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Building a Bridge to Connect Students to Country

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ABSTRACT

CONTEXT

Civil engineering projects in Australia are built on Aboriginal and Torres Strait Islander land. While it is important for our graduates to be technically competent and mindful of sustainability, it is also important for them to appreciate the social and cultural impact of conducting civil infrastructure works on Country. Professional guidelines establish expectations of professional engineers to engage responsibly with the community, which includes Indigenous communities. Civil engineering projects must also comply with legislation regarding Aboriginal and Torres Islander cultural heritage. Civil engineering students have little exposure to Indigenous perspectives.

PURPOSE

Many engineering educators lack the confidence to embed Indigenous perspectives. Here, we share our experience of authentically embedding Indigenous perspectives and knowledges in a fourth-year civil engineering unit, including reflections on what worked well and what might be improved.

APPROACH

In this Indigenous led effort to embed Indigenous perspectives in an engineering unit, students were provided with learning content and resources (embedded in unit project brief, lectures delivered by Indigenous academics and weekly design studio discussions) to help them respond to questions about Indigenous cultural heritage in three assessment items building up from demonstrating knowledge to synthesising information from multiple sources to creatively applying complex ideas in response to an open-ended problem. Students were introduced to the concept of Indigenous connection to Country – and caring for Country – as enacted through continuous cultural practice, taught a broad overview of local Aboriginal social and political history to facilitate an appreciation of Indigenous perspectives, and provided with some archaeological and legal information about identifying and protecting Aboriginal cultural heritage in the context of civil engineering projects.

ACTUAL OUTCOMES

The student response was generally positive about the Indigenous cultural heritage content and assessment. The academic performance of students on the Indigenous cultural heritage criteria of each assessment task was similar to their performance on other criteria.

SUMMARY

Education opens our eyes to the world. As engineering educators, we can open the eyes of our students to better see Country and understand how to engage with Indigenous stakeholders.

KEYWORDS

Indigenous cultural heritage, Indigenous knowledges, Indigenous perspectives, engagement

Introduction

Humans often see ourselves as separate from the natural world. We build infrastructure that hides the natural world from view, and we spend much of our lives within that built environment. Civil engineers are, in large part, responsible for creating this infrastructure and, for this reason, are well situated to bridge the gap between end users and the natural world.

Traditional owners have local knowledge of the rhythms of the natural world and a cultural obligation to care for their Country. Country is the word used by First Nations peoples to describe the complex system of land, water, air, animals, plants, people and kin, spirits and sacred places, and the culture that ties everything together. It is often said that if Country is sick, we are sick and, if we are sick, then Country is sick too. When you understand this, you can appreciate the obligation of Indigenous people to care for Country. Indigenous knowledges and perspectives have the potential, therefore, to guide the development of sustainable civil infrastructure on Country if our civil engineering professionals engage meaningfully with Indigenous stakeholders (Ens, *et al.*, 2012). There is, then, an obligation on engineering educators to incorporate Indigenous knowledges and perspectives in the engineering curriculum. This obligation is outlined broadly in the United Nations Declaration on the Rights of Indigenous Peoples (UN, 2007) and is further supported by calls from Universities Australia (UA, 2017, 2022) and the Australian Council of Engineering Deans (ACED, 2017) to embed Indigenous content in curricula. Curiously, the ACED makes no mention of embedding Indigenous content in engineering curriculum in their most recent strategic vision, the Engineering 2035 Project (ACED, 2021).

Civil engineering professionals comprise the largest group level occupation (10%) within the university qualified engineering workforce in Australia, which is predominantly male (84%) and culturally and linguistically diverse (62% born outside of Australia and 50% speaking a language other than English at home) with very few Aboriginal and/or Torres Strait Islanders (only 0.2%) (Office of the Chief Scientist, 2020). This workforce data supports the view that, while the civil engineering workforce (which includes university educators) is culturally and linguistically diverse, there are relatively few opportunities in the workplace for Indigenous knowledges and perspectives to inform practice. Indeed, Goldfinch and colleagues (2017, p.441), reflecting on interviews with engineering academics, point out that “efforts to embed Aboriginal perspectives [in the engineering curriculum] are starting from a very small base of knowledge and experience.”

Engineering faculties at Australian universities are requiring their teaching staff to include Indigenous content in the engineering curriculum (ACED, 2017), which poses a tricky challenge for all engineering academics who mostly lack the relevant knowledge. Academics have dedicated their careers to broadening their knowledge in their chosen discipline and honing their expertise in their specific area of research. Those few who have developed knowledge of Aboriginal and Torres Strait Islander history and culture have usually done so out of personal rather than professional interest.

Indigenist research methodologies often use storytelling and yarning (e.g., Bobongie-Harris, Hromek & O’Brien, 2021) in a way that “respects and honours Indigenous ways of knowing, being, and doing” (Rix, Wilson, Sheehan & Tujague, 2019, p.254). In this paper, we share our story of bridging the gap for our fourth-year civil engineering students to connect with Country on a bridge design project delivered in Semester 2 of 2022 and 2023. It is our hope that our experience might also bridge some gaps for our colleagues.

Who are we?

Indigenous members of the team include the unit coordinator and first author (C.C.) and a Traditional Owner and guest lecturer (C.E.). C.C. is a Worimi engineer. C.E. is a Yuggera and Coenpul elder, archaeology student, and Cultural Heritage Coordinator working on his Country in southeast Queensland. Non-Indigenous authors include other members of the teaching team (J.B., S.Y., M.L., D.L., and C.A.), with expertise across sub-disciplines of civil engineering and stakeholder engagement, learning and teaching support (S.K.), and leadership (L.D.).

Unit Description

EGH479 – Advances in Civil Engineering Practice is a core fourth-year honours unit in the Civil Engineering major of the Bachelor of Engineering and Master of Professional Engineering (Civil with Management) courses at Queensland University of Technology (QUT). EGH479 is the final project-based 'design' unit in the Civil Engineering major in which students deliver a feasibility design of a major piece of civil infrastructure to solve a mobility problem. The project for 2022 and 2023 was to design a permanent river crossing to replace an existing limited-hours ferry which currently operates across the Brisbane River connecting the Ipswich suburb of Riverview with the Brisbane suburb of Moggill. Students form into multi-disciplinary teams to address the problem from their chosen sub-discipline. The sub-disciplines supported in 2022 were Transport, Structural, and Geotechnical Engineering. This was expanded in 2023 to include Environmental and Construction Engineering.

Learning Support

To help students respond to questions about Indigenous cultural heritage in the assessments, learning content was provided in the project brief, in a lecture co-delivered by C.C. and C.E., and in informal weekly design studio sessions led by C.C.

The project brief included a three-page summary on Indigenous cultural heritage. The summary began with a correlation with the Engineers Australia Code of Ethics (EA, 2022) and Stage 1 Competency Standards (EA, 2019) to highlight the need for professional engineers to consider diverse perspectives and the social, cultural, and political implications of their work. Attention was drawn to state and federal legislation which places legal obligations to protect Indigenous cultural heritage. The internationally endorsed rights of Indigenous peoples were introduced (UN, 2007) as well as the global call to empower and engage with Indigenous peoples in support of the UN's Sustainable Development Goals (UN, 2016). To help students develop an understanding of an Aboriginal perspective, some local history was summarised from several sources (Anti-Discrimination Commission Queensland, 2017; Kerkhove, 2014, 2015, 2018; Kerkhove & Uhr, 2019; Petrie, 1904; Steele, 1984). The historical summary provided a broad overview from the establishment of the penal colony on the banks of Maiwar (the Brisbane River) in 1825, the impact of early contact on Aboriginal people in the area, the frontier wars, the establishment of reserves and protectors restricting the rights of Aboriginal peoples, the policy of assimilation, the civil rights movement of the 60s and 70s, the 1967 referendum, the introduction of anti-discrimination laws in the 70s and 90s, the emergence of Native Title, and finally the 2017 Uluru statement (The Uluru Statement, 2017). The 2023 Voice referendum was also mentioned to the 2023 cohort. The summary in the project brief concluded with some information regarding sites of actual and potential Aboriginal cultural heritage surrounding the study area.

There were four parts to the lecture: introduction, Indigenous perspectives, cultural heritage, and local Indigenous history.

In the introduction, C.E. acknowledged his ancestors, the Yuggera, and those of the Turrbal peoples, welcomed the class to Country, and shared his perspective on Aboriginal history since colonisation by reading one of his poems titled, "Who is me?" C.C. then shared some of his own family history and connections to Worimi Country.

An Indigenous perspective was then shared with the class, including an explanation of what Country means to various Aboriginal and Torres Strait Islander peoples. Some cultural practices were described and explained, including Acknowledgement of Country, Welcome to Country, smoking ceremonies, and not speaking the names of the dead. The Indigenous connection to Country, which is a truly ancient connection upheld through continuous cultural practice, was highlighted as a model example of sustainable land management.

Some parts of the *Aboriginal Cultural Heritage Act 2003* (Qld) were introduced to the class to emphasise the importance of developing a cultural heritage management plan on civil infrastructure projects. Students were told of a bora ring near the project site, several historical

Aboriginal settlements nearby, and the Deebing Creek Mission. C.E. and C.C. had previously conducted a site walk and shared some preliminary findings with the class, including a possible scar tree. Students were advised that there is a high probability of finding Aboriginal cultural heritage at the site. Some items of cultural heritage, such as stone tools and petrified wood, can be difficult for untrained people to identify. This point was highlighted in a short video on stone tool analysis produced by Everick Heritage and featuring Prof Chris Clarkson (Everick, 2022).

The last half of the lecture comprised a brief summary of local Aboriginal history from first contact with the British who established a penal colony on Maiwar in 1825 until the present day. Storytelling and poetry were used to connect students to the experiences of the Yuggera as early diplomacy gave way to the frontier wars, protection, assimilation, the stolen generation, the civil rights movement, the introduction of anti-discrimination laws, the hopeful Uluru statement (The Uluru Statement, 2017), and the Voice referendum.

Assessments

Learning outcomes were assessed in three assessment tasks. Task 1 was an individual assessment where students were asked to demonstrate their understanding of the project and plan their engagement over the semester. Tasks 2 and 3 were group assessments with an individual component of marks. In Task 2, teams were asked to assess the existing conditions of the study area, with a focus on issues relevant to their chosen sub-discipline, to inform their proposed solution. In Task 3, teams were asked to present a coordinated multi-disciplinary feasibility design of their proposed solution.

Student's knowledge of Indigenous cultural heritage and their ability to critically evaluate sources was assessed across all three assessment tasks building up from demonstrating knowledge (Task 1) to synthesising information from multiple sources (Task 2) to creatively applying complex ideas in response to an open-ended problem (Task 3). The rubric for all three assessment tasks included a separate criterion for Indigenous cultural heritage (not included in this paper). The requirements in each task are as follows:

- Task 1: Who are the traditional owners within the study area and what is your understanding of their history in the area and the obligations we have, as engineers and global citizens, towards Indigenous cultural heritage?
- Task 2: Locate on plan to suitable scale and summarise Indigenous cultural heritage elements surrounding the study area.
- Task 3: Building on your knowledge of the Indigenous history in the region (Task 1), your review of Indigenous cultural heritage around the study area (Task 2), and informed by your stakeholder engagement strategy (all three tasks), make recommendations for the client to value, protect, and promote Aboriginal and Torres Strait Islander knowledge, culture, and tradition in the delivery of this project.

The wording of the Task 3 requirement is drawn directly from the *Planning Act 2016* (Qld) s.5(2)(d) which states that, "Advancing the purpose of this Act includes … valuing, protecting and promoting Aboriginal and Torres Strait Islander knowledge, culture and tradition."

Academic Performance

Results from the 2022 cohort and 2023 cohort (see the boxplots in Figure 1) show that students performed equally well, or better, on the Indigenous cultural heritage criteria in the rubric as they did in all other criteria, such as stakeholder engagement, team management, sustainability, and technical discipline-specific criteria. The naming convention used in Figure 1 includes a number which denotes the assessment task (i.e., 1 denotes Task 1, 2 denotes Task 2, and 3 denotes Task 3). This is followed by the text "IND" which denotes the Indigenous criteria on the rubric or "ALL" which denotes all other criteria. So, the category 2-IND includes student results on the Indigenous criteria of Task 2. Please note that data is missing for Task 1 in 2022. Of interest, results for the open-ended question on valuing, protecting, and promoting Aboriginal and Torres

Strait Islander knowledge, culture, and tradition in Task 3 for the 2023 cohort (3-IND in Figure 1) were 8.4% higher on average than all other criteria (3-ALL in Figure 1). This was the only statistically significant difference with a p-value of 0.019 on a one-sided Wilcoxon rank-sum test.

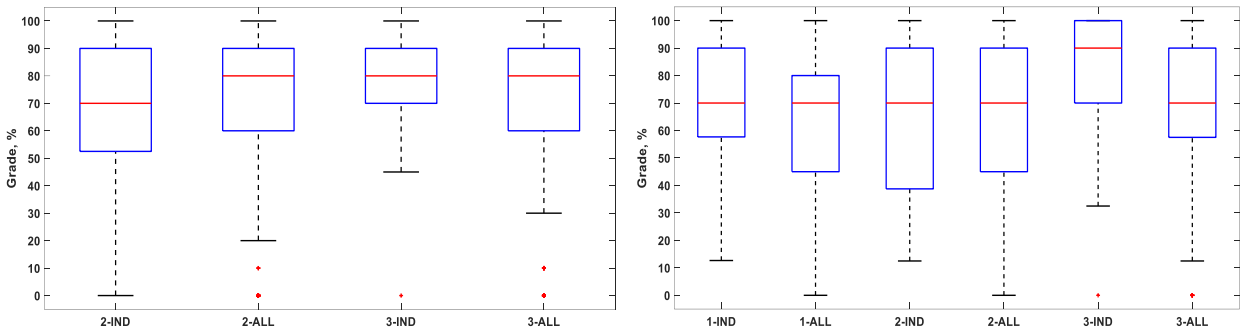

Figure 1: Boxplot of student grades in 2022 (L) and 2023 (R) for Task 1, 2, and 3.

The data here supports the view that student learning outcomes for the Indigenous content was of a similar standard as their learning outcomes for all other criteria in the rubric. A similar conclusion may also be reached for teaching quality. Evidently, learning support for the Indigenous content was to the same standard as other content in the unit.

The Student Response

Students were attentive and engaged in the Week 4 lecture on Indigenous Cultural Heritage. Several students thanked C.C. and C.E. as they filed out of the lecture theatre. After both the 2022 and the 2023 lectures, an Indigenous student approached C.E. to introduce themselves and personally thank him for sharing his knowledge and experience. Both these students later approached C.C. to say how grateful they were that the Indigenous content was included in the unit and how well it had been delivered. One student said that they had never been taught by another Indigenous person in their entire engineering degree and they were excited to discover that their lecturer was Indigenous. C.E. also received thanks from several non-Indigenous students after both lectures and he received positive comments that the students enjoyed the content in the lecture overall and enjoyed his poems. C.E. was applauded by all of the students after reciting two personal poems. Informal feedback from non-Indigenous students was positive, with several students saying they wished there had been more high-quality Indigenous content throughout their degree and that the small amount to which they had been exposed was cursory and lacking depth. One student emailed C.C. directly to say, “thank you for your inclusion of Stakeholder Engagement and Indigenous Cultural Heritage subjects into assessment. In other units, these topics usually feel like they are mentioned superficially, and are tacked on only to fill a requirement. Embedding these topics so deeply into each assessment has been awesome … I can't thank you enough for facilitating this within EGH479.”

Anonymous feedback was provided by students in the Student Voice Survey (SVS) at the end of semester. Of the 114 responses to the SVS, 18 provided feedback on the Indigenous content in the unit. Responses can be categorised into six themes, which are listed in order of frequency: 1) feelings about the Indigenous content, 2) reflections on the quality of teaching of the Indigenous content, 3) perceptions of the relevance of the Indigenous content to engineers, 4) constructive feedback to improve delivery in the future, 5) cultural reflections, and 6) reflections on knowledge gained. Please note that quotations below are taken directly from the SVS and have not been corrected for spelling or grammar nor to align with guidelines on respectful terminology about Aboriginal and Torres Strait Islander peoples.

1) **Feelings about the Indigenous content.** Most respondents expressed positive feelings about the Indigenous content in the unit. Expressions of positive feelings included, “thoroughly enjoyed,” “inspiring,” “appreciated,” “thank you,” “big impact,” and “interesting.” One student expressed negative feelings about the Indigenous content – more on this below.

2) **Reflections on the quality of teaching of the Indigenous content.** Respondents had a high opinion of teaching quality, with comments such as, “incredibly well done,” “Great teaching,” “this has not been covered well, if at all, in other engineering classes,” “very refreshing,” “very engaging and one of the best I’ve listened to,” “the indigenous components of the project were good and Craig addressed them well throughout the semester especially considering the surprisingly large number of international students in the subject who would have even less of an understanding about indigenous culture and traditions.”

3) **Perceptions of the relevance of the Indigenous content to engineers.** Several respondents could appreciate the relevance of Indigenous perspectives and knowledges in an engineering context as evidenced by comments such as, “Incorporating a specific focus on indigenous significance to the engineering projects was incredibly well done and I believe very important to learn about as young engineers,” “they were valuable components of the assignments that are essential for young engineers,” and “highlighting the importance of learning about Australia’s shared history and how it is encompassed in engineering.” One respondent was more thoughtful about the problems with incorporating Indigenous content in an engineering context, saying, “in industry issues of Indigenous cultural heritage always seem to be viewed as burdensome and expensive. Most stories are about how it cost an extra 2 million dollars because they made a significant find, it all seems to be seen through a lens of expense and inconvenience. In this course I think it has been stressed how disregarding legal obligations can get you sued.”

4) **Constructive feedback to improve delivery in the future.** One respondent had some rather helpful constructive feedback, saying, “I would really like a case study of how including and incorporating Indigenous knowledge and input resulted in a better design. Too often the rhetoric seems to be just pay off the local groups so they will leave you alone and you can get the work done, I think this is a narrative you need to combat.” Another respondent provided some guidance on improving assessment items by incorporating “more with indigenous/cultural considerations” in “the 1st assignment” and “completely” removing it from “the 2nd assignment.”

5) **Cultural reflections.** Cultural reflections tended to focus on the value of “recognition and respect” for Indigenous culture.

6) **Reflections on knowledge gained.** Respondents didn’t reflect much on how their own knowledge improved. One respondent said, “the unit gave students a deeper understanding of the culture and [I] thoroughly enjoyed developing a better understanding of the aboriginal people and their culture.” Another said, “I find it challenging to understand … indigenous culture.”

“The [A]boriginal content is way too heavy.”

As the teaching team contemplated embedding Indigenous knowledges and perspectives into EGH479, there were concerns of a potential backlash from the student cohort. The teaching team discussed whether a risk management plan might be needed to handle racism and ensure the wellbeing and safety of staff and students during the Week 4 lecture and the subsequent grading process. The approach taken was to remind students in the Week 1 lecture of their workplace health and safety responsibilities, relevant sections of the Student Code of Conduct, and the formal process for resolving complaints which includes complaints about unfair or inappropriate academic decisions. This information was reinforced at the beginning of the Week 4 lecture with a content warning notifying students that the material in the lecture could be confronting for some. This was contextualised as a result of the history of colonisation and its impact on Indigenous peoples. Students were advised that the teaching staff were aware of psychosocial hazards when describing historical injustices and aimed to control for psychosocial risks by adopting a scholarly approach when delivering the historical content. If racist content was identified during grading, the teaching team resolved to coordinate an appropriate response rather than allocate grading to one person. Where student submissions displayed a lack of understanding, for example, using inappropriate terminology, the teaching team provided corrective feedback.

Either the proactive measures taken by the teaching team were effective, or they were unnecessary. Whatever the case, racism was not encountered by staff during either semester.

Despite the content warning and caveat and the respectful delivery of the Indigenous content, at least one student felt targeted. They provided the following feedback in the anonymous survey:

> "The aboriginal content is way too heavy. The whole time it felt like Craig was trying to make any white student feel bad for what happened decades or centuries ago. Honestly, lay off that. Also, 99% of the class doesn't care about that stuff, but it was forced on us."

Of interest, this perspective was directly countered by another student who said, "I really like how he didn't pressure anyone's views on the topic and was still respectful at the same time."

The workplace culture in the engineering profession "is intolerant of diversity" as Bastalich *et al.* (2007, p.397) noted in their work on gendered experiences of the engineering workplace culture. This intolerance creates problems for the inclusion of Indigenous people too. More work is needed to make space for Aboriginal and Torres Strait Islander people in engineering education.

Reflection

The need to embed Indigenous knowledges and perspectives into engineering education is clear (ACED, 2017; Goldfinch et al., 2017; UA, 2017; UA, 2022). Our own students have said that they believe it is essential for engineers to have some awareness of Indigenous knowledge, culture, and tradition.

Some of the things that were done in this final year design capstone unit to ensure that the Indigenous content was incorporated successfully include:

- identifying the traditional owners of the project site – the Yuggera people;
- engaging with Yuggera elders to identify the right person for the guest lecture on Aboriginal cultural heritage;
- contacting the prospective guest lecturer (C.E.) and providing him with a description of his potential contribution to the unit and requesting a quote for his services;
- securing financial support from the Head of School to engage the guest lecturer;
- meeting with the guest lecturer to provide him with a comprehensive brief of his potential contribution to the unit and to conduct a walk on Country at the project site;
- co-developing the learning content and assessments with the guest lecturer;
- providing students with relevant written content in the project brief;
- during the guest lecture, setting the context for students in terms of professional guidelines, UN guidelines, and governing legal requirements;
- co-delivering the Week 4 lecture with the guest lecturer in a respectful way;
- providing students with weekly opportunities to ask questions in the design studio sessions;
- ensuring that the Indigenous criteria for all student submissions was marked by one person, the unit coordinator (C.C.), who provided targeted written feedback; and
- inviting feedback from students via the Student Voice Survey on the Indigenous content.

This experience has been quite the journey of learning and discovery for the teaching staff. While conducting the literature review on local Aboriginal history, the first author found himself contemplating the similar experiences of his own Worimi ancestors who were forcibly removed from their land and ended up living on the Karuah Mission (Ramsland, 2009).

If we are going to present an Indigenous perspective to our students, it seems necessary to engage in truth-telling about the history of colonisation and its effect on Aboriginal and Torres Strait Islander families. This is, after all, a perspective that many Indigenous people are born into – a perspective that cannot be escaped. It may be easy for non-Indigenous students to remain desensitised and disengaged if the history of colonisation is told in a detached and clinical way. Storytelling and poetry help to connect our students to the history in a way that is meaningful for them. The guest lecturer's poetry provided a moving portrayal of the broad arc of history for

Indigenous Australians and a confronting encounter of jarjums being taken away. Jarjums is the Yuggera word for children. The story of Old Moppy and his warrior son who fought for their Country in the frontier wars provided effective scaffolding for telling the early history. Some stories, however, are too difficult to share. The hurt suffered by the Yuggera people at the Deebing Creek Mission was mentioned in the lecture without story.

Elder's Reflection

Yowa everyone, That is hello in my Yuggera language. I have immensely enjoyed working on this paper with Dr Craig Cowled and conducting lectures at the Qld University of Technology and giving an informative insight into my Yuggera cultural Heritage work on Country and Indigenous Cultural issues. And giving this valuable knowledge to Craig's 4th year Civil Engineering students for the past 3 years. I am a traditional cultural knowledge holder and I was very proud to pass some of that knowledge into Craig's teaching onto his students, within QUT's Civil Engineering Teaching Curriculum. Valuable knowledge that was passed down to me from generation to generation. From the world's oldest surviving culture, that has been here for over 65000 years. And I positively envisage, that my Traditional knowledge and QUT's Academic Engineering Knowledge will combine in sync, successfully, for many future generations to come for QUT and throughout Australia, New Zealand and globally . Thank, you, for your time. Uncle Craig Egert.

Conclusion

Education opens our eyes to the world. As engineering educators, we can open the eyes of our students to better see Country and to better understand how to engage with Indigenous stakeholders and, in doing so, provide a more inclusive environment for Aboriginal and Torres Strait Islander students and highlight for all our students how infrastructure projects can achieve better outcomes when engineers engage meaningfully with Indigenous stakeholders.

Student feedback provides broad support for the view that, when it is done well, embedding Indigenous knowledges and perspectives in the curriculum is seen as valuable and relevant to civil engineering students. Students overwhelmingly appreciated the Indigenous content and its relevance for engineering professionals. Student learning outcomes for the Indigenous content was of a similar standard as their learning outcomes for all other criteria.

We concluded the paper with a reflection on what was done well and what might be improved. This reflection included some specifics which may guide our colleagues as they embed Indigenous knowledges and perspectives in their own units.

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