

UNDERSTANDING STUDENTS' EXPERIENCES AFTER INCORPORATING INDIGENOUS PERSPECTIVES IN A POSTGRADUATE SCIENCE COMMUNICATION

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Abstract

Many Australian universities have recently incorporated Indigenous graduate attributes into their programs, and the University of Technology Sydney (UTS) is no exception. This project aimed to investigate students' perceptions and experiences of learning about Indigenous Knowledge systems and culture while developing science communication skills. Advanced Communication Skills in Science is a core subject in the Master of Science program at UTS. An existing assessment task, a three-minute thesis style oral presentation, was reworked to include the Indigenous Graduate Attribute (IGA) developed for the Faculty of Science. Students researched an aspect of Indigenous Science, an area of emerging interest for cultural and scientific understanding, and a mechanism for empowering Australia's diverse first nations peoples. They then presented their key message in three minutes using a single PowerPoint slide. This task allowed students to demonstrate an awareness and appreciation of multiple ways of developing understandings of nature while enhancing their ability to understand the role of science communication in the modern world. Students were surveyed at the beginning and end of the semester to establish their Indigenous Science conceptions and reflect on their experiences. Students demonstrated an outstanding ability to integrate appropriate Aboriginal and Torres Strait Islander knowledges, experience, and analysis into a key message. Most students reported greater familiarity with concepts such as Indigenous Science and provided richer definitions of what this means. When asked if understanding Aboriginal and Torres Strait Islander knowledges and cultural practices might impact their practice as a scientist, many felt their perspective had changed and that reflecting on their cultural values and beliefs had improved their cultural capability. Most students responded that this subject challenged (at least to a degree) some firmly held assumptions, ideas, and beliefs.

Keywords: *Graduate attributes, science communication, cultural competence, Indigenous science, tertiary education.*

1. Introduction

With the recent paradigm shift from unlimited growth and the dominance of Western capitalism to sustainable development, the importance of Indigenous Knowledge Systems (IKS) has gained international recognition. The beginnings are demonstrated in Article 8 of the *Convention on Biological Diversity* which followed the Rio de Janeiro Earth Summit in 1992. This urged us to 'respect, preserve and maintain knowledge, innovations and practices of Indigenous and local communities embodying traditional lifestyles relevant for the conservation and sustainable use of biological diversity and promote their wider application with the approval and involvement of the holders of such knowledge, innovations and practices and encourage the equitable sharing of the benefits arising from the utilization of such knowledge, innovations and practices' (UN, 1992). Similarly, the 1999 UNESCO and International Council for Science World Conference, *Science for the Twenty-first Century: A New Commitment* asserted that science and technology have been, and continue to be, enhanced by traditional and local knowledge systems. IKS are 'dynamic expressions of perceiving and understanding the world', and there is 'a need to preserve, protect, research and promote this cultural heritage and empirical knowledge' (World Conference on Science, 2000).

Mazzocchi (2006) has pointed out the difficulty in defining IKS. Terms such as traditional, Indigenous, folk, ecological, local, knowledge and science are used in various combinations. Indigenous Science can be considered a body of social, spiritual, and physical understandings of the relationships between living things and the environment, which have evolved by adaptive practices and been

transmitted through cultural practices by generations (Berkes et al., 2000). UNESCO defines Indigenous Knowledge as the ‘understandings, skills and philosophies developed by societies with long histories of interaction with their natural surroundings’, which informs decision-making about aspects of day-to-day life and ‘encompasses language, systems of classification, resource use practices, social interactions, ritual and spirituality’ (UNESCO, 2017).

Currently, the United Nation’s Sustainable Development Goals (SDGs) do not explicitly refer to IKS. However, they call for urgent action to combat the impacts of climate change, protect and restore aquatic and terrestrial ecosystems and biodiversity, and use resources sustainably. The importance of the contributions of Indigenous peoples to such responses is highlighted (UN, n.d.).

Colonial settlers arrived in Australia in the late eighteenth century, bringing social and cultural disruption, land dispossession, violence, and racism. Over the last fifty years, however, the reconciliation process has made steady, if slow, progress (Reconciliation Australia, 2021). Most Australians believe that education about our shared past is critical, with 83% of the general community agreeing that it is essential that Indigenous histories and cultures are taught in educational institutions (Reconciliation Australia, 2021).

In the Australian higher education context, the peak industry body, Universities Australia, has developed a sector-wide initiative, *The UA Indigenous Strategy 2017-20*. This provides a plan to achieve common goals to advance Aboriginal and Torres Strait Islander participation and success in higher education while improving Indigenous cultural competency in Australian universities. Progress has been steadily made, with forty-nine per cent of the 39 member universities recently reporting they had Indigenous-specific graduate attributes; a further eight per cent had graduate attributes that covered global issues and included Indigenous people. (Universities Australia, 2021).

Introducing the concept of Australian Indigenous Knowledges into science education has two aims. The first aim is to increase awareness of Aboriginal and Torres Strait Islander culture and identity, for so long overlooked and marginalised by Australian mainstream culture. The second is to provide an alternative perspective on the environmental problems challenging Australians who face increasing impacts from bushfires, droughts, floods and diminishing biodiversity. Indigenous Knowledge can make a valuable contribution to the scientific approaches needed to tackle these issues (The Living Knowledge Project, 2008). Australia’s Indigenous Knowledge systems vary depending on local context, are complex and interdisciplinary and including Aboriginal or Torres Strait Islander knowledges and perspectives into our classes must be done mindfully. The Australian Council of the Deans of Science (2022) cautions that such knowledge must not be seen as a subset of Australia’s Western knowledge systems or as a novelty or add-on. Instead, Australia’s Indigenous Knowledge is an “important addition” to our curricular.

This project focuses on students’ learning experiences in the subject *Advanced Communication Skills in Science*, a core subject in the Master of Science program at the University of Technology Sydney. Content, learning activities and assessment relating to the UTS Science Indigenous Graduate Attribute (IGA) were added to the subject in 2021. The other graduate attributes developed in this subject relate to Research, Inquiry and Critical Thinking; Professional, Ethical and Social Responsibility; Reflection, Innovation, Creativity; and Communication. The IGA, *Aboriginal and Torres Strait Islander Knowledges and Connection with Country* states

‘As a professional scientist, you will work with people from various backgrounds and with different levels of scientific knowledge. An awareness and appreciation of multiple ways of developing understandings of the natural world, especially of Aboriginal and Torres Strait Islander Knowledges and people, will enhance your ability to understand the role of science communication in the modern world’ (UTS, 2022).

The IGA is detailed in two Course Intended Learning Outcomes assessed in this subject:

Analyse: Demonstrate an appreciation of historical and contemporary Aboriginal and Torres Strait Islander Knowledges relevant to professional scientists.

Evaluate: Integrate appropriate Aboriginal and Torres Strait Islander knowledges, as both experience and analysis, to inform professional practice (UTS, 2022).

In this paper we report on an initial study of students’ perceptions and experiences of learning about Aboriginal and Torres Strait Islander knowledge systems through an oral presentation in a postgraduate science communication subject.

2. Study design

2.1. Incorporating Indigenous Knowledges into the subject through an oral presentation

One of the assessment tasks in the subject required students to research an aspect of Indigenous Science and present it as a three-minute oral presentation supported by a single PowerPoint slide. The topics included a variety of examples of Indigenous Science related to food production and harvest,

medicines, and materials used for tools and weapons. The most successful presentations integrated the Indigenous and Western Science perspectives to represent contemporary Australian science. For example, tea tree oil is a volatile essential oil derived mainly from the Australian native plant *Melaleuca alternifolia* and has a long history of use by Aboriginal people, such as the Bundjalung people (of the north-eastern parts of New South Wales). The crushed leaves were inhaled to treat coughs and colds or applied on poulticed wounds. Wet leaves can also make an infusion to treat sore throats or skin ailments. Oral histories speak of healing lakes, where leaves had fallen and decayed over time. When analysed in 1923, the antiseptic properties were more than 11 times stronger than the widely used carbolic acid (phenol). It is now understood that the broad-spectrum activity of tea tree oil (antibacterial, antifungal, antiviral, and antiprotozoal) results, for example, in bacterial membrane rupture and damage to the functioning of fungal membranes. The active properties of *Melaleuca alternifolia* will attract further interest in the post-antibiotic era (Carson, Hammer, & Riley, 2006).

2.2. Investigating students' learning experiences

An online anonymous and voluntary questionnaire was administered to students at the beginning and end of semester 2 (2021). The questionnaire included Likert scale and open-ended questions (see section 3). Twenty students (five were international students) provided responses to both questionnaires that could be matched.

3. Evaluation of the students' responses

When asked if understanding Indigenous knowledges and cultural practices might impact their practice as a scientist, many students felt their perspectives had changed. Comparing baseline and follow-up paired responses (see Table 1), there was an overall shift to an agreement that understanding Indigenous knowledges and culture may impact students' practice as scientists. Eighty per cent of 'unsure' responses became 'agree', and 67% of those who had responded 'somewhat agree' strengthened their response to 'definitely agree'.

Students were also asked if reflecting on their cultural values and beliefs had helped improve their cultural capability to impact their professional practice. Initially, 5% of students strongly disagreed that this process would be of value. Twenty per cent were unsure. At the end of the semester, 95% of students agreed with this statement, with only one student reporting feeling unsure. In the follow-up questionnaire, students were asked if engaging with these concepts challenged (at least to a degree) some firmly held assumptions, ideas, and beliefs. Eighty per cent agreed that this was the case.

In the open-ended question, students were asked what they thought the terms 'Traditional Knowledge Systems', 'Indigenous Knowledge' and 'Indigenous Science' meant. Baseline answers referred to tradition, culture, and stories. Most students reported greater familiarity with the concepts by the end of the semester and provided richer definitions of what they mean. Table 2 details some of these paired responses.

The enthusiastic comments from students confirm the increased value of the oral presentation activity and that the Course Intended Learning Outcomes were achieved:

"Learning about since (sic) science is the modern way of thinking, it is definitely not the only way. We have to acknowledge and be open-minded about the other forms."

"My understanding surrounding traditional knowledge systems has grown significantly. I now understand just how much Indigenous Australians have contributed to our way of life and have a grown appreciation for the skills and tools they mastered so long ago. It is incredibly interesting to see how they discovered things in a time where they didn't have all the technology and tools available to us today."

"That it can be integrated with knowledge from western science, and that it can also stand alone as its own field. Also, that indigenous knowledge is useful particularly in ecosystem function and for the protection and conservation of species."

Table 1. Student questionnaire items and responses.

Item	Responses	Initial response (n = 20)	Final response (n = 20)
How familiar are you with concepts such as Traditional Knowledge Systems, Indigenous Knowledge, or Indigenous Science?	Not at all familiar	55%	5%
	Slightly familiar	25%	15%
	Somewhat familiar	15%	30%
	Moderately familiar	5%	45%
	Extremely familiar	0%	5%
Understanding Aboriginal and Torres Strait Islander knowledges and cultural practice may impact on my practice as a scientist, including science communication.	Definitely disagree	5%	0%
	Somewhat disagree or disagree with some reservation	0%	0%
	Somewhat agree or agree with some reservation	25%	30%
	Definitely agree	50%	65%
	Unsure	20%	5%
Reflecting on my own cultural values and beliefs will help me improve my cultural capability in my professional scientific practice.	Definitely disagree	5%	0%
	Somewhat disagree or disagree with some reservation	0%	0%
	Somewhat agree or agree with some reservation	25%	30%
	Definitely agree	50%	65%
	Unsure	20%	5%
This subject has challenged some of my firmly held assumptions, ideas, and beliefs.	Definitely disagree		0%
	Somewhat disagree or disagree with some reservation		10%
	Somewhat agree or agree with some reservation	n/a	50%
	Definitely agree		30%
	Unsure		10%

Table 2. Student conceptions of Traditional Knowledge Systems, Indigenous Knowledge, and Indigenous Science – selected quotes.

Baseline response	Follow-up response
<i>I think this knowledge can be cultural or past stories of the Indigenous.</i>	<i>These terms are all related to knowledge systems and scientific discoveries that have been made by the Indigenous people.</i>
<i>I think they may be connected with local culture.</i>	<i>These terms are the accumulated knowledge of indigenous people based on their experiences in their lives. This knowledge lays the foundation for the development of specific fields of science in the future.</i>
<i>Not sure</i>	<i>Traditional knowledge and indigenous knowledge and science are the same things. It is an expression of how the world was and is understood by indigenous individuals. They are cultural heritages. Whilst it is not called science, they have science in them.</i>

4. Conclusion

A long-standing oral communication assessment task was reworked to incorporate the UTS Science Indigenous Graduate Attribute. Students were able to research Aboriginal and Torres Strait Islander scientific knowledges and communicate it into a key message. Investigating students' awareness of Australian Indigenous Knowledges showed clear shifts in perspectives and increased appreciation of Indigenous Science. Students reported that some firmly held assumptions, ideas, and beliefs had been challenged, strengthening their cultural capability. This has positive implications for their professional practice. Based on this initial success, we encourage the integration of Indigenous Science perspectives into university curricula.

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