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Systemic Review of Native Hawaiian and Pacific Islander representation in engineering education research

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Introduction

The engineering pipeline has long been recognized as unequitable, with stark disparities in who enters, persists, and thrives within engineering education and professions.[1] Indigenous students come into engineering with a different framework for understanding systems—one rooted in traditional ecological knowledge, community stewardship, and a deeply relational worldview. These strengths, however, are not recognized and are actively discouraged in engineering curricula that emphasizes compartmentalization and technical reductionism.[2], [3] Instead, we are taught to unlearn our systems thinking and replace it with methods that disconnect problems from their social, cultural, and ecological contexts. In doing so, we're asked to leave behind essential parts of our identities.[4] We're expected to bring our "white selves" to the classroom—to code switch, to assimilate, and to survive in spaces where our knowledge isn't seen as valid engineering.[5]

In the current literature, it is apparent that there have been attempts to change this exclusionary environment within engineering. [6], [7], [8], [9] While these efforts are a step in the right direction, they still often fall short as they lack the correct balance between specificity and representation. Strategies to support Indigenous students are especially guilty of this as the Indigenous demographic is treated as a monolith. ASEE's own data on bachelor's degrees awarded by race and ethnicity explicitly states that American Indian/ Alaska Native and Native Hawaiian/ Pacific Islander populations have been lumped into the "Other" category.[1] Because there are so few of us from these groups in engineering, specifically Native Hawaiian Pacific Islanders (NHPI), we often don't have the power, numbers, or visibility to push for research that centers our needs. The burden of inclusion is placed on those most excluded—and too often, we are left to advocate for ourselves in systems that aren't built to listen. The continuation of monolithic categorization leads to the exclusion of these smaller populations and creates unnecessary barriers to developing effective strategies to support them and identifying where current methods fall short.

While NHPI students have similar struggles to other Indigenous students, like lack of representation, facing pressure to assimilate, and are seen as not white and therefore must deal with the systemic inequities associated, they additionally must deal with not fitting in or being fully accepted by other Indigenous groups.[3], [10] This isn't to say that professional societies like AISES (Advancing Indigenous Science and Engineering Society) or groups who advocate for American Native demographics should shift to prioritizing NHPI populations, but hopefully this acts as more of a call to recognize that even though there is overlap, these groups have very different needs that must be addressed.[11] For example, typical strategies for building

community (ie. increased representation, support for increased feelings of belonging, etc.) aren't always feasible as they usually require a moderate amount of the population to be physically present.[12], [13] These strategies aren't always the most effective because there are so few NHPI students enrolled in engineering degrees. It would be extremely difficult to build a community using standard methods with only ~30 NHPI students in an engineering program with a total population of ~11,000 students.

Native Hawaiian Pacific Islander's experiences in engineering aren't just a side issue—they're a reflection of the broader health of our engineering education system. When entire communities are excluded or marginalized, it signals deeper structural problems that affect the quality, inclusivity, and relevance of the engineers we're producing. This matters to everyone, not just those directly affected. Engineers shape the world we live in—they design our infrastructure, our medical technologies, our climate solutions. Taxpayers fund public universities and research that develop these engineers, and in return, society should expect a system that works for everyone. A more inclusive, culturally responsive engineering education doesn't just benefit Indigenous students—it produces more thoughtful, ethical, and effective engineers. If we want engineering to truly serve society, then we need to fix the ways it fails its most excluded members.

If we were to truly start helping NHPI, we need to address the lack of research done to support them. As it stands currently, there isn't enough literature to identify where the shortcomings are and the correct ways to move forward. We need evidence-based ways of knowing in order to make any reasonable claims for which direction to go in order to significantly improve NHPI recruitment and retention in engineering. If engineering is to become truly inclusive, it must go beyond superficial diversity efforts and begin to Indigenize—not only in content but in structure, values, and pedagogy. Supporting Indigenous students in a way that recognizes each group's unique needs isn't just a moral imperative—it's a practical one. We need to create strategies that center their experiences, build community, and challenge the assumption that engineering must look a certain (white, Western) way to be rigorous.

Purpose and Scope

Rather than conducting a broad search across large multidisciplinary databases, we intentionally limited our search to these engineering education–focused venues to ensure relevance and applicability to the field. This decision prioritized depth over volume by excluding broader cultural and ethnic categories (e.g. "minoritized" or "BIPOC" students) as well as related disciplines (i.e. STEM students). There is a critical gap in the literature addressing culturally and disciplinarily specific experiences of students. Our preliminary searches indicated that there is very limited scholarship focused specifically on Native Hawaiian and Pacific Islander (NHPI) populations within engineering, and even less within engineering education. Much of the existing literature examines broad categories such as BIPOC students or STEM education as a whole.

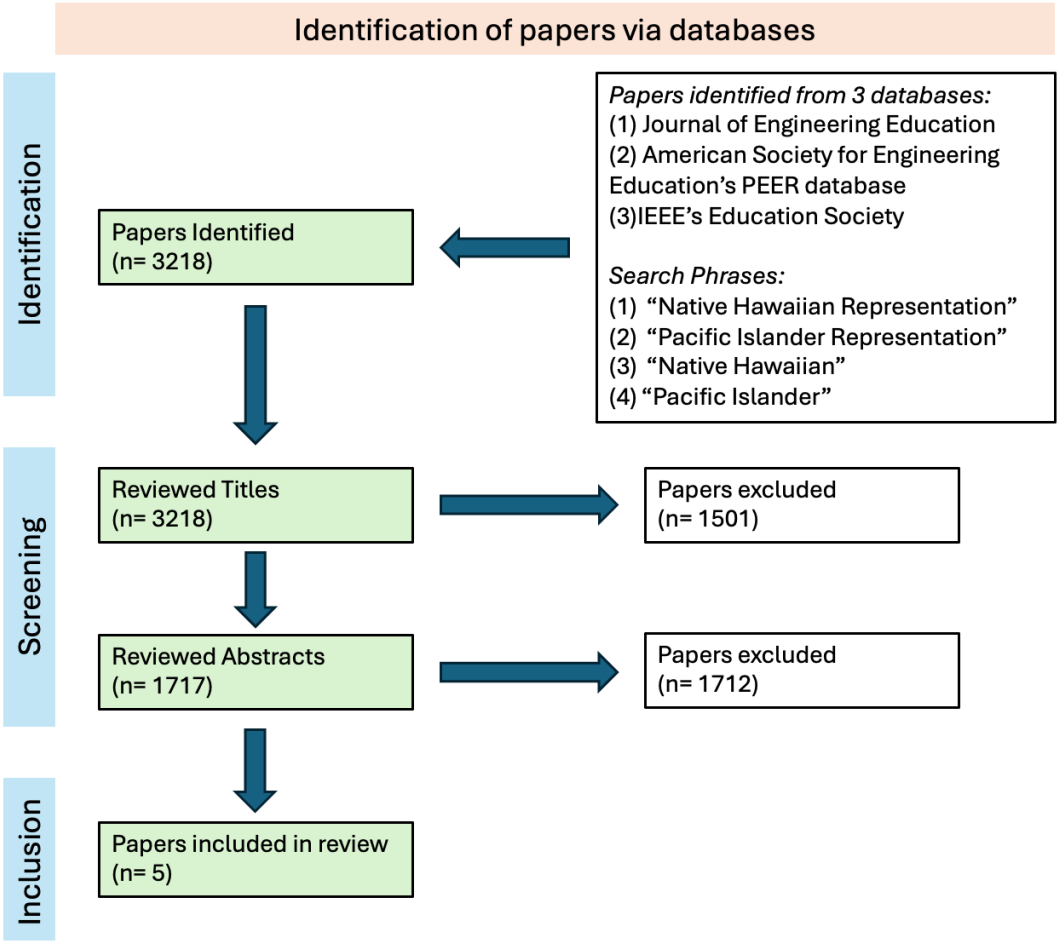
While this work provides important insights, it often obscures the distinct experiences of NHPI students. We argue that a more specific and disaggregated approach is necessary. By starting with a narrow focus and situating our findings within the broader literature, we aim to balance specificity with applicability. Focusing exclusively on NHPI populations allows us to contribute insights that broader studies cannot capture, particularly given the unique cultural, historical, and structural contexts shaping NHPI experiences in engineering education. Similarly, focusing on engineering instead of all students or STEM students allows investigation of meaningful cultural, epistemological and practical features of student experiences.

Methods

To identify relevant literature, we conducted a search using the terms "Native Hawaiian," "Native Hawaiian representation," "Pacific Islander" and "Pacific Islander representation." Searches were conducted using three databases: (1) the *Journal of Engineering Education* is the primary publication outlet for the field and was searched individually; (2) the American Society for Engineering Education's PEER database includes national and regional conference publications from 1996 to the present; and (3) IEEE's Education Society offers a database covering their three publications IEEE Transactions of Education, IEEE Transactions on Learning Technologies and IEEE ACCESS Education Society Section. These sources represent core outlets for scholarship in engineering and engineering education and cover the breadth of the engineering education research community. Any significant research efforts in the community would be visible in these publications and combined, they represent a meaningful measurement of engineering education scholarship.

These broad searches resulted in 3218 total articles containing the search phrases. The titles were reviewed to exclude 1501 articles whose titles emphasize groups of students not including NHPI students. For example, "Examining Engineering Education Research with American Indian and Alaska Native Populations: A Systematic Review Utilizing Tribal Critical Race Theory," would be excluded at this stage.[14] The remaining 1717 articles' abstracts were reviewed to find articles explicitly examined NHPI experiences in engineering education or focused on strategies to improve NHPI recruitment, retention, or graduation in engineering. Articles that only referred to NHPI students in reporting participant demographics, for example, were excluded at this stage. This selection and filtering process resulted in the 5 articles discussed in this paper. Table 1 below summarizes the systematic review processes of identifying, screening and including.

Table 1:



Positionality Statement

[Author 1] is a queer Native Hawaiian woman that was born in Honolulu, O'ahu. O'ahu has a history of colonization and Kānaka (Native Hawaiians) still suffer from the residual effects of colonialism that remain in the current systems of power. Throughout her experiences in her personal life and academic career, she has been heavily influenced by her culture and the responsibility that us as Indigenous folks feel to ensure the success of future generations. She views the world through this lens and tries to incorporate this worldview into the work that she does. She feels strongly that if we as engineers were encouraged to integrate resource regeneration and approached problems through less of a colonized lens and through one that was more inclusive, we would be able to design better solutions.

[Author 2] is a cis, white man and an associate professor in an engineering department doing education research. His research works toward social justice by focusing on student voices and experiences.

Results

Because there are so few papers about NHPI experiences in engineering education we will briefly discuss each of them here. Themes and a broader analysis will follow in the Discussion and Conclusion section.

Curricular and Cocurricular Interventions
1 article covered specific interventions meant to support NHPI students.

Peters et al. utilizes Meyer's holographic epistemological framework that utilizes Body (Objective), Mind (Subjective), and Spirit (Cultural) to better understand the Native Hawaiian engineering students' experiences and create a new definition of diversity. [15], [16] The researchers conducted semi-structured interviews with current Native Hawaiian undergraduate engineering students. Key findings were that students struggled with the individualistic and isolated characteristics of the engineering community, and experienced disdain from others when refusing to assimilate to Western culture. Students especially struggled with being able to find ways to bind both their heritage and engineering culture together. [15]

Academic and Career Success
1 article investigated pathways and obstacles for NHPI student and faculty success.

The purpose of the study done by Ngyuen et al. is to understand the gaps in the progression of Native Hawaiian students to an academic career in engineering. Researchers utilize surveys, structured interviews with NH graduate students and workshop series. Key findings were that financial aid was a big barrier, and there was a lack of information/knowledge about additional graduate studies compared to their counterparts.[17] NH students were more likely to pursue an advanced degree and have strong beliefs in their likelihood to complete their degrees. The data shows that getting the degree(s) is heavily affected by family support, the information available about the degrees and financial aid available.

Indigenous Ways of Knowing/NHPI experiences
3 articles focused on bringing NHPI ways of knowing and experiences into engineering and to make them more visible in the engineering education research community.

Peters et al. compare Western and Native Hawaiian education systems to identify the gaps within the ways of knowing in engineering education. The purpose of this is to illustrate the contributions that Native Hawaiian ways of knowing can contribute to engineering and engineering education. [18] Researchers conducted semi-structured interviews with Native Hawaiian engineering undergraduate students and coded results into 3 themes: Body-Pono, Mind-Kuleana, and Spirit-Hō'ihi. Key findings showed that positive role models helped the

students to bring their authentic selves into the engineering spaces and helped them to feel more comfortable incorporating Native Hawaiian ways of knowing into their education.[18]

Peters et al. utilizes Meyer's Native Hawaiian Epistemology in order to illustrate Native Hawaiian Pacific Islander engineering students are constantly in conflict with their own culture and Western engineering culture. [19], [20] The study explores Meyer's seven themes and uses it as a lens to examine existing literature on student experiences in order to illuminate the various cultural differences that Native Hawaiian students in engineering experience. Key findings were that, "specificity allows the Native Hawaiian Epistemology to be valued and liberate the assimilative minds of colonization bringing back the perspectives of the past into a modern setting."[19] The authors also highlights that there is a need to conduct research on Native Hawaiian students and their experiences within engineering.

In the last relevant paper, Peters takes us through his journey through engineering as a Native Hawaiian student with the purpose of highlighting how Indigenous knowledge is discouraged within engineering despite its ability to be useful and provide valuable insight.[21] The author employs autoethnographical methods to provide supporting evidence for integrating Native Hawaiian ways of knowing into engineering education.

Discussion

A central finding of this work is the general lack of research about NHPI experiences in engineering education. Four of the articles found are authored by one scholar, and though they provide an immensely useful foundation in deep qualitative descriptions of NHPI student experiences they are inherently limited to the capacity and perspective of their author.

There are common findings among these articles that are already useful for readers seeking to improve their education or research on NHPI students. Supportive mentorship was shown to have a positive impact on Native Hawaiian engineering students. Specifically, when mentors encouraged students to bring their cultural identity to the classroom and their work, it helped students who were dealing with the pressure to assimilate to Western engineering culture. Native Hawaiian students also struggle with isolation as they represent such a small percentage of the engineering population, so ensuring there are multiple avenues of providing community is essential for their persistence in engineering. Literature also suggests that engineering education that allows opportunity to blend Native Hawaiian ways of knowing with engineering ways of knowing can help with providing representation, but there are limitations to this suggestion due to the lack of scholars researching this issue. There needs to be more research done in this area, but scholars who conduct this work need to do it from the right perspective in order to avoid colonizing participants and students.

Directions for Future Work

As research in this area grows there is great potential for confusions and contradictions unless that work is transparently and thoughtfully situated within broader theories of education and research. In the search for theoretical framing, we can draw from broader research on NHPI STEM students. For example, in the Meyers epistemology mentioned, they demonstrated how Native Hawaiians can be catalysts for forging new paradigms that are built from the bottom up and aren't based off of predictable philosophies. Additionally, they provided guidance to Native Hawaiians on taking ownership of their own liberation in an anti-Indigenous and oppressive system. This knowledge and framework, though not grounded in engineering, can be utilized to inform future work and ensure equitability of solutions.

Because of the lack of literature available in engineering education there is limited insight into the struggles specific to Native Hawaiian engineering students. The authors of this work did a preliminary search of work being done in STEM education and identified common struggles that Native Hawaiian students dealt with. A few being; lack of academic support, high levels of tokenism, steep university learning curves, residual effects of colonialism affecting their education and lack of representation and community. [9], [22]

The existing literature does provide a decent starting point on what barriers Native Hawaiian student face in engineering, but there needs to be more work done on what solutions can be implemented in order to combat these issues. Particularly, there is strong evidence to suggest that culturally relevant engineering curriculum could provide representation for these students and can improve the curricula with the integration of Native Hawaiian ways of knowing, but there is no current work on determining the best way to do that.

Conclusion

The entire project of engineering education and research will benefit from a more nuanced understanding of how specific cultural groups interact with the systems, culture and practices of engineering education. The relatively low number of potential participants pose problems for researchers but do not invalidate the importance of these students and their experiences nor the potential value more deeply understanding them. Changing the system of engineering education to remove obstacles to NHPI students will indubitably help other students and improve the system's ability to achieve its function. For example, curricula with Indigenous ways of knowing would help all students form more meaningful connections to engineering content, which has been shown to include learning and academic success.

It is important to make sure that the work required for these changes is not disproportionately left to NHPI or BIPOC people. The focus on NHPI students is not excluding other students, but rather finding important insights that have previously been hidden by our disciplinary ignorance of certain student experiences and perspectives. The challenging and contradictory goal of this

work is authentically center and serve students' individuality while informing the discipline as a whole.

References

[1] "Engineering & Engineering Technology by the Numbers, 2023." Accessed: Jan. 21, 2026. [Online]. Available: https://ira.asee.org/wp-content/uploads/2024/10/Engineering-Engineering-Technology-By-the-Numbers-2023-27-October-2024.pdf

[2] J. Kaomea, "Reading Erasures and Making the Familiar Strange: Defamiliarizing Methods for Research in Formerly Colonized and Historically Oppressed Communities," *Educ. Res.*, vol. 32, no. 2, pp. 14–23, Mar. 2003, doi: 10.3102/0013189X032002014.

[3] J. Kaomea, "Dilemmas of an Indigenous Academic: A Native Hawaiian Story," *Contemp. Issues Early Child.*, vol. 2, no. 1, pp. 67–82, Mar. 2001, doi: 10.2304/ciec.2001.2.1.9.

[4] S. Masta, "'I am exhausted:' everyday occurrences of being Native American," *Int. J. Qual. Stud. Educ.*, vol. 31, no. 9, pp. 821–835, Oct. 2018, doi: 10.1080/09518398.2018.1499984.

[5] J. Holly and S. Masta, "Making whiteness visible: The promise of critical race theory in engineering education," *J. Eng. Educ.*, vol. 110, no. 4, pp. 798–802, Oct. 2021, doi: 10.1002/jee.20432.

[6] R. J. Downey, J. A. Mejia, D. A. Chen, G. D. Hoople, and S. M. Lord, "Scripts of Whiteness in engineering: An analysis of the literature," presented at the 2024 Collaborative Network for Engineering & Computing Diversity (CoNECD), Feb. 2024. Accessed: Feb. 22, 2026. [Online]. Available: https://peer.asee.org/scripts-of-whiteness-in-engineering-an-analysis-of-the-literature

[7] R. Harrison, *Culturally Relevant Design in Engineering: Fostering STEM Diversity and Enhancing Student Retention*. 2025. doi: 10.13140/RG.2.2.18364.96649.

[8] J. Love, C. Duggan, J. Xavier, A. Slater, and K. Rath, "Engineering PLUS Alliance stEm PEER Academy for Faculty and Administrators: Transforming the National Engineering Education Landscape for Women and BIPOC Students," in *2023 ASEE Annual Conference & Exposition Proceedings*, Baltimore , Maryland: ASEE Conferences, Jun. 2023, p. 43343. doi: 10.18260/1-2--43343.

[9] "Recognizing and Reducing Barriers to Science and Math Education and STEM Careers for Native Hawaiians and Pacific Islanders - PMC." Accessed: Jan. 21, 2026. [Online]. Available: https://pmc.ncbi.nlm.nih.gov/articles/PMC6755887/

[10] A. M. K. Peters and S. M. Lord, "'Aha: Braiding the Cords of Knowledge for Native Hawaiian Engineering Students," in *2022 IEEE Frontiers in Education Conference (FIE)*, Oct. 2022, pp. 1–4. doi: 10.1109/FIE56618.2022.9962676.

[11] K.-A. R. K. N. Oliveira and E. K. Wright, *Kanaka ʻŌiwi Methodologies: Moʻolelo and Metaphor*. University of Hawaii Press, 2015.

[12] D. M. Wilson, P. Bell, D. Jones, and L. Hansen, "A Cross-Sectional Study of Belonging in Engineering Communities".

[13] E. Litzler and C. Samuelson, "How Underrepresented Minority Engineering Students Derive a Sense of Belonging from Engineering," presented at the 2013 ASEE Annual Conference & Exposition, Jun. 2013, p. 23.674.1-23.674.20. Accessed: Feb. 22, 2026. [Online]. Available: https://peer.asee.org/how-underrepresented-minority-engineering-students-derive-a-sense-of-belonging-from-engineering

[14] E. Young and D. Delaine, "Examining Engineering Education Research with American Indian and Alaska Native Populations: A Systematic Review Utilizing Tribal Critical Race Theory," in *2022 ASEE Annual Conference & Exposition Proceedings*, Minneapolis, MN: ASEE Conferences, Aug. 2022, p. 41461. doi: 10.18260/1-2--41461.

[15] A. M. K. Peters and S. M. Lord, "'Aha: Braiding the Cords of Knowledge for Native Hawaiian Engineering Students," in *2022 IEEE Frontiers in Education Conference (FIE)*, Oct. 2022, pp. 1–4. doi: 10.1109/FIE56618.2022.9962676.

[16] M. A. Meyer, "Holographic Epistemology: Native Common Sense," 2013.

[17] T. T. Nguyen *et al.*, "Native Hawaiians in Engineering: A Path to the Professoriate," in *2018 ASEE Annual Conference & Exposition Proceedings*, Salt Lake City, Utah: ASEE Conferences, Jun. 2018, p. 30832. doi: 10.18260/1-2--30832.

[18] A. Morgan Kainoa Peters and S. M. Lord, "'These Different Ideas, Traditions, and Values Make My Thinking Unique and Creative': Bringing Native Hawaiian Ways of Knowing to Engineering Education," *IEEE Trans. Educ.*, vol. 67, no. 3, pp. 413–422, Jun. 2024, doi: 10.1109/TE.2023.3334195.

[19] "Ho'okele- Native Hawaiian and Pacific Islander Engineering Students Navigating Troubled Waters.pdf."

[20] "Manu-Meyer-Our-Own-Liberation-Hawaiian-Epistemology-1.pdf."

[21] A. Peters, "Ko'u Mo'olelo: My Journey as a Kanaka Maoli Rediscovering Balance in Engineering Education (Experience)," presented at the 2022 ASEE Annual Conference & Exposition, Aug. 2022. Accessed: Jun. 12, 2025. [Online]. Available: https://peer.asee.org/ko-u-mo-olelo-my-journey-as-a-kanaka-maoli-rediscovering-balance-in-engineering-education-experience

[22] F. S. Allaire, “Themes from a Narrative Analysis of Native Hawaiian Experiences in Science, Technology, Engineering, and Mathematics”.