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Who am I and How Should I Engineer? A guide to using 'deep' skills such as reflexivity when engaging at the cultural interface to co-design engineering education.

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ABSTRACT

CONTEXT

Engineering has been practised in Australia for thousands of generations, with recorded engineering structures that are estimated to be 40,000 years old. Yet, there is very little reference to the contributions of Aboriginal and Torres Strait Islander (Indigenous) engineering in contemporary engineering education. We assume a significant contributing factor is because very few of the roughly 2,500 engineering educators in Australia identify as Indigenous. We also assume that most engineering educators in Australia do not know how to engage with Indigenous Australians or understand Indigenous ways of knowing, doing, and being – or even that these ways are relevant to their work. This is deeply problematic as Indigenous Ways of Knowing, Doing, and Being, hereafter abbreviated to Indigenous Ways (IW), have much to contribute to engineering education and practice.

PURPOSE OR GOAL

The purpose of this paper is to help empower all engineering educators in Australia to feel comfortable and confident to collaborate with Indigenous peers at the cultural interface such that, in turn, engineering students are provided with experiences to help them understand and appreciate the contributions of Indigenous ways of knowing, doing, and being to the engineering profession.

APPROACH OR METHODOLOGY/METHODS

The framework we introduce is a collaboration between a non-Indigenous engineer and researcher (Author1) and First Australian peers (Author2 and Author3). Our shared vision is for the engineering profession in Australia to be one that understands and appreciates the contributions of Indigenous ways of knowing, doing, and being, leading to at least parity representation in engineering professionals, students, and educators, and a co-designed engineering education curriculum.

ACTUAL OR ANTICIPATED OUTCOMES

To achieve the purpose described above.

CONCLUSIONS/RECOMMENDATIONS/SUMMARY

We provide a framework for engineering educators in Australia to engage with Indigenous Australians and IW at the cultural interface in a mutually respectful manner, so they can co-design engineering education together. We also introduce the importance of 'deep' skills, such as reflexivity – the ability to examine one's thoughts, feelings, and motivations – to complement the existing 'hard' and 'soft' skills that engineers learn.

KEYWORDS

Indigenous Ways; First Nations; Culture; Education; Reflexivity

Introduction

Engineering has been practised in Australia for thousands of generations, with recorded engineering structures that are estimated to be 40,000 years old (Tan, 2015). Yet, there is very little reference to the contributions of Aboriginal and Torres Strait Islander (Indigenous) engineering in contemporary engineering education. We assume a significant contributing factor is because very few of the roughly 2,500 engineering educators in Australia identify as Indigenous (ACED, 2020). We also assume that most engineering educators in Australia do not know how to engage with Indigenous Australians or understand Indigenous Ways of Knowing, Doing, and Being – or even that these ways are relevant to their work. This is deeply problematic as Indigenous Ways of Knowing, Doing, and Being, hereafter abbreviated to Indigenous Ways (IW), have much to contribute to engineering education and practice. Indeed, we need as many engineering educators in Australia as possible to understand and appreciate the value that IW offers the engineering profession – especially if we want to improve the (co-)design and implementation of infrastructure and services in Indigenous communities.

To help address this issue, the focus of this paper is to provide a framework for engineering educators in Australia to engage with Indigenous Australians and IW at the cultural interface (Nakata, 2002) in a mutually respectful manner, so they can co-design engineering education together. We also introduce the importance of 'deep' skills, such as reflexivity – the ability to examine one's thoughts, feelings, and motivations – to complement the existing 'hard' and 'soft' skills that engineers learn.

The primary audience of this paper is (non-Indigenous) engineering educators in Australia who wish to learn more about the value that IW offers contemporary engineering education and practice by engaging with Indigenous peoples at the cultural interface. A secondary audience is Indigenous peoples who are interested in how engineering educators may try to engage them.

The framework we introduce is a collaboration between a non-Indigenous engineer and researcher (Author1) and First Nations Australian peers (Author2 and Author3). Our shared vision is for the engineering profession in Australia to be one that understands and appreciates the contributions of Indigenous ways of knowing, doing, and being, leading to at least parity representation in engineering professionals, students, and educators, and a co-designed engineering education curriculum. Our shared purpose in writing this paper is to help empower all engineering educators in Australia to feel comfortable and confident to collaborate with Indigenous peers at the cultural interface such that, in turn, engineering students are provided with experiences to help them understand and appreciate the contributions of IW to the engineering profession.

We aim to achieve this purpose by introducing the importance of understanding and connecting to our own culture through reflexive practice. We then outline the value to the engineering profession of some key tenets that are common to First Nations Australian cultures. Finally, we offer a framework for respectfully engaging with Indigenous peers at the cultural interface, so they can co-design engineering education together.

Culture

There are many formal definitions of culture. For example, Stuart Hall defines culture as a process of producing and exchanging meanings between members in a society or group so they can meaningfully interpret their surroundings, thoughts and feelings, "'making sense' of the world, in broadly similar ways" (Hall, 1997, p. 2). Another way to describe culture is that it is how we see the world, rather than simply what one sees—for example, cultural artefacts such as clothing, shelter, tools and food. In other words, culture is how we interpret, understand and make sense of the world; this includes our assumptions, beliefs and values, many of which may be un/sub-conscious.

There are many levels or layers of culture that can influence an individual or group, from national or ethnic cultures, to social classes, occupational, industry, and organisational (Hofstede et al., 2010). The difference is the mix of values and practises in each: national or ethnic cultures are primarily concerned with values, which are largely ingrained in the early, formative years of life,

whereas organisational cultures are primarily concerned with practices, which are more superficial in nature and easier to change. In between are the levels of social class, occupation, and industry.

Engineering is an occupation, which suggests that there is a mix of values and practises in engineering culture. According to McIlwee and Robinson (1992), these values include technical proficiency, and a self-centred belief in the value of engineering – a culture that is "characterised by a form of locker room, macho tinkering, in which male engineers strut their stuff in competitive displays of hands-on technical virtuosity" (Whalley, 1992).

Despite attempts to encourage greater diversity – especially gender diversity – in engineering, the percentage of women in engineering in Australia has only increased from 13% in 2022 to 14% in 2024 (Howard, 2024). Furthermore, according to Moote et al. (2019), the gender stereotypes associated with engineering begin early, at around only 10 years of age.

If the engineering culture is not open to the views of minority groups, including women and people of colour, then it will struggle to design services, solutions and systems for and with them. Even if engineers adopt a (weaker/diluted) form of human/user centred-design, it will be constrained by their lack of respect and understanding for the ways of knowing, doing and being of minority cultures, which will undermine the effectiveness of the designed services, solutions, and systems (Varma, 2018).

Moreover, the Western focus on outcomes over process may further disadvantage the groups and communities impacted, as they may value engaging with the right process more highly than the outcomes. Indeed, failing to understand and engage in an appropriate manner shows disrespect and may exacerbate existing (often intergenerational) trauma. So how can individual engineers challenge the existing engineering culture and learn to engage and practice engineering in a more open and respectful way?

In short, it starts with understanding their own culture—how they make sense of the world. It is a common misconception that leads some people of a dominant culture to believe that they do not have an identifiable culture, as their culture is considered a 'societal norm'. For those who belong to a society's dominant culture, it can be difficult to put their culture in context.

Furthermore, to appreciate other cultures, we need to understand and connect to our own culture—both the visible, and the invisible. Hall (1976) posits that there are two layers to culture: internal and external. Internal aspects of one's culture are difficult to observe. They are the implicitly learned, unconscious elements of who we are, built from subjective knowledge. They are the most difficult parts of ourselves to change. The external aspects of one's culture are those more readily observable—explicitly learned, conscious, and built on objective knowledge.

From this understanding, Weaver (1993) likened this dichotomy to that of an iceberg – where only 10% is visible above the surface, the rest existing below. If the culture of a society was the iceberg, Weaver suggests that while there are some visible aspects, above the water, there are a vast number of unseen aspects hidden beneath the surface. The visible elements are the things that we can usually see and identify in other people without even knowing them. Things like age, gender, the clothes we wear, what language we speak, and other physical characteristics. The invisible aspects of culture, existing below the surface of the cultural iceberg, are more challenging for people to understand and to identify. Here, culture is articulated through values, beliefs and attributes which can be intangible and difficult to describe. While the visible aspects of one's culture might make up the societal norm, the invisible aspects of one's culture are often unique, and arguably more defining of someone as a person. Understanding these aspects of one's own culture is the first step to understanding these aspects of another's culture.

Reflexivity as a 'Deep' Skill

We will now discuss how you can begin to understand your own culture more deeply. There is no single way to go about this; most likely, understanding yourself and your culture will be an ongoing exercise in reflexivity – one that grows and evolves with you over time as you develop this 'deep'

skill. However, there are a number of ways to think about or conceptualise your culture that can help make it accessible and understandable.

For instance, looking at the elements of the cultural iceberg that exist below the surface, can you clearly articulate how you feel about each of these elements? Can you remember the first time you thought about those things? Do you think your parents or grandparents feel the same way?

If possible, you could start by speaking to your family, especially your parents and grandparents, to get a sense of what it was like growing up for them. What qualities were valued by society at the time? Where did they live, and why? What did they like or dislike about where and when they lived? Reflect on (and discuss, if possible) how these factors have influenced who they are as a person – and, in turn, how they have then influenced your character.

Learning about your own culture – how you see the world – is needed in order to start understanding people from other cultures, as you need to be as aware as possible of your own assumptions, beliefs and values when exploring others. However, when you first experience another culture, you are usually first interacting only with the external aspects of that culture. For many of our interactions with people of another culture, this surface level understanding can lead to the development of assumptions or ideas about another cultural community – without really understanding the internal or deep culture that makes up the majority of that culture's values and beliefs.

Hall (1976) suggests that the only way to learn the internal culture of others is to become a respectful and active participant in their culture. As one spends more time immersed within a new culture, the underlying beliefs and values systems that dictate their behaviour will be uncovered. This model teaches us that we cannot judge a new culture based only on those overt behaviours which are presented to us at a surface level. It is critical that we take the time to get to know individuals from that culture and interact with them based on mutual respect. Only by doing so can we slowly start to build trusted relationships and uncover the values and beliefs that underlie the behaviour of that person, the communities they belong to, and the ways in which we can relate in turn.

First Nations Australians have built the understanding and nurturing of relationships into their protocols for thousands of generations. These protocols require that people get to know each other authentically, based on the person you are ('who you are'), instead of the role you perform at work ('what you do'). That is why it is important to acknowledge your parents, guardians, and family, as well as the places where you were brought up, as each of these will have had a formative influence on your character and the person you have become. These protocols also help to drive understanding and accountability, as you will get to know a person's 'story', beyond just knowing who someone is.

This level of understanding is important to engineers. For example, engineers need to be trusted by their colleagues and stakeholders, otherwise they may end up designing an inappropriate solution. Indigenous Ways prioritises the centrality and value of relationships between the different parties during the design process, such that there is a deeper sense of shared responsibility and ownership throughout the process, and over the co-designed solutions.

Reflexivity is an essential tool in this process as you simultaneously learn about people from different cultures, and yourself, which is why we believe it is worth calling it out explicitly as a 'deep' skill, to complement the existing 'hard' skills (such as technical knowledge) and 'soft' skills (such as communication, leadership, teamwork).

However, it is also important to note that reflexivity may not be enough when there are significant power imbalances between the different cultures. In these cases, it is also important to interrogate the systems of the dominant (typically 'White') culture (Russell-Mundine, 2012).

We would now like to outline the value of doing so–that is, why would an engineering educator invest their time and energy in this in the first place?

The Value of Indigenous Knowledge in Engineering

What unique value might there be at the intersection of engineering education, and Indigenous Ways of Knowing, Doing, and Being? The question of value is first a question of worldview and perspective. A worldview that emphasises, say economic return, will have a favourable view of a solution which drives economic value. In contrast, a worldview that takes a broader perspective will naturally privilege (or find greater value) in solutions which drive other types of value. At the same time, it is important to note that these views are not binary, nor are they stagnant, and they may not be homogenous—so the best we can do in this context is to provide some clear examples for the reader to begin their own journey around some of the key concepts. In doing so, the reader can seek to uncover the unique value which they believe exists at the intersection.

The more values that two people or groups have in common, the greater the chances that the services offered by one group to the other—engineering or otherwise—will be culturally appropriate. As such, one question that engineering educators may wish to consider is: are there particular values or principles associated with IW that, if better understood, could help the engineering profession design and deliver better solutions?

To illustrate, we shall consider a small number of key tenets that are common across Indigenous cultures within Australia: respect, reciprocity, responsibility, custodianship, and sustainability. Importantly, these tenets represent the very first step—they are far from exhaustive, and they may be described with slightly different language across different Indigenous nations around the country.

These tenets are embedded in a worldview that: has respect for all things – animate and inanimate; all things have a place and value; knowledge is earned over time through conduct in accordance with key values; each person has a role and responsibility; are based in a relational ontology – something which governs behaviours and conduct and interactions as between these parties; and uses stories and songs to bring many of these elements together in a range of different contexts, including different peoples across the country (that is, ‘songlines’ which can connect different groups). We will now present some of these more common tenets, and some leading questions and considerations to help understand the relevance to contemporary engineering education.

First Nations Australian Tenets

Respect

Indigenous Ways Description

Indigenous Australians have a relationship with all things, animate and inanimate, and we have respect for all their respective roles in informing and bringing about our ways of knowing, being and doing.

Potential Engineering Lens/Questions

Engineering is a profession that works alongside others, using a range of different materials, ways of thinking, and technical knowledge, to deliver value in the world. What are the relationships between these different components, and what could this view of engineering, in the context of this complex system of things, deliver to the profession, and to society at large? Would it change how the profession viewed itself? Would it change how it connects with other systems/professions? Would it change how information is curated, distilled, codified, or taught? What are the roles of non-professionals in engineering? What is the role of communities in engineering? How is non-technical knowledge blended or combined with more technical knowledge? Is it possible to view these different types of knowledge and ways of being and doing, as valid and authentic, and not simply ‘lesser than’, or dismissed?

Responsibility

Indigenous Ways Description

Once people have demonstrated that they operate in accordance with expected ways of knowing, being and doing, they may have additional knowledge shared with them. The receipt, use, and dissemination of this knowledge comes with significant responsibility. Some knowledge might be relatively universal (such as the timing of the seasons, or where useful plants and animals might be found), whereas some knowledge may only be available to specific people, such as Elders, or to women only, or to men only.

Potential Engineering Lens/Questions

What might the 'responsibility' of engineering educators be in this context? Could this be broader than subject matter delivery/teaching? How far should their responsibility extend? What if this type of framing were provided to engineering students? Would engineering solutions change?

A tangible example of this is the 'Iron Ring' (Engineers Canada, 2025) and its associated ritual for engineers to remind them of their moral responsibilities, which has been compared to the Hippocratic Oath taken by physicians. This connection surpasses legal or technical boundaries around knowledge, and instead talks to something more profound—something that addresses a deeper role for engineers, beyond their technical expertise.

Reciprocity

Indigenous Ways Description

We all have a role to play in delivering value to our people and communities—no one just 'takes', we must all contribute to the betterment of our community/clan/nation.

Potential Engineering Lens/Questions

Aspiring engineers are provided with subject matter to develop their technical expertise with a particular set of knowledge, and ways in which they can apply that knowledge, to create value. Engineering educators not only take existing content to educate students, but they help by building on the existing knowledge base as they themselves learn more, and as they bring new insights into contemporary curricula. What if students adopted this lens? What would it mean for them not just as learners of content, but as the next in a long line of expert professionals? What might it require of them, over and above just, 'becoming qualified'? And what might it require of them as they build their skills and knowledge and experience—is there an expectation of what it means to be an engineer, in the context of the history (and future) of the engineering profession?

Custodianship

"We are all visitors to this time, this place. We are just passing through. Our purpose here is to observe, to learn, to grow, to love… and then we return home." – Australian Aboriginal Proverb

Indigenous Ways Description

We make decisions informed by thousands of generations of practice; and Ways of Knowing, Being and Doing, refined for millennia. Beyond our current activities, is our (a) understanding and respect for the sacrifice of those who have come before us to provide us with the opportunities we now enjoy; and (b) appreciation that we too have a responsibility to do the same thing for future generations.

Potential Engineering Lens/Questions

What are the roles of educators, practitioners, and students (and potentially others) in the progression of engineering as a profession, and in the improvement of designs/solutions for the future? With this longer-term lens, does the framing of any of these roles change? Does the design and delivery of any engineering solutions/advice change with this lens? What are the roles of each in setting new/improved foundations for the engineers of tomorrow? How have the engineers of the

past contributed to the platform afforded to the engineers of today? What are the implications of this lens on more holistic connections between engineers and community?

Sustainability

Indigenous Ways Description

The use of materials is very considered, and there is minimal wastage. In line with the respect for all things, materials are only taken when absolutely needed. Moreover, land, water, and other resources are typically personified, with the relationships between these things being paramount. Indeed, they are often closely connected—take for example the 'health' of country (a term encompassing both land and water, among other things) and its connection with the health of the people on (and caring for) that country. Where the health of the country is strong, the health of the people on that country will be better. Conversely, poorly-managed or 'sick' country might be connected with poorer health outcomes for citizens.

Potential Engineering Lens/Questions

Sustainability is already an important aspect of the engineering curriculum, especially in environmental engineering majors. However, existing questions around minimising environmental impact, the total life cycle of the materials, and site rehabilitation can be complemented when the relationship between people and their natural environment is considered in a more direct and intimate way. For example, the health benefits of being in nature are increasingly being recognised, so are there ways to increase our exposure to nature in a sustainable way through the engineering project/solution?

Furthermore, Indigenous Ways demands that engineers adopt a multi-level systems thinking approach when designing to ensure the full cradle-to-grave life cycle is properly considered, and they are designing a technical solution that takes into account the overall context and needs/desires of all stakeholders. Extending the guiding principles that engineers use to inform their work may help. For example, engineers typically value (and optimise around) efficiency and safety, but Indigenous Ways demands that sustainability and a more holistic view of wellbeing (that is, beyond safety) also need to be prioritised.

Learning Loops

Now that we have introduced the key elements of the framework for engaging with IW – the importance of culture and identity, reflexivity as a 'deep' skill, First Nations Australian tenets, and how to be an ally – we will look at how they can be sequenced and patterned to create a framework for respectfully engaging Indigenous peers at the cultural interface. We have found that a learning loop most effectively conveys our understanding of the lifelong learning journey involved. The goal of the learning loop is to establish a pattern for co-designing engineering education at the cultural interface.

This 'loop' operates at both micro and macro scales: at the micro scale, it offers discrete steps to be taken in the learning of key content and processes; at the macro scale, it helps when stepping back to reflect on the journey through the learning, to consider what has been learned, and how to apply that learning in the future – and moreover, what does this learning mean for their profession and colleagues, as much as for the individual. The learning loop consists of the points illustrated in Figure 1. Each point consists of concentric circles, which represent the levels of understanding and knowledge that build over time as you move through the loops.

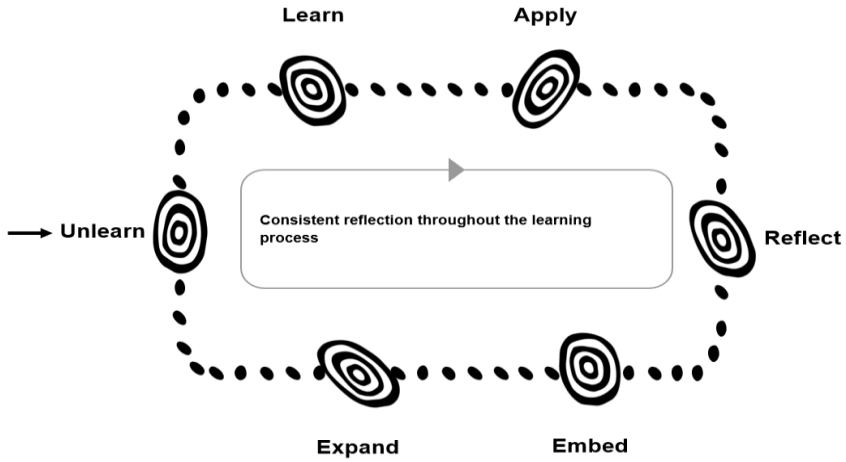

Figure 1: Learning Loops

1. **Unlearn**: The first step is to help you, as an engineer, better understand the concepts and importance of culture - through the lens of your own culture, specifically, as this will have strongly influenced your worldview. By understanding and challenging what is established and accepted, and placing your understanding within an Indigenous context, you can begin the next cycle of your learning. This may initially require a level of 'unlearning'—which can be awkward and difficult—particularly with technical experts who have spent many years learning and honing their expertise, and especially where their education has already delivered professional success. As such, the challenge here is (at least) twofold: first, this step does not in any way de-value existing expertise, it should be understood as complementary; second, these two 'worldviews' (technical and cultural) can co-exist, and each are lenses which can be developed and improved over time.
2. **Learn**: With an understanding of your own cultural reference frame, the second step is focused on learning at the cultural interface. You might begin to engage and discuss with Indigenous people via relevant networks, such as the Indigenous centre of your university. This is about hearing from others how the established ways of doing may not work, or exist differently for Indigenous peoples. This requires listening, understanding, and patience for yourself and others. A key principle in this space is to listen more than talk. Typically, there are strong impulses to demonstrate expertise to others, but often in this space there is far greater value in listening, distilling, comparing and contrasting with existing worldviews, and actively seeking the 'nuggets' of information which represent specific value for the listener/participant. Conversations in this space can be very fluid and often circular, as concepts are triangulated between the different worldviews, and then shared understanding and meaning utilised. Patience is paramount.
3. **Apply**: Having begun learning at the cultural interface, you can begin to embark on applying your new learning to your field of work. Here, you can be focused on working with specific Indigenous collaborators to co-design positive engineering education, interactions, and environments at the cultural interface. There are many ways in which this can be done: on an individual level, organisational level, community level, or even specific interest group level (such as through professional associations). Once again, this is an exercise which requires great patience, and a commitment to exploring shared value, and acceptance that this is not a linear process. However, we believe there is great value, both for the engineering profession, and society more broadly, if more of these types of conversations and practices can be sustained.
4. **Reflect**: Although reflection is required consistently throughout the learning process, this step is focused on assessing and reflecting on the application of your learning. This involves challenging the assumptions that you have made. How do you know what you are doing is working? Who have you asked? Are you ready to continue, or is further unlearning and learning required? As noted above, this engagement will require the melding of worldviews, and sometimes circular processes – but substantial value is typically only

derived through astute observation, and an ability to recognise analogies. Stories sometimes relayed from Elders can be about a specific discrete/obvious subject, and at the same time about values and behaviours and roles and responsibilities – or represent different ways of thinking about things.

5. **Embed**: If, after critical reflection, you are ready to proceed on your learning journey, you can now begin to embed your learning into your work and everyday life. Inherent in this is everything you have learnt so far, an understanding that you will need to continue your learning, and your advocacy for this learning. Perhaps the key principle here is that to be authentic (and effective), this process needs to be centred around *genuine relationships*. To be able to navigate awkward conversations, have the patience to progress through non-linear conversations, and to be vulnerable in order to learn, the cultural interface needs to be a safe space where all parties' views are absolutely respected.
6. **Expand**: Finally, having embarked on a deeply reflexive learning experience, you can begin to explore the next area or focus of learning that you are looking to undertake. It is important to reflect on your learning experience and share and contribute your learnings and outcomes back to the individuals and communities that you involved. Finally, you can return to stage one once again, ready to start anew and build upon your previous experiences.

We believe there are many applications for insights gained from working at the cultural interface. On one level these insights might assist in introducing new worldviews to the engineering profession; on another level it might help to define the organisations or projects or causes to which an engineer might commit their time and considerable expertise; and on another level again, work at the cultural interface might help in evolving the curricula (and therefore the future practices) of the engineering profession as a whole.

Lifelong Learning Loops and Ever Deeper Reflexivity

> *More than a concept, Cultural Humility is a process of communal reflection to analyse the root causes of suffering and create a broader, more inclusive view of the world... It is a daily practice for people who deal with hierarchical relationships, changing organizational policy and building relationships based on trust…* – Vivian Chávez

In this paper, we have sought to express the value and importance of engineers' understanding of Indigenous ways of knowing, being, and doing – a critical component along the journey to improved (co-)design and implementation of infrastructure and services in Indigenous communities. In doing so, we hope to make the engineering profession more inclusive and accessible to First Nations Australians, which will benefit the profession as a whole.

To build this understanding, we examined the importance of understanding our own culture, and how this has shaped our world view – and our own ways of moving throughout the world. We also came to understand that this learning journey, particularly when it involves the traumatic histories of Aboriginal and Torres Strait Islander peoples in this country, can be confronting and traumatic in its own way.

By working at the cultural interface, we understood the ways in which engineers are able to begin to develop their 'deep' skills as a complement to the 'soft' and 'hard' skills that are required within their roles. By moving through our suggested learning loop, engineers can seek to reframe their understanding of the peoples and communities with whom they are working – in turn finding new ways to apply and embed important cultural changes within their work and outputs. Two of the most critical steps in this learning loop were reflection and expansion – both focused on building on previous learning experiences with continual openness to new ways of doing.

To continue to progress along your cultural journey, it is crucial to understand and practise cultural humility. This concept is about building trust. It is about having an open mind when learning about other cultures. It asks you to put aside any preconceived notions, biases, or assumptions that might have been learnt through life, and take time to understand the experiences of other people.

In the context of Aboriginal and Torres Strait Islander peoples, cultural humility can take many forms. It might mean that you learn further about the historic treatment of Aboriginal and Torres Strait Islander peoples by previous governments – putting aside any nationalistic pride, to critically reflect on the power imbalance that exists within Australian society.

It might mean involving Aboriginal and Torres Strait Islander peoples to have input to the work you do, particularly when they, as individuals and communities, will be affected by the outcomes. It might simply be that you are more aware of times that you need to listen to the stories, experiences, knowledges, and needs of Aboriginal and Torres Strait Islander peoples.

However cultural humility manifests for you, practising it is an ongoing process. It will take time. Just as others will always be able to learn new things about you, you too will never stop learning about others, and their cultures. Willingness to humbly acknowledge this lifelong journey is the first, and most important, step towards cultural safety in all that you do.

References

ACED (Australian Council of Engineering Deans) (2020). Australian Engineering Education Statistics. Retrieved August 8, 2025, from: http://www.aced.edu.au/downloads/ACED%20Engineering%20Statistics%20Mar%202020.pdf

Chavez, V. Cultural Humility (Videos). Global Library for Antiracism & Digital Citizenship. Retrieved August 8, 2025, from: https://sacred.omeka.net/items/show/164

Engineers Canada (2025). 100 years of the iron ring: A symbol of an engineer's commitment. Retrieved August 8, 2025, from: https://engineerscanada.ca/nem2025/feature-stories/100-years-of-the-iron-ring-a-symbol-of-an-engineers-commitment

Hall, E. T. (1976) *Beyond Culture*. Garden City: Anchor/Doubleday

Hall, S. (Ed.). (1997). *Representation: Cultural Representations and Signifying Practices*: Sage Publications Ltd.

Hofstede, G., Hofstede, G. J. & Minkov, M. (2010). *Cultures and Organizations: Software of the Mind* (Rev. 3rd ed.). New York: McGraw-Hill.

Howard, W. (2024). Just 13 per cent of engineers are female, but push for gender parity is building on International Women's Day. Retrieved August 8, 2025, from: https://www.abc.net.au/news/2024-03-08/push-for-more-women-in-engineering-and-stem-careers/103561460

McIlwee, J. S., & Robinson, J. G. (1992). *Women in engineering: Gender, power, and workplace culture*. SUNY Press.

Moote, J., Archer, L., DeWitt, J., MacLeod, E. (2019) Comparing students' engineering and science aspirations from age 10 to 16: Investigating the role of gender, ethnicity, cultural capital, and attitudinal factors. *Journal of Engineering Education*. 109: 34– 51. DOI: 10.1002/jee.20302

Nakata, M. (2002). Indigenous knowledge and the cultural interface: Underlying issues at the intersection of knowledge and information systems. *IFLA journal*, 28(5/6), 281-291.

Russell-Mundine, G. (2012). Reflexivity in Indigenous research: Reframing and decolonising research? *Journal of Hospitality and Tourism Management*, 19, e7.

Tan, M. (2015) The fish traps at Brewarrina are extraordinary and ancient structures. Why aren't they better protected? Retrieved August 8, 2025, from: https://www.theguardian.com/australia-news/2015/jul/10/fish-traps-brewarrina-extraordinary-ancient-structures-protection

Weaver, G. R. (1993). Understanding and coping with cross-cultural adjustment stress. *Education for the intercultural experience*, 2, 137-167.

Varma, R. (2018). U.S. Science and Engineering Workforce: Underrepresentation of Women and Minorities. *American Behavioral Scientist*. 62(5): 692–697. DOI: 10.1177/0002764218768847

Wedel, K. A. (2012). *The Obligation: A History of the Order of the Engineer*. AuthorHouse.

Whalley, P. (1992) Reviewed Work: Women in Engineering: Gender, Power, and Workplace Culture. By Judith S. McIlwee, J. Gregg Robinson. *American Journal of Sociology*. Vol. 98, No. 3 (Nov., 1992), pp. 679-681.