another solution."* Consequently, as things kept devolving in Isabelle's lab and lab culture, she mentioned, "*I went to our department head and she just kind of said, like, 'Well, if you find someone who will take you on, I'll support that.' But no one wants to get involved. Because they don't want to upset my advisor… It just kind of overall feels like there isn't a whole lot you can do when things are going wrong, and that lack of control over your future is unacceptable to me. It feels that way."* It is worth noting that this response from the department head is what Tuma et al. [32] call as 'collegial protections', where faculty are safe from repercussions because of their seniority, department/program needs, or academic freedom.

Sharing similar administrative frustrations, Heidi discussed how her attempts to voice her concerns with previous and current program administrators resulted in silence or unresponsiveness (alternatively apathy), *"Yeah, like I've said those experiences I've had, I really don't feel like they care, which is unfortunate. But honestly, the past two degrees that I had at the other school that I went to; I also felt the same way. I don't know if it's just academia or what it is, if that's how they operate. But also, when I was having issues with my advisor and him telling me that he didn't want to advise me anymore, I went to the department and told them all of this and that maybe I would like to switch and work with somebody else. And it was just not that great of a conversation. And then they never followed up with me. They never followed up or cared that I switched from a PhD to a Master's. They weren't concerned or anything about it. Which was kind of weird. That's when kind of, I guess, a disappointing... It felt like before I came here, when they were wanting to get me here, that they cared a lot and then now that I'm here, they don't really care that much."*

These last cases show how students' decision to exit or consider exiting their program were impacted due to a lack of support, response, and in some cases an active suppression of voice from their faculty or department. Thus, if institutions seek to learn about the underlying causes of attrition, they need to show a willingness to address channels of communication from their current or exiting graduate students.

Discussion and Conclusions

The purpose of this work was to discover how engineering doctoral students respond to decline or dissatisfaction with their educational experience, and what was the response to this discontent. This research brief, grounded on Hirschman's [20] "Exit, Voice, Loyalty" framework, examined to whom graduate students had voiced their discontent and possible departure. Similar to previous scholarship [3], [11], [12], we noticed instances where participants 'horizontally' voiced potential departure to close relatives and colleagues and cases where students disengaged in these activities due to plausible negative ramifications. Literature explains that this reluctance occurs due to higher education reward structures which create an environment that prevents students from sharing their concerns about their current status in, and progress through, the program [22]. For example, as Weatherton [33] explains, in academia individuals are "encouraged to pursue their own self-fulfillment and achievement and are rarely held responsible for a collective notion of success [p.13]." Consequently, those joining the organization must adopt these norms to be successful, and someone who attempts to break through these values risks exposing themself as an 'impostor' [34], [35]. This premise pressures graduate students to adhere to the norms of a hegemonic and competitive culture and prevents them from discovering that many challenges lie within the institution and not within themselves [3], [36].

Furthermore, this brief found several cases where participants engaged in discontent discussions with supervisors or administrators, which has not been the case in many prior studies. Notably, from these discussions, some participants reflected on how the lack of apathy and support from their faculty and department influenced their decision to depart or consider departing. This neglect or absence (regardless of it being intentional or unintentional) suggests that graduate education is highly decentralized, and enacting change would create conflicts, especially between individual interests and values. Accordingly, by allowing graduate engineering students to express and address discontent, graduate programs would need to confront to the deterioration of their product (i.e., education) and force it to remediate. Nonetheless, as Lovitts [22] remarks, "allowing students voice would potentially challenge the university's control over students and upset the social order -- a medieval social order that dates back to the 11th century in which fealty and knowing one's place in the status hierarchy functioned to perpetuate the system [p. 34]."

In conclusion, this study highlights the complexity of attrition and shares the importance of faculty advisors and administrators who interact with and have the power to positively influence graduate engineering education. It is critical that we contemplate student behavior (through reluctance to voice) and faculty response (through suppression of voice and apathy) to further understand how the graduate engineering environment and structure actively suppresses or ignores student's voice. While the implications of this brief are simultaneously encouraging and discouraging, we insist that doctoral attrition problems in engineering education can be successfully tackled. However, no intervention can be implemented successfully without clear institutional intentionality and commitment [33]. Ultimately, we hope this study encourages readers to critically reflect on the importance of graduate students' feedback, and urges academic leaders to devise and/or reinforce mechanisms that allow graduate students to voice their concerns and treatment without fear of retribution.

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Appendix

Table 1. Number of participants who identified with different demographics including race/ethnicity, gender, number of years in graduate school, and intention to depart the program.

Racial/Ethnicity	**Number of Participants**
White/Caucasian	30
Black/African American	2
Hispanic/Latinx	2
Asian	2
Multiracial	6
Gender	
Men	16
Women	24
Non-Binary	1
Gender non-conforming	1
Years in Grad School	
1-2	15
3-4	18
5+	9
Status	
Questioners	23
Persisters	11
Departers	8