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Publication date
2025

Document Version
Final published version

Published in
Evolving Education: A Manifesto to Reimagine Higher Education

Citation (APA)
Cortes Arevalo, V. J., & Benitez Avila, C. A. (in press). Facilitating safe and reflective environments to approach, analyse, and act upon diversity in (engineering) education. In *Evolving Education: A Manifesto to Reimagine Higher Education* (pp. 1-8)

Facilitating safe and reflective environments to approach, analyse, and act upon diversity in (engineering) education

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Abstract:

The global shift against diversity underscores universities' vital role in embracing diversity beyond mere representation. A key challenge is recognizing diversity beyond cross-cultural boundaries of, for example, gender, ethnicity or nationality. We suggest universities to foster an intercultural approach that recognizes the co-existence of multiple forms of difference and the agency of continuously shaping one's identity. By fostering the development of a diversity competence throughout and beyond the curriculum, we envision universities not only as places for learning how to make projects or innovations on time, on budget, and with functional quality. Universities are also places for reflecting on which type of society these projects contribute to and what role one plays. Do we want a society and engineers that build bridges between people or set walls between them? Overlooking diversity in the engineering practice can lead to growing pressures overtime within and between diverse groups. We write this manifesto from our teaching experience about intercultural relations. First, we outline the impact of ignoring diversity on sustainable development. Then, we discuss diversity in theory and how our technical university embraces it. Finally, we reflect on the students' perspectives on our attempts to shift from managing diversity to developing competencies. We call for each course and project where teamwork occurs to facilitate a safe and reflective environment to approach, analyse, and act upon diversity at three levels: at the professional level, by recognizing how (technical) work involves both making and caring; at the project level, by navigating biases and teamwork challenges; and at the societal level, by recognizing the project's (unintended) impact and role.

Keywords: Inter-cultural, teamwork, project-based education, life-long learning

A relevance that was taken for granted

Despite shifts in engineering education toward cultural diversity, global events reveal resistance from leaders and society. In 2024, worldwide politics saw a clear shift to the right, with voters expressing "*some feeling that migratory flows contribute to keeping wages too low.*" (Euronews, 2024). President Trump was elected, vowing to build a U.S.-Mexico border wall and rollback diversity initiatives in the world's largest economy (BBC, 2025). Tech leaders like Elon Musk and Mark Zuckerberg advocate similar policies in engineering workplaces (Breck Dumas, 2025). Meanwhile, the ruling coalition in the Netherlands imposed budgetary restrictions on higher education and purposively reduced the share of international students in universities (Persbureau, 2024). Current events and facts show a global shift against diversity and contrast with the relevance given so far from the social justice and sustainable development's perspective.

A common call to deal with societal challenges like climate change, inequality, and environmental degradation is about integrating sustainable development principles into all education (Žalėnienė & Pereira, 2021). The call to educate (future) professionals capable of transforming society and looking for social justice is an ambition that flourished with the worldwide commitment to sustainable development goals. Such a call gained force in the era of

internationalization of higher education, supporting the mobility of students (Horn et al., 2022). As societal challenges are more complex and universities become more international, it is clear that (future) professionals should develop competencies in their field, meet global needs, and work with others from diverse backgrounds (Brundiers et al., 2021). However, building a sustainable, equitable future requires changing practices, shifting power, and fostering cross-boundary collaboration between cultures, disciplines, societal stakeholders, and policy sectors (Gordon et al., 2019). In addressing the call, educational institutions have faced several contradictions, such as tradition vs. innovation, single vs. together, inside vs. outside, and comprehensive vs. pragmatic (Daneshpour & Kwegyir-Afful, 2022). The remaining challenges for improving sustainability education are high. For example, fostering global citizenship and shared responsibility is essential to inspire voluntary and collective action (Guillén-Yparrea & Ramírez-Montoya, 2023). On top of that, universities should now justify the relevance of diversity competencies in their education.

What does the theory say about diversity?

Despite the recent attention to working and collaborating in diverse cultural settings in education, business, and government, among others, efforts to train diversity date to the 1930s (Sabet & Chapman, 2023). Initially, there was no distinction between cross, multi, and inter-cultural terms. However, the emphasis was mainly on a cross-cultural view by comparing cultural groups. As such, by reducing identity to a single social group, one takes an ethnocentric or mono-cultural perspective. Yet, we all begin by viewing other cultures as "us" versus "them" while (unconsciously) denying, defending, or minimizing differences. A multi-cultural or ethnorelative perspective emerges when one starts to accept, adapt to, and integrate aspects of one's and others' cultures (Bennett, 1986). Multi-cultural competence is about interacting effectively and appropriately with those different from us. However, "effective and appropriate" reflects the outsider's perspective rather than mutual understanding.

Emphasis then moved on to understanding differences and the appropriateness and effectiveness of interactions between people. Intercultural competencies are about "*improving human interactions across difference, whether within a society (difference due to age, gender, religion, socio-economic status, political affiliation, ethnicity, and so on) or across borders*." (Deardorff, 2006, p. 70). After all, communication misunderstandings "*often stem not from culture but from limited awareness of each other's share in the communication, social context, or individual traits, biological or psychological*" (Hoffman & Verdooren, 2018, p. 26). Yet, the desired outcomes of social interactions (cultural or not) should distinguish the personal or "inner" outcomes for adequacy and effectiveness from the inter/intra personal or "outer" ones (Deardorff, 2009, p. 33).

Finally, for reflecting on any interpersonal interaction cultural or not, Griffith et al. (2016) further suggested to critically reflect about diversity differences in three stages: approach, analyse, and act. Veine (2020), added the test it out stage. Hence, approaching is about reflecting with a positive attitude toward differences. Analysing involves the unbiased acceptance, assessment, and integration of these differences. Acting translates thought into action while maintaining control in challenging situations. Testing it out is about using and applying the learning in other situations to start a new learning cycle. Then, diversity competence is about transforming an experience with an unfamiliar difference into a familiar one to which one knows how to react, enabling shared interaction goals with an adequate, effective yet ethical attitude (Hoffman & Verdooren, 2018). A reflective approach to diversity also requires sharing the desired individual and shared outcomes in a relationship, checking and revisiting regularly to align each other's expectations (Lantz-Deaton & Golubeva, 2020).

As such, working towards sustainability development goals are not only about the ability to collaborate in diverse teams. Inner development recognises the need to reflect, be responsible,

empathetic, care, and respect for oneself and others (Wickson et al., 2025). Diversity recognizes the co-existence of multiple forms of difference, the agency of continuously shaping one's identity, and the intentional journey of embracing diversity. Overall, culture is a dynamic and rich concept. It (Hoffman & Verdooren, 2018, p. 24):

- Reflects the complex habits of our various social groups, not a one-time phenomenon.
- Encompasses group characteristics, not limited to the individual.
- Is learned through personal experiences and historical developments, not biological.

Hoffman & Verdooren (2018) further point out that people—not cultures—interact. While cultural habits or group memberships may not always be a choice, cultural habits can be adapted, ignored, or expanded. Culture shapes how we interpret others (model of reality) and act (model for reality). In alignment with the UNESCO conceptual and operational framework (Leeds-Hurwitz, 2013), a diversity competence is rooted on the individual practice of valuing diverse worldviews and identities (**Figure 1**). Even small actions can help build a more just world. As such, diversity celebrates uniqueness while recognizing common needs like dignity, safety, and autonomy. It further encourages reflection on power dynamics and ethical questions about justice, collective action, and mutual respect. Diversity fosters solidarity through shared experiences and respect and helps to explore and adjust behaviours, meanings, judgments, and core values individually and collectively (Escobar, 2017; Hoffman & Verdooren, 2018).

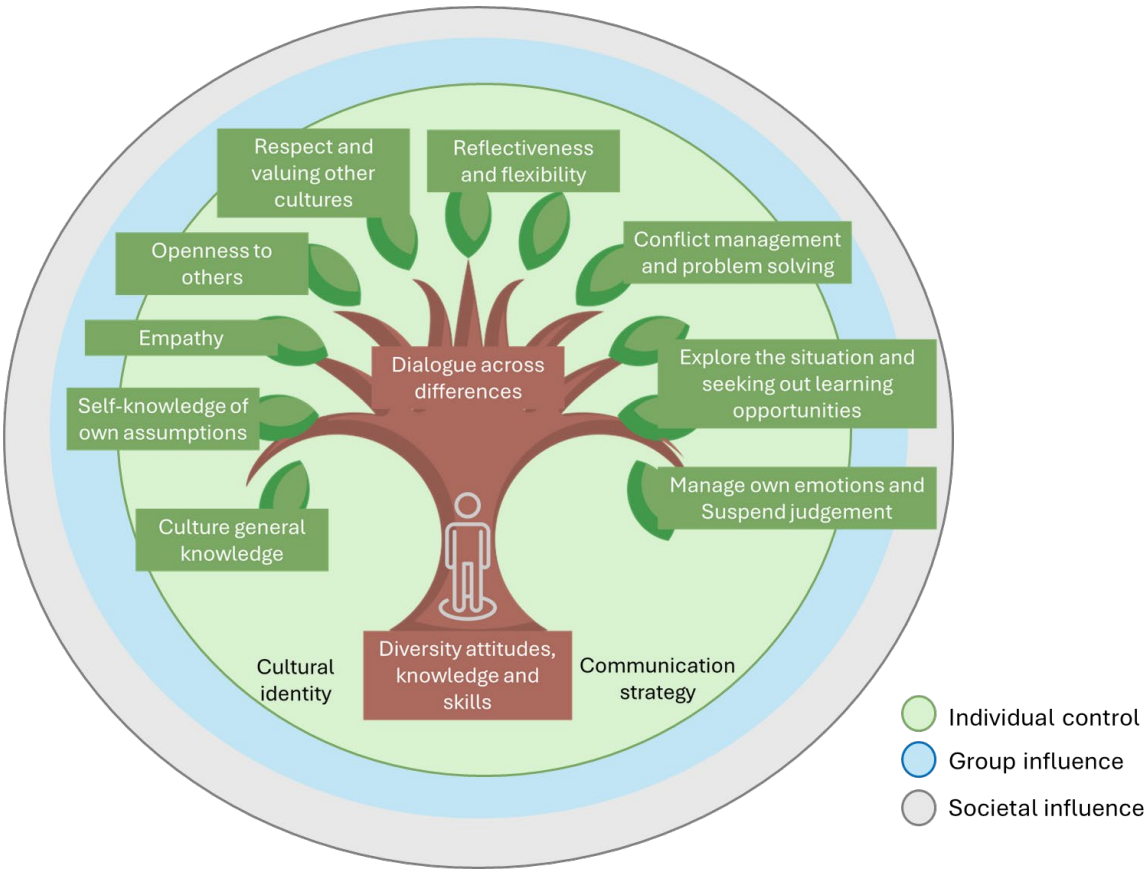

Figure 1. Key attitudes, knowledge, and skills to build a diversity competence starting from the individual circle of influence. Adapted from Leeds-Hurwitz (2013, p. 23) based on (Deardorff, 2020, p. 281). Tree icon from freepik (jagatkreasi, 2025) and circle of influence icon from Neville Medhora (2020).

So far, organizational policies have prioritized equity, diversity, and inclusion, promoting inclusive leadership and social cohesion. However, diversity ambitions are often oversimplified into the increasing representation or are promoted with functional objectives such as a business

case, an organizational or revindication strategy for improving productivity and reputation and supporting otherwise marginalized groups (Holck et al., 2016). Fostering diversity goes beyond the business case. Diversity safe environments are a safe physical, social, and psychological space for interaction. However, spaces in university and industry, among other organizational contexts, often become toxic (Clegg et al., 2023) or unsafe without intervention (TUDelft, 2025). As referred on some LinkedIn discussions, the TUDelft university has arguably improved diversity indicators (Chorus, 2025). Despite the university budget cuts which may imply otherwise, the discussion further pointed out that diversity is about prioritizing people over profit, collaboration over competition, nurturing over self-praise, and a thriving environment over mere survival (Fakhredin, 2025). Goh et al, (2022) define thriving environments as spaces where the members feel energised, learning and moving on a development direction.

Meanwhile, the TU Delft introduced diversity and social safety guidelines, with the Teaching Academy offering reflective guidance across six dimensions (Hermsen et al., 2022). The guidelines emphasize action and growth, focusing on society, product, process, interactions, learning, and self. Collecting insights from using these guidelines and embedding reflection and diversity competencies at the curriculum level and in all project-based courses is still necessary (Gregersen-Hermans, 2017). After all, challenges in intercultural teams mirror those in project-based education, including language barriers, exclusion, teamwork skills, and stakeholder relations (Jiang et al., 2023).

What have we tried and learned from teaching?

We wrote this manifesto building on the experience of teaching a course on intercultural relations and diversity competence in a first-year master's course at this university. We started coordinating the course two years ago when we joined as lecturers. We partner to bring our different but complementary expertise working on integrated and participatory management. Key characteristics of the course included:

- **An already intercultural view, now closer to professional practice.** Following the guiding book (Hoffman & Verdooren, 2018), students were asked to analyse a communication challenge in a personal cross-cultural relation of their choice. To do so, they reflected on each other's language, way of thinking, intention, organizational context, and view of each other. We turned a solo essay into a group reflection essay with two cases. Students reflect on a communication challenge on a reference engineering case. Then, they select among teamwork communication challenges in their student's life one to analyse.
- **Serious games as safe environments.** The course used a game to help students experience cultural differences by simulating interactions between two archetypes cultures. We introduced a game designed to illustrate that interpersonal communications are not limited to cross-cultural differences in our professional practice but lead to differences from the communication or the context.
- **Bringing theory into reflections about practice with effort in providing feedback.** The course had a guiding book that explained the theory of diversity with cross-cultural examples, and we added references illustrating construction and engineering cases. We invested in providing feedback to the students on their essay introductions and theory discussions so that they can use this feedback in their joint reflections for the final essay.

While the course has been received positively by some: "*The learnings about intercultural relations were very good and useful for the future, including the use of games as a safe learning environment*". Simultaneously, others did not enjoy the course as much and required "*a more practical approach, which is about the actual scenario in the world*". Overall, students found difficult to explore the different viewpoints from theory or distant examples from practice. We

should also finetune the message that come across every lecture and discussion. Students suggested not reinforcing stereotypes through the game experiences and starting discussions based on the student's experience or surrounding environment with actual examples from the professional practice. We used this manifesto as means to reflect on how to take this feedback into the course. As we write, we work on the course improvements.

How can we practically embrace diversity?

We call for each course and project where teamwork occurs to facilitate a safe and reflective environment to approach, analyse, and act upon diversity at three levels in a bottom-up fashion (**Figure 2**):

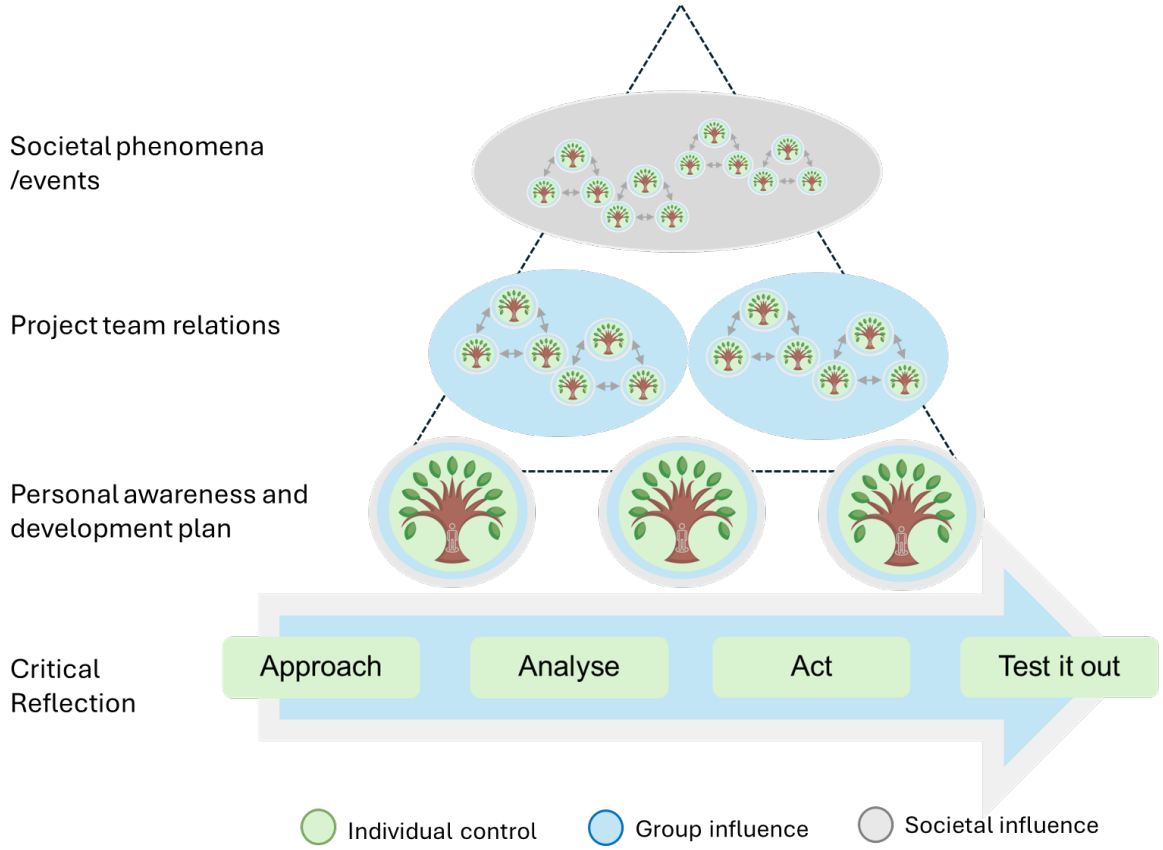

Figure 2. Call for action to practically embrace diversity. Inspired from Veine et al.(2020) and Deardoff (2009, p. 33). Tree icon from freepik (jagatkreasi, 2025) and circle of influence icon from Neville Medhora (2020).

- **At the project level, one navigates biases and teamwork challenges.** Then, it comes to the point that engineers play a social role in delivering projects on time, on budget, and quality. Understanding the other, addressing communicating challenges, and going beyond stereotypes are critical in any collective task, regardless of whether such a task entails diverse knowledge, customs, or values.
- **At the professional level, one considers how technical work can involve making and caring.** Suppose one has ambitions for being relevant to the world and beyond the boundaries of daily life. In that case, such diversity entails cultural differences that we need to prepare our students for. There is a dividend of diversity in the pure instrumental way of increasing representation. However, practically fostering diversity should not be reduced to its instrumental dividends. Diversity competences also foster spaces for caring about how the word shaped by engineering impacts one's and others' lives.

- **At the societal level, one recognizes its role and its project's (unintended) impact.** Engineers have been trained to take such impact as evident and non-problematic for so long. A technical domain unfolds, serving values, viewpoints, interests, and ideas on the desirable society and world. At the societal level, we invite students to reflect on the social and political projects their engineering practice aligns with. We invite them to consider the (unintended) consequences or "walls" between diverse groups and invite them to build "bridges" instead. After all, we may recognise from each other's experiences that overlooking diversity in the engineering practice can lead to growing pressures overtime within and between diverse groups.

Acknowledgments: We thank the students who participated in the course and provided valuable feedback for improvement, also to the formal and informal reviewers at different stages of this manuscript. We acknowledge using ChatGPT to shorten long sentences while writing draft versions that we critically review and rewrote.

Authors biography:

Juliette Cortes-Arevalo is a civil engineer, with an MSc in Hydro informatics and a doctoral on the participatory inspection of hydraulic structures. She co-designs (online) tools that facilitate knowledge exchange between research, government, and local communities for managing water in an integrated way. Juliette bridges expert and local knowledge by experimenting with visual storytelling, serious games, and citizen science in engineering education and practice.

Camilo Benitez-Avila is a political scientist by training, with an MSc in System Dynamics and a doctoral on the governance of Public-Private Partnerships. His research explores the ethics of urban social resilience, addressing the tensions between culture, power, and organisation. Camilo collaborates with like-minded colleagues, highlighting the coloniality of engineering and exploring possibilities for rethinking it so that engineering enforces human rights.

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