

The Influence of Perceived Identity Fit on Engineering Doctoral Student Motivation and Performance

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Introduction

This research paper explores how Engineering Doctoral Student (EDS) experiences and identities influence their perceived fit in graduate programs and inform their actions toward degree progress.

Chronically high attrition rates challenge engineering doctoral programs, and few studies have identified the results of these economic and human costs.^{1,2,3} This shortage of research has served to reify misconceptions and assumptions about graduate student abilities and why they leave engineering graduate programs.⁴ In STEM (Science, Technology, Engineering, and Mathematics) fields, a recent focus on student experiences and identities has emerged as research has recognized that negative student experiences and limited opportunities to develop a disciplinary identity increase the likelihood of attrition.⁵ The purpose of this work is to explore how EDS experiences and identities influence their perceived fit in graduate programs and inform their actions toward degree progress. Specifically, we set out to answer the following research question: How do engineering doctoral students' experiences influence their perceived fit of salient identities and subsequent actions toward degree progress?

Theoretical Framework

To provide structure for our examination of EDS' experiences, we applied Identity-Based Motivation as the theoretical framework. This theory explains how individuals make sense of their identities within present contexts and use them to motivate actions in attaining goals and in making sense of experienced difficulty within those experiences. Using this perspective may also help unveil details about the EDS' experiences, as IBM lends itself well to our qualitative methodology of Interpretative Phenomenological Analysis (discussed below) that is based in grasping how people perceive a phenomenon.

Identity-Based Motivation

Identity-Based Motivation (IBM) examines how people perceive the fit of their salient, or prominent, identities within a given context to motivate action. Context refers to the entirety of an environment's elements including: location (classroom, school office, home), people (students, professors, family), and interaction with that environment (social vs academic conversations with students or professors). Oyserman and Destin argue that specific experiences

bring salient identities to mind.⁶ The ways in which these salient identities are expressed are based on influence of the context and the perceived relevance between the context and the salient identity cued. The perception of fit of a salient identity then drives action, including motivational goal setting and subsequent actions towards those goals. For instance, an EDS may cue a particular salient identity in their graduate office among peers (e.g., student), which may differ from a cued identity during a meeting with an advisor in the advisor's office (e.g., researcher).

IBM theory is based in two notions. First, the identities accessed by people during an experience influence their actions. Second, individuals pursue actions they perceive are congruent to their accessed identities and the context of the experience.⁷ IBM is then operationalized through three main constructs: action-readiness, dynamic-construction, and interpretation of difficulty.⁷ Action-readiness states that a person is ready to act in a way that is congruent to their salient identity; dynamic-construction explains that identities are fluid, impressionable, and dependent on context and individuals' salient identities are based on past, present, and future sense-making of their self-concept.⁶ Finally, interpretation of difficulty states that a person's sense making of experienced difficulty is also dependent on the congruence between action and identity. That is, action difficulty is interpreted as *important* if it is identity-congruent, while action difficulty is interpreted as *pointless* if it is identity-incongruent.⁶ IBM's recursive process explains how identity evolution is influenced by a person's experiences.

One study explored how IBM presents itself in an educational environment for a population of secondary students. The study ascertains that IBM explains the gap between desired and attained outcomes of students.⁶ The authors state that IBM "processes can be beneficial (goal-supporting) or detrimental (goal-undermining), depending on how an identity is constructed in a specific context," and emphasize that "school success needs to feel identity-congruent."⁶ Within the space of engineering education, a student might hope to become an educator and enters an engineering doctoral program. The EDS knows the Ph.D. is the gatekeeper to their goal of becoming a lecturing professor. However, some program cultures do not support or reward the transformation of this future goal and may hinder the development of a teaching identity. The EDS who works to develop a teaching identity may be estranged in their engineering doctoral program and perceive the pursuit of other tasks as conflicting with their desired teaching identity, thus increasing perceptions of difficulty for those tasks. Based on previous study's findings on difficulty, an EDS who experiences difficulty and perceives it as misaligned to their teacher identity will engage in goal-undermining action as the work is "pointless."⁶ Conversely, an EDS who perceives difficulty as aligned with their teacher identity will engage in goal-supporting action. Therefore, EDS tasks need to align with EDS identities to motivate action that causes their retention, as identity misalignment may provoke graduate attrition. This example highlights the ways in which EDSs' identities may be developed in

engineering doctoral programs. To understand how the processes of EDS identity development occurs we leveraged an IBM theoretical lens.

Methods

This study leveraged an interpretive stance to examine the experiences of EDS as described from their perspective. How students interpret their lived experiences can directly influence their actions and attitudes in engineering environments.⁸ The following section presents the methodology, the structured approach used to conduct this study, and the positionality of the research team. We outline our adaptation of interpretative phenomenological analysis to answer our research question: How do EDSs' experiences influence their perceived fit of salient identities and subsequent actions toward degree progress?

Methodology

Interpretative Phenomenological Analysis⁹ (IPA) was used as the methodological lens for this study. IPA's philosophical underpinnings have been described in detail previously.^{9,10} This theory seeks to understand how individuals make sense of their lived experiences through examination of participants' descriptions, use of language, and perceptions of their experiences. Additionally, IPA argues that the interpretive stance of the researcher cannot be separated during analysis. Thus, the voice of the researcher is meaningfully integrated into the analysis, often through the generation of explicit connections to theory.

Participants

Two recruitment strategies were used to identify EDS for participation in this qualitative study. First, we sent an anonymous recruitment email to all EDS of the university via an email database from the engineering college. This strategy did not produce a large pool of participants. Our second strategy involved face-to-face meetings with engineering lab groups. We provided the same information detailed in the email and asked participants to sign-up during their available time. Four EDS volunteered for our IBM interviews; three were international students and one domestic. The four participant's degree completion and engineering specialities were comprised as follows: a civil engineer in his third of his planned four years (Edward); a mechanical engineer in her last year (Trisha); a material science engineer in his first year (Vince); and a mining engineer in his last year (Oliver). Each participant was assigned a pseudonym to provide anonymity. All recruitment procedures were IRB approved, and all participants were compensated with a \$25 gift card for their time. Despite attempts at a purposive homogenous sample, our sample is one of convenience. Specifically, the sample represents four

EDS from a Western land-grant institution who participated in semi-structured, one-hour interviews during the Spring of 2016.

Table 1. Participant Demographics

Participant Pseudonym	Engineering Major	Degree Completion at Time of Interview	Domestic /International
Trisha	Mechanical	Last Year	International
Edward	Civil	Third of Four Years	International
Vince	Materials Science	First Year	Domestic
Oliver	Mining	Last Year	International

Interview Protocol

The interview protocol was developed by utilizing Oyserman's⁷ Identity-Based Motivation (IBM) theory and the research team's experiences in engineering doctoral programs. Guiding questions were based on each of the theoretical constructs of IBM. The semi-structured design allowed the interviewer to follow the voice and interpretations of the participant through probing or follow up sample questions. Sample questions posed included (see Appendix for entire questionnaire):

- Do you feel like being a grad student is difficult?
- Do you feel like your current self as a graduate student aligns with your future self?
- When/where do you identify with being a Ph.D. student/candidate/researcher?

Given the complex nature of IBM, questions were constructed to highlight the participants' experiences rather than attempting to have them discuss deep theoretical nuance. This choice places additional burden on the research team during analysis and when interpreting the student experience. Additionally, this shifts the traditional stance of an IPA from one that balances researcher and participant interpretations to one that more heavily relies on the voice of the researcher.^{8,9}

Analytical Process

IPA employs a three part iterative annotation process: descriptive, linguistic, and conceptual coding.⁹ The initial descriptive step involved the researcher to repeatedly listen and read the interview, while paraphrasing and summarizing the text to familiarize themselves with

the participant's statements. After fluency was attained, the linguistic step focused attention on the participant's chosen rhetoric for experiential description. This includes metaphors, word types (nouns, verbs, adjectives), and emotive language (positive or negative connotation).⁹ The descriptive and linguistic steps directly contributed to the final conceptual step that engaged the researcher in interpretation of the participant's phenomenon to capture the voice and lived experience of EDS.

The three part annotation process involved the creation of interpretative codes to identify patterns within and across EDSs' interviews. For each participant, a mind map, or graphic organizer, was generated after analysis to identify the relationships based on those identified codes. This process ultimately led to the increased discerning of EDS phenomenon as the researcher's familiarity with the interview increased.¹¹ IPA's recursive process facilitated the understanding of EDSs' salient identities as presented during their interviews by providing insight into the successes and barriers students encounter on their way to graduation. This study is a small portion of a larger project that seeks to understand how engineering graduate programs can be improved based on the development of students' identity profiles. The findings from this qualitative data will provide in-depth information for the item construction of a national survey that will be disseminated to approximately 5,000 engineering graduate students in 2017.

Results and Discussion

Participants in this study indicated that their program experiences serve to inform their identity congruence, or lack thereof, for continued pursuit of their doctoral degrees. Through the discussion of two sub-themes we unpack the ways in which identity congruence manifests in perceived student action and the motivational attributes that can serve to increase fit. Specifically, EDS distinguished that (1) identity congruence developed by connecting research to societal improvement and (2) advisors and lab groups influence perceived identity congruence by creating opportunities for high or low levels of autonomy (i.e., choice in task pursuit).

Identity Congruence Developed by Connecting Research to Societal Improvement

Edward:

Edward was a third year civil engineering EDS in the pavement and materials program. He identified the task of research as a difficult portion of his doctoral experience. However, it was a portion of his experience that aligned with his self-identification as someone who wanted to generate societal improvement. Edward found fulfillment in his research through understanding of its potential for a direct and positive impact on society. He stated,

“I think finding a solution for something that has been a problem, or it’s been a challenge in some area, that’s rewarding. Then, you are able to publish whatever you have found, and it’s helpful for...people, then it’s more rewarding, even.”

When asked to expand on the word rewarding, Edward responded: *“I feel good, I feel accomplished. I feel with myself, I am setting an example for my family. That’s also motivation. I want to set an example for my family and my kids, that when you do work hard, you can do anything.”* Edward stated, “I feel with myself,” that is, he interpreted this experience as identity-congruent to his EDS identity, his parent identity, and his familial identity as a son and brother. He felt accomplished as both a researcher and the role of exemplar that he plays within his familial structure due to the opportunity to contribute to society. Rather than his multifaceted identities being disassociated from one another, the relationships in his life outside of the university are enriched by the work he does within it and continued to motivate him in his research. This statement offers a clear expression of Oysterman’s theory of IBM⁶ in engineering doctoral programs by demonstrating the ways in which an EDS’s identities when congruent to their experiences, resulting in increased motivation valuing of the tasks undertaken.¹²

Vince:

Throughout Vince’s interview, a first year Ph.D. student in materials science and engineering, he demonstrated the prominence that his role as an EDS held in his life and how it led to a desire to make a contribution to society. Listening to his interview, it was evident that he was fully immersed in his EDS identity, to the extent that no other identity ever truly presents itself. Vince was asked if he identifies as a Ph.D. student, he states, *“Pretty much all the time. It’s my life. It’s my life right now, so it’s what I do.”* Being an EDS was Vince’s existence. This is unlike our other participants who shared details about external salient identities from that of an EDS, such as spouse, parent, or international student. Several times Vince described the alignment of this identity to his work in his doctoral program when discussing the ways in which his research can improve society, *“I think it means trying to improve, to add to the knowledge that we, as humanity, have...to become an expert in whatever particular field you’re in and making a contribution to that field.”* He elaborated on this notion, *“It’s what you do as a Ph.D. student. To contribute to the scientific field... that is what I want to be doing with my life... contributing to society... Getting a Ph.D. is a step in that direction.”*

Making a social contribution was characteristic of Vince’s self-concept; for him, altruism and a Ph.D. were inseparable. It was his goal to make a social contribution and getting a Ph.D. offered the avenue to reach it. Due to the identity congruence that Vince had as an EDS, he was motivated to earn a Ph.D. Later in the interview he added how his experience in graduate school

furthered his ability to reach this goal, *“It’s given me the skills to make a big impact on the future.”*

Vince revealed that contributing to social improvement had not always been a critical component of his self-concept. *“I think I’ve aimed a little higher. I didn’t have such ambitions to change the world as I do now, so I think that’s pretty cool. I think it increased my ambition by going to grad school.”* Vince’s EDS identity was strengthened through alignment or congruence of his identity to make change and the work conducted in his doctoral program. Although he may have had a previous interest in making a positive contribution to society, it wasn’t as pronounced as was at the time of the interview. Graduate school fostered and motivated his interest to make that contribution through the alignment found in his EDS role. Specifically, Vince’s identity was strengthened through his lab work, *“I like figuring out how stuff works and making it work better, fixing it... I think research is kind of a next step from that.”* Taking part in research afforded Vince a space where he could engage in actions related to developing his identity. Within the discussion of his lab work for nuclear engineering, Vince says, *“That’s one of the big goals that all of us have in the lab is to try to convince people that it’s not as dangerous as they have been taught to think that it is.”* The goal of making a social contribution was a direct part of his lab work and research, and he felt that he could make a contribution by communicating his knowledge with people outside of his lab space.

Vince displays a high level of identity congruence throughout his interview. His experience of only mentioning a doctoral student identity directly contrasts the experiences of our other participants who integrated multiple identities with their EDS identity(i.e. parent, spouse, international). When these multiple or singular identities are perceived as congruent in their doctoral programs these students indicate positive expression of motivation theories ranging from value¹² to interest.¹³ The positive effects of identity congruence are best demonstrated by the culminating statement of Vince’s interview:

“I think it’s pretty fun [grad school]. I get to work with all my friends. It’s pretty much like being in Neverland... We’re the Lost Boys and we just get to go off and have fun, play around and do experiments and stuff. I think it’s pretty cool.”

While the data outlined presents a story of the ways in which students successfully integrate their identities, it is hypothesized that many EDS may struggle to integrate their multiple identities with the environment and cultures of the doctoral experience. If identities are perceived as congruent students are more likely to persist and work through difficulty and when incongruent students are more likely to drop out.⁶ This hypothesis may provide one explanation of why the attrition rate in graduate education hovers around 50%.⁴

Advisors and Lab Groups Guide EDSs to Perceive Having High or Low Autonomy

Trisha:

Trisha, a mechanical engineering EDS in her last year researching polymers, explained that throughout her doctoral program her advisor guided her to make decisions about her research. This guidance included emphasizing the importance of an EDS's ability to design and conduct research independent of an advisor, *"if I wanted to do... specific experiments, he didn't force me to do [what he wanted]. He suggested to me, 'do this, I recommend it to you do this'...and if I wanted to do that, I did that."* Trisha's advisor offered her recommendations when she had an idea related to her study, but ultimately it was up to her to pursue the recommended course of action or her own alternative route. Similarly, Trisha's advisor echoed this action in recommendations regarding her program, *"He told me, 'It's good for you to be [a] teaching assistant for your resume [and]... future' [but] I wasn't on pressure...it was up to me."* Rather than stating what tasks should be accomplished during her doctoral program, Trisha's advisor explained what was available and reasons why it would be beneficial for her to engage in them, but again the decisions were hers to make. Toward the end of the interview, Trisha shared that her advisor explicitly emphasized autonomy with an explanation of its importance to her future success.

"He always says to me that, 'You are a Ph.D. student, this is your research. I can only recommend something to you but you have to do everything you want, you have to choose what you want to do.' He always says this to me. I didn't like this actually because this is like being responsible...He told me that if he train me like this, this is better for my future...if I do this decision[s] on my own."

The guidance that Trisha's advisor provided in research and the program allowed her to self-manage. Trisha's interview indicated that her advisor offered a guided approach that did not infringe, but rather pushed Trisha to be autonomous throughout her graduate experience. We see clear evidence of this in her description of her advisor's statements of choice within her research, *"you have to choose what you want to do."* Rather than having Trisha do an experiment in a manner that he saw fit, the advisor told Trisha she should make the final decision according to her own expertise. Ultimately, she seemed to have internalized this perspective as she repeatedly expressed that she did what she preferred, *"if I wanted to do that, I did that."* Guided development of autonomy allowed Trisha to identify as an autonomous researcher and in turn motivated her to persist through her responsibilities. She elaborated on this notion when asked if she experienced difficulty in her program.

“No, it’s not difficult for me actually...I think it depends to my professor, he was really easy going professor...if I had any questions, I went to him and then I ask him the question, but otherwise, I did whatever I wanted to do. It was very easy for me and I was very interested in the subject so it helped me, like, I was very motivated to do the research”

The guided development of autonomy that reinforced Trisha’s EDS identity, directly contributed to her perception of ease in her program. Furthermore, Trisha is the only participant that describes her graduate experience as *“not difficult,”* despite having experienced challenges in her research. Our analysis revealed evidence of autonomy, the origin of a person's behavior,¹⁴ as being a necessary component of identity congruence. The resulting high autonomy from her doctoral experience enables Trisha to utilize *her* identities throughout the course of her degree program. By enacting these identities, Trisha is able to determine their congruence within her engineering doctoral program (here high congruence). These findings mirror previous results that indicate autonomy support and structure foster students’ perceptions of control and elicit effort and enjoyment of academic tasks.¹⁵

Edward:

In contrast to Trisha who had the freedom to decide what her tasks were and how to pursue them, Edward’s advisor gave him the tasks he must complete, but limited his choice on how to complete the assigned tasks. Specifically, Edward’s advisor expected self-sufficiency and independence, but not autonomy:

“One of my first meetings with my advisor he said, ‘You’re an engineer. You have a master’s, so we expect a lot. You can do many things on your own. We’re not going to teach you everything, you know a lot of it.’”

Trisha’s advisor had discussions with her and made recommendations about her ideas, but left the decisions up to her. Edward experienced an advisor who did not provide structured or supported autonomy, *“will not teach him everything.”* Edward came away from his first meeting knowing that his advisor had high expectations, but would not provide support to meet those expectations irrespective of Edward’s level of competence. Nonetheless, Edward did express some level of autonomy in his work and the precedence that Edward’s advisor set at the beginning of his program is reflected in the structure of Edward’s responsibilities:

“Yeah he gave us a lot of freedom. He gave us the concepts, he gave us assignments, and we have to deliver in whatever way we feel.”

Interviewer: *“For you, is that a nice thing, though”*

“Yeah, to have that freedom, not having him [advisor] coming every day, sending you emails or telling you what to do, or when something is due, that's good. He gives you the task, and it's on your shoulders, and then you are solely responsible for setting up appointments or sending emails saying, ‘We have this due, or we have this presentation, or we have this paper due.’ I think it's also good for him, because he manages 15 or 20 projects. He can't have all 20 projects in his mind all the time.”

This statement indicated that having independence in accomplishing and disseminating a task is Edward's preference but it also demonstrated the burden he feels in not having support, *“it's on your shoulders, and then you are solely responsible.”* Further, Edward viewed these tasks as chosen and administered for him to complete, rather than being chosen by him. That said, he did have some autonomy in that he set the timeline and pace of deliverables and decided how to execute the goal his advisor set based on provided *“concepts”* and *“assignments.”* Having some autonomy still offered some reinforcement of Edward's EDS identity. IBM states that context and relevancy contribute to the identities brought to mind.⁶ In Edward's case, his context was relevant to his identity as an EDS due to being given an opportunity to exercise decision making power about his assigned responsibilities. Additionally, this notion provoked Edward to take on a sense of pride and bolstered his perception of autonomy as an EDS in that he off-loaded some of his professor's workload by having the capacity to manage himself without ongoing support.

Where Trisha described trying new or different ideas in her research, Edward described his role as taking on some of his advisor's responsibilities: *“he can't have all 20 projects in his mind all the time.”* For this reason, Edward experienced a significantly different kind of advising than Trisha. He had intermediate autonomy as the source of control is his advisor, but he is still expected to be independent and self-sufficient in the deliverable. Additionally, Edward was not able to reach out to his advisor for help as his advisor indicated from the beginning of Edward's program that he should already *“know a lot.”* This discomfort is reflected in how Edward manages difficulty. Discussing his comfort level in approaching students versus professors he states,

“The professors, it's a little different because sometimes I don't want to show that I don't know anything. I always go first to...my classmates and students in my program, and then I go to a professor. It's not the first step to go to a professor... [it's] the last step, the last resource.”

Oliver:

In contrast to the above EDS who had some levels of control over their tasks, Oliver explained that he felt he was fulfilling requirements that were a waste of his time. This was especially evident in the context of his courses,

“Honestly, if I took 84 classes towards my degree, only 10 or 15 maybe are useful... You shouldn’t make grad students take this many classes. There’s no point... I could spend those hours working on something 10 times more productive. My dissertation would look better if I didn’t have to take those classes.”

Regarding his research workload he states, *“You have to put the time in. When they say 20 hours a week... [they mean] 60 hours a week.”* This statement reflects a broad institutional culture of a high workload expectation that is imposed by others and is common within graduate programs.⁴ Oliver also discussed interactions with his advisor in a pessimistic manner,

“My advisor is a different story. He’s by himself. He wants us to do things by ourselves, and that’s what we do. We don’t... we just meet once a week. He will ask me what I’m doing today... and he’ll ask what’s the progress and that’s it. That’s the end of the conversation.”

When initially examined, this quote from Oliver appeared to reflect aspects of autonomy within his work. His advisor expected him to work independently and make progress towards their own goals. But when examining the details of Oliver’s experience it became clear that his advisor expected his students to work exactly as he did: *“How he is, is more like, he’ll ask you... [but] he’ll want you to do what he says.”* This expectation of independent work done in a prescribed manner revealed a subtle distinction between autonomy and independence. In this study we distinguish independence to be the act of carrying out tasks solely by the individual where tasks may be assigned by others, where autonomy is the carrying out of a task driven by one’s own desires.¹⁶ Oliver is not necessarily granted the choice in what he works on. Oliver is allowed to work independently, but the task he completes and how he completes them are controlled by his advisor.

Oliver’s discussion of his experience provided a clear distinction of the low autonomy he faces compared to Trisha’s high autonomy and Edward’s intermediate autonomy in the context of research. It is important to note that throughout his interview, Oliver seemed to be the most cynical and disillusioned with his experience. This may be a consequence of his perceived low autonomy in multiple aspects of his program. Further Oliver’s low autonomy did not reinforce

his identity as an EDS, but instead served to dissuade his EDS identity as he is not being allowed the opportunity to apply what he learns to the extent that Trisha does.

When examined across each participant these results indicate that the student-advisor relationship influences the ways in which EDSs perceive their level of autonomy. The level of control over their choices in their tasks undertaken during their doctoral experience serves to influence the ways students view themselves and ways their identities fit into the program. The conversations of Vince, Edward, and Trisha serve demonstrated a level of autonomy (from intermediate to high) in their experiences. All three of these participants indicated a level of congruence in their identities with the tasks they are undertaking. In contrast, Oliver displayed low levels of autonomy and expressed a level of disillusionment with the Ph.D. process. Oliver's low autonomy, as fostered by his advisor's expectations of Oliver "doing what he says", shows that some EDSs may have limited opportunities to develop and explore the congruence of their own identities. Limited identity development and checking of congruence can lead students to view tasks as pointless⁶ or to spend less time working to understand the material.⁸

Summary of Findings

The importance of identity congruence was reflected throughout each of our participants. Results demonstrated that when participant identities were congruent with their doctoral programs they were more motivated to pursue doctoral level tasks and work through challenge (Theme 1). Additionally, when students expressed a level of control or autonomy over their work they noted that their identities were more likely to be perceived as congruent with their doctoral programs. When students expressed little to no perceived autonomy they discussed the negative aspects of their doctoral programs and did not express how their identities were congruent with their doctoral programs (Theme 2). Moreover, the desire to make a social contribution presents an opportunity to deepen the existing interests of EDS in a manner that is identity-congruent and establishes a sense of autonomy for students. Our findings indicate that this may be one direction that engineering doctoral programs and advisors can steer students in their research to motivate them in their degree completion. Further the multifaceted identities that EDSs balance (student, teacher, researcher) need not conflict with their identity as an EDS. Instead they can serve to reinforce and align with their salient EDS identities. Secondly, our analysis exposed the need to implement advising of guided autonomy to allow students the opportunity to apply what they have learned and to experience the decisions they will have to make in industry or academia after graduation. Our small sample may provides some evidence for transferability and is supported by results of previous literature. Previous literature has identified the need to "facilitate students' personal autonomy by taking the students' perspective; identifying and nurturing the students' needs, interests, and preferences; providing optimal challenges; highlighting meaningful learning goals; and presenting interesting, relevant, and enriched activities".¹⁵ Not doing so may instead

be leading to feelings of discontent thus contribute to high attrition rates of EDSs. However, continued work is need with EDS to better understand how these experiences transfer to other environments.

Future Work

This is one of the first studies that has attempted to make sense of the EDS experience from the IBM perspective, as well as from the IBM and autonomy perspective. Given our findings, future work should consider investigating the EDS experience from the lenses of motivation and identity, especially as our participant pool was small and limited to one university. Additionally, future work should consider observations of EDS in day-to-day tasks. Ryan¹⁷ argues that “observations are the primary data for making inferences about the motives and autonomy of others.” Observations may reveal findings that our analysis was not able to identify. Observations may also determine how high and low levels of autonomy within program perceptions shape EDS identities and motivation towards tasks to persist through to degree attainment.

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