Engineering Educators Bringing the World Together
2025 ASEE Annual Conference & Exposition
Palais des congrès de Montréal, Montréal, QC • June 22–25, 2025 ASEE
Paper ID #45797

Characterizing Interactions Between Master's Engineering Students and Their Environment During the Advisor-Matching Process with the Person-Environment Interaction Model

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Abstract

The purpose of this research full paper is to understand the how engineering master's students navigate the one of the most critical parts of their programs: matching with a research advisor. While there have been many recent studies exploring the experiences of graduate engineering students, very few studies have focused on the first years of graduate school as a particularly difficult time of transition for new graduate students. Further, very little work explores the specific experiences of master's students, who only have two years (typically) to become acculturated to graduate school, perform master's level research, accomplish coursework objectives, write a thesis, and obtain a position. This accelerated timeframe lends itself to an amplified need for a smooth transition into graduate school. This study, framed through Neufeld's Engagement Model of Person-Environment Interaction, explores the experiences of five engineering master's students using qualitative thematic analysis to show how students conceptualize and navigate the advisor matching process through the lens of "negotiation"—one of the key elements of Person-Environment Interaction theory. Results show how the respective goals of master's students and their environment are mis-aligned such that even in successful-matching with an advisor, environmental barriers impede the process leading to potentially-lasting negative outcomes. These negative outcomes include degraded participation within the environment and negative evaluations of the self (e.g. imposterism) and the environment (e.g. mistrust).

Keywords: graduate education; masters' students, navigation; barriers

Introduction and Literature Review

Issues in graduate-level attrition [1–5] and well-being [6–12] have been well documented for decades, and while interest in graduate-level education research has increased recently, there is still a dearth of literature pointing towards the root-cause of these issues. With attrition in engineering estimated to be at least 24% (higher for women and minorities) [13] and rates of depression and anxiety between 4 and 6 times that of non-graduate peers [6], the National Academies published a call to action to pursue systemic change in graduate education [14]. To date, graduate education research has largely focused on psychosocial factors impacting student attrition and well-being. This student-centered approach, while valuable, has left a significant gap in understanding how environmental factors influence student outcomes.

Scholars have begun to investigate how institutional structure and processes are tied to the negative outcomes reported in literature. Recent work indicates that significant systemic and structural barriers lead to the commonly cited causes of doctoral attrition (changes in career goals, perceptions of fit, leaves of absence, or unfulfilled degree requirements) [15,16]. These barriers originate from institutional, departmental, and research-lab policies and practices [15,16]. Further work is needed to characterize the mechanisms behind how these processes influence graduate student attrition decisions and well-being. One of the most-cited causes of graduate attrition is issues with advising and mentorship [3,5,6,17–29]. Therefore, the student-advisor matching process that occurs early in the student's graduate degree forms the foundation of one of the most critical elements relating to graduate student success during and after graduate school as they form future career intentions [30,31].

In engineering education and higher education literature, most studies attend to the critical role that the advisor plays as a mentor, research supervisor, and link to both funding and future career opportunities. While literature suggests that graduate students find advisors that match their expectations and working styles, advocating for students to ask and select faculty based on mentorship potential [25,32], in reality, this process is fraught with both faculty and students navigating uncertainties in funding, openings in a specific research group, and departmental/disciplinary norms around advisor matching. Artiles' work [21] investigates the advisor matching process in chemical engineering programs, which typically have a rotational structure for students to "try out" different laboratories before faculty select their hiring choices. However, this is not typical in other engineering disciplines, with some students connecting with and committing to advisors before even starting graduate school and others attempting to match with an advisor through their first semesters in graduate school. The wide variation perpetuates the opaque nature of the process, especially for students who are first generation undergraduate or graduate students in engineering disciplines.

Most work in graduate education focuses on doctoral students, leaving master's students largely understudied. Sallai et al [33] has noted that master's and doctoral students differ in their reasons for pursuing graduate study and reasons why they persist in their programs, motivating a specific focus on this population. Furthermore, master's degrees take place across a reduced timeframe relative to doctoral degrees. So, while doctoral programs might afford larger timeframes to students navigating the advisor matching process, master's students require an accelerated process to facilitate early progress with research in a program intended to (typically) take two years. Thus, the advisor matching process is a particularly critical early experience that likely has lasting impacts on the outcomes for master's students. The purpose of this paper is to investigate the environment's role in facilitating or hindering the advisor matching process. Specifically, we are interested in how the environment influences student behavior in, feelings about, and evaluations of graduate school through this critical process. In this work, we will answer the following questions:

1. How do master's students engage with the environment during the advisor matching process, and how do environmental factors influence this behavior?
2. What impacts do these early experiences have on graduate student positive participation in and evaluations of themselves and their environment?

Theoretical Orientations

This study employs Neufeld's Engagement Model of Person-Environment Interaction [34] as a conceptual framework for analysis. This framework builds upon three key psychological frameworks: Holland's person-environment theory [35,36], Moos' model of person adaptation [37], and Wright and Lopez's four front model of assessment [38] which emphasize the role an environment plays in influencing a person's behavior and well-being. While these frameworks can be used to provide understanding and characterization of the relationship between a person and environment, Neufeld's Model (Fig. 1) focuses on the process through which a person and environment interact and how that process promotes or hinders goal attainment. In general, the environment is defined as the people, procedures, and structures that comprise the environment a person is navigating including implicit or informal procedures and structures. To characterize the engagement between a person and environment, this model uses a tripartite construct of negotiation, evaluation, and participation. Negotiation is the mutual adaptation process between an individual and the environment, characterized by each party's efforts to accommodate the other. Participation refers to the level and quality of a person's active involvement within an environment,

encompassing cognitive, behavioral, and emotional aspects, as well as the environment's reinforcement of such engagement. Evaluation represents the ongoing, reciprocal assessment between an individual and their environment, encompassing an individual's reflective thoughts and feelings as well as the environment's feedback. The nature of these three components ultimately determines the release of positive or negative outcomes in any person-environment interaction. In this study, we are particularly interested in how these elements emerge within the process of student-advisor matching as this critical early experience has significant implications for a student's persistence in their degree. To date, this framework has not been leveraged within the context of graduate education, and therefore an expansion of each engagement-component is needed. In this work, we are particularly interested in characterizing the process of negotiation. For now, we present a valence interpretation of evaluation and participation primarily to highlight the negotiation-participation and negotiation-evaluation connections.

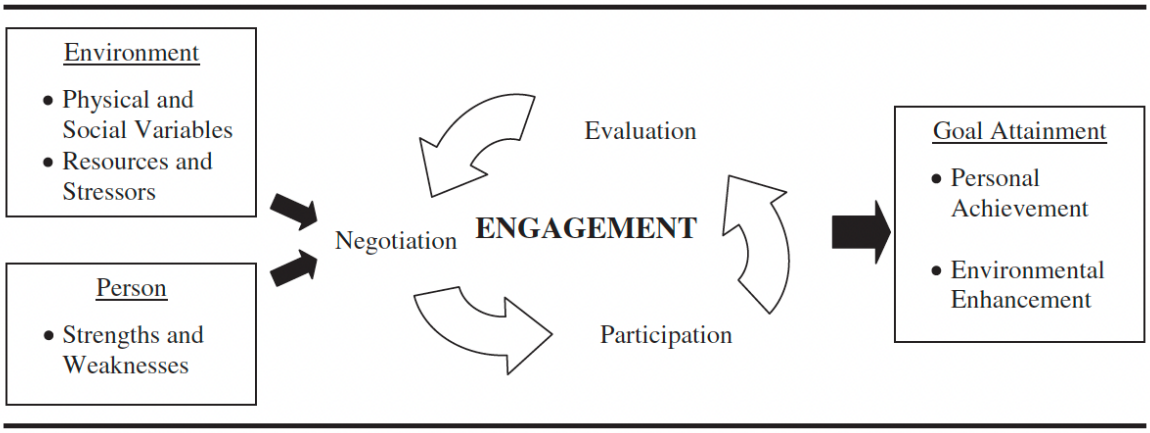

Figure 1. Neufeld's Engagement model of Person-Environment Interaction. Reproduced from [34].

Methods

Context: This research was conducted at a single large research intensive (RH-VH) public university located in the mid-Atlantic region of the United States, as part of an NSF Funded SSTEM program. SSTEM programs are intended to support low-income students in their trajectories to and through school. While most funded SSTEM programs in the United States are aimed at undergraduate student support, this SSTEM is unique in that it supports low income Master's students to obtain thesis-based Master's of Science (MS) degrees. Students in the program are supported with a financial supplement, are provided substantial professional development programming, regular mentorship meetings with faculty affiliated with the program, and peer/near-peer mentoring. At the time of data collection, the program was in its third cohort.

Participants and Recruitment: All participants in this study are first- or second-year MS students enrolled in an engineering field at the institution of focus in this study. All M.S. students are required to do research and write a Master's paper or thesis. All participants for this study recruited were part of the SSTEM, although participation in this particular study was optional. IRB approval was obtained for the entire project and all data collection; the interviews collected and analyzed in this study are part of the broader engineering education research plan in the funded SSTEM project. Six students scheduled interviews, and five qualified for inclusion in this study. Inclusion criteria required that students 1) identified the advisor matching process as a significant challenge and 2) had actively engaged in the matching process or matched with a research advisor within the previous semester. Of those five, one was a second-year MS student, and four were first-year MS

students mid-way through their first semester. Three participants identified as men and two as women or nonbinary. Three of the participants had previously attended this university for their undergraduate degree. The study participants' disciplines included aerospace, electrical, mechanical, and acoustics engineering.

Data Collection and Analysis: Semi-structured interviews [39] were conducted by the first author via Microsoft Teams with the study participants and recorded with their consent. The interview protocol asked questions designed to prompt discussion of the three elements of engagement (negotiation, participation, and evaluation). For example, students were asked to discuss in detail the challenges faced that were most and least difficult to overcome. Interview transcripts were transcribed by secure professional transcription service and cleaned by a member of the research team for accuracy by listening to the original audio recording and modifying the transcript when necessary. Then, the written transcriptions were coded using an abductive approach [40], employing Neufeld's Engagement Model of Person-Environment Interaction [34] as an *a priori* coding schema to understand the processes and implications of person-environment engagement while very early-stage engineering Master's students navigated common challenges. Of note, it is the aim of the SSTEM program to alleviate some of these issues, particularly surrounding mentorship, professional development, community, and career trajectory support, and as such this program makes up a portion of the student's environment and does influence the process of engagement. Furthermore, the interview transcript did not specifically probe about the process of advisor matching, yet the majority of students interviewed (five of six) discussed the process and implications thereof in detail and therefore the scope of this work has been narrowed to focus just on this one key challenge.

Limitations of the Study: While the goal of qualitative research is not to be generalizable, we offer the following findings as a sending context, by which readers of the paper can consider which aspects of the qualitative experiences reported in this study might translate to their own contexts, and how. The participant population for this study are all at a large R1 public institution and are part of a funded program intended for students with demonstrated financial need. One caveat to the SSTEM selection criteria is that for graduate students, it is very difficult to ascertain whether demonstrated financial need is a function of being newly independent from parents on the FAFSA application, or whether the financial need is a result of low socio-economic status in childhood (e.g., Pell eligible as an undergraduate.) However, we must be clear that the 'demonstrated financial need' may or may not correspond with family financial status, and it is probable, given the literature on low-SES students [41,42], that there may be additional significant barriers to pursuing a graduate degree in engineering for these students, especially if they are first-generation college students.

Findings

The primary focus of this work, grounded in Neufeld's Engagement Model of Person-Environment Interaction, is to characterize *negotiation* during the advisor matching process, and identify how *negotiation* can influence *participation* and *evaluation*. Starting with the tripartite model of engagement, a codebook was developed that begins to characterize these components in the context of graduate education. The codebook overview is shown in Appendix Table A1. Note that since the primary focus of this work is *negotiation*, codes for *participation* and *evaluation* have been left at a valence level. While coding, a need for clear and distinct environment and person definitions were required to accurately represent responses from participants. In this work, we define the environment as elements of the graduate-environment that do apply or have the potential

to apply to all graduate students at the institution. These elements include structural and process elements, members of the community (students, faculty, and staff), geographic location, etc. The person is defined as both the student themselves, including demographics, personality traits, and academic history, and any cultural or environmental connections they bring with them (such as partner/familial support). These definitions take a sociological rather than psychological approach to differentiating between person and environment. While traditionally a person's support-network or SES might be included within *environment*, in the context of graduate education systems, these factors are unique to the *person*.

Three different modes of negotiation emerged: structural influences, goal misalignment, and goal alignment. The first negotiation type comprises how the environment structure and processes influence a student's path through the system towards goal-attainment. Within this sub-theme, there emerged three ways in which the environment altered, hindered, or propelled a student towards matching with a thesis advisor: *Environmental Neglect, Environmental Redirection, and Environmental Support*. The second type of negotiation involves the process of managing conflict resulting from misalignment of goals between the student and environment. When student/environment goals are misaligned, we observed two different ways that that resolution takes place: *Student Sacrifice and Student/Environment Compromise*. While it was not observed in this dataset, from literature in conflict management [43,44], it follows that a third avenue hypothetically exists for resolution of student/environment goal misalignment: *Environmental Sacrifice*. Last, we observed that the potential for goal alignment exists with the student and environment collaborating synergistically to mutually achieve goals.

Structural Influences

Environmental Neglect: The majority of students interviewed experienced confusion, stress, or worry (negative participation) due to the unclear and non-transparent advisor matching process, which constitutes an aspect of environmental neglect. For example, Earnest highlighted the difficulty in discerning faculty research interests from the department website delayed their engagement in the process stating, "Even within the [department] website when I was looking for things just by myself, it was hard to tell what their research was…So, I guess just without any information, it's hard to know where to start." Furthermore, the relocation of faculty and administration to a different building apart from where students worked compounded the issue by reducing accessibility, as Earnest did not want to bother the program coordinator, a valuable resource for facilitating advisor matching in that department, via email. The physical and informational barriers contributed to Earnest's difficulty engaging with departmental resources that might have aided the advisor matching process and contributed to negative participation (e.g. fear, overwhelm, confusion, and stress) for the student.

Similarly, Harold faced challenges in determining which faculty had funding for master's students. "There's nothing like in terms of who has funding, because I guess that's not publicly available or [not available] unless they want to make it publicly available." His proactive attempts to connect with faculty frequently resulted in the advice to "keep doing what you're doing," without tangible progress or introductions to faculty with available resources. Furthermore, faculty often lacked knowledge about their colleagues' research and funding, leading to dead ends for students like Harold, who noted: "it seemed that, at least in [my] department, it seemed very disconnected. Like nobody knew what people were working on, or it almost felt like they were hiding it from one another." Repeated rejections led to negative participation in the advisor matching process with Harold disengaging almost entirely, noting that "[the rejection] started weighing on me at the

end of the semester. I sort of even didn't wanna talk to anybody else because it almost seemed like everybody didn't have research assistantships to provide." The culmination of these experiences led to negative self-evaluation and feelings of not belonging. Harold felt that the consistent rejections reflected his worth as a researcher, "Something that made me feel [like I did not belong] was that search for an advisor, because in a way I felt like it reflected that I wasn't good enough for research or something of that nature, you know?"

In contrast, Doris internalized these challenges as indicative of systemic issues rather than personal shortcomings. She perceived a lack of resources within the department, stating, "I think it's just the lack of resources within the department. That's really, really the main thing 'cause a lot of professors, they're like, yeah, I would, but, and then it comes back to the funding." This scarcity led to negative environmental evaluation (mistrust in the university) and negative participation (feelings of fear, anxiety, and exacerbated stress). This example underscores the subtle ways in which students' trust in the environment can be eroded and how the perceived scarcity of funding can sow the seeds of negative evaluations of the university and diminish participation.

Kenneth's experience reflects those of his peers in that there are significant elements of confusion and a lack of clarity around expectations. Yet, unlike the other students who struggled from the start to find an advisor, Kenneth began with what he believed was an established advisor relationship, only to experience uncertainty later when he reached out for course and research advice at the beginning of the semester. It was then that this advisor suggested he meet with a different faculty member for advice, leaving Kenneth uncertain about his advisory status. As a result, he disengaged and postponed this task, hoping to gain insights from his coursework that might assist him. Furthermore, he elected not to contact the other faculty member as he was unsure what he was supposed to be asking and what would come of it. In this case, Kenneth experienced environmental neglect in the form of a lack of clarity of his expectations regarding research and a lack of support in executing his tasks. While attempting to engage in his research role, Kenneth felt confusion and a lack of support. He believed that his absence of active research engagement contributed to his feeling of not belonging in the academic community. In a relatively short amount of time (~2months), the confusion and lack of clarity around expectations placed upon him led him to develop negative participation (confusion, stress, and significant feelings of imposter syndrome) and negative self-evaluation (a lack of belonging) differently than he had ever felt before in his undergraduate studies.

The examples above illustrate how environmental neglect, through a lack of clarity, transparency, and support around the advisor matching process, hinders student progress towards goal attainment, reduces engagement in university processes, and promotes negative participation and evaluation of the environment and self.

Environmental Redirection: Between environmental neglect and support lies environmental redirection, which is not inherently positive or negative as it relates to a student's ultimate goal attainment. For example, Earnest experienced a moment of environmental redirection that ultimately resulted in additional environmental support later. While they had no prior experience or connections at the institution, when they applied to their master's program, a faculty member reached out to them asking if they would be interested in a producing (similar to a TA) position available on campus. In their role as a producer, Earnest sat in on and managed the recordings of multiple courses that they were not enrolled in. This production role significantly expanded Earnest's network of faculty and facilitated the process of advisor matching by providing connections with potential faculty advisors. Notably, this event is both a redirection (since Earnest did not seek out the producer position) and resulted in further environmental support.

In contrast, another instance of redirection came early in the degree-process for Harold. Initially Harold applied to the Master's of Engineering program, a one-year, 32-credit program which requires the completion of a capstone project rather than a thesis. Upon receiving Harold's application, a member of the department reached out to him indicating that he was qualified to be admitted into the Master's of Science program and encouraged him to switch programs as the M.S. option had the potential to be funded. In contrast to the M.Eng., the M.S. degree required the completion of a master's thesis to be completed under the advisement of a faculty member. However, Harold had originally applied to a Master's degree with the goal to break into a specific sub-field, but ironically because he was re-directed to switch programs, he faced significant challenges in finding a research advisor in that niche area, ultimately landing in an area highly misaligned with his goals. He is worried about the consequences: "To me, that's a little bit… concerning because obviously, I wanna work sort of closer to the interests I described. And other than helping me get my degree, this thesis doesn't feel helpful..."

Environmental Support: During the process of advisor matching, environmental support came primarily from transparency around the process, clear communication, clear expectations of students, and availability of funding. Most students did not have a readily accessible way to find information related to the advisor matching process and expectations of them. Often information on how to navigate this process was communicated by peers or individually by faculty. For Earnest, support came early on in the form of a faculty member offering insight into the advisor matching process and the role of graduate students: "…that was the advice of one of the first professors I met with… I think he knew that I probably wouldn't know much and how research is more of a job. And so he was talking about that and how I should make sure that it's a good fit with anyone who I talked to. So that was really nice of him." This advice helped them continue to navigate the landscape moving forward and built the foundation for how they ultimately made their decision regarding choice of advisor.

Students received additional support during their advisor search from faculty and support staff, which, while not always leading to the acquisition of a thesis advisor, tended to positively affect their academic experience. Two students, Harold and Doris, encountered institutional support; Doris through a program coordinator who, ultimately did not help her secure a funded faculty match, but kept her well-informed: "The grad coordinator, she has just been, yeah, sympathetic and […] she's been really transparent about, 'okay, I've talked to these people to ask for updates if they are funding…' And she's just been helpful, as helpful as she can be in her position, I think."

Harold connected with a faculty member, recommended by a peer, who was upfront about the lack of available funding but remained communicative, providing regular updates on the funding situation, which helped Harold navigate the process without impacting his self-esteem: "[Professor] would always update me on his, on the sort of status of his research, whether he was getting funding or not. […] He was unfortunately one of the people that said, 'keep doing what you're doing', but he at least made me feel like I was doing the right thing, which was good in a way."

Notably, students in this study benefited from the support of SSTEM program mentors. Doris gained insights into the advisor matching process and faculty expectations, which was not available to her within her own program. The guidance helped alleviate her concerns about advisor interactions: "I think having someone else kinda outside of [my master's] program to give more advice on how to go about talking to professors about funding [has been helpful]." For Harold, SSTEM mentors actively facilitated introductions to faculty with available funding, which played

a crucial role in him securing a thesis advisor: “That ended with me reaching out to the SSTEM program mentors that we have. I cc-ed them all on the same email and I sort of said, ‘Hey, I can't find research. I was wondering if you guys could help me.’ And [SSTEM mentor] actually got me in touch with my current advisor.”

Goal Misalignment

Student Sacrifice: In our interviews, student sacrifice manifested as students sacrificing an element of their well-being, personal satisfaction, or progress towards goal-attainment, while the environment provided no accessible avenue for effective alternatives. For example, when meeting with potential advisors, Earnest noticed that there seemed to be a trade-off between joining a research group with a good culture and mentorship vs. a research group pursuing more cutting-edge research. The groups conducting the most exciting work lacked the culture and mentorship they wanted. Recognizing that their chosen thesis topic could have lasting impacts on their career, Earnest said, “it feels like if, once I do start searching for jobs [my thesis work will] probably be something that, like, comes up a lot, and just feels like a big deal, I might be making a decision for even longer than two years, 'cause maybe a job will have to be related to that”. Ultimately Earnest chose a lab that they perceived would provide good mentorship, sacrificing the experience and expertise development that might come with the more “cutting-edge” labs.

Similarly, Harold made significant sacrifices to his goals. After spending nearly a year unable to match with an advisor in his niche discipline, he had to settle with a poorly-aligned research topic. Harold also experienced high levels of burnout when it came to his coursework, regularly skipping class. It is notable that, while he recognized that his coursework was the only remaining element of his program related to his goals, it was also the element in which he was the least engaged.

Student/Environment Compromise: In partial contrast to the examples cited above, we also observed instances of compromise between the student and environment: where the student and environment both sacrifice elements of their respective well-being or progress towards goal-attainment. Harold's story highlights a compromise that allowed him to pursue his Master's degree in his chosen field by providing flexibility in thesis topic choice, which extended to a different department’s domain, while still granting an MS degree from his preferred field. Walter's experience with compromise differed; he faced a choice between a government fellowship and a TA position. He chose the TA position for its lack of "strings attached" to his post-graduation career, albeit with a trade-off. In declining the fellowship, Walter felt he disappointed his advisor and possibly damaged their relationship, saying, “So yeah, so I wanted that to be my decision on where I end up [after graduation] so I told her that I didn't wanna do it, which she wasn't really happy about.” This decision impacted his research participation, as he now feels heightened pressure to perform and greater frustration during setbacks. These instances of compromise highlight examples of moments where students were able to maintain elements of their goals facilitated by environmental flexibility: flexible departmental policy in Harold’s case and a flexible advisor in Walter’s. Even so, a connection to negative participation can be seen in both cases.

Goal Alignment

Student/Environment Collaboration: Last, while unobserved (in action) in this data-set, there is also the possibility that student/environment goals are well-aligned. For example, after Kenneth matched with his “advisor,” they directed him to identify a research project that aligned both with the advisor’s work and Kenneth’s research interests. This would be an example of student/environment collaboration, if it were to come to fruition. Unfortunately, the environmental

neglect he experienced impeded his ability to manifest such a project and therefore this potential avenue for student/environment collaboration dissolved.

Discussion and Implications

Table 1. Key findings and Implications of Negotiation Sub-Themes

	Sub-Theme: Definition	Key Findings	Implications
Structural Influences	**Environmental Neglect** Lack of support or resources from the environment hinders the student's goal attainment or university engagement.	• Students experienced confusion and stress. • Difficulty accessing faculty and funding information.	Negative impact on participation and Evaluation. Potential to deteriorate a student's sense of belonging and/or facilitate development of mistrust towards the university environment.
	Environmental Redirection The environment changes the student's goal path, potentially positively or negatively, by introducing new directions.	• Redirection led to expanded networks and potential support. • May result in changes to student goals.	Can facilitate or hinder goal attainment depending on the nature of the support and student adaptability.
	Environmental Support The environment accelerates or improves the student's goal attainment or university engagement through support and resources.	• Support from faculty and staff improved navigation of advisor matching. • SSTEM program mentors were particularly helpful.	Positive impact on students' ability to navigate the advisor matching process and manage expectations.
Goal Misalignment	**Student Sacrifice** The student sacrifices well-being or goals due to misalignment with the environment, which offers no effective alternatives.	• Sacrifices in research interests and career goals. • Trade-offs between research quality and support.	May lead to continued engagement but at the cost of personal goals and satisfaction.
	Student/Environment Compromise Both student and environment sacrifice well-being or goals when misaligned, but both show flexibility.	• Students maintained some goals while adapting to the constraints of the environment. • Some dissatisfaction and pressure remain.	Shows potential for positive outcomes when both parties are willing to adapt, though may still impact student well-being and performance.
Goal Alignment	**Student/ Environment Collaboration** Both student and environment progress without sacrificing well-being, with aligned goals enhancing each other's success.	• Potential avenue where student and environment goals align leading to synergy.	Although evidence of this subtheme's existence was found in this work, it was impeded by environmental neglect.

The negotiation process of advisor matching, as detailed in this work, is crucial because it sets the tone for how students will engage with their environment throughout their academic journey. It is during this phase that students often encounter barriers that require them to adjust their expectations and strategies to align with the realities of the departmental structures and available resources. The engagement model underscores the continuous interaction between the student and the environment, where negotiation is an ongoing process rather than a one-time event. Three sub-themes within negotiation that appeared frequently in student interviews (environmental redirection, student sacrifice, and student/environment compromise) indicate that there exists a conflict or misalignment between student and environmental goals that requires resolution. Indeed, the themes that arose through this work align well with those identified as common negotiation modes also observed in interpersonal conflict [43,44].

We found that negative participation and evaluation stems from the misalignment of student/environment goals. When students feel compelled to adjust their goals, it can affect their level of active involvement within their program. This, in turn, can lead to positive or negative evaluations of both the self and the environment, further influencing their subsequent participation. A positive reintegration of broken goals can foster a sense of accomplishment and belonging, whereas a negative reintegration may lead to feelings of inadequacy and alienation. This work, through a narrow focus on the advisor matching process for master's students, highlights *how* even in success (matching with a research advisor) the negotiation process within the graduate environment can lead to student surviving rather than thriving [28].

One outcome of this work that requires further investigation is the sub-theme of environmental support. Notably, almost all instances of environmental support observed were support that students received individually from faculty and/or department administrators. While in this context, these parties make up elements of the environment, they, too, are individuals navigating the institutional and academic system. This could indicate that faculty play a mediating role in balancing the goal-conflict between master's students and the institution – the implications of which might have a significant impact on faculty goal-attainment and wellbeing.

Incorporating the engagement model into the assessment of the student-advisor matching process provides a holistic view of the environmental factors affecting student behavior. It highlights the connections between negotiation, participation, and evaluation, suggesting that a better alignment of goals, clarity in communication, and transparency in processes can enhance student participation and lead to more favorable self and environmental evaluations. By acknowledging these connections, institutions can create more supportive environments that align with students' goals and promote their academic success and well-being.

Conclusions

This investigation into the advisor matching process through the lens of Neufeld's engagement model of person-environment interaction [34] reveals the intricate dynamics between MS students and their academic settings. This study expands this model, with a particular focus on *negotiation*, and applies it in the context of graduate education. Based on abductive analysis of qualitative interviews with five students, three modes of negotiation emerged: goal misalignment, goal alignment, and structural influences. This framework begins to unravel how the environment influences student behavior, with structural influences often impeding or redirecting students and goal-misalignment leading students to make sacrifices to their goals and/or well-being in order to persist. Our findings demonstrate that this negotiation process can negatively impact student participation and evaluation of both the self and institution, even in the face of "success". Universities should take care to evaluate systems and processes in place to ensure that student expectations and logistical processes are clearly communicated, as even if students consistently overcome obstacles within said process, the experience can have potentially lasting negative impacts on students.

Acknowledgements

This material is based upon work supported by the National Science Foundation under Grant 2130169. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.

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Appendix

Table A2. Person-Environment Interaction Codebook

	Subtheme		Definition
Negotiation	Goal Misalignment	Student Sacrifice	The student sacrifices an element of their well-being, personal satisfaction or progress towards goal-attainment, while the environment provides no accessible avenue for effective alternatives. This occurs when student and environment goals are misaligned and the environment's goal take priority.
		Environment Sacrifice	The environment sacrifices an element of its well-being/functioning to meet student needs or facilitate attainment of student goals. This occurs when student and environment goals are misaligned and the student's goal take priority.
		Student/Environment Compromise	The student and environment both sacrifice elements of their respective well-being or progress towards goal-attainment. This occurs when student and environment goals are misaligned, yet both parties participate in exercising flexibility towards meeting the other's goals.
	Goal Alignment	Student/Environment collaboration	Nether the student nor environment sacrifice well-being or progress towards goal-attainment. Rather, this occurs when the student and environment's goals are well-aligned. Both parties progress toward goal-attainment are enhanced by the other.
	Structural Influence	Environmental Redirection	The occurs when the environment facilitates a new or different direction that the student had not previously considered or planned on pursuing. The student's path towards goal-attainment is altered by the environment. This alteration can be either positive or negative.
		Environmental Neglect	This occurs when the student's progress towards goal attainment or engagement in university processes is hindered due to a lack of support or resources provided by the environment.
		Environmental Support	This occurs when the student's progress towards goal attainment or engagement in university processes is accelerated or improved due to support or resources provided by the environment. Faculty network/connections
Participation	Positive Participation		Broadly defined as agentic behaviors, active engagement, and positive feelings towards/during engagement with the environment. Examples include: actively pursuing feedback, reflection, task focus, feelings of happiness, growth, fulfillment, curiosity, belonging and the like.
	Negative Participation		Broadly defined as impotent behaviors, passive engagement, and negative feelings towards/during

		engagement with the environment. Examples include burnout, avoidance, procrastination, feelings of sadness, overwhelm, anger, fear, distrust and the like.
Evaluation	Self-evaluation (positive)	Student experiences positive evaluation of the self, originating either from the environment or from the self. Examples of positive self-evaluation are belonging, self-efficacy, intelligent, competent, tenacious and the like.
	Self-evaluation (negative)	Student experiences negative evaluation of the self, originating either from the environment or from the self. Examples of negative self-evaluation are lack of belonging, incompetent, un-intelligent, disappointing, helpless and the like.
	Environment-evaluation (positive)	Student develops a positive evaluation of the environment. Examples includes perceiving the environment as supportive, bountiful, transparent and the like.
	Environment-evaluation (negative)	Student develops a negative evaluation of the environment. Examples includes perceiving the environment as unsupportive, resource-barren, opaque/unclear and the like.