Work-In-Progress: Intersectionality, (Re)Defined: A Scoping Review of Intersectionality in the Journal of Engineering Education

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Abstract

The experiences of engineering students with multiply marginalized identities have gained increasing attention from engineering education researchers and practitioners, as they face unique oppressions due to their interlocking identities. In exploring these experiences, researchers and practitioners have often marshalled the theoretical construct of intersectionality to explain multiply marginalized students' experiences. Intersectionality, first coined by Black feminist scholar Kimberlé Crenshaw in 1989, generally refers to conceptualizing the experiences of multiply marginalized people not as a sum of marginalization brought upon by each identity, but as a unique product of all the interlocking oppressions they face as multiply marginalized people [1]. However, as the term has become more popularized and mainstream, definitions of intersectionality – and what it means to do (or not do) "intersectional" research – have shifted over time [2]. Since its first use in engineering education literature in 2009 [3], intersectionality has gained steadily increasing prevalence in engineering education research, highlighting the need to unpack its definitions, meanings, operationalization, and utilization within the context of engineering education.

In this paper, I introduce a brief history of intersectionality's radical roots and evolving definitions in queer Black feminist activism, identity politics, and social justice efforts. Then, I showcase a subset of a broader, on-going mixed-methods scoping review on intersectionality's definitions and usage in the engineering education research literature over time. Drawing from a dataset of 25 journal articles published in the *Journal of Engineering Education* between 2011 and 2022, I analyze word frequencies, types of studies, and contexts in which intersectionality is summoned using descriptive statistics and qualitative coding. These results suggest the need for two key considerations in future engineering education research engaging in intersectionality: first, a reframing of intersectionality as a theory about structural systems of power, privilege, and oppression rather than individuals with multiply marginalized identities, and second, a call for researchers to intentionally situate intersectionality within systemic oppression, social justice, liberation, and solidarity/coalition-building frameworks.

Introduction

As research exploring marginalized groups in engineering education has increased, new methods and theories from across the disciplines have emerged to provide new insight into how marginalized groups navigate broader systems and cultures of engineering. From education to sociology to feminist and critical theories, these perspectives help researchers, practitioners, and stakeholders in engineering education to engage in complex problems and needs of historically marginalized students in engineering, particularly in the areas of diversity, equity, inclusion, access, broadening participation, and social justice [4], [5]. In addition, they provide new modes

of thought in unpacking the material systems and intangible ruling relations within engineering education that continue to marginalize students [5]. Furthermore, scholars and practitioners have recognized the need to explore the experiences of multiply marginalized students in engineering education, as the intersection of multiple forms of marginalization create unique lived experiences that cannot simply be explained by disaggregating their identities.

Yet despite significant calls to center the voices and theories of historically marginalized students in engineering education research and practice, theories reflecting the experiences of multiply marginalized students remain elusive in engineering education. Oftentimes, multiply marginalized students' experiences are explored through identifying particular marginalized identities within study participants and applying theories of engineering education to their experiences. Other approaches situating certain standpoint theories emerge from single-identity traditions that identify specific identities and deepen understandings of only those facets of identities relevant to those theories. While these approaches are often immensely helpful in developing new knowledge about the experiences of marginalized students, they often do not accurately reflect the unique holistic experiences of multiply marginalized students or consider the intersecting systems of marginalization that these students must contend with.

Intersectionality has gained recent traction in engineering education research as a theory and means to center the lived experiences of multiply marginalized students in engineering. Rooted in critical post-Civil Rights Era scholarship, intersectionality developed alongside critical race theory to further theorizations of multiply marginalized people's, particularly Black women's, experiences of oppression and push for radical liberation [1], [6], [7]. However, as it has entered mainstream academic parlance, some intersectionality scholars have argued that it has been used, misused, coopted, and redefined outside of its historical tradition [8]–[10].

In this paper, I address the research question, "How is intersectionality—as a term, theory, analytical tool, and heuristic—defined, utilized, and applied in engineering education research?" As a first step in exploring this question, I conduct a systematic literature review of 28 articles from the *Journal of Engineering Education* containing the word stem "intersectional" published between 2011 and 2022. This pilot analysis suggests that there is wide variation in how intersectionality is used in engineering education, leading to potential for return, reorientation, and redefinition towards its radical liberatory origins. In this work-in-progress paper, I outline my methods and sketch initial conclusions from the general characteristics of the dataset. Future work will delve into qualitative analysis of the articles.

Background: History of Intersectionality

Brief Timeline of Intersectionality

The term "intersectionality" was first coined by Kimberlé Crenshaw in 1989 to theorize about the violent experiences of Black women in the United States legal system [1]. In its original formulation, Crenshaw described the intersecting oppressions of Black women in the legal system as a traffic junction where systems of racial oppression intersected with systems of gender oppression. Advancing the theory in 1991, Crenshaw argued that intersectionality could take on multiple forms: structural intersectionality, political intersectionality, and

representational intersectionality [11]. The academic development of intersectionality dovetailed with the rise of critical race theory to provide a powerful structural and material critique of systems of oppression [7], [12]. Intersectionality, as one of the primary tenets of critical race theory, highlighted the unique experiences of multiply marginalized people while also grounding theory within material, empirical, activist, and radical liberatory epistemologies [7], [10].

However, the ideological tradition of thinking intersectionally about systems of oppression did not begin with Kimberlé Crenshaw; while Crenshaw's work was significant in naming intersectionality for its use in the academy, it was merely a continuation of many activists' goals of centering multiply marginalized voices in the fight for liberation. In the waning of the 1960s Civil Rights Movement, radical scholars and activists looked for new ways to continue the fight against systems of racial, gender, and sexual oppression. With new efforts of organizing along anti-war movements and second-wave feminism, in 1977, a small group of queer Black women articulated a new set of ideals bringing together their identities and intersectional oppressions to motivate their politics [13]. The Combahee River Collective focused on providing political agency through identity politics; that is, their identities gave rise to their unique politics due to their lived experiences as queer Black women. Written to challenge the (predominately white) feminism of their day, the Combahee River Collective highlighted intersectional politics and activism within a framework of solidarity. Through the 1980s, writers such as Audre Lorde and Patricia Hill Collins highlighted the multitude of ways that intersecting identities gave rise to unique, interlocking, and intersectional forms of oppression [14], [15]. These writings brought intersectionality to the center of activist thought, challenging the previously single-issue politics of groups such as the civil rights movement, the gay/lesbian liberation movement, and second-wave feminism.

Since its roots in activist politics and articulation by Crenshaw, intersectionality has made its way into a wide array of disciplines. Packaged as a tenet in critical race theory, intersectionality arrived in education research in 1995 through the writings of Gloria Ladson-Billings and William Tate [6]. Critical scholars of education applied critical race theory, and critical theories more broadly, to explore persistent inequities in the US education system and ways to counteract the interlocking systems of oppression experienced by students with multiply marginalized identities, such as girls of color [12]. This liberatory strand of education research continues today, where critical education scholars continue to apply intersectionality to examine the intersections of various systems of oppression, such as racism, sexism, and ableism [16]; racism and ableism [17]; and racism, ableism, and carcerality [18]. In addition, critiques of intersectionality have emerged, challenging its dynamic and constantly shifting use in mainstream research [8]–[10]. While a full discussion of intersectionality as a theory is outside the scope of this paper, I encourage readers to engage more deeply with intersectionality through the reference section.

Intersectionality in Engineering Education Research

Engineering education research has a history of drawing from multiple theoretical and intellectual traditions to explore the individual, sociocultural, and institutional processes that create engineering education. Intersectionality is no different. In the past 15 years,

intersectionality has gradually moved to the center of engineering education research, with increasing numbers of publications using the term each year (Fig. 1). Various descriptions of intersectionality have proliferated in engineering education, from situating it within feminist theory [4] to using it as a synonym and signifier for researchers exploring student groups with multiply marginalized identities [19]. This project seeks to unpack and identify the ways in which intersectionality has been used in engineering education research and whether/how they align with Crenshaw's and subsequent articulations of intersectionality.
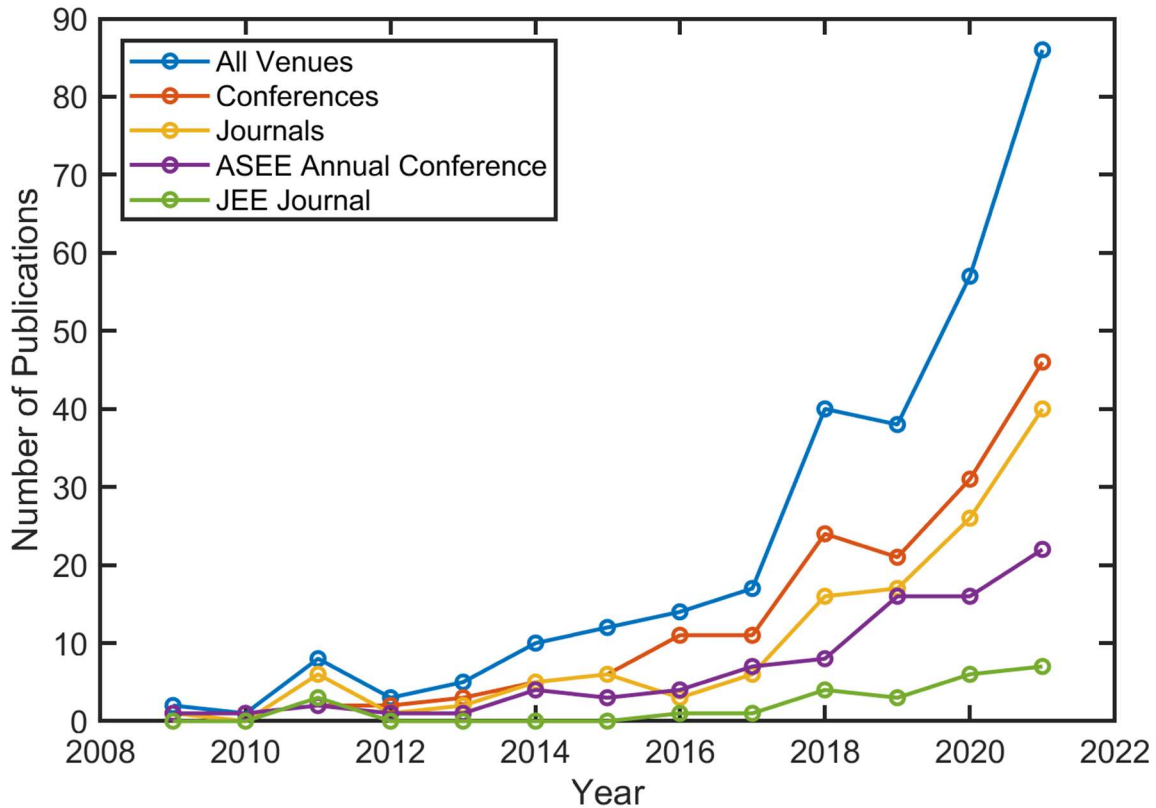

Fig. 1. Plot of the number of publications using the word "intersectionality" in engineering education literature between 2009 and 2021. Total publications equals journal publications plus conference publications. (Total dataset: $n = 372$)

Methods

This project follows the procedures for systematic literature reviews (SLR) outlined in Borrego, Foster, and Froyd [20]. Borrego *et al.* identify the following procedures for conducting a SLR: 1. Identifying scope and research questions, 2. Defining inclusion/exclusion criteria, 3. Finding and cataloguing sources, 4. Critique and appraisal, and 5. Synthesis. Figure 2 showcases a flowchart of the process used to identify and screen articles for this paper, as recommended by Borrego *et al.* and Liberati *et al.* [20], [21]. While this flowchart showcases the search, screening, and selection process as linear, it was highly iterative, as will be discussed in subsequent paragraphs.
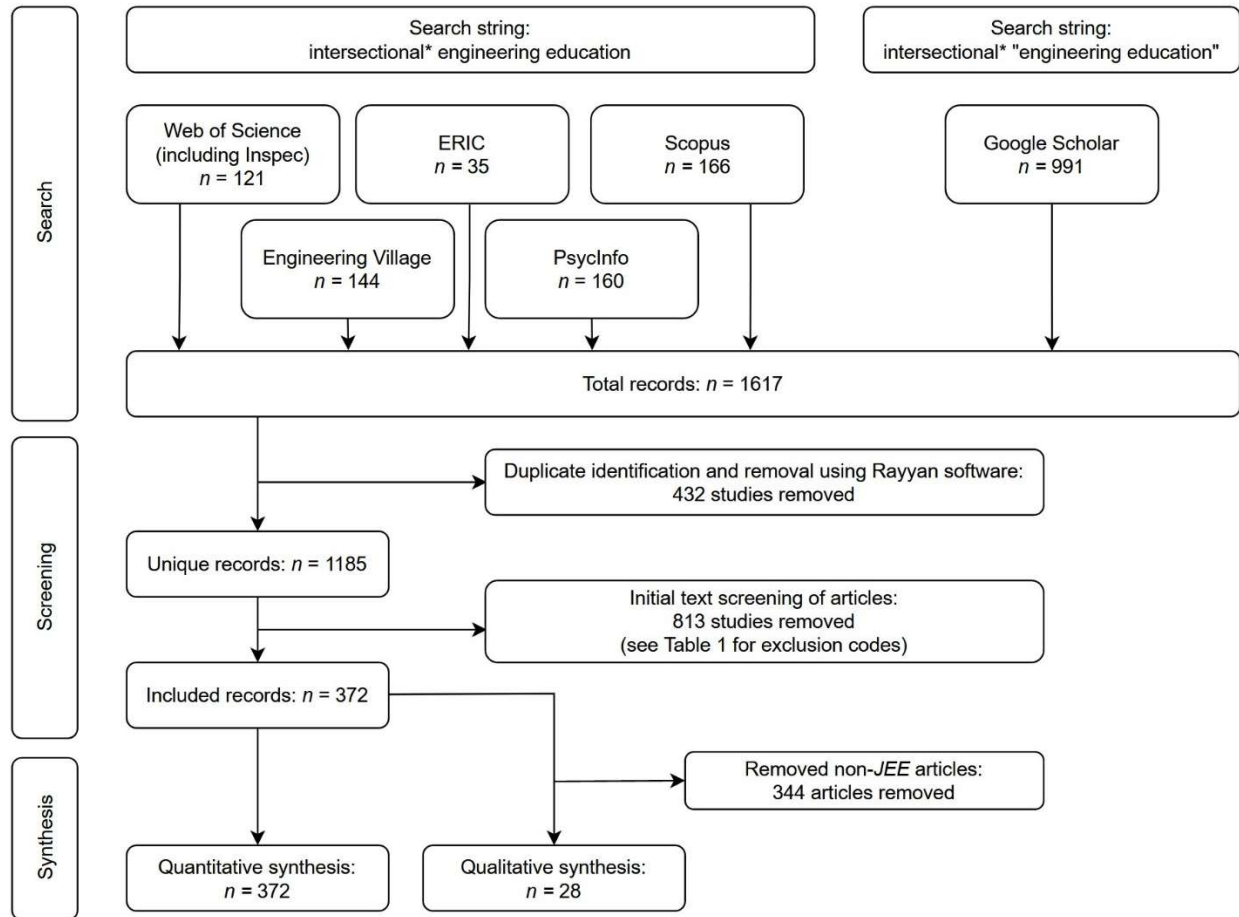
Fig. 2. Simplified flowchart of the search and selection process for qualifying studies. For this paper, I focus only on the qualitative synthesis, with 28 qualifying studies.

Search and Selection Process

The scope and research question were adapted from Harris and Patton, who did a similar systematic literature review of intersectionality in higher education [2]. Given the general research question, I conducted initial *ab initio* searching with Google Scholar to qualitatively assess the amount of literature that could be surveyed and talked to two librarians to identify specific databases that would provide the most relevant articles [22]. This *ab initio* search confirmed that the scope and research question was adequate and well-defined for the study.

Based on the initial search, I defined the following inclusion criteria:

1. Be published as a peer-reviewed journal or conference paper that seeks to present new knowledge about the field. Posters, dissertations, theses, books, book chapters, panels, workshops, editorials, commentaries, paper responses, and other "grey literature" were excluded. Articles that were not yet available were also excluded.
2. Must explicitly mention the term "intersectionality" or its stem "intersectional*" (e.g. intersectionally, intersectional) in the body of the paper at least once. Papers that contained references with the term were excluded.

3. Published between 1989 and 2022 to capture all literature since Crenshaw's articulation. No studies were excluded based on this criterion.
4. Situated within the United States if data was collected. Because intersectionality may be (re)interpreted in different national contexts outside the United States, I limit the scope of papers to work done within the United States (but could be published in an international or non-US venue).
5. Focuses specifically on engineering education and engineering education students and stakeholders, including K-12 students, faculty, and administrators. This criterion excludes studies on engineering professionals or the engineering workplace.
6. Must be labeled with "engineering," not STEM or science/technology studies since disciplinary differences may be obscured under the STEM umbrella term. The exception is "computer science," which is classified by the American Society of Engineering Education as an engineering discipline.
7. Must use "intersectionality" within an identity context. I excluded papers that used terms such as "intersectional disciplines" or "intersectionality of engineering and technology."

With librarians' help, I identified five databases for the search: Scopus, Web of Science, Engineering Village, ERIC, and PsychInfo. These databases were chosen because they were likely to contain articles focused on engineering education. In addition, I used Google Scholar to supplement the database search to ensure that articles that did not use intersectionality in the title, abstract, and keywords were still captured. For the databases, I used the search string "intersectional* engineering education" with the asterisk denoting a wildcard. For Google Scholar, to limit the results to engineering education, I used the search string "intersectional* "engineering education"". The search returned 1617 total records.

During the initial screening stage, I used Rayyan.ai to identify duplicate records and select the articles [23]. Rayyan.ai identified 432 duplicate records, which were removed from the dataset after human verification. After this stage, 1185 records remained to be screened. An additional 9 records were found to be duplicates during the hand-screening process. The screening process was completed by obtaining a digital PDF copy of the article, using the text search feature of Adobe Acrobat Reader to search for "intersectional" in the article, and quickly skimming the article to assess its content, study location, author affiliation, and publication venue. Articles that met the inclusion criteria were downloaded and stored in Rayyan.ai. Additional details about exclusion criteria will be provided in a forthcoming work. After this stage, 372 articles remained in the dataset.

For this work-in-progress paper, I further narrowed the scope by selecting articles published only in the *Journal of Engineering Education (JEE)*. This choice is aligned with Harper and Harris and Patton [2], [24], as JEE is considered one of the "venues that publish most of the empirical research" [24, p. 13] and a leading journal in engineering education and is ranked as the top engineering education-specific journal by Scimago as of December 2022 [25]. Thus, the final dataset for this paper consisted of 28 JEE articles.

Critique/Appraisal and Synthesis

To assess the qualifying studies, I adapted Harris and Patton's article assessment rubric with additional questions and clarifiers based on my understanding of intersectionality [2]. The rubric I used is given in Appendix A. To organize the data, I loaded the rubric into Microsoft Excel and wrote responses to the rubric items, with each row representing one paper. Each qualifying paper was given a close reading to gain a clear contextual understanding of the study purpose and research questions before completing the rubric for the paper, which enabled me to develop a substantial critique and appraisal for each study.

Synthesis occurred in two ways: first, through quantitative means, and second, through latent content analysis of my responses to the rubric items during the critique/appraisal phase [2], [26]. For quantitative analysis, I used NVIVO to search all articles for number of uses of the term "intersectional*" (with the asterisk again representing a wildcard) in each paper. In addition, during the close reading, I identified the type of study (quantitative, qualitative, mixed-methods, or review). These attributes provided additional insight into the characteristics of the dataset. For qualitative analysis, I used latent content analysis to interpret and assign meaning to the items on the rubric, identifying general patterns across the rubric responses [26]. This step enabled me to coalesce the patterns into themes, which I report in the Preliminary Findings section.

Limitations

There are several limitations that impacted the direction of the SLR. First, articles that were forthcoming or not accessible via databases were not included in the analysis. This may lead to additional articles that could possibly have been included in the dataset. Second, databases often only searched the title, abstract, and keywords, which was much narrower than the inclusion criterion of intersectionality appearing anywhere in the body of an article. This may have excluded a significant number of studies relevant to the SLR. Third, often in pre-college contexts, engineering is lumped together with STEM or other umbrella subjects because students and schools may not have structures explicitly labeled as engineering. Thus, higher education studies are overrepresented in this sample and may obscure the ways intersectionality is being applied in pre-college contexts. Fourth, authors who engage in intersectionality work may choose to publish in other, more equity-focused engineering education venues or non-engineering venues versus *JEE*. This impacts this literature review by likely underrepresenting intersectionality work in engineering education, and I use the full corpus of 371 articles in a forthcoming paper to compare the trends in *JEE* to broader disciplinary trends. Despite these limitations, this study sparks additional implications and questions on how intersectionality is/is not/can be used to promote social justice and equity research in engineering education.

Positionality

In line with other critical scholars, I recognize that positionality guides how research is done and how power structures and subject positions may contribute to ways in which I conduct and communicate research [27]. I identify as a critical scholar in engineering education who applies critical theories from a variety of literature bases to inform my work in engineering education. My work often engages with intersectionality, critical race theory, feminist and queer

studies, and sociology to explore and unpack the experiences of marginalized engineering students in higher education. As such, my personal beliefs and epistemologies on the value of intersectionality, equity, social justice, and liberatory perspectives guided my interpretation, critique, appraisal, and synthesis of the studies in this project.

Preliminary Findings

Twenty-eight studies qualified for inclusion in this review. Aligning with Harris and Patton, I do not name the qualifying articles because the goal is to promote discussion and reflection of scholars' use of intersectionality, not to target specific studies or scholars for critique [2]. I also recognize that knowledge and scholarship is co-constructed by scholars across disciplines, disciplinary spaces and contexts and evolves as more research is contributed to the broader scholarly landscape. Therefore, these findings represent a static temporal cross-section of the literature that allows us to begin unpacking scholarly trends with respect to intersectionality rather than focusing on individual studies.

Characteristics of Qualifying Studies

Figure 1 shows the 28 studies' distribution by year. Since 2016, there has been a sharp increase in number of JEE articles using the term intersectionality, with only 3 studies published in 2011 using the term before 2016. While these studies are a temporal outlier in the dataset, I retain them to get an accurate picture of how intersectionality has become more mainstream over time. Figure 3 categorizes the studies by methodological approach. There were an equal number of qualitative and quantitative studies in this dataset. There were only 2 mixed-method papers, and 4 review papers, compared to 11 qualitative and quantitative studies each. Review papers included both systematic literature reviews and more general literature reviews but did not include theory papers that sought to advance a theoretical argument (which did not appear in this subset). This suggests that intersectionality as a term has primarily been mentioned within empirical contexts.
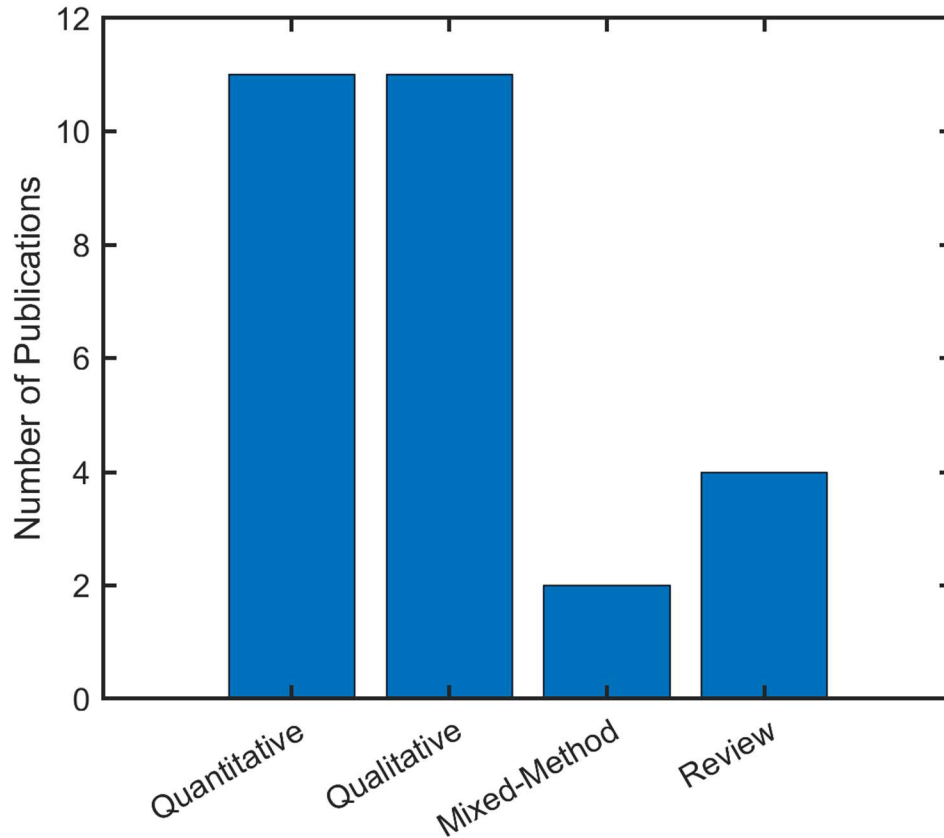
Fig. 3. Bar graph showing the number of publications for each method type.

Examining the number of mentions of intersectionality in each paper in Figure 4, over half (57%) of papers mentioned the term intersectionality less than twice, and only 6 papers mentioned the term more than 5 times. This result may suggest that scholars are not engaging with intersectionality significantly in articles that use the term; I unpack this result in the qualitative synthesis below. There is a likely correlation between the length of the paper and the number of mentions of intersectionality; however, I do not normalize by the length of the paper because normalizing would potentially obscure potential patterns in papers that only mention intersectionality once or twice.
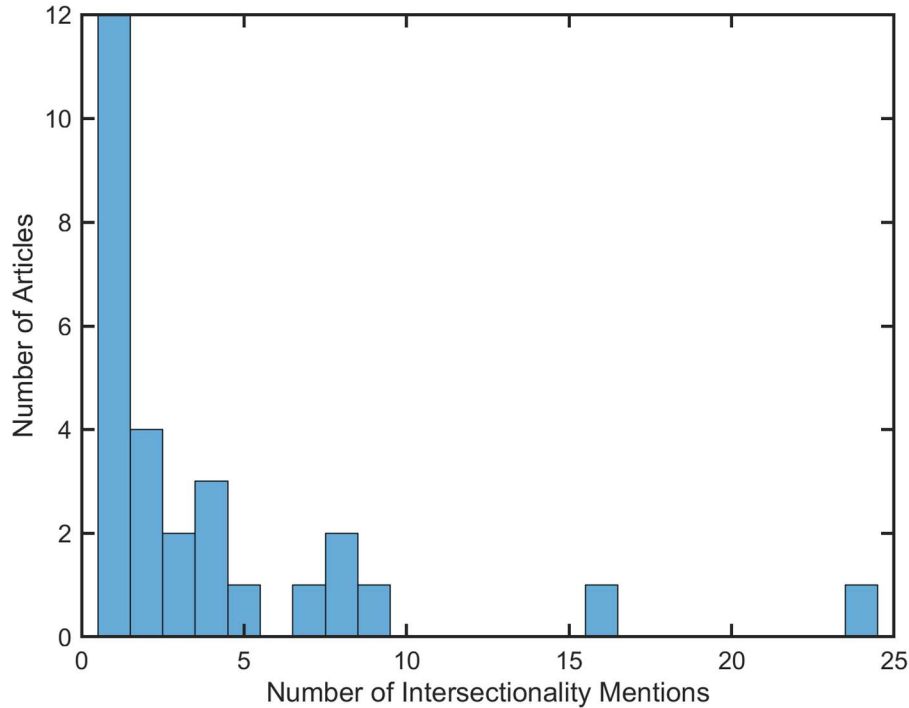
Fig. 4. Histogram of articles versus the number of intersectionality mentions per article.

Emergent Themes

This work-in-progress paper focuses on two key themes that are emerging from the qualitative latent content analysis. First, in both qualitative and quantitative studies, intersectionality was often used synonymously with multiply marginalized identities, particularly as future work items. Many of the articles that mentioned intersectionality once or twice highlighted the need to explore and understand participants' multiply marginalized identities, despite only focusing on one identity category, usually race or gender, in their study. Phrases such as "intersectional identities" and "intersectional experiences" permeated throughout the articles. In quantitative studies, intersectionality was often operationalized as either multiple variables for distinct identity categories or as interaction terms within larger statistical models. A common refrain in quantitative studies was some variation of "the authors were unable to statistically account for intersectionality in this study." In qualitative studies, authors often noted that the limited number of participants precluded intersectional analyses, thus relegating intersectionality to future work.

Second, intersectionality is often used within individual contexts to analyze micro/meso-level sociocultural phenomena, obscuring its roots and power as a radical critique of interlocking systems of oppression. In studies that mentioned intersectionality once or twice, other theories comprised the bulk of the theoretical framework, such as social identity theory, expectancy-value theory, and microaggressions. These frameworks often situated either individual student experiences at the micro-interactional level or cultural phenomena at the meso-interactional level. For studies engaging in intersectionality theory, intersectionality was employed as a framework to highlight the experiences of specific multiply marginalized identity groups, such as

women of color. A corollary to this finding is that intersectionality often took a backseat to other theories – scholars' engagement with intersectionality often forefronted the "multiply marginalized identities" usage rather than using it as a tool to examine experiences as material manifestations of systems of oppression. Very few papers mentioned terms such as "racism" and "sexism" in the text despite often exploring race and gender, potentially indicating that scholars may be hesitant to label actively inequitable processes and products as such. This position inhibits social justice research because naming and labeling interlocking systems of oppression within institutions is crucial to reimagining institutions that uplift all (multiply) marginalized students.

These preliminary findings represent a surface-level synthesis of the articles that has been completed thus far and corroborate previous work highlighting the substantial gap in citational politics surrounding intersectionality [28]. Additional questions that will be explored in forthcoming work include what identities are primarily studied through intersectionality, what contexts intersectionality is often used in, and how intersectionality's use is/can be leveraged to further social justice in engineering education research and praxis.

Conclusion

This work-in-progress systematic literature review demonstrates the emergence of problematic dominant narratives of how intersectionality is (mis)used in engineering education research. While intersectionality's roots and power come from its analyses of interlocking systems of oppression, its operationalization as a synonym for "multiply marginalized" and relegation to future work items showcases a lack of direct engagement with intersectionality as a theory, analytical tool, and heuristic in engineering education. As a result, engineering education scholars have not unlocked its full potential to deconstruct and dismantle systems of power, privilege, oppression and ruling relations within engineering education. A forthcoming scoping review will include more in-depth analysis and discussion of the full 372-paper dataset and implications and recommendations for equity-focused engineering education researchers and scholars.

Acknowledgements

References

[1] K. Crenshaw, "Demarginalizing the Intersection of Race and Sex: A Black Feminist Critique of Antidiscrimination Doctrine, Feminist Theory and Antiracist Politics," *University of Chicago Legal Forum*, vol. 1989, no. 1, pp. 139–167, 1989.
[2] J. C. Harris and L. D. Patton, "Un/Doing Intersectionality through Higher Education Research," *The Journal of Higher Education*, vol. 90, no. 3, pp. 347–372, May 2019, doi: 10.1080/00221546.2018.1536936.

[3]   D. M. Riley, A. L. Pawley, J. Tucker, and G. D. Catalano, "Feminisms in Engineering Education: Transformative Possibilities," *NWSA Journal*, vol. 21, no. 2, pp. 21–40, 2009.

[4]   K. Beddoes and M. J. Borrego, "Feminist Theory in Three Engineering Education Journals: 1995-2008.," *Journal of Engineering Education*, vol. 100, no. 2, pp. 281–303, Apr. 2011.

[5]   A. L. Pawley, "Learning from small numbers: Studying ruling relations that gender and race the structure of U.S. engineering education," *Journal of Engineering Education*, vol. 108, no. 1, pp. 13–31, 2019, doi: 10.1002/jee.20247.

[6]   G. Ladson-Billings and W. F. Tate, "Toward a Critical Race Theory of Education," *Teachers College Record*, vol. 97, no. 1, pp. 47–68, Sep. 1995, doi: 10.1177/016146819509700104.

[7]   R. Delgado and J. Stefancic, *Critical Race Theory: An Introduction*, 2nd ed. New York: NYU Press, 2001.

[8]   R. Delgado, "Rodrigo's Reconsideration: Intersectionality and the Future of Critical Race Theory," *Iowa Law Review*, vol. 96, pp. 1247–1288, Jan. 2011.

[9]   P. H. Collins and S. Bilge, *Intersectionality*. Cambridge, UK: Polity Press, 2016.

[10]   D. Gillborn, "Intersectionality, Critical Race Theory, and the Primacy of Racism: Race, Class, Gender, and Disability in Education," *Qualitative Inquiry*, vol. 21, no. 3, pp. 277–287, Mar. 2015, doi: 10.1177/1077800414557827.

[11]   K. Crenshaw, "Mapping the Margins: Intersectionality, Identity Politics, and Violence against Women of Color," *Stanford Law Review*, vol. 43, no. 6, pp. 1241–1299, 1991.

[12]   Z. Leonardo, "Race Frameworks: A Multidimensional Theory of Racism and Education," in *Race Frameworks: A Multidimensional Theory of Racism and Education*, New York: Teachers College Press, 2013, pp. 11–43.

[13]   Combahee River Collective, "The Combahee River Collective Statement," in *Available Means: An Anthology of Women's Rhetoric(s)*, University of Pittsburgh Press, 1977.

[14]   A. Lorde, "Age, Race, Class, Sex: Women Redefining Difference," in *Sister Outsider*, Berkeley, CA: Crossing Press, 1984, pp. 114–123.

[15]   P. H. Collins, "Learning from the Outsider Within: The Sociological Significance of Black Feminist Thought," *Social Problems*, vol. 33, no. 6, pp. S14–S32, 1986, doi: 10.2307/800672.

[16]   S. A. Annamma, T. Handy, A. L. Miller, and E. Jackson, "Animating Discipline Disparities through Debilitating Practices: Girls of Color and Inequitable Classroom Interactions," *Teachers College Record*, vol. 122, no. 5, pp. 1–46, May 2020, doi: 10.1177/016146812012200512.

[17]   Z. Leonardo and A. Broderick, "Smartness as Property: A Critical Exploration of Intersections Between Whiteness and Disability Studies," *Teachers College Record*, vol. 113, no. 10, pp. 2206–2232, Oct. 2011.

[18]   Annamma, Subini Ancy, *The Pedagogy of Pathologization: Dis/abled Girls of Color in the School-prison Nexus*. New York: Routledge, 2017.

[19]   A. Godwin, D. Verdín, A. Kirn, and D. Satterfield, "The Intersection of Gender and Race: Exploring Chemical Engineering Students' Attitudes," *Chemical Engineering Education*, vol. 52, no. 2, Art. no. 2, Mar. 2018.

[20]   M. Borrego, M. J. Foster, and J. E. Froyd, "Systematic Literature Reviews in Engineering Education and Other Developing Interdisciplinary Fields," *Journal of Engineering Education*, vol. 103, no. 1, pp. 45–76, 2014, doi: 10.1002/jee.20038.

[21]   A. Liberati *et al.*, "The PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate healthcare interventions: explanation and elaboration," *BMJ*, vol. 339, p. b2700, Jul. 2009, doi: 10.1136/bmj.b2700.

[22]   M. Denton and M. Borrego, "Funds of Knowledge in STEM Education: A Scoping Review," *Studies in Engineering Education*, vol. 1, no. 2, Art. no. 2, Feb. 2021, doi: 10.21061/see.19.

[23]   M. Ouzzani, H. Hammady, Z. Fedorowicz, and A. Elmagarmid, "Rayyan—a web and mobile app for systematic reviews," *Systematic Reviews*, vol. 5, no. 1, p. 210, Dec. 2016, doi: 10.1186/s13643-016-0384-4.

[24]   S. R. Harper, "Race without racism: How higher education researchers minimize racist institutional norms," *Review of Higher Education: Journal of the Association for the Study of Higher Education*, vol. 36, pp. 9–29, 2012, doi: 10.1353/rhe.2012.0047.

[25]   Scimago Journal & Country Rank, "Journal Rankings on Engineering (miscellaneous)." https://www.scimagojr.com/journalrank.php?category=2201&area=2200&country=US&year=2021 (accessed Dec. 10, 2022).

[26]   H.-F. Hsieh and S. E. Shannon, "Three approaches to qualitative content analysis," *Qual Health Res*, vol. 15, no. 9, pp. 1277–1288, Nov. 2005, doi: 10.1177/1049732305276687.

[27]   S. Secules *et al.*, "Positionality practices and dimensions of impact on equity research: A collaborative inquiry and call to the community," *Journal of Engineering Education*, vol. 110, no. 1, pp. 19–43, 2021, doi: 10.1002/jee.20377.

[28]   K. Moore, N. R. Johnson, F. Sánchez, and W. R. Hargrove, "The Politics of Citation Practices in Engineering Education: A Citation Analysis of Intersectionality," presented at the 2021 American Society of Engineering Education Annual Conference & Exposition, 2021.

Appendix A

Rubric Item	Notes
What population(s), institutions, or organizations are analyzed through the article?	
What identity markers are explored?	
Are the above identity markers privileged? Historically oppressed?	
How and who is credited when describing intersectionality?	
How is the history of the concept studied?	
Is intersectionality given a cursory overview or in-depth overview?	
To what extent does the theory frame the research and resulting article (e.g. methods, framework)?	
Are other concepts or terms used synonymously with, alongside, and/or in place of intersectionality?	
Do articles identify multiple oppressions that multiply marginalized people face and show how they intersect?	
Do articles address/highlight the uniqueness of experiences at the intersections of multiple marginalizations?	

What systems of oppression and/or privilege are being studied? (e.g. racism, classism, sexism)	
What unit of analysis is used? (e.g. individual, institutional, organizational)	
What is the level of analysis and interpretation of findings through an intersectional framework?	
How is intersectionality explored in implications and recommendations?	
Are micro levels *and* macro levels accounted for in referencing intersectionality?	
Were the mentions of intersectionality superficial or in-depth?	
How do the authors refer to intersectionality? (e.g. analytical tool, heuristic device, concept, theory)	
In your opinion, does the use of intersectionality in the article advance a social justice agenda?	
Are there instances of statements, findings, or conclusions that may reify privilege and/or be harmful to historically marginalized groups)?	
General comments	