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# Board 116: Experiences of Engineering Students with Disabilities

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**Experiences of Engineering Students with Disabilities in the Accommodations Process**

**Background and Motivation**

Students with disabilities attend higher education institutions, but the exact number is not clear. In the 2019-2020 academic school year, 21% percent of undergraduate students reported having a disability, of which eight percent were formally registered as having a disability with their institution (Postsecondary National Policy Institute (PNPI), 2022). These numbers are an underestimation. Disabled students may not be disclosing their disability or even taking a census or survey in the first place. Thus, a potential "hidden" group of students are navigating higher education institutions that are not always set up to be accessible and inclusive. When specific concerns arise, students with identified disabilities are directed to a student disability office. These disability services units at higher education institutions provide support and resources for students with disabilities, such as academic and technological accommodations, *but* students must make the first contact to request help themselves. Some students may make the decision to not disclose their disability to the college at all, or only to certain people at certain times (Lindsay et al., 2018), or may not be aware such a unit exists or can help them (Cole & Cawthon, 2015; Lindsay et al., 2018; Postsecondary National Policy Institute (PNPI), 2022). Awareness and trust in these spaces is important, as the supports disability service offices provide can have positive impacts on a student's academic journey (Blasey et al., 2022; Dong & Lucas, 2016; Kim & Lee, 2016). Still not all students with disabilities are able to use such support. Barriers such as stigma, negative reactions from faculty and peers, and tensions trying to control how aspects of one's identity are perceived can prevent students from requesting and using accommodations in their classes (Briel & Getzel, 2001; Mamboleo et al., 2019). The choice whether to disclose or use accommodations or not should be up to the personal discretion of the student, not fear or the temperament of faculty.

**Research Questions**

My research questions are aimed at understanding the instructional and attitudinal influences on students requesting and using accommodations, with the intention that these findings can help faculty work to create a supportive classroom environment for students.

1. What are the experiences of engineering students with disabilities in the accommodations process?
2. What are the common ways engineering instructors speak about and engage with students about disability topics?

**Positionality**

As an engineering student with a disability who has participated in the accommodation process in my undergraduate and graduate studies, I have operational and experiential knowledge of the accommodation process and disability service centers at two public R1 universities. I am aware that my own experiences may bias my interpretation of student data and their descriptions of their own positive and negative experiences. Additionally, my own experience being unsure of my own disability influenced the decision to include "unsure" options in the survey.

**Literature Review**

Literature on students with disabilities in higher education is mostly on the general student population. Less research is conducted on academic disciplines such as STEM, and even less specifically study students in engineering (Spingola, 2018). The exact number of students with disabilities in engineering is unknown, but a NSF report found eight percent of Science and Engineering Bachelor degree recipients in 2021 to have a disability (National Center for Science and Engineering Statistics, 2023). Before this research was conducted, I completed a systematically organized scoping review on experiences of engineering students with the accommodation process. I found engineering student experiences in the accommodation process to be mostly negative. Across eight of the twelve studies explored in the review, students reported having negative experiences with faculty when asking for accommodations. These experiences include having an instructor argue about the need for the accommodations (Beddoes & Danowitz, 2022), not being believed (Zongrone et al., 2021), and an instructor using derogatory or stigmatizing language about disability (Pfeifer et al., 2021). This is in line with other studies, that suggest negative experiences prevent students from requesting accommodations in the future (Cole & Cawthon, 2015; Salzer et al., 2008). On the other side, positive experiences with professors and having professors with positive demeanor (kind or helpful) makes students more likely to disclose their disability (Cole & Cawthon, 2015; Mamboleo et al., 2019), and seek help from student services (Hartman-Hall & Haaga, 2002). The technical, detailed-oriented nature of engineering as a field may also prevent students from seeking help. Fiona Campbell (2020), identifies technicism as a tool for humiliation. Universities use procedures and policies to surmise compliance with accessibility laws and requests, but in reality many of the "accessible" structures (physical and not) are actually inaccessible. Students will not want to seek help from a process where they find themselves degraded.

**Frameworks**

*Critical Disability Theory* The main guiding framework that informs my study is Critical Disability Theory (CDT). CDT is interpreted differently depending on the researcher and the context of the study, but the main tenets that form the basis of CDT are 1) disability is fluid and dynamic, 2) local knowledge is used to study lived experiences of disabled individuals, 3) emancipation, human rights, and social justice are valued and 4) a relationship between impairment, the environment, and disability exists (Evans et al., 2017). The fourth tenet produces a model of disability that is similar to the social model (i.e. considers environment) but compensates for what the social model is lacking with an acknowledgement of the embodiment of disability through impairment (i.e. the bodily experience is not separate from the social/environmental). Not every researcher interprets or uses CDT in the same way, but most seem to agree with the tenets described by Evans et al. (2017).

In my study I will use CDT to study the experiences of engineering students with disabilities in the accommodations process. I follow the main four tenets by 1) defining disability in a broad manner that is not restricted to medical interpretations and acknowledges the dynamic complexities of disability, 2) using local knowledge of students who use accommodations, 3) analyzing power structures that contribute to ableist policies and impact student experience, and

4) recognizing the relationship between impairment, disability, and environment (i.e., using an expanded version of the traditional social model that acknowledges embodiment).

**Methods**

This research project uses a mixed methods approach consisting of two main components 1) a survey of undergraduate engineering students, and 2) the analysis of lecture recordings and syllabi from engineering courses. This paper will explore the initial findings from component 1.

*Component 1: Survey of Undergraduate Engineering Students* Surveys containing the Attitudes Towards Requesting Accommodations (ATRA) scale (Barnard-Brak et al., 2010) (not discussed in this work in progress) and free response items was distributed to approximately all 7,600 undergraduate engineering students at a Midwest, R1 institution regardless of registration with disability services. Approximately 137 students completed the survey in full from eleven majors within the College of Engineering. An additional 63 participants completed survey portions.

Free response items include questions asking about both positive and negative experiences with instructors and examples of things done or said that made the participant uncomfortable or comfortable in the accommodation process. Additional questions asked students if they have an impairment that affected their educational experiences, identify as having a disability, and major. Similar to Fox et al., (2022), we use two methods of defining disability (self-identification as having a disability and of having an impairment that impacts education), and include "unsure" options in the survey. Doing this provides more freedom for participants to describe and define their own experiences that exist outside the typical binary.

**Discussion of Preliminary Analysis and Results**

139 students completed the survey in full, with additional students completing only some portions (e.g. answering ATRA scale questions but not open response). 147 students indicated their major on the survey. Students from sixteen out of eighteen majors responded to the survey, with the majority of students being from Biomedical Engineering or Mechanical Engineering (Table 1). No students from Data Science or Naval Architecture and Marine Engineering completed the survey. Two students indicated their major was not listed.

**Table 1. Participant's Major in College of Engineering.**

| Major | % | n |
|---|---|---|
| Mechanical Engineering | 23.29% | 34 |
| Biomedical Engineering | 22.60% | 33 |
| Computer Science | 9.59% | 14 |
| Chemical Engineering | 7.53% | 11 |
| Industrial and Operations Engineering | 6.16% | 9 |
| I have not declared a major yet | 5.48% | 8 |
| Electrical Engineering | 4.79% | 7 |
| Computer Engineering | 4.11% | 6 |
| Environmental Engineering | 3.42% | 5 |
| Engineering Physics | 2.74% | 4 |
| Aerospace Engineering, Robotics | 2.05% | 3 |

| | | |
|---|---|---|
| Materials Science and Engineering, Nuclear Engineering and Radiological Sciences | 1.37% | 2 |
| Civil Engineering, Climate and Meteorology, Space Science and Engineering | 0.68% | 1 |
| Data Science, Naval Architecture and Marine Engineering | 0 | 0 |
| Total | 100% | 146 |

Of the 146 students who indicated a major, 23 participants reported identifying as having a disability, 61 students reported not identifying as having a disability, 18 students were unsure, 30 students answered sometimes, and 7 preferred not to answer. Furthermore, 50 participants reported having an impairment that affected their educational experience, 26 reported no, 14 were unsure, 19 reported sometimes, and 4 participants preferred not to answer.

Most of the students who completed the survey did not identify as having a disability, despite 69 students reporting they have or had an impairment. Disability identity is complex. Individuals may not want to attribute the "disability" label to themselves or not be considering non-apparent disabilities as disabilities. Additionally, some impairments fluctuate in symptoms and severity, and thus some participants may not identify as disabled because it is not a consistent experience. This result aligns with Wood (2017), that some students do not want to be "defined by their disabilities," and thus may not identify as disabled but be registered with disability services.

*Experiences of engineering students with disabilities in the accommodations process*

Students were asked about positive and negative experiences, and supportive or unsupportive actions. Participants then had the opportunity to describe these experiences. Around 140 students responded to questions about their experiences. 40 students described having a positive experience, while 67 students reported not having positive experiences in the accommodations process. 22 students reported having negative experiences, while 104 students reported not having negative experiences in the accommodations process. These results are summarized in tables 2-3.

**Table 2. Student positive experience(s)**

| Theme | n | Example comments |
|---|---|---|
| Emotional Support | 23 | "[Saying] I am there for you, take all the time you need, I am listening."<br><br>"It's also fantastic when the professor gives us reassurance that it's okay. . ." |
| Informational Support | 35 | "They went in-depth about it and talked about it on the first day of classes, and they made sure people with accommodations won't be uncomfortable. . ."<br><br>"They included resources related to SSD in their syllabus and either explicitly explained in class where to submit accommodation requests or sent an additional email to clarify." |
| Normalizing Accommodations | 5 | "Professors treated requests as if they were no big deal/no problem. It made it feel like it was a normal thing to do . . ."<br><br>"The way the professor treated it as a "normal" situation rather than an unusual or "weird" request also helped ease my anxiety and made it a positive experience." |

**Table 3. Student negative experience(s)**

| Theme | n | Example comments |
|---|---|---|
| Refusal | 12 | "The professor would not allow me to have accommodations and I had to bring in the SSD office so they could talk to the professor." |
| | | "…professors outright refused to accommodate them or made fun of them for needing the accommodations." |
| Technicism | 8 | "[Student when asking about accommodation options] told that without a diagnosis [student is] completely on their own." |
| | | "They said they had to give accommodations per policy, using a dismissive tone, which to me indicated that they wouldn't have provided accommodations if given the option not to." |
| Instructor Invalidation | 6 | "I've had a professor ask if I actually needed one of my accommodations…" |
| | | "They said that they don't believe mental problems really exist." |
| Perceived lack of care | 5 | "…the way that professors talk [about accommodations] leads me to believe they do not care about accommodations . . . Sometimes it appears they are only saying these things because it is required by the University…" |
| | | "The discussions [about accommodations] felt one sided and I felt brushed-off. A problem they had to deal with." |
| Lack of clarity on procedures | 3 | "It isn't very clear what constitutes an opportunity to ask for accommodations, and professors don't offer this information without asking for it. . ." |

## Moving Forward

Due to the complex nature of identity, we are in deliberation about how to group students for further analysis. Currently, we are considering grouping students by "students with disabilities and/or impairments" and "students who do not have disabilities and/or impairments." Students who answered "yes" or "sometimes" to the disability identity or impairment question are included in the "students with..." group. Students who answered "no" are included in the "students who do not..." group. These groupings will not perfectly represent student personal identities but will be made for the purpose of exploring experiences specific to disabled students and students who have impairments (that may be disabling) but do not identify as disabled.

## Conclusions

The way instructors respond to accommodation requests or disability disclosures is noticed and felt by students. Students are able to identify specific actions and language used by instructors that makes them feel supported and comfortable in the accommodations process, as well as actions and language that makes them feel unsupported and uncomfortable. The top ways we have initially found in our study that instructors can support students is through emotional support, informational support, and the normalization of accommodations and disability in the classroom. The positive experiences often had equal negative counterparts. Invalidation and lack of care can be viewed as opposites of emotional support. Further work will help illuminate more specific differences between supportive and unsupportive actions and language.

## Acknowledgements

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