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Disabled Student Experiences in Engineering Undergraduate Programs: A Scoping Literature Review (WIP)

Dr. Rachel Figard, University of Georgia

Dr. Rachel Figard is an Assistant Professor at the University of Georgia in the Engineering Education Transformations Institute (EETI) and the Department of Environmental, Civil, Agricultural, and Mechanical Engineering (ECAM). Her primary areas of research include disabled student experiences, design justice, the impact of institutional policy and practice on student experience, and accessible user experience design. She received a Ph.D. in Engineering Education Systems and Design from Arizona State University (ASU), an M.S. in User Experience from ASU, and a B.S. in Industrial Engineering from North Carolina State University.

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Abstract

This work-in-progress details the methods from a scoping literature review (ScLR) conducted to elucidate the current landscape, trends, and potential gaps in the literature surrounding the experiences of disabled students in engineering undergraduate programs. The study was grounded in four central inclusion criteria: (1) disabled student, (2) engineering education, (3) lived experience, and (4) undergraduate education. These criteria were used to search the existing literature in online databases. The database search was conducted twice and resulted in a total of 6,388 publications. After removing duplicates, 5,794 publications remained for analysis. Each publication then undergoes a three-stage screening process (title, abstract, full-text). This project is currently in the third round of the screening process, with 167 publications remaining for full-text review. Findings from this analysis will help reveal key themes, persistent barriers, and areas where further research is needed to better support disabled students' access, retention, and success in engineering undergraduate programs.

Keywords: *Disability, Disabled Students, Students with Disabilities, Undergraduate, Engineering, Lived Experience, Scoping Literature Review, ScLR*

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Introduction

Disabled students[1] in engineering education navigate an academic and professional landscape shaped by deeply ingrained ableist ideologies that equate physical and cognitive "normalcy" with intelligence, motivation, and success [1]. These beliefs are reinforced by the pervasive "ideal worker" norms within engineering education, which valorize full-time, high-intensity workloads and frame physical and mental endurance as essential qualities of a "successful" engineer [2]. Within this framework, faculty, staff, and administrators often act as gatekeepers, consciously or unconsciously reinforcing exclusionary attitudes that diminish the perceived capabilities of disabled students [3]. This systemic devaluation not only limits opportunities for disabled individuals but also creates structural barriers that hinder their access, retention, and success in engineering fields [4–6].

Despite these challenges, much of the existing research on disabled students in higher education prioritizes institutional interventions over the direct voices and experiences of disabled students themselves. As a result, the lived realities of disabled students in engineering remain underexplored, including the systemic obstacles they navigate and the strategies they employ to persist.

To address this gap, this paper presents the methods and preliminary findings of a scoping literature review (ScLR) aimed at mapping the current research landscape on disabled student lived experiences in undergraduate engineering programs. This review seeks to identify recurrent themes, methodological approaches, and potential gaps in the literature, providing insights that can inform future research and policy efforts. Specifically, the following research question guides this work:

What is the current literature landscape around disabled student experiences in undergraduate engineering programs in the U.S.?

Methods

Methodological Overview

This paper uses a Scoping Literature Review (ScLR) to explore the current literature related to the lived experiences of disabled students in undergraduate engineering programs within the United States. The goals of this study are to identify key themes and trends in the research, uncover persistent barriers and systemic challenges faced by disabled students, and examine gaps in the existing body of knowledge.

[1] In alignment with other disability scholars and activists, identity-first language is used in this paper to emphasize the identity and experiences of a collective group (e.g., Andrews et al., 2019; Brown, 2011; Okundaye, 2021). However, both person-first and identity-first language were used in the search query to a) expand the number of search results and b) reveal if there are any trends or differences between literature using person-first versus identity-first language.

Scoping Literature Review (ScLR) Protocol

Scoping Literature Reviews (ScLRs) are conducted to map the research landscape within a specific content area, providing an overview of existing literature and identifying gaps for future inquiry. This method differs from systematic literature reviews in its flexibility and broader research focus, as ScLRs aim is to synthesize and summarize literature without the rigid formalized structure of systematic reviews [7–10]. ScLRs are particularly effective for quickly identifying key concepts, evidence, and trends relevant to a defined research question [7, 10].

The ScLR follows the methodology presented by Arksey and O'Malley [7], which breaks the process into five stages: (1) identifying the research questions, (2) identifying the relevant studies, (3) study selection, (4) charting the data, and (5) collating, summarizing, and reporting the results. These stages were performed iteratively to allow for researcher reflection along each stage.

Stage 1: Identify Research Questions

The purpose of this study is to engage with current engineering education literature to explore the lived experiences of disabled students in undergraduate engineering programs. By examining this body of work, the study seeks to illuminate the barriers and systemic challenges these students face, identify supports that contribute to the success and inclusion of disabled students in engineering education, and highlight opportunities to create more inclusive educational environments. Thus, the research question guiding this ScLR is the following:

What is the current literature landscape around disabled student experiences in undergraduate engineering programs in the U.S.?

Stage 2: Identify Relevant Studies

To further guide our ScLRs, we utilized this study's research question and goals of this study to outline four main inclusion criteria to find relevant studies:

1. The literature must focus on students who identify as disabled, including those with physical disabilities, neurodivergence (e.g., ADHD, Autism), chronic illnesses, sensory disabilities (e.g., Deaf/hard of hearing or blind/visually impaired), non-apparent disabilities, and apparent disabilities.
2. The studies must examine aspects of undergraduate engineering education, including but not limited to in-classroom experience, socialization, or curricular, pedagogical, or institutional practices within undergraduate engineering programs.
3. The research must emphasize the expressed and articulated experiences of disabled students.
4. The literature must focus on four-year undergraduate institutions or programs within the United States

Additional inclusion and exclusion criteria related to publication specifics (e.g., publication type, publication date, language published in) are summarized in Tables 1 and 2. These criteria guided our search for existing literature in the following online databases: Engineering Village (Compendex, INSPEC), ProQuest (ERIC, Education Database), EBSCOHost, Scopus, ASEE PEER, and IEEE Xplore. A generalized search query was created (Figure 1) for the databases to ensure consistency in the searches across databases. Databases were searched individually, and results were exported to a spreadsheet application (Google Sheets) to prepare for study selection. The database search was in two rounds, first in September 2024 and last in January 2025, and resulted in 6,388 publications. After removing duplicates, 5,794 publications remained for study selection and analysis.

Table 1

Central Inclusion Criteria

Central Inclusion Criteria	**Working Definition**	**Synonyms**
Disabled student	A student who identifies as disabled, including those with physical disabilities, neurodivergence (e.g., ADHD, Autism), chronic illnesses, sensory disabilities (e.g., Deaf/hard of hearing or blind/visually impaired), non-apparent disabilities, and apparent disabilities.	Disability, students with disabilities, people with disabilities, disabled person, disabilities, disabled, neurodiversity/neurodiverse students, adhd, physical disabilities, Deaf/hard of hearing, blind/visually impaired, chronic illness, invisible disability, visible disability, hidden disability, non-apparent disability
Engineering education	The experiences that occur within engineering disciplines or academic programs. This may include pedagogical approaches, mental health experiences, peer socialization, experiences with faculty, etc.	Computer science education, CS education, STEM education, engineering, STEM, agricultural engineering, biological engineering, biomedical engineering, BME, chemical engineering, ChemE, computer engineering, computer science, CS, civil engineering, electrical engineering, electrical and computer engineering, environmental engineering, ECE, human systems engineering, HSE, industrial engineering, IE, manufacturing engineering, material engineering, mechanical engineering, MechE, mining engineering, nuclear engineering, petroleum engineering, software engineering, systems engineering, textile engineering
Lived experience	Disabled students' articulated experiences, accounts, and perspectives of navigating engineering education as disabled individuals.	Experience, barriers, challenges, support, support strategies, accessibility, access

Education level	Undergraduate education	College, university, post-secondary school/education, postsecondary school/education, post-secondary, postsecondary, higher education, undergraduate

Table 2
Additional Criteria

Additional Criteria	Working Definition	Implementation
Publication type	Journal article or conference publication	Database restriction
Written in English	Publication written and available in the English language	Database restriction
Publication year	Dates ranging from January 1, 2009 to January 1, 2025	Publication date was determined by research team during screening
U.S. institutions	Bachelor's degree granting institutions of higher education (college, university, etc.) location in the United States	Location was determined by research team during screening

Figure 1
Search Query Criteria

“Disabled student” OR “disability” OR “disabilities” OR “disabled” OR “neurodiverse” OR “neurodivergent” OR “ students with disabilities” OR “people with disabilities” OR “persons with disabilities” OR “disabled person” OR “disabled people” OR (“disabilities” AND “student”) OR (“disabled” AND “student”) OR (“neurodiverse” AND “student”) OR (“neurodiversity” AND “student”) OR (“learner” AND “disability” OR “disabled” OR “disabilities”)
AND
“engineering education” OR “engineering” OR (“engineering” AND “education”) OR “computer science education” OR “CS education” OR ((“engineering” OR “computer science” OR “cs”) AND “education”) OR “STEM education” OR (“STEM” AND “education”) OR “STEM” OR “computing education” OR (“computing” AND “education”) OR “agricultural engineering” OR “biological engineering” OR “biomedical engineering” OR “BME” OR “chemical engineering” OR “ChemE” OR “computer engineering” OR “computer science” OR “CS” OR “computing” OR “civil engineering” OR “electrical engineering” OR “electrical and computer engineering” OR “ECE” OR “environmental engineering” OR “human systems engineering” OR “HSE” OR “industrial engineering” OR “IE” OR “manufacturing engineering” OR “material engineering” OR “mechanical engineering” OR “MechE” OR “mining engineering” OR “nuclear engineering” OR “petroleum engineering” OR “software engineering” OR “systems engineering” OR “textile engineering”
AND
“Lived experience” OR “experience” OR “barriers” OR “challenges” OR “support” OR “support strategies” OR “accessibility” OR “access” OR “ableism” OR “ableist” OR “anti-ableist” OR “accommodations”
AND
“college” OR “university” OR “post-secondary” OR “postsecondary” OR “post secondary” OR “higher education” OR “undergraduate” OR “undergrad”

Stage 3: Study Selection

A three-round screening cycle was employed to select the studies: (1) title screening, (2) abstract screening, and (3) full-text screening. A screening tool was created to standardize study selection using the inclusion and exclusion criteria. During the review, papers were noted if the study would be included in the next screening cycle and, if not, the reasons why (defined by the inclusion criteria that were not met).

Initially, papers were assessed based on relevance to the research question using predefined inclusion and exclusion criteria. To ensure reliability, the screening process was conducted collaboratively by multiple researchers. During the title and abstract screening, each paper was independently reviewed by two members of the research team. In cases of disagreement, a third member reviewed the study, and final decisions were made by consensus.

The first two rounds of the screening cycle have been completed. From the title screening, 1,598 publications moved to the abstract screening stage. 167 publications moved from the abstract screening stage and are currently in the third stage of full-text screening. In the full-text screening stage, three members of the research team are independently reviewing each article.

Preliminary Insights: Exploring Trends in Excluded Studies

Although this ScLR is still in progress, preliminary analysis of excluded studies reveals key trends that highlight prevailing research priorities and assumptions within engineering education. Notably, many of the excluded studies focus on ***(1) interventions rather than lived experience*** and ***(2) framing disabled individuals as "engineered for" rather than as engineers***. These trends reflect broader patterns in how disability is conceptualized within engineering education research and underscore the need for more critical, justice-oriented approaches.

Emphasis on Interventions Over Lived Experience

A significant portion of excluded studies focus on interventions, technologies, and institutional programs designed to support disabled students in engineering education. While interventions are crucial for ensuring access and success, these studies often frame disability as an individual deficit to be mitigated, rather than interrogating the systemic ableism embedded within engineering education.

For instance, many papers assess the effectiveness of assistive technologies, classroom accommodations, or faculty training programs. However, few of these studies incorporate the direct voices and perspectives of disabled students – instead relying on course performance metrics or faculty perspectives to evaluate success. This approach mirrors a broader trend in disability research where solutions are imposed on disabled individuals rather than developed with them. The exclusion of studies that foreground disabled students' lived experiences reveals a critical gap in the literature: a need for research that prioritizes how disabled students themselves perceive, navigate, and challenge barriers within engineering education.

Disabled People as "Engineered For" Rather than "Engineers"

Another pervasive theme among excluded studies is the framing of disabled people as subjects of engineering design rather than as active participants within engineering education and/or design. Many of these papers describe undergraduate engineering design projects in which students develop assistive technologies or other accessibility-related solutions for disabled individuals. These projects are often justified on the grounds that they promote "empathy building" and enhance students' socio-technical skills. In this framing, empathy building is produced as a byproduct rather than a partnership. When the project's purpose is helping non-disabled students develop awareness of disability and accessibility, this positions the learning experience of the privileged group at the center rather than the agency of disabled individuals.

So, while such projects may promote awareness of accessibility and inclusion, they also promote a one-directional model of assistance, in which disabled people are positioned as passive beneficiaries of engineering rather than as engineers themselves [11]. This framing risks reinforcing an ableist paradigm in which disability is viewed as an external challenge to be solved by engineering, rather than (1) acknowledging the agency, expertise, and participation of disabled individuals within the field and (2) challenging deeper ableist assumptions about who holds knowledge and power within the design process

Conclusions, Limitations, and Future Work

These findings underscore the need for more research that actively foregrounds the perspectives of disabled students and critically examines the ways engineering education reinforces systemic ableism through both its research priorities and pedagogical practices. Future work should also explore how engineering education can shift from viewing disabled individuals as subjects of design to recognizing them as full participants within the discipline.

The next steps of this ScLR involve advancing to the full-text screening phase, where the remaining 167 publications will undergo a thorough review. Prior to commencing this stage, the research team will meet to refine and finalize the inclusion and exclusion criteria to ensure clarity and consensus. A full-text screening tool will be developed and pilot-tested on a subset of publications to streamline the decision-making process and enhance consistency among reviewers. Upon completion of the study selection stage, the team will progress to the charting the data phase, followed by collating, summarizing, and reporting the results. This process will include a comprehensive analysis of the literature to identify prominent themes, theoretical frameworks, and gaps within the research landscape. The findings from this ScLR will culminate in a publication aimed at revealing key themes, persistent barriers, and areas where further research is needed to better support disabled students' access, retention, and success in engineering undergraduate programs.

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