

WIP: Building a structured faculty development program for inclusive pedagogy in engineering education

Dr. Renee M. Desing, University of Washington

Dr. Renee Desing is an Assistant Teaching Professor in the Department of Mechanical Engineering at the University of Washington. Her research interests include diversity, equity, and inclusion in the engineering classrooms and workplaces. Dr. Desing graduated from Ohio State with her Ph.D. in Engineering Education, and also holds a B.S. in Industrial Engineering from the Georgia Institute of Technology and a M.S. in Industrial Engineering and Operations Research from the Pennsylvania State University.

WIP: Building a structured faculty development program for inclusive pedagogy in engineering education

Abstract

This evidence-based practice work-in-progress paper presents the design and preliminary evaluation of a faculty development program aimed at advancing inclusive pedagogy among engineering faculty. Although engineering instructors play a critical role in shaping students' learning experiences, many report limited preparation and insufficient sustained support for adopting inclusive pedagogical practices. In response, our college of engineering recently launched a comprehensive faculty development program to equip engineering faculty with the knowledge, tools, and community necessary to integrate inclusive pedagogies into their teaching.

The central aim of this paper is to discuss our program's structural and pedagogical design, including the intentional integration of collaborative learning, reflective practice, and ongoing support. Our design is grounded in the community of practice and culturally relevant pedagogy frameworks and is structured in two phases: training and implementation. In the training phase, participants attended weekly, synchronous training sessions facilitated by experts across our university that explored theoretical and practical applications of inclusive pedagogy. During the implementation phase, participants redesigned and taught one of their courses according to the knowledge gained during the training phase. By design, we emphasized both collaborative learning through small group discussions and peer teaching observations as well as critical self-reflection, while ensuring that faculty were continuously supported throughout both phases. To-date, 19 engineering faculty have participated across the first two cohorts.

To evaluate the program's effectiveness, we are collecting a variety of interviews, surveys, reflections, peer teaching observations, course artifacts, and small group meeting recordings. Along with our detailed program structure, we present some preliminary feedback on the program from the inaugural cohort, which indicates high overall satisfaction and provides insight into the most impactful elements of the training and implementation structure. Preliminary feedback is also informing refinements for subsequent cohorts. Future analysis of our other data sources will explore faculty learning trajectories and longer-term impact on teaching practices and student experiences.

This paper contributes to the growing body of evidence supporting structured, theory-informed approaches to faculty development in engineering education. Our program evaluation informs not only our own future iterations of the program, but it also offers insights for institutions seeking to develop and implement similar initiatives. Our preferred presentation style is a lightning round table.

Keywords: inclusive pedagogy, engineering faculty development, Communities of Practice, course redesign, equity in STEM

Introduction

Recent years have seen a growing body of work in engineering education focused on strengthening faculty capacity for inclusive and equitable teaching, often through structured professional development and faculty learning communities (e.g., [1], [2]). This growth is driven in part by engineering faculty's increasing motivation to better support diverse learners and to cultivate more equitable classroom environments [3], [4]. However, persistent inequities in engineering, such as disparities in belonging, performance, and retention across demographic groups, continue to underscore the need for professional development that supports faculty in adopting evidence-based, inclusive teaching approaches [5].

Aligned with these needs, our college of engineering developed a year-long faculty development program that provides both foundational learning and ongoing, community-based support for implementing inclusive and equitable teaching in engineering. Guided by the communities of practice [6] and culturally relevant pedagogy [7] frameworks, the program is designed to help faculty integrate equity-oriented practices into their course design and instruction.

The purpose of this work-in-progress paper is to present the structure of the program, the rationale behind its design, and the approach being used to evaluate its impact. We also share some preliminary feedback on the program structure from the first cohort and outline our planned analyses to thoroughly examine the program's impact, as analysis remains ongoing.

Program Design and Structure

Institutional Context

Our program was developed at the University of Washington (UW), a large, public R1 institution in the western United States. Our institution uses an academic quarter system, such that we have three 10-week quarters during the 9-month academic year (autumn, winter, and spring). The College of Engineering [8] includes 10 engineering departments and comprises approximately 350 faculty across three tracks: tenure-track, research, and teaching [9]. The college also has an established commitment to inclusive excellence with a dedicated team of 11 faculty and staff in the Dean's office (including the authors) focused on initiatives that aim to support faculty, staff, and students across the college [10]. The College of Engineering enrollment demographics as of Autumn 2025 [9] are shown in Table 1. Our representation of women is higher than the national average, while our domestic students from underrepresented minority groups is below national average [11]. We also serve a large undergraduate in-state population. This institutional landscape provides important context for understanding both the need for and the potential impact of a faculty development program focused on inclusive and equitable teaching.

Table 1: College of Engineering Demographics as of Autumn 2025

Category	B.S.	M.S.	Ph.D.
Enrollment	6,763	2,118	1,255
% Women	36%	34%	36%
% Domestic Underrepresented Minority*	11%	10%	4%
In-State Residents	78%	42%	15%
*Defined by the university as African American, American Indian/Native American, Hispanic, and Hawaiian/Pacific Islander			

Program Goals

The purpose and goal of our program is to train engineering faculty on the integration of inclusive and equitable pedagogical approaches into their course design and teaching. Through structured training, community support, and guided course redesign, faculty develop practical strategies for inclusive and student-centered teaching. We also seek to promote systemic change by creating a community of change agents to advance inclusive excellence across the College of Engineering. We will also evaluate the impact of our faculty development program on both faculty and students, guided by the following overarching evaluation question: *How does our faculty development program impact engineering faculty's understanding and implementation of inclusive and equitable pedagogies and foster a cross-disciplinary community of change agents?*

Conceptual Frameworks

Culturally Relevant Pedagogy (CRP) [7] provides a foundational framework that guides the development of the program's curriculum as well as the program's evaluation approach. CRP emphasizes three components, academic success, cultural competence, and sociopolitical consciousness, which shaped the selection of curricular topics. The curriculum foregrounds multiple dimensions of CRP, and faculty learning activities were designed to help participants recognize, enact, and reflect on these dimensions within engineering contexts. CRP also informs several components of the evaluation design, such that data collection and analysis strategies are intentionally aligned with CRP principles to examine how faculty engaged with culturally relevant teaching. By embedding CRP into both program delivery and evaluation, the program ensures coherence between its curriculum and the mechanisms used to evaluate impact.

The program's design is also grounded in the Communities of Practice (CoP) framework [6], which conceptualizes learning as a social process that occurs through participation in shared practices and collective meaning-making. This framework particularly informed our program goal of cultivating a sustained community of engineering educators committed to inclusive and equitable teaching. Structurally, the program operationalizes CoP principles through its cohort-based model, which brings faculty together for in-person, interactive training sessions that support the development of shared language, norms, and commitments around inclusive pedagogy. Beyond the training phase, the program also incorporates smaller faculty groups that

meet regularly throughout the academic year. These groups are intentionally designed to foster mutual engagement, collaborative problem-solving, and ongoing peer support around pedagogical challenges, which are core features of CoPs. In this way, the program leverages community as both a mechanism for faculty learning and an outcome of participation.

Program Phases

Our year-long program consists of two phases, a training phase and a teaching implementation phase, that intentionally pairs foundational training with structured, community-based support. The first phase consists of a seminar-style training held weekly during the 10-week long spring quarter. In-person, synchronous sessions (lasting 60–90-minutes) are facilitated by a series of invited experts from across the university. Sessions engage faculty on key topics, including critical pedagogy, inclusive teaching practices, structural racism in engineering, and universal design for learning, to build shared foundations before implementation.

In the second phase, faculty apply their learning by modifying one of their own courses and teaching that updated course in the following academic year (autumn, winter, or spring quarter depending on their teaching schedule). This phase is intentionally designed to provide ongoing, structured support from both our team and a peer community as faculty conduct their implementation. Participants meet one to two times per quarter in small groups (subsets of the cohort organized by teaching context) to exchange feedback and discuss successes and challenges. Each faculty member also participates in reciprocal peer teaching observations using an adapted version of the Culturally Responsive Instruction Observation Protocol (CRIOP) [12] to support reflective teaching practice. Lastly, the full cohort reconvenes once per quarter for an additional training session tailored to the emerging needs of those doing their teaching implementation that quarter.

Funding Support and Participation Incentive

The current funding source for our program is gifts from individual donors, which provided the resources needed to design, launch, and implement the first two cohorts. As we currently do not have any other sources of funding (e.g., grants), the program team is working closely with institutional partners to develop a sustainable, long-term funding plan aligned with college priorities. Participants receive a \$1,200 stipend upon completing both phases of the program, offered as recognition of the substantial time and effort required for participation in training, course redesign, and engagement in peer learning activities.

Methods for Recruitment and Program Evaluation

Recruitment

Our recruitment strategy seeks to bring together a diverse cross-section of engineering educators whose varied disciplinary contexts, identities, and experiences would enrich the collaborative learning community. Recruitment for the program employed multiple communication channels across the College of Engineering, including announcements in college-wide newsletters, emails

through the college listserv, and targeted outreach to the teaching faculty community. Additional strategies included word-of-mouth referrals from prior cohorts, a presentation to college leadership, and direct emails to department chairs requesting that they share the opportunity within their units.

Interested faculty are required to complete an application to participate in the program. The application asked faculty to provide information about the course they intended to redesign, such as enrollment, whether the course is required or an elective, and the majors it serves, along with brief statements describing their motivation for participating and the impact they hope to achieve. Applications are reviewed using a rubric aligned with these elements to ensure a transparent and consistent selection process.

Data Collection for Evaluation of the Program

To evaluate the impact of the program, we are using a multi-method data collection strategy. The range of data sources was selected to capture changes in participants' pedagogical knowledge, their development as members of a learning community, and their ability to enact culturally responsive teaching practices. Two surveys, administered at the beginning and end of the program, provide measures of participants' feedback on the program. Survey responses will be summarized with descriptive statistics to document feedback on the program logistics, structure, and training components, as well as to capture information about the courses in which they implemented changes and the types of instructional practices they adopted.

Each participant completes four semi-structured, one-on-one interviews (before and after Phase 1 and before and after Phase 2), focused on their understanding of inclusive pedagogy and how they are implementing their learning. Interviews will be examined longitudinally through thematic analysis [13] guided primarily by the CRP framework to understand how participants describe shifts in their inclusive teaching beliefs and practices as they progress through the program phases.

Participants also submit three written reflections: two during Phase 1 via an online discussion board with their cohort, and one individual reflection at the end of Phase 2. Written reflections will be analyzed qualitatively with attention to their distinct purposes. The two Phase 1 reflections will be used to examine individual sense-making and evidence of peer interaction and emerging cohort community using the CoP framework, while the final individual reflection will provide insight into each participant's self-assessment of their inclusive pedagogical growth, guided by the CRP framework.

Small group meetings in Phase 2 are recorded and will be analyzed qualitatively, guided by the CoP framework, to document how the cohort develops as a supportive learning community as they implement their teaching. Participants also submit their completed peer teaching observation protocol and pre- and post-implementation course artifacts, such as syllabi, lecture notes, or assignment prompts. The peer teaching observations and course artifacts will be

analyzed using document analysis [14] to identify observable changes in instructional design and inclusive teaching practices. Triangulating findings across all data sources will allow us to evaluate individual faculty growth, cohort-level community development, and patterns that emerge across cohorts, informing continuous improvement of the program.

Program Status

At the time of writing, the program has completed one full cohort and is currently supporting its second. Cohort 1 launched in Spring 2024 and concluded in Spring 2025 with 13 participants representing 7 of the college's engineering departments, impacting 681 students during the teaching implementation. Cohort 2 launched in Spring 2025 and is currently in Phase 2, with 6 participants from 5 departments. Across the first two cohorts, 9 of the college's 10 departments have been represented. Planning is underway for Cohort 3, scheduled to launch in Spring 2026.

Preliminary Feedback

While full data analysis is in progress, initial findings from Cohort 1's surveys indicate strong perceived value and engagement with the program. Survey data (using a 5-point Likert-style scale where 1 indicates strongly disagree and 5 indicates strongly agree) showed high overall satisfaction (average score of 4.57/5.0), suggesting that participants found the experience meaningful and relevant to their teaching. Feedback on program logistics was positive, with time of day, day of week, and session duration rated 4.14 on average, with location rated slightly lower (3.86). Participants' evaluations of the Phase 1 training sessions also indicated which topics were most impactful. Inclusive teaching practices (5.0), structural racism in engineering (4.57), critical pedagogy (4.57), teaching teamwork (4.43), and universal design for learning (4.14) were rated the most useful and were retained for future cohorts. Lower-rated sessions (e.g., microaggressions) were revised or removed, allowing time for applied practice with the cohort, as recommended by cohort 1.

Feedback on Phase 2 also identified strengths and areas for refinement. Small group meetings (3.71) and peer teaching observations (4.17) were both viewed as beneficial, particularly for collegial exchange and cross-disciplinary idea sharing. However, participants expressed a desire for clearer structure and more guided prompts for the small group discussions, as well as additional support for conducting peer observations across differing departmental norms. These insights informed several adjustments in Cohort 2.

In addition to these early insights, readers can find further analysis of Cohort 1's Phase 1 interviews in our prior papers, which detail participants' motivations for joining the program (based on the Phase 1 pre-program interviews) [3] and the ways Phase 1 influenced their understanding of inclusive and equitable pedagogies (based on the Phase 1 post-training interviews) [15]. These findings complement the preliminary feedback presented here and offer deeper insight into the early impact of the program.

Next Steps

Looking ahead, ongoing analysis will examine the remainder of cohort 1's collected data as well as all data for cohort 2 and future cohorts upon their completion. Through this analysis, we seek a thorough evaluation of the program's impact across several dimensions, including longitudinal changes in participants' understanding of core topics, the development of community among faculty, and the nature and depth of their course redesigns and use of inclusive teaching practices. These next steps will help build a comprehensive understanding of the program's effectiveness and its contributions to inclusive excellence within our College of Engineering. Our program evaluation informs not only our own future iterations of the program, but it also offers insights for institutions seeking to develop and implement similar initiatives. Our long-term goal is for our program to run annually, continuing to evolve over time to meet the changing needs of our current and future faculty and students.

References

- [1] J. M. Vaden *et al.*, "Inclusive engineering classroom learning communities: Reflections and lessons learned from three partner institutions," *Front. Educ.*, vol. 10, p. 1641993, Dec. 2025, doi: 10.3389/feduc.2025.1641993.
- [2] S. Rooney, J. Enszer, J. Maresca, S. I. Shah, S. Hewlett, and J. Buckley, "Faculty Development Mini-modules on Evidence-based Inclusive Teaching and Mentoring Practices in Engineering," in *2020 ASEE Annual Conference & Exposition Proceedings*, Virtual Online: ASEE Conferences, Jun. 2020. doi: 10.18260/1-2--34660.
- [3] R. M. Desing, J. Yen, and K. Thomas-Brown, "Motivations for Engineering Faculty Engagement in an Inclusive Pedagogy Program," in *Collaborative Network for Engineering and Computing Diversity (CoNECD)*, San Antonio, Texas, 2025.
- [4] M. Evans, T. Altman, M. Darbeheshti, K. Goodman, H. Johnson, and D. Mays, "Lessons Learned: Motivational Factors for Engineering Faculty Seeking Professional Development for Inclusive Teaching," in *2025 ASEE Annual Conference & Exposition Proceedings*, Montreal, Quebec, Canada: ASEE Conferences, Jun. 2025. doi: 10.18260/1-2--56919.
- [5] R. Singh and J. Kittur, "Inclusive Teaching Practices in Engineering: A Systematic Review of Articles from 2018 to 2023," in *2024 ASEE Annual Conference & Exposition Proceedings*, Portland, Oregon: ASEE Conferences, Jun. 2024, p. 47602. doi: 10.18260/1-2--47602.
- [6] J. Lave and E. Wenger, *Situated learning: Legitimate peripheral participation*. Cambridge University Press, 1991.
- [7] G. Ladson-Billings, "Toward a Theory of Culturally Relevant Pedagogy," *Am. Educ. Res. J.*, vol. 32, no. 3, pp. 465–491, Sep. 1995, doi: 10.3102/00028312032003465.
- [8] University of Washington College of Engineering, "Explore UW Engineering Departments." Accessed: Apr. 27, 2026. [Online]. Available: <https://www.engr.washington.edu/explore-uw-engineering-departments>
- [9] University of Washington College of Engineering, "About UW Engineering." Accessed: Jan. 16, 2026. [Online]. Available: <https://www.engr.washington.edu/about>
- [10] University of Washington College of Engineering, "Office of Inclusive Excellence (OIE)." Accessed: Jan. 16, 2026. [Online]. Available: <https://www.engr.washington.edu/about/diversity>

- [11] American Society for Engineering Education, “Engineering & Engineering Technology By the Numbers,” American Society for Engineering Education, Washington, DC, 2024.
- [12] R. Powell and S. Chambers Cantrell, *A Framework for Culturally Responsive Practices: Implementing the Culturally Responsive Instruction Observation Protocol (CRIOP) In K-8 Classrooms*. Gorham, ME: Myers Education Press, 2021.
- [13] J. Saldaña, *The Coding Manual for Qualitative Researchers*, 2nd ed. Thousand Oaks, CA: SAGE Publications, 2013.
- [14] G. A. Bowen, “Document analysis as a qualitative research method,” *Qual. Res. J.*, vol. 9, no. 2, pp. 27–40, 2009.
- [15] R. Desing and R. Clayton, “Enhancing engineering faculty implementation of inclusive pedagogy through an inclusive excellence faculty development program,” in *2025 ASEE Annual Conference & Exposition Proceedings*, Montreal, Quebec, Canada: ASEE Conferences, Jun. 2025, p. 56410. doi: 10.18260/1-2--56410.