

Enabling Sustainable Development by Embedding Tongan Knowledge into University**Science Curricula**Sonia M. Fonua^{a*}^a*University of Auckland, New Zealand**Correspondence: s.fonua@auckland.ac.nz**ABSTRACT**

Sustainable development requires the valuing of Indigenous knowledges. The complex and intertwined processes of coloniality and globalisation have contributed to spreading a dominant set of Western knowledge, values, and practices discrediting local Indigenous knowledges and wisdom (Thaman, 2003). Achieving Sustainable Development Goal 4 (SDG4), to “ensure inclusive and equitable quality education and promote lifelong learning opportunities for all”, requires educators to recognise that non-Western students continuously negotiate the disconnect between their formal Western education and their cultures. Developing educational sustainability requires resetting this educational imbalance. Culturally sustaining pedagogy acknowledges and encourages cultural pluralism something often absent in the teaching of Western Modern Science. Here I describe the *‘Ulungaanga faka-Tonga Fonu* model, a response to Thaman’s directive that embedding Indigenous knowledges in higher education institutions’ formal curriculum enriches

student experience by providing diverse understandings, perspectives, and wisdoms. This model demonstrates a way to engage with Tongan knowledge in formal teaching spaces.

Keywords: culturally sustaining pedagogy, cultural values, indigenous knowledge, Moana, Pacific, science education, sustaining pedagogy, Tonga, university

INTRODUCTION

The complex and intertwined processes of coloniality and globalisation have contributed to spreading a dominant set of western knowledge, values, and practices discrediting local Indigenous knowledges and wisdom (Thaman, 2003). Developing educational sustainably requires a resetting of this educational imbalance, in particular, the inclusion of Indigenous knowledges in the formal curriculum of higher education to expose students to diverse understandings, perspectives, and wisdom (Thaman, 2003). If Indigenous knowledges are not included in the formal (science) curriculum (Howlett et al., 2008), the students might feel “othered” or deficient in an educational institution’s culture because of the inherent social and cultural bias that favours the dominant social groups (Bishop et al., 2014; Kahu, 2013). Paris (2012) introduced the concept of culturally sustaining pedagogy which values “our multi-ethnic and multilingual present and future” by emphasising the need to “support young people in sustaining the cultural and linguistic competence of their communities while simultaneously offering access to dominant cultural competence” (p. 95). The goal of integrating Indigenous knowledges in the curriculum is to empower students to be owners of what they study. This approach supports the aim of SDG 4, to ensure inclusivity and equitability of opportunity in education, by creating opportunities that ensure Indigenous students also hear about their knowledge and ways of being throughout their education experience.

Moana/Pacific Achievement in the Context of Western Modern Science

Concerns about *Moana/Pacific* student achievement in Aotearoa (the Indigenous name for New Zealand) New Zealand have been debated and discussed for several decades, yet the underachievement of *Moana/Pacific* students continues. According to Education Counts (2021a), only 22.8 percent of Pacific school leavers attained a University Entrance Award compared with 43.8 percent of Pākehā, 63.8 percent Asian, and 18.6 percent Māori; such outcomes have considerable impacts on engagement in higher education and its subsequent benefits. Despite the low proportion of Pacific tertiary students in Aotearoa New Zealand compared to other ethnicities, their numbers are increasing which represents a demographic shift for the tertiary sector (Education Counts, 2018). This provides incentive to address teaching practices and learning environments so that they do not continue to hinder the successful engagement, enjoyment, and success of many Pasifika students (Benseman et al., 2006; Airini et al., 2010).

Moana/Pacific students have perspectives which differ from those presented in the mainstream education system in Aotearoa New Zealand. These world views and perspectives may not fit with the current teaching and learning methods driven by recent reform and globalising processes. Furthermore, although Pacific peoples may share some widespread beliefs and values (Hau'ofa, 1998), *Moana/Pacific* peoples are not homogenous. There is considerable variation in ideologies and viewpoints among the different Pasifika ethnic groups in Aotearoa New Zealand (Samu et al., 2008). As previously stated, a single label masks the complexity of each group, hence the need to begin focusing on individual ethnic groups to meet their specific needs.

The New Zealand Government's Pasifika Education Plans indicate that educational achievement for Pacific students is a government priority, yet *Moana/Pacific* students, despite recent improvements, have some of the lowest achievement rates of any ethnic group in Aotearoa New

Zealand. For example, the number of Pacific school leavers gaining Level 3, the highest level, of Aotearoa New Zealand's National Certificate of Educational Achievement (NCEA) has increased but it is still low compared to other ethnicities (Education Counts, 2021). In 2019, 46.3 percent of Pacific school leavers achieved NCEA Level 3 or above compared with 56.7 percent of Pākehā, 75.2 percent of Asian, and 35.6 percent of Māori (Education Counts, 2021). Furthermore, the homogenising approach to policies for Pacific education in Aotearoa New Zealand does not acknowledge the cultural nuances of *Moana*/Pacific groups.

Vaioleti (2011) argued in his study of Tongan students, that if “an acknowledgement of [their] Tongan identity and the knowledge that their unique ways of learning and current knowing are respected,” Tongan student achievement will improve at all levels of the education system (p. 13). Therefore, to de-homogenise *Moana*/Pacific learner experiences, this research specifically focused on Tongan science learners to improve science educators' understanding of how to engage Tongan (and all *Moana*/Pacific) science learners so that they may be successful in Aotearoa New Zealand's education system. My qualitative doctoral research gathered stories from successful university-level Tongan (the Kingdom of Tonga is a Pacific Island country with diasporic populations in Aotearoa New Zealand, Australia, the United States of America, among other countries) science learners to understand how they experienced their science education in light of the underachievement of *Moana*/Pacific students in science (Bull et al., 2010; May with Flockton & Kirkham, 2016). Most of these participants reported feeling culturally isolated and excluded as they did not see their views, knowledge, or values represented in their science education.

While this article briefly describes the methods and some of the findings of my research, the focus of the article is on sharing a key outcome of the research; the development of the '*Ulungaanga faka-Tonga Fonu* model. This model responds to the participants' stories around the kinds of

teaching and learning practices that supported their learning and provides guidance for culturally sustaining pedagogy for Tongan learners. I will first provide a brief overview of the conceptual framework for this research. I will then discuss my relational positionality, which influences every aspect of the research and is important to acknowledge as I am non-Indigenous. I will then give a brief overview of the methods and findings before discussing in detail the Framework and how it has been used subsequent to my initial research.

CONCEPTUAL FRAMEWORK

Learner Identity

Ethnic minority students in higher education institutions that cater to the needs of the students from the dominant cultural group often feel isolated and out of place in their learning environments because they are underrepresented (Syed et al., 2011). Identity is important for the academic success and retention of all students but particularly so for underrepresented ethnic minority students (Syed et al., 2011). Unfortunately, some teachers in Aotearoa New Zealand perceive Pacific students through a deficit lens which assumes their academic underachievement (Ferguson et al., 2008; Siope, 2010). Teachers usually allocate their students a learner identity rather than affirm one they already hold; for Pasifika students, this can “promote fixed, unrealistic, fragmented and singular identities” (Siteine, 2010, p. 9).

Identity is a complex concept that covers many aspects of a person, such as who they are and their sense of belonging and knowledge systems. This is evident in the variety of terms applied to students with ancestral connections to island nations in the Pacific Ocean. Currently, ‘Pasifika’ is commonly used by The New Zealand Ministry of Education and in the field of education to describe the Pacific diaspora in Aotearoa New Zealand (Ministry of Education, 2009), as opposed

to the term “Pacific”, which signifies the island nations of the Pacific, excluding Australia and Aotearoa New Zealand.

For several decades, several researchers have argued using a collective term “conceal[s] and undermine[s] the historical social, political, and cultural uniqueness of each Pacific Islands society” (Mara et al., 1994, p. 182). In response, I have chosen to use *Moana* in this article as well as Pasifika/Pacific; Pasifika and Pacific (with respect to students and education) have been kept because they were emphasised or used by the authors that I draw on in this article. “*Moana/Pacific*” in this article refers to learners with ancestry to the Indigenous people of the different island nations of the Pacific Ocean. *Moana* is an indigenous term that refers to a large body of water or the ocean, it is present in many different languages found across the Pacific Ocean and refers to people connected to the Pacific Ocean (Ka’ili, 2005). Only indigenous words and voices, in the form of the participant quotes, have been highlighted by italicising, to differentiate and privilege this knowledge.

Globalisation and Science Education

Internationally, many previously colonised countries are dealing with how to develop culturally relevant curricula that suit their culture and history, complicated further by the hegemony of Western culture in this time of globalisation and the heterogeneity of different cultural groups (Tikly, 1999), for example, Canada (Aikenhead, 1997) and Australia (Hansen, 2016). Globalisation is a complex process that blurs national boundaries economically, politically, culturally, and socially. Globalisation is not homogeneous and has manifested itself in multiple ways over many decades. It is relevant to the discussion of SDG4 because, in its current neo-liberal form, globalisation is spreading a dominant set of western industrialised knowledge, values, and

practices, including the subculture of Western Modern Science (WMS), replacing local Indigenous knowledges and wisdom (Cobern & Aikenhead, 1997; Thaman, 2003).

In the anthropology of education, G. Spindler defined culture as “patterns for living, acquired through socialization and enculturation, and passed on and modified by each generation” (Hammond & Brandt, 2004, p. 3). As such, WMS has been considered by some to be a subculture of Western culture, a group within a culture that has systems of meaning and symbols that convey identity and aid social interaction, because it shares a well-defined system of norms, values, meanings, and symbols (Aikenhead, 1996). The prestige and power associated with Western culture and its science often allows it to assume superiority in non-Western cultures. As a result, WMS can displace the local Indigenous knowledges, usually through assimilation or acculturation, causing some to label WMS as a “hegemonic icon of cultural imperialism” (Cobern & Aikenhead, 1997, p. 3).

Increasing numbers of Pacific tertiary students represent a demographic shift for the tertiary sector in Aotearoa New Zealand, compounded by a concentration of Pacific learners in Auckland’s universities (Education Counts, 2018). This provides incentive to address teaching practices and learning environments so that they do not continue to hinder the successful engagement, enjoyment, and success of many Pasifika students (Benseman et al., 2006; Airini et al., 2010). In summary, the conceptual framework for this research brings to the fore the way in which alignment between learners’ identity & IK, and the pedagogy & curriculum of their formal science learning is important and needs to be addressed in order to achieve SDG4. There is a significant gap in current research on learners' perceptions and experiences of this alignment, suggesting it is vital to determine, from students themselves, in this case, Tongan science learners, what it is that promotes their engagement, enjoyment, and success in their science studies.

Positionality

My decision to undertake this research, my choice of research questions and methodology were not instigated by merely seeing a gap in existing research but are all influenced by my own experiences and my relational positionality.

Fasavalu and Reynolds (2019) stress the importance of reflexivity when researching and working in the complex and diverse context of Oceania where many cultural understandings intersect. Therefore, as this research context was Oceania (a geographical region that includes Australia, Aotearoa New Zealand and the Pacific Island nations such as Tonga) and focused on Tongan science learners, it is important that I position myself before any discussion of the research process and of participants' voices is shared. I was born and raised in Aotearoa New Zealand where I identify as *Pākehā* (*te reo Māori* name for European descent), and in *Moana* contexts as *Pāpālangi* (Tongan for European descent). Growing up in the Pacific region, I have been exposed to, and influenced by, *Moana* ways of being and understanding. *Moana* peoples are an important influence on the culture of Aotearoa New Zealand; this culture has been informed by a diverse mixture of ethnicities, particularly *Māori*, the Indigenous people of Aotearoa, and more recent migrants from Europe, Pacific Island countries, Asia, and increasingly Africa and the Middle East. I am married to a migrant Tongan man, and live with our extended Tongan family and children. My ontological and epistemological thinking are shaped by my lived experience as a member of a Tongan family, my work in Indigenous education contexts, and my upbringing in Aotearoa New Zealand. Most of my own studies have been in the social sciences, yet my career has been spent primarily teaching science in higher education. As a result, I often experience stark ontological differences between my colleagues, particularly regarding the importance of relationships and which knowledges should be privileged and prioritised.

METHODS

The research questions were focused on the participants' experiences of science including one that informed the development of the model described in this article: Which teaching and learning practices encourage engagement, enjoyment, and success in science for Tongan science learners? To address this question, individual semi-structured interviews were conducted with 26 (16 female, ten male) successful Tongan students who shared their narrative accounts of specific experiences of their science education in Aotearoa New Zealand and the Kingdom of Tonga. All participants self-identified as Tongan ethnicity had successfully completed at least two Stage 1 university (or first year bachelor's level) study courses, and were either current students or recent graduates (in the last three years). While interviews were conducted in English, all participants were encouraged to use Tongan words or phrases if they wished.

While this research used semi-structured interviews, these interactions were heavily influenced by *talanoa*, in a form most akin to Vaioloti's (2011) *talanoa faka'eke'eke*. *Talanoa* is open conversation, *faka* is a prefix added to verbs, and *'eke* implies asking a question, allowing a participant of the *talanoa* to drive the questioning to uncover particular knowledge. Data was thematically analysed using a retroductive approach (Ragin & Amoroso, 2011). The analysis was informed by The Manulua Framework, which weaves four different theoretical-conceptual perspectives (critical realism, relationality through *vā*, the Multiscience Framework, and Tongan and *Moana*/Pacific methodologies) (Fonua, 2020b). One outcome was the development of a model in response to the participants' stories (all participants have been given a pseudonym), the '*Ulungaanga faka-Tonga Fonu* model, which is discussed below. First there will be highlights of some of the key sentiments/experiences shared by the research participants, in order to then demonstrate how these findings informed the development of the model.

Understanding Tongan Science Learners' Experiences

Considerable research (e.g., Nadal et al., 2011; Steele & Aronson, 1995; Sue et al., 2007) indicates that most ethnic minority students experience negative verbal and non-verbal interactions during their education. My research was no exception (Fonua, 2020b). For the participants, this negativity came primarily from their peers and teaching staff but also how they felt as Tongan learners in these institutional spaces.

There are very few university-level Tongan science learners; often only one or two in a class of hundreds of students. Ultimately, for those who are the “only brown person in class,” their presence often represents the culmination of a challenging academic journey. Being an ethnic minority has impacted on the participants' experiences of the university teaching and learning environment which has subsequently impacted on their learning:

students in my class say ‘What are you?’, and I say ‘Tongan’ and they expect me not to speak proper English... they say ‘Are you doing a Bachelor of Arts?’, and I say ‘What makes you think that?’, [they say] ‘It’s, you know...’ and I say ‘I don’t know, I am doing Science’. I am not the only Tongan that [doesn’t do] arts. We do all kinds of degrees... some other students prefer you not to do well or they think oh give it [until] next week, they won’t be in class, they will be doing something else... I walk into my bio class, and there are times I am the only brown student. In other classes, there are three or four [of us], we are the only brown people... people give you a look like, I am sure you are in the wrong class, and we are no, I am enrolled here [laugh]. I am supposed to be here... (Kalala).

Being the ‘only brown person’ in their university science classes often made the participants feel responsible for perceptions of Tongan (or *Moana*/Pacific) students:

When you walk around at uni, there are not a lot of brown people doing sciences. Being the only brown person in the room makes you feel inferior and scared, you have to prove something. When you get that notion into your head that you have to prove something...I have to beat this person, show we can be smart, and we can succeed in science (Mele).

Identity is formed by “an ongoing process of negotiation within multifaceted structural and agentic relationships” (Wong, 2015, p. 981). In other words, identity is socially constructed and continually informed and shaped by interactions with people (i.e., agents) and structures such as educational institutions. When the participants continually found themselves one of the few Tongans (or at times *Moana*/Pacific) students this often led to feelings of cultural isolation:

It's not easy, it's hard...looking around and there's not many Tongans around ...it makes you want to do something else sometimes (Vaea).

It sucks, because...the people around me are fine, it's that there is no-one else who I can relate to in that way, you know how the Tongan culture and values is a bit different (Laulotu).

The participants often described feeling that they did not belong, some questioned whether they were academically capable:

It's the whole stigma, being able to feel that you deserve to be there, you are constantly having to prove yourself because you are so different. ('Ana)

I don't think it's easy [to study] science at university as a Tongan. There aren't many Tongans relative to everyone else, that makes it a bit harder, and sometimes your mind plays on you. You think there aren't many Tongans doing this, it must be hard for a Tongan to do this...sometimes I tell myself, this is out of your league, which is bad (Jake).

Interactions with peers and teaching staff are recognised as one of the defining influences on students' sense of belonging (Hoffman et al., 2002). Sense of belonging affects confidence, achievement, and cohort relationships; when students have a sense of belonging, they are more likely to be confident, achieve academically, and have positive relationships with their peers (Booker, 2016). The participants' stories shared above clearly indicate they struggled with their sense of belonging and they often found themselves questioning whether they were good enough to be studying science at university.

Embedding Tongan Knowledge into University Science Curricula

The participants were asked how they felt about the idea of including Tongan knowledge in the formal curriculum. Many of them were interested in the idea but there were some concerns. For example, one participant liked the idea of using Tongan knowledge to teach content, but felt that it contradicted with Aotearoa New Zealand society's perceptions of *Moana*/Pacific people:

...if they did [use Tonga as an example], it would be cool...[but...you know how us Pacific Islands are always at the bottom of the spectrum? Why would they use Tonga as an example for something when they are going to teach that kind of stuff? (Laulotu).

The reasons for doing so would be precisely that, positively showcasing things acts to counter negative perceptions. A key aspect of my research is critical self-reflection of my teaching and how my practices have changed in response to the stories shared by the successful Tongan science learner experiences. A particular focus of my work is critiquing how relationships are valued in WMS education. The learners stories shared through my research, as exemplified above, affirmed that as a *Pāpālangi* educator, it is imperative I consider how I create equitable learning opportunities for students in the spaces in which I the teacher teach, an approach that aligns with Sustainable Development Goal 4's (SDG4) priority to "ensure inclusive and equitable quality

education and promote lifelong learning opportunities for all.” To transform how society perceives diverse groups and challenge the dominance of particular knowledge systems (e.g, WMS) to the exclusion of others (e.g. IK) it is necessary to consider the use of specific examples and analogies and the value of using any teaching and learning opportunity to celebrate diversity and challenge stereotypes and assumptions, rather than perpetuating them.

Doing so is an example of engaging with Oceanic ways, as captured in the ‘*Ulungaanga faka-Tonga Fonu*’ model. This model was developed through my research, informed by both the learners’ stories and my critical reflection on my own teaching practice, and I have continued to apply it in my work and ongoing research. Following is the description of the model and shared insights from my own application.

The ‘*Ulungaanga faka-Tonga Fonu*’ Model

This model (see Figure 1, below) draws heavily on Vaioleti’s (2006) work which describes five ‘*ulungaanga faka-Tonga*’ (Tongan behavioural characteristics) needed for effective *talanoa*. Visualising Tongan (and other *Moana/Pacific*) values in this way encourages explicit discussion and demonstration of them in my university teaching and learning spaces. It also recognises the importance of social connectedness, visible in Tongan (and other *Moana/Pacific*) culture in the practice of *tauhi vā* (maintaining of the relational space) that is particularly absent in science education. Embedding this model also displays my attempts to ensure my teaching is culturally sustaining, promoting the use of Tongan language in otherwise very western, English-language dominated spaces. I have written elsewhere about the need to “*Lalanga ha kaha‘u monu‘ia*” (*lea-faka Tonga* for “weaving together for a better future”) (Fonua, 2020a). This model is a way to *lalanga* (weave) Tongan behavioural characteristics into these institutional learning spaces to make them more inclusive and equitable for all students.

Figure 1

The 'Ulungaanga faka-Tonga Fonu model: embedding Tongan values in teaching and learning spaces for effective teaching

**The 'Ulungaanga faka-Tonga Fonu Model in my practice**

In Oceania, sea turtles (*fonu* in Tongan) are often sacred and have traditionally been important, especially in Polynesian chiefly society (Allen, 2007; Kirch, 1994). In parts of the *Moana*/Pacific, the ability of turtles to “transcend the boundary between the worlds of the land and the sea” has meant they have been likened to priests, including being able to communicate with the gods (Rolett, 1986, p. 87). According to Allen (2007), there is limited ethnographic evidence as to why turtles reached such an elevated status, she suggests that “turtles assumed such an elevated place in Polynesian cultures (as well as many Micronesian and Melanesian ones), [because] their habits of breathing, bleeding, crying, and tenaciously holding on to life, paralleling human characteristics, were probably important” as well as the reasonably unusual ability in animals of being able to survive in both water and air (p. 962). These ‘habits’ align well with those required by the participants’ to achieve their goal of undergoing university-level science study. It was often a struggle to get through their secondary schooling, so breathing, bleeding, crying, and

tenacity are essential qualities. The conceptualisation of *fonu* existing in two worlds also speaks to the need for the participants to border cross the learning gap between the worlds of their family and their formal academic western world. The *fonu* in Figure 1 is one of my children's toys; I speak to this when I present the model in my classrooms as part of my positioning with respect to Tongan culture and what drives me as an educator - ensuring that my children and any Indigenous students do not have to conform to a Western system that does not acknowledge their ancestry in its entirety.

Ever since I developed it, I have used The '*Ulungaanga faka-Tonga Fonu* model to foreground these '*ulungaanga faka Tonga* in my practice and develop a type of 'contract' as to how we (the staff and students would all embody them and any other values identified by the students in the learning spaces. For example, all teaching staff would make sure we were prepared for all our classes to teach to the best of our abilities and to respond appropriately to situations that arose (*poto he anga*).

From the participants' stories shared it is clear they have had to battle many negative interactions during their science journeys. I believe that employing visual references that explicitly connect with Tongan cultural ideas demonstrates this knowledge is valued where and when I teach. It also displays an attempt to ensure my teaching is culturally sustaining, promoting the use of Tongan language in otherwise very western, English-language dominated spaces.

I recently shifted from an Indigenous-led teaching context with only *Māori* and *Moana/Pacific* students to a non-Indigenous context. One thing that concerned me was how the things I had been learning about teaching and my practice would translate to this new space. I deliberated over whether or not to show the '*Ulungaanga faka-Tonga Fonu* model to my class of 300 students of mixed ethnicity (a tiny proportion of whom are *Moana/Pacific*). I was not sure

they would respond or how presenting Tongan values in this way would impact on any Tongan students in the class (i.e., trigger microaggressions or stereotype threat). However, I have learnt that I must always foreground the values of the learning spaces in the first interactions I have with my students before I have delivered anything else, signalling what I considered as acceptable and valued. Therefore, I showed the model in the first lecture and then again, a few weeks later.

Two months after I first showed the *'Ulungaanga faka-Tonga Fonu* model, a non-Indigenous student contacted me regarding concerns about noise levels in the learning spaces. They referred to the model, noting the importance I had placed on it, and asked me to remind students about their shared responsibilities (*faka'apa'apa*, *poto he anga*, and *anga lelei*) to ensure the learning space is respected. I believe this explicit discussion of values helped to build relationships and interactions and positioned me as a university educator who cared about students' learning experiences. It also demonstrated how non-Indigenous students can benefit from engagement with Tongan cultural value systems.

Other *Moana/Pacific* students have commented that that was the first time they had observed their own (or similar) knowledge presented during their degree. One Stage 3 *Moana/Pacific* student (with mixed *Moana/Pacific* ancestry, including Tongan) took a photo of the model in class and told me after that they had sent it to their Tongan father to show him that finally they were hearing about their own knowledge, in the last semester of their degree programme. Another Stage 1 student in their first semester contacted me after I showed the model in the first lecture to thank me as they had come into the lecture feeling out of place but they had been made to feel comfortable to be Tongan, they had found their sense of belonging.

If sense of belonging is prioritised, it makes the institution responsible for student success; “[s]tudents’ success is in part predicated upon the extent to which they feel welcomed by

institutional environments and climates” (Johnson et al., 2007, p. 526). An example of institutional adaptation to diversity, thus addressing SDG 4, would be encouraging a shift in the learning environment so that it is learner-centred, an approach which is shown to aid in retention and completion rates (Zepke et al., 2006). The *‘Ulungaanga faka-Tonga Fonu* model is an example of how learner-centred approaches encourage teaching staff to be inclusive, treat their students fairly, and welcome and value the diversity of their students’ cultural capital (Zepke et al., 2006). This model demonstrates a way to make Tongan knowledge valued and visible so Tongan science learners could see themselves in the course even if the content is entirely based on WMS, creating opportunities that align with the ‘inclusive and equitable’ aspects of SDG4.

CONCLUDING COMMENTS

Appreciating multiple perspectives by including Indigenous knowledges into tertiary curricula challenges the hegemony of Western, English-language dominated science curricula (Hammond & Brandt, 2004) and has benefits for all students, their institution, and wider society (Thaman, 2003). In order to achieve SDG4 of “inclusive and equitable quality education and promote lifelong learning opportunities for all”, educators and institutions must adapt to the diversity of their student cohort, particularly for minority students who are likely to have different cultural backgrounds to that of the institution and that of students from other major ethnic groups. One way to do so is to build students’ sense of belonging, and subsequent success, by embedding and valuing their knowledges and ways of being.

I believe the explicit discussion of values driven by the *‘Ulungaanga faka-Tonga Fonu* model helps with relationships and interactions and positions me as a university educator who cares about students’ learning experiences. Presenting this model demonstrates the importance of behaviour in our teaching and learning spaces and generates an active discussion of expectations

and reasonings, rather than leaving our teaching and learning spaces to be considered as locations for content dumping or passive absorption. It also demonstrates how non-Indigenous students can benefit from engagement with Tongan cultural value systems, creating inclusive and more equitable learning spaces for all students.

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Ethics

Ethical approval was given for this research by the researcher's own institution. Each participant completed a consent form before the research took place and was offered the right to withdraw at any stage. All participants were able to review the transcript of their interview and indicate parts that were never to be shared.

AUTHOR NOTE

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REFERENCES

- Aikenhead, G. S. (2006). Towards decolonizing the pan-Canadian science framework. *Canadian Journal of Science, Mathematics and Technology Education*, 6(4), 387-399.
- Allen, M. S. (2007). Three millennia of human and sea turtle interactions in remote Oceania. *Coral Reefs*, 26, 959-970.
- Bishop, R., Ladwig, J., & Berryman, M. (2014). The centrality of relationships for pedagogy: The whanaungatanga thesis. *American Educational Research Journal*, 51(1), 184-214.
- Booker, K. (2016). Connection and commitment: How sense of belonging and classroom community influence degree persistence for African American undergraduate women. *International Journal of Teaching and Learning in Higher Education*, 28(2), 218-229.
- Bull, A., Gilbert, J., Barwick, H., Hipkins, R., & Baker, R. (2010). *Inspired by science: A paper commissioned by the Royal Society and the Prime Minister's Chief Science Advisor*. New Zealand Council for Educational Research.
- Coburn, W. W., & Aikenhead, G. (1997). Cultural aspects of learning science. *Scientific Literacy and Cultural Studies Project 13*. http://scholarworks.wmich.edu/science_slcsp/13
- Education Counts (2021). *School leavers with NCEA Level 3 or above 2019* [Excel file]. Retrieved from https://www.educationcounts.govt.nz/indicators/main/education-and-learning-outcomes/school_leavers_with_NCEA_level_3_or_above
- Fasavalu, T. I., & Reynolds, M. (2019). Relational positionality and a learning disposition: Shifting the conversation. *International Education Journal: Comparative Perspectives*, 18(2), 11-25.

- Ferguson, P. B., Gorinski, R., Samu, T. W., & Mara, D. (2008). *Literature review on the experiences of Pasifika learners in the classroom: Report to the Ministry of Education*. Ministry of Education.
- Fonua, S. (2018). Embedding Indigenous Science Knowledge & Values in Higher Education: Critical reflexive practice informed by Successful Tongan Science Learners. *Waikato Journal of Education*, 23 (1), 95-106. DOI: 10.15663/wje.v23i1.629
- Fonua, S. M. (2020a). Lalanga ha kaha'u monu'ia – Helping science educators to embed indigenous knowledge, values, and culture in their courses for Māori and Pasifika science student success. *MAI Journal*, 9 (1), 49-58. DOI: 10.20507/MAIJournal.2020.9.1.6
- Fonua, S. M. (2020b). Ha'ota: Transforming science education in Aotearoa New Zealand for Tongan students. (Unpublished PhD thesis). University of Auckland, New Zealand.
- Hammond, L., & Brandt, C. (2004). Science and cultural process: Defining an anthropological approach to science education. *Studies in Science Education*, 40(1), 1-47.
- Hansen, J. J. (2016). *Examining the effectiveness of including Aboriginal perspectives to engage Aboriginal students in high school science*. (Unpublished PhD, Curtin University).
- Hau'ofa, E. (1998). The ocean in us. *Contemporary Pacific*, 10(2), 392-410.
- Hoffman, M., Richmond, J., Morrow, J., & Salomone, K. (2002). Investigating “sense of belonging” in first-year college students. *Journal of College Student Retention*, 4(3), 227-256.
- Howlett, C., Seini, M., Matthews, C., Dillon, B., & Hauser, V. (2008). Retaining indigenous students in tertiary education: Lessons from the Griffith School of Environment. *Australian Journal of Indigenous Education*, 37(1), 18-27.

- Johnson, D. R., Soldner, M., Leonard, J. B., Alvarez, P., Inkelas, K. K., Rowan-Kenyon, H., & Longerbeam, S. (2007). Examining sense of belonging among first-year undergraduates from racial/ethnic groups. *Journal of College Student Development, 48*(5), 525-542. DOI: 10.1353/csd.2007.0054
- Ka'iili, T. O. (2005). Tauhi va: Nurturing Tongan sociospatial ties in Maui and beyond. *The Contemporary Pacific, 17*(1), 83-114.
- Kirch, P. V. (1994). The pre-Christian ritual cycle of Futuna, Western Polynesia. *The Journal of the Polynesian Society, 103*(3), 255-298.
- Kahu, E. R. (2013). Framing student engagement in higher education. *Studies in Higher Education, 38*(5), 758-773. DOI:10.1080/03075079.2011.598505
- May, S., Flockton, J., & Kirkham, S. (2016). *PISA2015 New Zealand summary report*. Wellington: Ministry of Education. Retrieved from https://www.educationcounts.govt.nz/__data/assets/pdf_file/0019/180613/PISA-2015-Summary-V2.pdf
- Nadal, K. L., Wong, Y., Griffin, K., Sriken, J., Vargas, V., Wideman, M., & Kolawole, A. (2011). Microaggressions and the multiracial experience. *International Journal of Humanities and Social Sciences, 1*(7), 36-44.
- Paris, D. (2012). Culturally sustaining pedagogy: A needed change in stance, terminology and practice. *Educational Researcher, 41*(3), 93-97.
- Rolett, B. (1986). Turtles, priests, and the afterworld: A study in the iconographic interpretation of Polynesian petroglyphs. In P. Kirch (Ed.), *Island societies: Archaeological approaches to evolution and transformation* (pp. 78-87). Cambridge University Press.

- Samu, T. W. (2015). The 'Pasifika Umbrella' and quality teaching: Understanding and responding to the diverse realities within. *Waikato Journal of Education (Online), Special 20th Anniversary Collection*, 129-140. DOI: <https://doi.org/10.15663/wje.v20i3.229>
- Samu, T. W., Mara, D., & Siteine, A. (2008). Education for Pacific peoples for the 21st century. In V. M. Carpenter, M. Stephenson, P. Roberts, & J. Jesson (Eds.), *Nga Kaupapa Here: Connections and Contradictions in Education* (pp. 145-157). Cengage.
- Siope, S. A. M. (2010). *Children of the migrant dreamers: Comparing the experiences of Pasifika students in two secondary schools attempting to be culturally responsive to mine from a generation ago*. (Unpublished master's thesis). University of Waikato, Hamilton, New Zealand. Retrieved from <https://researchcommons.waikato.ac.nz/bitstream/handle/10289/5003/thesis.pdf?sequence=3&isAllowed=y>
- Siteine, A. (2010). The allocation of Pasifika identity in New Zealand classrooms. *MAI review*, (1), 1-12.
- Steele, C. M., & Aronson, J. (1995). Stereotype threat and the intellectual test performance of African Americans. *Journal of Personality and Social Psychology*, 69(5), 797-811.
- Sue, D. W., Capodilupo, C. M., Torino, G. C., Bucceri, J. M., Holder, A. M. B., Nadal, K. L., & Esquilin, M. (2007). Racial microaggressions in everyday life: Implications for clinical practice. *American Psychologist*, 62(4), 271-286. DOI:10.1037/0003-066X.62.4.271
- Syed, M., Azmitia, M., & Cooper, C. R. (2011). Identity and academic success among underrepresented ethnic minorities: An interdisciplinary review and integration. *Journal of Social Issues*, 67(3), 442-468.

- Thaman, K. H. (2003). Decolonizing Pacific studies: Indigenous perspectives, knowledge, and wisdom in higher education. *Contemporary Pacific*, 15(1), 1-17.
- Tikly, L. (1999). Postcolonialism and comparative education. *International Review of Education*, 45(5-6), 603–621. DOI: <https://doi.org/10.1023/A:1003887210695>
- Vaioleti, T. M. (2006). Talanoa research methodology: A developing position on Pacific research. *Waikato Journal of Education (Online)*, 12, 21-34.
- Vaioleti, T. M. (2011). *Talanoa, Manulua and Founnga Ako: Frameworks for using enduring Tongan educational ideas for education in Aotearoa/New Zealand*. (Unpublished PhD thesis). University of Waikato, New Zealand. Retrieved from <https://hdl.handle.net/10289/5179>
- Wong, B. (2015). Careers ‘from’ but not ‘in’ science: why are aspirations to be a scientist challenging for minority ethnic students? *Journal of Research in Science Teaching*, 52(7), 979-1002.
- Zepke, N., Leach, L., & Prebble, T. (2006). Being learner centered: One way to improve student retention? *Studies in Higher Education*, 31(5), 587-600.