

# Transforming science learning for Tongan students

*Sonia Fonua is a Pāpālangi university teacher; her husband is Tongan and she is a member of a large Tongan family. Sonia interviewed 26 Tongan university students about their school experiences for her PhD; they had all finished two years of science-focused programmes. She spoke with NZASE Science Communicator Jenny Rankine about how her teaching changed as a result, and suggests ways to transform science learning for Tongan students.*

## Background

Half of the students Sonia interviewed had had at least their primary education in Tonga, and half were educated only in New Zealand, in a mix of low, medium and high-decile schools. Many of these students regularly achieved good results in science, but said their New Zealand teachers and fellow students did not treat them as competent learners.

For participants in Tonga, taking science and doing well was normal. “My teachers [in Tonga] were always praising me and saying, you are good at science ... I started to think ... that I have these qualities,” said one student.

## Terms

*Terms change as populations decolonise. Sonia uses:*

**Pacific** – People who live in the island nations

**Pāpālangi** (Tongan) – Pākehā

**Tangata Moana** – People of the (Pacific) ocean, a term common to several Polynesian languages.

**Tangata Pasifika** – People in Aotearoa with ancestry to island countries (Note, [pronunciation is different from Pacifica](#).)

**Indigenous knowledge** – Holistic and observational knowledge shared orally by elders, inherited across generations; usually relational, with elements of subjectivity and spirituality (Castellano, 2000).

In contrast, her teachers at a high-decile New Zealand school often ignored her in class, and she began to fail.

Students educated in Tonga were more likely to encounter examples of Tongan science knowledge about navigation, cultivation and building, and teachers used familiar analogies.

“I remember our bio teacher talking about the organs and the cells,” said one student. “They explained it ... in Tonga we have different levels [of hierarchy]; there is a king and it goes down, and the [teacher] explained it thinking of organs in the body and the [biological] levels ... It was helpful for me ... because we didn’t think of it as that simple.”

Another student talked about the different expectations of students in Tonga and New Zealand: “I was the only brown guy in the class. That was new for me, but it wasn’t new [to take science] because in Tonga, everyone did science ... It made me want to prove them wrong ... When I did well, they were all surprised. I topped biology and did pretty good in physics and chem as well; that didn’t stop them though.”

## A sea of islands

The students felt that Pāpālangi in New Zealand perceived their islands as small and insignificant, and devalued the skills needed to thrive in “a sea of islands” (Hau’ofa, 1993/2008). To Tangata Moana, their world is large, including connected island groups, the surrounding oceans as far as they can sail, the volcanic and earth-shaking underworld, and the stars by which they navigate.

NZ Curriculum (2007) principles include cultural diversity, inclusion and community engagement, and encourage the value of ‘respect’ and ‘relating to others’ as a key





*Photo: Kalauni 'O Tonga/Tonga Voyaging Society, which provides theoretical and experiential seafaring training to young Tongans, honouring "the indivisibility of people from their heritage, land and seas".*

competency. *Tapasā* (Ministry of Education, 2018, p. 8), a framework of cultural competencies for teachers, expects them to “use Pacific constructs” to engage Pacific learners and to maintain “collaborative and respectful relationships” that enhance their learning.

## The teaching environment

Many of the participants in Sonia’s research thought that New Zealand teachers saw what they were teaching (Western science) as far more important than the learning environment. Yet for Pasifika student achievement, the learning environment is often much more important than the content, Sonia says. Students she taught in a tertiary foundation course, who came straight from school, had routinely been expected to fail and as a result mistrusted teachers.

Participants in Sonia’s research came to believe that New Zealand teachers had low expectations of them because they were Pasifika, rather than because of their individual abilities. One student said: “I think the school expected [Pasifika students] to do [non-science subjects] ... It seems they only expect brown boys for rugby ... there were not enough expectations from the school. If you skipped class, they were like, ‘Oh, that’s what they do...’”

Sonia argues that the lack of Indigenous knowledges in the formal science curriculum supports such deficit assumptions. Many

### Embedding Indigenous knowledge

#### Example 1- Assessment

*Aim: To show how indigenous knowledge systems are useful in learning.*

Sonia developed an assessment for anatomy students, which asked them to describe Indigenous healing practices that they know relating to one of the organ systems in Western science, such as wound healing. Twice as many marks were allocated for Indigenous knowledge shared as for Western science knowledge.

teachers resist such assumptions, while some may be unsure how to challenge them or unaware of how their actions may reflect them.

Sonia supports culturally sustaining pedagogy, which acknowledges a range of cultures and languages in classrooms. With this philosophy, teachers aim to support students in their own cultures and languages while building their skills in Western science.

## What worked for Tongan students

Many of the Tongan students Sonia interviewed were the only Pasifika student of science in their New Zealand classes, and most said that relationships with teachers were critical to their engagement with the subject. They had usually experienced content-driven teaching, often learnt from textbooks or copied off the board, with limited opportunities for discussion with others. Only a few had received direct feedback on their work.

They valued teachers who learnt their names, demonstrated interest in students’ understanding and achievement, encouraged class discussion, used varied ways of delivering content, enabled students to experiment, and fostered opportunities for group learning.

## Vā - The relational space

The key concept of Vā refers to the relational space between living and non-living entities, like the ocean, the land and the stars, and is associated with balance; both parties are expected to maintain the relationship.

A Tongan view of such spaces is different from the Western idea of space as empty. “In my Tongan family I had to unlearn Papālangi ways of maintaining relationships, and learn about Vā and Tauhi Vā, and the responsibility of both parties to make relationships work,



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and to protect this space.”

## Embedding Indigenous knowledge

Sonia says embedding Indigenous knowledge in science education can be slow and long-term, but is “incredibly worthwhile for the students”.

She suggests that teachers start by acknowledging what they don’t know or are unsure of, welcoming and asking for critique about their approaches and teaching. “If you don’t create the opportunity to hear feedback about what you’re doing, you’ll continue to think you’re doing a good job.”

A good place to start is for teachers to discuss their values and how they understand their students’ values. “A key value in Pasifika cultures is respect, but meanings of respect can be quite different across cultures. Until you understand how students respect you, you may not understand their behaviour. The values of service, caring, empathy, respect are used and talked about all the time in Pasifika cultures. These are often very different to what Pāpālangi emphasise or how they express these concepts.”

## Lalanga ha kaha‘u monu‘ia

Sonia led this year-long university project, which provided a safe space for monthly,

### Embedding Indigenous knowledge

#### Example 2 – Course structure

*Aim: To teach reproductive and endocrine systems in a culturally sustaining way.*

This content is tapu for some students, and can be confronting in mixed groups, especially in discussions. Student feedback showed Sonia that it wasn’t “enough to say ‘I recognise this is a bit tapu.’” She changed the timetable and rooms for the two weeks of tutorials to give students the choice of female-only, male-only and mixed tutorial groups. “It wasn’t hard - I had to do a few extra things, but no biggie”.

Anonymous responses from an online student survey found that they valued this choice as helpful, culturally sensitive and considerate. She also reviewed all the course images to ensure they were not unnecessarily graphic, and replaced some photos with diagrams.



*Lalava, the craft of binding buildings with sennit rope made from coconut fibre. These bindings in the Fale Pasifika at the University of Auckland were woven by Sopolomelama Filipe Tohi, a Tufunga Lalava (master craftsman).*

90-minute discussions between up to 35 Indigenous and non-Indigenous tertiary educators and administration staff. They reflected critically about their teaching practice and institutional structures, discussed examples, and helped each other learn as a group.

The project also collected feedback from 16 Māori and Pasifika students about resulting changes in teaching practice, and suggestions on how science courses could better reflect Indigenous values and knowledge.

Sonia says that initial conversations with teaching staff about introductions focussed on their waste of time when science content was more important. Yet for many student cultures,

### Embedding Indigenous knowledge

#### Example 3 – Assessment

*Aim: Students learn an essential concept and teach it creatively to their peers.*

Students were asked to form groups of up to four, and submit a four-minute video of a creative, dynamic process (e.g., animation, game, dance or song) for teaching a course learning objective for an audience of their peers. The use of Indigenous languages, knowledges and cultures was encouraged but not required. For example, one video used examples of cultural differences in dating for Pasifika and Pāpālangi girls as an analogy for different cell signalling pathways.

Each student wrote an explanation of the objective and justified the style of delivery. Inaccuracies were removed during marking, and the videos were uploaded to the online course system as study tools, where they were often used for revision before tests, labs and exams. Feedback showed that students found the assessment engaging and fun, although time-consuming.



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introductions begin relationships, telling the history and connections of the speaker.

Many science educators eventually developed their own pēpeha (short introductions about identity and heritage). One Māori student responded: “It warms you, aye ... I don’t think that the lecturers realise that when they mihi, when it’s in Māori, they acknowledge that Māori are tangata whenua ... that is coming from a place [of] caring and aroha from them”.

Science educators often found that their departments viewed pēpeha as token, and many students in the research were concerned

### Embedding indigenous knowledge

#### Example 4 – Course values

Sonia incorporated Tongan values in the ‘*Ulungaanga faka-Tonga Fonu*’ model (below) for discussing staff and student behaviour in teaching and learning. The values were symbolised by a fonu (sea turtle), which is able to survive in air and water. This represents surviving in the Pākehā world and students’ own. The model creates opportunities for students to discuss their own values and use their own languages with each other, making Indigenous knowledge visible where it often is not.

Sonia has learnt the importance of stating the values of learning spaces in her first interactions with students, to show what she values and considers acceptable.

that by itself a pēpeha was not enough for student engagement. For one lecturer, learning a pēpeha changed her behaviour. She gave an example of allowing a student to sit an early test because of a trip to Samoa; “because I now understand how central family is to her, that she’s been chosen and can’t just say no”.

Sonia stresses the importance of being guided by experts from the Indigenous cultures which teachers aim to promote, to help avoid offensive attempts at inclusion. She gives the example of a Pākehā lecturer whose pēpeha stated that her family were the first people in the South Island.

Sonia says that to make science classrooms more inclusive of Tongan students, teachers need to be more reflective about what they do, and schools need to include Indigenous knowledges in the curriculum, and embed Indigenous values in teaching and learning spaces.

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