Fijian Students' Perceptions of their Science Learning Environment in New Zealand Secondary Schools

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Abstract

Pacific students in Aotearoa, New Zealand, come from a range of cultural and ethnic backgrounds. This heterogeneous cultural and ethnic mix of students presents opportunities and challenges for teachers. Results from the National Certificate of Educational Achievement (NCEA) show that Pacific students are underperforming in science compared to the general cohort in secondary education. To help meet the needs of Pacific students, many New Zealand educators are undertaking research to explore the perceptions of students learning. Little research has been done on Fijian students to address this. The purpose of this study is to examine Fijian students' perceptions of their current and preferred learning environment and how it can be improved to suit the learning needs of Fijian students.

Talanoa, a Pacific research methodology, informed and guided this study. It is based on Pacific cultures and is primarily used to study Pacific peoples. A mixed-method approach was adopted to respond to the research questions. Talanoa method with a survey called the Constructivist Learning Environment Survey-Fijian students (CLES-FS) was used to collect the data. A total of 305 students participated in this study. A thematic approach was used to analyse the data obtained from the talanoa method. The CLES-FS data was analysed using the Statistical Package for Social Sciences (SPSS), and comparisons were made between the students' perceptions of their actual and preferred learning environments. Variations between gender, ethnic differences (Fijian Indian and iTaukei) and between different year levels were also analysed.

Key findings show that positive student-teacher relationships, a sense of belonging to the class, and teachers' understanding of students' cultural experiences played a vital role in engaging students in their learning. The findings also highlighted that the Fijian students enjoyed working in groups. However, they indicated that excessive use of group work without defined learning intentions had a negative impact on learning. In addition, the study found that the students were reluctant to respond to or ask questions in front of the whole class. Students also identified that, at times, cultural values of respect for elders discouraged them from expressing

their views to the teacher. Many students preferred to communicate with the teacher one-on-one about how they would like to learn and have more control over their classroom learning activities.

There was a statistically significant difference in the perceptions of iTaukei and Fijian Indian students regarding building relationships with their teachers and collaborative learning. iTaukei students perceived that they had fewer opportunities to build relationships with their teachers but had more opportunities to engage in collaborative learning than Fijian Indian students. In addition, there was a statistically significant difference in the perceptions of male and female students when it came to learning in a familiar context scale. Female students perceived they were given more opportunities to learn in a familiar context than their male counterparts.

This study has contributed to the understanding of Fijian students' perceptions of the current and preferred learning environments in New Zealand secondary schools. The research also demonstrates that CLES-FS and Talanoa methods can be used effectively for data triangulation. The findings of this study provide new insights into the knowledge gap in the literature about the learning needs of Fijian students studying in New Zealand classrooms. It is envisaged that the findings will help to inform the teachers and leaders of secondary schools who teach Fijian students.

Publications and conference presentations arising from this thesis

Publications

1. Fijian Indian students' perceptions towards group work in New Zealand classrooms
2. e–talanoa as an online research method: extending vā–relations across spaces
3. Weaving CLES-FS and talanoa to capture Fijian student's science learnings
4. Going back and researching in the Pacific community

Conference Presentations

1. Education conference. The University of Waikato (November 2020)
2. Fiji Aotearoa Research Symposium. Aukland University of Technology (2020)
3. Fiji Aotearoa Research Symposium. Aukland University of Technology (2021)
4. New Zealand Associations for Research in Education. Via Zoom (November 2021)
5. Pacific Symposium. The University of Waikato (October 2020)
6. Pacific Symposium. The University of Waikato (October 2021)
7. Post Primary Teachers Conference. Wellington (April 2021)
8. Revisioning education in Oceania: Walking backwards into the future, together. Fiji conference (November 2022)

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Acronyms

AIMHI	Achievement in multi-cultural classroom
ANOVA	Analysis of variance
BOT	Board of Trustees
CBA	Classroom-Based Assessments
CLES	Constructive Learning Environment Survey
CLES-FS	Constructive Learning Environment Survey-Fijian students
CRP	Culturally responsive pedagogy
CRPP	Culturally responsive and relational pedagogy
FJ	Fiji
KMO	Kaiser-Meyer-Olkin
MDHB	Manukau District Health Board
MEHA	Ministry of Education, Heritage and Arts
NCEA	National Certificate of Educational Achievement
NZQA	New Zealand Qualification Authority
NZF	Fiji's National Curriculum Framework
NZC	New Zealand Curriculum
NOS	Nature of Science
PCA	Principal component analysis
PEAP	Pacific Education Action Plan
PPTA	Post Primary Teachers' Association
SD	Science Technology Engineering Mathematics
SEG	Science expert group
SPSS	Statistical Package for Social Sciences
STEM	Science Technology Engineering Mathematics
TIMSS	International Mathematics and Science Study
TSRs	Teacher-student relationships
ZPD	Zone of Proximal Development

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वक्रा-टुनंदा महा-काया, सूर्या-कोट्टी समाप्रभा।निर्विघ्नम कुरु में देवा, सर्व-कार्येसु सर्वदा

Salutations to the one who has a curved trunk, and a huge body, the one who radiates the glow of millions of Suns, and to the one who removes obstacles. Bless me before all my endeavours always and forever.

Chapter 1

Introduction

This chapter is divided into eight sections. Section 1.1 is a preamble that explains the purpose of this thesis and its underlying philosophy. My interest in exploring Fijian students' perceptions of science learning in New Zealand's secondary schools is explained in section 1.2. This section describes my interest in the research within my role as a secondary school teacher in a state school in the Fiji Islands and, later, New Zealand. I give an account of my teaching experience and how it has led to this study. The next part, section 1.3, outlines the context of the study. Section 1.4 discusses the significance of the study. This is followed by the aim of the study, as explained in section 1.5, and section 1.6 presents the importance of the learning environment. A brief discussion of the theories and the research design is outlined in section 1.7. Finally, section 1.8 presents a summary of the individual chapters of the work.

1.1 Preamble

Diverse and vibrant Pacific communities are well established in New Zealand society, with many having made the transition from immigrants to third-generation New Zealanders of Pacific heritage. Pacific communities, among them my own, are making strides in establishing themselves in business, sports, arts, social service, and public sector roles. Despite this, results in many areas, such as education and equal pay opportunities, remain a challenge. The education system plays a pivotal role in enabling the people of the Pacific to acquire the skills and knowledge needed to enter high-skilled and higher-paid jobs. Pacific people in New Zealand are paid 23 per cent less in salary compared to the general population (Godfrey, 2021).

While achievement data shows some gains in the most recent student performance of 18-year-olds in the National Certificate of Educational Achievement (NCEA) Level 2 and above, the education system in New Zealand is still failing many Pacific students, particularly in science subjects (Education Counts, 2022). Trends in the International Mathematics and Science Study

(TIMSS) tests conducted on Year 9 students have also shown that Pacific students have lower mean scores in science subjects compared to the general cohort (Medina et al., 2016). The TIMSS results show that the mean science score for the Pacific students was 427, whereas for the general cohort, it was 499. In addition, the data from the New Zealand Qualification Authority (NZQA) reveals that relatively few Pacific students choose science subjects, and where the subjects are attempted in levels 1, 2 and 3 in secondary schools, Pacific students' pass rates are low compared to the national average (New Zealand Qualification Authority, 2021).

The relatively low level of student interest and pass rate in science subjects compared to the national average has prompted the Ministry of Education to conduct research and compile reports over recent years on how to engage with Pacific learners. For example, reports such as "Making a difference to Pasifika Students in Achievement in Literacy" (Si'ilata & Dreaver, 2012), "Best Practice for Teaching Pacific Learners" (Chu et al., 2013), and "Talanoa Ako-Pacific talk about education and learning" (Chu-Fuluifaga et al., 2021) described Pacific students' experience in the New Zealand education sector. These reports indicate that many Pacific students face challenges during their studies in New Zealand for several reasons, such as teacher capability to meet the learning needs of Pacific students, unsatisfactory learning situations in schools, and a lack of learning support and understanding of students' cultural values and beliefs by the teaching staff.

Many changes have been made in the education sector in recent years to meet the learning needs of Pacific students, such as student-centred learning, the use of digital technology in teaching, and culturally responsive teaching (Ministry of Education, 2020). However, the efforts by teachers and the education sector have not seen a drastic improvement in Pacific students' school achievements. One potential reason for this is the complexity surrounding the learning needs of Pacific students. In reality, many Pacific students have different cultural backgrounds, values, and belief systems and are not a homogenous group (Kalavite, 2020). Complexity is due to cultural differences and differences in values, beliefs and experiences. Pacific students come from various island states such as Samoa, the Cook Islands, Tonga, Tokelau, the Republic of Fiji Islands, Niue, Vanuatu, Marshal Islands, Kiribati, Nauru, Tahiti, the Solomon Islands, and Tuvalu. The terms Pacific, Pacifica or Pasifika do "not refer to a single ethnicity, nationality or culture but [are a] … term of convenience to encompass the diverse range" (Fletcher et al., 2009, p. 25).

This indicates the cultural and ethnic diversity that exists across the Pacific, and more research is needed on the learning needs of these groups of students. One relatively unexamined Pacific group of students studying in New Zealand schools is Fijian students. In recent years, the number of Fijian students studying in New Zealand secondary schools has increased (Stats NZ, 2022), further reinforcing the need to study their learning needs. This study seeks to explore this vital area. In the absence of previous research in New Zealand secondary schools with a focus on the learning needs of Fijian students, I believe it is timely that more studies are done to serve the interests of this group of students. In the next section, I discuss my research interests in this field of study.

1.2 Background and research interest

Relational positionality is a way to ground a researcher's connection to the topic and the communities involved in their study (Fasavalu & Reynolds, 2019). Relational positionality generally involves "the stance or positioning of the researcher in relation to the social and political context of the study" (Rowe, 2014, p. 628). Justifying my relational position is important as it positions my entry point in exploring the research questions in this study and provides the reader with information about my identity and role.

I am a fourth-generation Fijian Indian, born and raised in Fiji. My ancestors were brought to Fiji by the British government through the Indentured Labour System to work in the sugar cane fields in the late 1800s. My family and I now reside in Aotearoa, New Zealand. My work experience and education contributions have been in secondary teaching and leadership, with expertise in science and physics in the Auckland and Waikato Regions. My desire for more Fijian and Pacific students to succeed in the sciences is a personal goal. It explains why and what I do, including embarking on my doctoral studies.

Currently, I am the Head of Faculty, Sciences at James Cook High School (JCHS). In my current job, I have formed a good working relationship with several science teachers, including many colleagues of Fijian origin from different schools in the South Auckland region. I am also the director of the Health Science programme at JCHS, a programme funded by the local Manukau District Health Board (MDHB). The programme aims to encourage Pacific students to take up tertiary studies related to health careers. Part of the programme is to build good

working relationships with Pacific parents to make it easier for students to get involved in Science, Technology, Engineering and Mathematics (STEM) subjects. The programme also aims to empower parents to take an active interest in their children's education and give them the confidence to express their views. This program points out the importance of family involvement in the education of Pacific students.

Apart from teaching, I am actively involved in union work. For the last six years, I have been an executive member of the Post Primary Teachers' Association (PPTA) and have worked closely with national executive members. My role requires collaborating with secondary school teachers, discussing issues facing students, and providing feedback and advice pertinent to the educational needs of Pacific students. Furthermore, I do contract work for the Ministry of Education on the Science Subject Expert Group (SEG). We advise the Ministry of Education on how current science programmes can be refreshed to suit student needs by reflecting on their perspectives and experiences. This role has allowed me to collaborate with other secondary school teachers and learn more about Pacific students' learning needs.

In my 21 years of teaching experience, four years were in the Fiji Islands, both in rural and urban districts. I taught Physics and Science from Year 7 to Year 13. I began my teaching career at Vinicibicibi Junior High School, a rural district school in Naitasiri, Fiji. This was also my first experience living away from home.

During the first year of teaching, I realised that it would be helpful to know the background and culture of students so that I could tailor-make programmes to engage them in learning as these students were very different from where I came from. I used my free time to visit villages and local attractions to understand better how local students lived. I was interested in discovering cultures, values, and practices that might help me better engage with local students. I realised that understanding the students' perceptions, experiences, and worldviews was vital when engaging diverse students in learning. According to Alessiato (2022), a person's worldview can be defined as the collection of attitudes, values, and expectations that, in turn, inform their thoughts. I was grateful for the help of my fellow teachers and the local people who helped me to build my understanding of local cultures.

There are diverse religious and cultural differences within Fiji. For example, there are multiple religious groups, such as Hindu, Muslim, and Christian. In iTaukei culture, kava is a traditional

drink that plays an important role in life. Kava has mythical and spiritual significance and is a sacred drink in the Fijian community. Kava is also offered to guests during the welcome ceremony. It is a dry powder made from the root of a leafy shrub with approximately six to ten segments with knotted branches.

In Fiji, people of the Hindu faith often recite mantras to seek blessings from divine spirits on specific occasions, such as starting a new day, job, or project. A mantra means a sound, a certain utterance or a syllable. Reciting mantras can invoke different dimensions of life and experience within a person (Sadhguru, 2023). Mantras are often associated with a particular deity, such as the Ganesha mantra at the beginning of this chapter which is associated with the remover of obstacles. Hindus believe that chanting the Ganesha mantra can bring about success. The Ganesha mantra is often recited at the start of a function, work, or new life journey. As a Hindu, it is customary in my family to recite mantras to seek blessings. I recite prayers every morning and meditate to have self-control (emotions, thoughts, and desires). It is the reason that every chapter begins with a mantra, and its meaning is written at the beginning of the chapter, aiming to seek blessings from different Hindu deities. I believe that many Fijian people, including students, carry cultural values with them when they migrate to other countries.

During my teaching experience in New Zealand secondary schools, I have seen many Fijian students struggle to adjust to the new learning environment in New Zealand classrooms. For example, my sister did well in science in Fiji in Years 9 and 10. My parents took a keen interest in her education and always attended school functions and parent-teacher interviews. They were well-informed about her academic performance and had good relationships with the school staff. When she migrated to New Zealand in the late 1990s, her academic performance suffered in the new learning environment. She found the school environment foreign and could not adjust to the new culture. In her own testimony, she explained that teachers' pedagogies during science education were also very different. My family did not understand the school system of New Zealand very well, and as a result, my parents hardly communicated with the school staff. Unfortunately, this could not be rectified in time for her and contributed to her failure in the science subjects.

I have heard many similar testimonials from parents and students who have migrated from Fiji and attended New Zealand secondary schools. These stories inspired me to learn more about some of the issues Fijian students face. I was motivated to find solutions to these problems.

Upon researching the literature, I realised there is a significant gap in the current research in this area, which I was keen to explore in depth.

1.3 Aims of the study

This study examined the Fijian students' perceptions of their learning environments in science classes in New Zealand secondary schools. The objectives of this study were to explore what pedagogical changes teachers can make to engage more Fijian students in science learning. Also, to validate the use of a modified version of the Constructivist Learning Environment Survey (CLES) to collect data in this study. Validation in this study refers to the process of ensuring the modified CLES is fit for the purpose of collecting data.

The following questions were the focus of this study:

1. What are the perceptions of Fijian students about their current and preferred learning environment in science classrooms in New Zealand secondary schools?

2. How can the learning environment be altered to make it easier for Fijian students to engage in learning?

Supplementary focus:
To find any significant differences in Fijian students' perceptions of science learning across groups characterised by gender, ethnicity, place of birth, and year levels of their current and preferred learning environment.

1.4 Research setting

New Zealand is geographically located between 36° and 46° south latitude and at 174° east longitude. It has two major islands, Te Ika a Maui (North Island) and Te Waipounamu (South Island). Māori are the Indigenous people of New Zealand. As 'tangata whenua' [literally, people of the land], Māori first arrived on the islands some 1000 years ago (Brooking, 2004). The Dutch explorer Abel Tasman was the first European to arrive in 1642. European whalers and sealers then started visiting regularly, followed by traders. A treaty was signed on 6th

February 1840 between the Crown (British Monarch) and some members of the tangata whenua to bring about peace and harmony (Brooking, 2004).

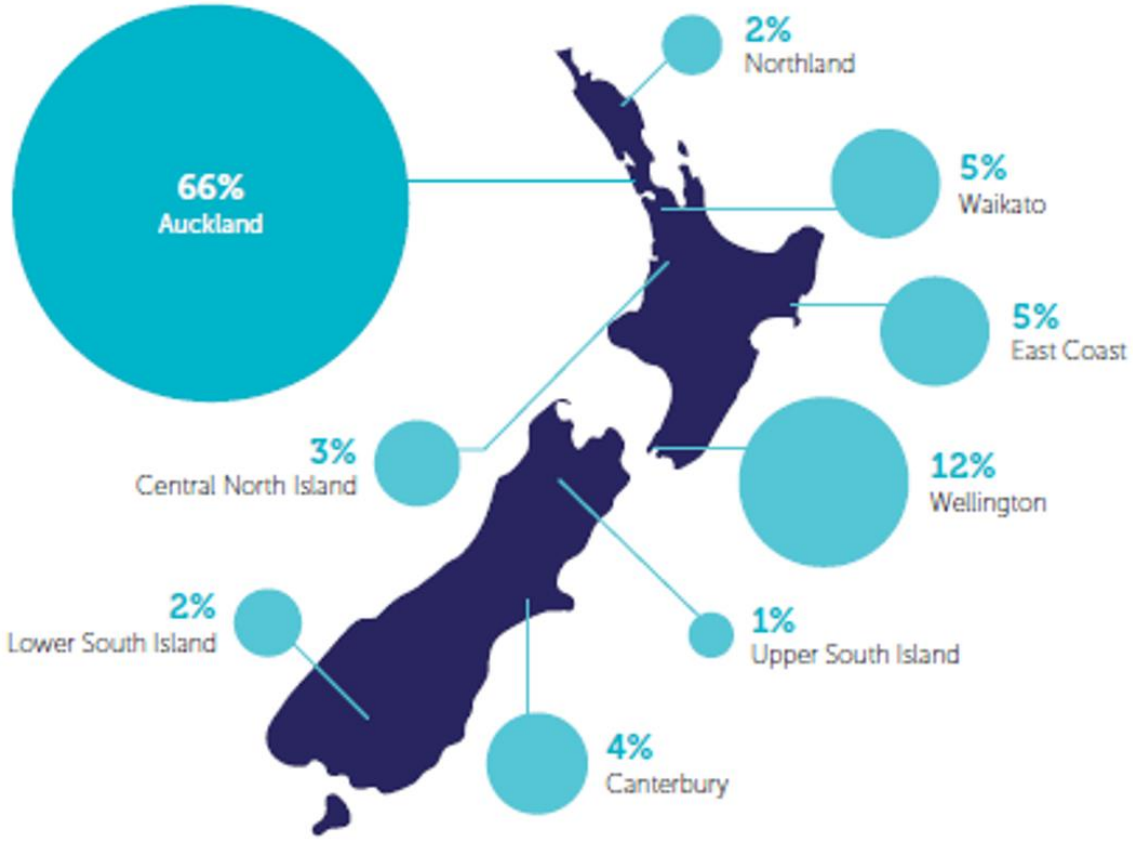
After the treaty was signed, more settlers arrived in search of a better lifestyle, mainly from Europe. As the economy grew, there was a shortage of labourers. During the 1950s and 60s, at the behest of the New Zealand government, there was an influx of Pacific Island people into New Zealand to cater to the labour market shortage (Bedford & Hugo, 2012). According to Stats NZ (2022), the population of New Zealand is 5.1 million, of which about 380,000 are Pacific people, many of whom are related to settlers from the 1950s and 60s. Predictions are that this number will increase to about 480,000 by 2026, making up about 8% of New Zealand's population (Stats NZ, 2022).

Students in New Zealand classrooms come from many different cultural and ethnic backgrounds. This study was conducted with Year 9-13 Fijian students studying in English medium state schools in New Zealand. Fijian students studying in New Zealand either migrate from Fiji with their parents, arrive separately on student visas, or are born in New Zealand and have Fijian ancestry ties.

Many Pacific Island people live in New Zealand's larger cities and work as labourers. Figure 1 shows that most Pacific Island people in New Zealand live in Auckland, followed by Wellington and the Hawkes Bay region. Samoans make up the largest proportion of the Pacific community; however, there are increasing numbers from the other countries of the Pacific, such as Fiji (Stats, NZ, 2022). The next sub-section briefly discusses why Fijian people are coming to live in New Zealand.

Figure 1

Population of Pacific people living in different regions of New Zealand



Note: Source: Pasefika Proud (2016)

1.4.1 Research Context

As the Prime Minister of the Cook Islands, Sir Geoffrey Henry, quoted from an old Chinese proverb, "We cannot know the village we are going to unless we know the village from which we came" (Henry, 1992, p. 14). This Chinese proverb can be interpreted in many ways, but in this context, it is taken as that one needs to know the histories and culture of the people before forming an opinion. Therefore, knowing about the Fijian people and their country of origin is important. This section gives an overview of Fiji and its people and the reasons why so many Indians came to live in Fiji and then subsequently migrated to New Zealand.

Fiji lies in the southwest Pacific between 15° and 22° south latitude and 175° east. According to Chandra (1998), Fiji has a total land area of 7,055 square miles scattered around some

250,000 square miles of water. Of the 300 or so islands that make up the Fijian archipelago, about a third of them are uninhabited. The two major islands are called Viti Levu and Vanua Levu. According to the latest report by the Fiji Bureau of Statistics (2018), Fiji has a total population of 865,611.

The Lapita people settled in the Fiji Islands some 3,000 years ago (Nunn, 2009). According to Fijian legends, the great chief Lutunasobasoba led his people across the seas to Fiji. The Indigenous people of Fiji call themselves iTaukei. One year after visiting New Zealand, in 1643, the Dutch explorer Abel Tasman was the first recorded European person to interact with Fijian people. Many other explorers visited Fiji following his visit to restock food for their voyages (Nunn, 2009). As a result, trade between the iTaukei and the sailors grew, and Fiji became known to other explorers. As the years passed, some sailors settled in Fiji and started businesses.

Later, in 1874, ostensibly to protect the rights of the iTaukei people and bring about law and order, Fiji was declared a British colony. Sir Arthur Gordon became the first Governor-general of Fiji (Kelly, 1992). One of his priorities was to develop Fiji's economy. Gordon did this by means of an exhibition in Australia which promoted Fijian products and the tropical climate. Large investment companies heard of Fiji, and after the exhibition, the directors of Colonial Sugar Refining Company of Sydney announced it would extend its operation to Fiji (Gillion, 1958).

During Gordon's time, a primary concern was to preserve the traditional culture of the iTaukei people and protect them from being exploited as labourers on farms (Derrick, 1950). Gordon turned to India for a cheap and reliable source of labour. The first Indian migration ship, the Leonidas, left the port of Calcutta, India, for Fiji and arrived on 15th May 1879 (Gillion, 1958). It is estimated that about 60,000 labourers came from various parts of India during the British colonial period. This explains why there are so many Indians who live in Fiji and call the islands their home.

Many Indians who went to Fiji did not go of their own free will. They were forced to go to Fiji. Gillion (1958) stated that for the British, recruiting labourers from India was not easy, so the recruiters used different tactics, such as giving false hope that recruits would earn good money in Fiji. They also claimed that Fiji was not far from India (Gillion, 1958). This was a lie. In

fact, Fiji is over 11,000 km away. After giving false hope, the recruitment agents became so unpopular in India that many villagers hated them, calling them ‘arkatis’. The word arkati in Hindi means [a bad person or someone with wrongful intentions].

Another issue the recruiters faced was persuading women or girls to go to Fiji to cook and do housework. The recruiters used different tactics to lure the women to sign contracts, such as visiting temples and pilgrim sites and seeking vulnerable women. Often, girls or women were abducted, tricked or lured into signing contracts by giving them food and shelter (Ali, 1977). According to Gillion (1958), for every 100 Indian men, 40 women or girls were recruited. The gender imbalance of Indian recruits in Fiji resulted in jealousy and many social problems. Many men became depressed, and some committed suicide. Life for indentured labourers was tough in Fiji, both in physical labour and in mental and spiritual terms. Indians in Fiji had to make many adjustments, which in many instances meant changing their worldviews and lifestyles.

Leaders such as Totaram Sandhya, Mani Lal, Charles Freer Andrews, and others protested the indenture system used by the British. As a result, the indentured system ended in 1916, and the last man who freed himself from the ‘girmit’ succeeded on January 1st, 1920 (Gillion, 1962). The term girmit is derived from the word 'agreement' and was used to refer to the system of indentured labour. At the end of the girmit, the Colonial Refinery Company (CSR) initiated a small cane farmer cultivation scheme. Plantations were divided into 10 to 12 acres and were offered to Indian labourers for cultivation. The contract bound the lessee to cultivate the land and supply cane to the company. As the scheme grew, each village formed groups called gangs in Fiji and immigrants who came as individuals from India eventually integrated with the iTaukei people (Jayawardena, 1975). Migrant Indians were referred to as ‘Kai-India’, by the iTaukei people, which means [a friend from India]. The integration with local people and hard work has helped the Indian migrants to grow in numbers and prosper in Fiji, forming a unique identity as Fijian Indians.

The number of Fijian Indians living in Fiji increased, and in the late 1900s, they were perceived as a threat to the iTaukei people. Jealousy and racial hatred among them grew as a result. There were political upheavals in Fiji in 1987, 2000 and 2006 due to racial tensions. This major factor prompted Fijians (especially Fijian Indians) to emigrate, mainly to New Zealand, Australia, Canada, and America, for a better future. Because Fiji and New Zealand are close and have strong ties that span heritage, culture, and sport, many Fijians migrated to New Zealand for job

opportunities and better education. This has resulted in the population of Fijians living in New Zealand increasing significantly in recent years (Stats NZ, 2022). In this thesis, Fijians refer to the main ethnic groups, Fijian Indian and the iTaukei.

1.5 Significance of the research

This study is significant for four major reasons. Firstly, it addresses the issue of meeting the needs of an increasingly diverse student population from the Pacific. Education of this diversity remains a challenge for many teachers in Aotearoa (Education Review Office, 2019) despite various initiatives and interventions to help Pacific students engage in learning (Chu et al., 2013; Chu-Fuluifaga et al., 2021; Mutch & Collins, 2012). Gaining insight into the perceptions of Pacific students regarding science education, particularly those groups such as Fijian that have not yet been studied, is vital. Therefore, the findings of this study will help narrow this gap.

Secondly, studies show that Pacific students have inequitable experiences in the education sector in New Zealand (May et al., 2016; Tabete et al., 2019). The authors stated that factors such as the lack of students' voices and parents' expectations from the teachers can contribute to the inequitable experiences of Pacific students. For example, some teachers of Fijian students may not be aware of how they want to learn. It is anticipated that the findings from this study have the potential to inform teachers about Fijian students' perceptions of how they want to learn science in New Zealand classrooms.

Thirdly, according to the NZQA, Pacific students in New Zealand are less likely to take science subjects. It is important to identify the reasons behind this trend. This study's findings could help providers develop professional development programmes to encourage more Pacific students, especially Fijian students, to pursue science subjects.

Lastly, the research is significant because it uses mixed methods to collect data from the participants in a way that has not been done before in New Zealand secondary schools. It will be the first time a Pacific qualitative research method, called talanoa, will be used alongside a modified version of the Constructivist Learning Environment Survey (CLES) to study students' perceptions in New Zealand classrooms. Validation of modified versions of CLES would mean that CLES can be applied to support other Pacific students by finding their perceptions of the

learning environment in New Zealand and the Pacific. In the next section, I briefly explain how the learning environment affects students' academic success.

1.6 Importance of researching the learning environment

Teachers and academics have observed links between students' perceptions of their learning environment and academic performance over the years (Edgerton & McKechnie, 2023; Guo et al., 2022). Guo et al. (2022) examined the relationship between students' perceptions of their environment and academic outcomes at the university level. The authors analysed responses from a large cross-curricular sample (N=1502) of undergraduate students. Results confirmed that students' perceptions of their learning environment directly predicted learning satisfaction and academic success (Guo et al., 2022).

A study done in Fiji on students' perceptions of their learning environment during physical education classes shows that students' academic success increases if they have a positive learning experience in Physical education (Ali, 2022). Edgerton and McKechnie (2023) also observed similar results, indicating a direct correlation between students' positive perceptions of their learning environment and academic success.

In this study, the learning environment refers to the physical, psychological, social, and pedagogical factors that affect student attitudes and achievement. Since students' learning environment plays a vital role in academic success, studying students' perceptions of their learning environment has the potential to unearth some barriers and enablers of Fijian students in science learning. It is anticipated that implementing the findings of this study will help Fijian students succeed academically. Therefore, this study aims to support Fijian students' academic success through a sharp focus on their learning environments.

In the next section, I briefly present the theories and the research approach underpinning this study. The literature review and methodology sections will later discuss the research design and relevant theories in more detail.

1.7 Theories and research approach

The theories that have underpinned this study are constructivism and sociocultural theory. Constructivism and sociocultural are learning theories that describe how students learn and acquire knowledge. According to Anyon (2008), theorising provides a "coherent structure of interrelated concepts and architecture of ideas which are useful for teachers in reflecting on their practice" (p.3). The author mentions that the theories serve to connect research with classroom practice.

Constructivism is a dynamic process in which small localised knowledge construction changes can significantly shift overall understanding (Chuang, 2021; Jordan et al., 2008). Constructivism is rooted in the belief that students learn best when they are active participants in their education rather than passive recipients of information (Bada, 2015; Cowie, 2015). The authors state that constructivism is based on the idea that students actively construct knowledge based on previous knowledge as a foundation and build on it with new ideas that they learn. They make use of their prior knowledge and worldviews to scaffold their learning. According to Dickson et al. (2016), the parent of constructivism is interpretivism. Interpretivism can be described as people constructing their understanding and knowledge of the world through experiencing things and reflecting on those experiences.

Sociocultural theory emphasises the role culture and social interaction play in knowledge construction (Vygotsky et al., 1978). The practice of teaching is influenced by the social context, including the geographic community of the school, the society as a whole, and various ethnic and cultural communities within the larger society (Buntting, 2019). The author argues that communities' values, beliefs, and norms shape the purpose and activities of teaching. Sociocultural theory suggests that human learning is largely a social process and that our cognitive functions are developed based on our interactions with people (Bell, 2011). When teaching is theorised as a sociocultural practice, it may be viewed with reference to several related and interacting classroom practices which teachers do in the classroom. More discussion on these theories is done in sections 2.5 and 2.6.

Constructivism and sociocultural theories are seen as helpful theories for this study because other researchers have found that Fijian students build their knowledge based on life experiences and prior knowledge (Ali, 2016; Bakalevu, 1997; Burnett & Lingam, 2013; Brison,

2011; Chand et al., 2021; Sharma, 2012; Taylor & Lucas, 1997; Taylor et al., 2008). For example, Taylor et al. (2008) found that science programmes based on a constructivist view of learning appeared to provide Fijian students from both ethnic groups (iTaukei and Fijian Indians) with an improved understanding of an area of science that is often considered conceptually difficult.

This study used a mixed method (quantitative and qualitative) approach to answer the research questions. The qualitative aspect uses talanoa method. Talanoa is one of the most prominent research methods utilised in the Pacific (Farrelly & Nabobo-Baba, 2014; Hindley et al., 2020; Nabobo-Baba, 2008; Tunufa'i, L. 2016). Talanoa method provides a platform where researchers and participants engage in a "social conversation which may lead to critical discussions, knowledge creation or co-constructed stories" (Vaioleti, 2006, p. 24). Talanoa method is justified in this context because the participants are familiar with the talanoa concept, and many have lived experiences.

The quantitative instrument used in this study was the Constructivist Learning Environment Survey-Fijian students (CLES-FS). CLES-FS is a modified version of the Constructivist Learning Environment Survey (CLES) that assists researchers in determining students' learning environments in classroom settings based on constructivist theory (Taylor & Fraser, 1991). In addition, CLES can also be used to assess students' perceptions of their preferred learning environment, which can be helpful in making pedagogical changes to engage students in learning.

Data was collected over a year for two major reasons. First, the COVID-19 pandemic slowed progress. Second, as a researcher, I wanted to spend ample time collecting data so that the philosophy underpinning the use of the talanoa method was supported. This study involved 305 Fijian students who self-identified as either Fijian Indian or iTaukei.

1.8 Chapter outlines

This thesis is organised into seven chapters. A brief outline of each remaining chapter follows:

Chapter 2 presents the literature review. It discusses what is known about the key elements of this study. It examines the seven areas of interest, including the education systems in Fiji and

New Zealand, how culture and worldviews affect Fijian students learning, historical developments in the learning environment, relevant theories, and theoretical frameworks. The chapter summary discusses the research gap that prompted this study.

Chapter 3 describes the methodological approach used in the research. It also explains how the data was collected and analysed. This chapter also includes a description of the research design and discusses validity, trustworthiness, and ethics issues. A conceptual framework was developed and discussed in this chapter to give the study an overview.

Chapter 4 presents the findings from the CLES-FS (quantitative). This chapter provides statistical information regarding the validity and reliability of the CLES-FS, and differences between students' actual and preferred perceptions about their science learning environment. This chapter also reports on the differences in students' perceptions across different categories, such as gender, ethnic differences, and place of birth.

Chapter 5 presents qualitative findings from the talanoa sessions. Narratives from the talanoa sessions are selected to help explore student perceptions and provide the overall patterns. This chapter also provides some personal encounters with students' perceptions of daily realities in the science classrooms of their actual and preferred learning environment via talanoa.

Chapter 6 discusses the interpretations of the findings and evaluates the students' perceptions of their current and preferred learning environments. The discussion reviews the findings and puts them into context with possible explanations backed up by the literature or theories. In addition, this chapter explains new understanding or insights that emerge from the research.

Chapter 7 provides the answers to the research questions and recommendations. It also discusses the suggestions for further research and the study's limitations.

सरस्वती नमस्तुभ्यं वरदे कामरूपिणि। विद्यारम्भं करिष्यामि सिद्धिर्भवतु मे सदा || Salutations to Goddess Saraswati, the one who gives boon and grants wishes. As I begin my education, shower me with the knowledge and intellect I need to attain wisdom.

Chapter 2

Literature Review

The literature reviewed in this chapter places this study in the context of existing research. The chapter is divided into eight sections. Sections 2.1 and 2.2 briefly discuss the education systems in Fiji and New Zealand. The rationale behind this is to provide background information on schooling in both countries, the origins of Fijian students (Fiji), and the place in which they are currently educated (New Zealand). The rationale of science learning in New Zealand classrooms is also discussed in this section.

Section 2.3 discusses how students' cultures impact on their learning. This section presents culturally responsive pedagogies, the importance of a sense of belonging, and the impact of student-teacher relationships on learning. Section 2.4 reviews related literature on learning in a familiar context, active learning, and the impact of student voices and classroom control on learning. Sections 2.5, 2.6 and 2.7 discuss the theory and the theoretical framework that has guided this study.

Section 2.8 presents literature concerning productive learning environments. In addition, it discusses the use of a constructivist learning environment survey to capture students' perceptions of their learning environment. The chapter concludes with a summary.

2.1 The education system in Fiji

Fijian students in New Zealand carry personal and/or intergenerational ideas and experiences of education (Pasefika Proud, n.d.). As this study seeks to explore the perceptions of Fijian students in science education, it is important to explore how the education system works in Fiji. According to Baba (1985), before the arrival of Europeans, older members of the iTaukei society passed on their knowledge orally in villages. Baba states that these learnings were contextualised; young members of society observed and imitated adults to develop appropriate skills in different areas. However, while valuing this kind of learning, in the context of this

thesis, education was limited to the knowledge received through schooling. Knowledge, in this view, refers to the facts that can be recalled or used in daily life; education is how we acquire knowledge.

Formal education in Fiji falls under the Ministry of Education, Heritage, Culture and Arts (MEHA). Their vision for Fiji's education system is "education and cultural diversity for empowered and sustainable futures for all" (Ministry of Education, Heritage and Arts, 2019, p. 3). The MEHA in Fiji incentivises students to attend school through initiatives such as free textbooks, assistance with transportation and meals, and support for the poor and needy. In Fiji, students usually start school at the age of six, before which some students attend preschool, better known in Fiji as kindergarten.

According to MEHA, around 15,557 children nationwide are enrolled in early childhood education (Ministry of Education, Heritage, Culture and Arts, 2017). MEHA aims to encourage as many students as possible to enter early childhood education before primary school. One of the intents of the early childhood centres in Fiji is to teach students about their culture and traditions (Brison, 2011).

After preschool, students attend primary school, which finishes in Year 8. High school begins in Year 9 (age between 13 to 14 years) and ends in Year 13 (age between 17 to 18 years). Around half of Fijian students end up in a work or training programme after High school, as shown in Table 1. Students who want to continue their education can attend universities or other technical colleges. MEHA endeavours to keep student-to-teacher ratios low to allow for greater interaction between the teacher and their students. The student-teacher ratio in primary schools is 1 to 26, while in secondary schools, it is 1 to 13 (Ministry of Education, Heritage, Culture and Arts, 2017).

Table 1

Numbers of students and institutions in Fiji

	Students	Number of Institution
Early Childhood	15,277	942
Primary	143,438	731
Secondary	67,947	178
Tertiary/Vocational	29,896	57

Note. Data from the Ministry of Education, Heritage, Culture and Arts, 2017. Annual corporate plan: 2017-2018 financial year. Republic of the Fiji Islands. http://www.education.gov.fj/wp-content/uploads/2019/11/MEHA-SP-2019-2023-Short-Version-26082019.pdf

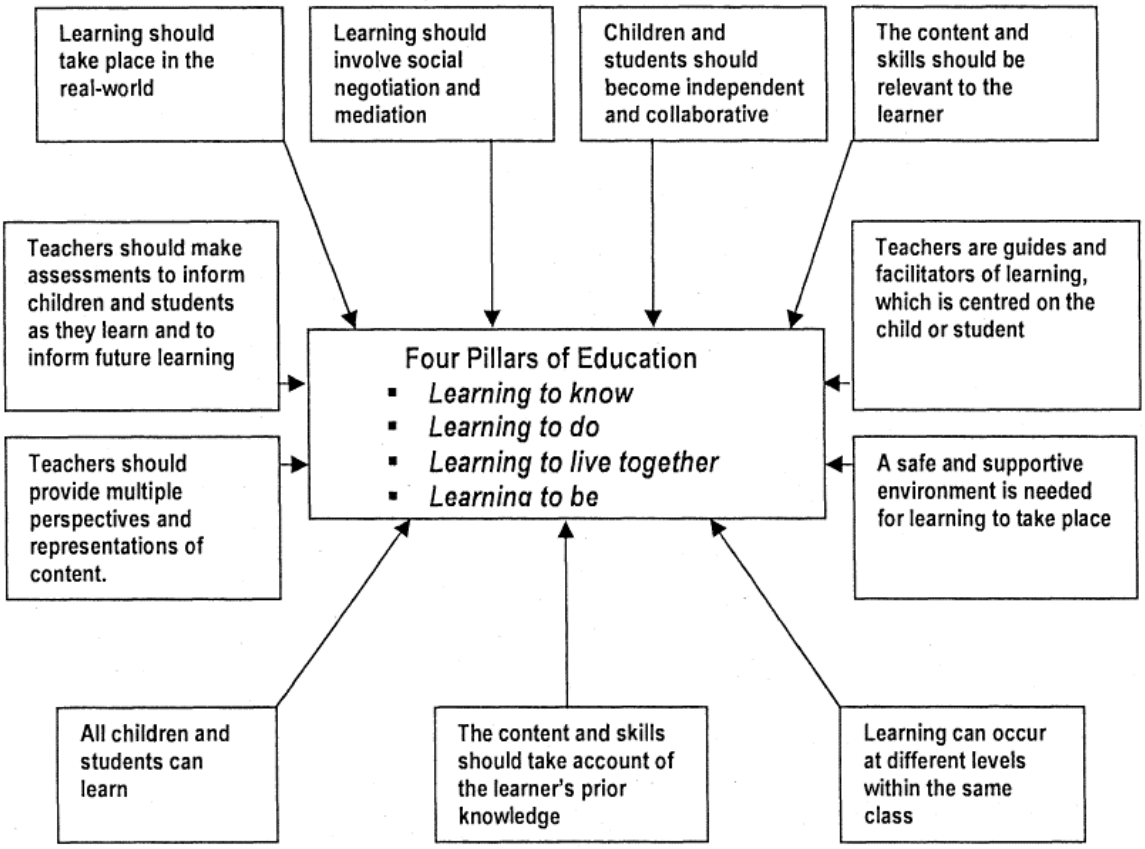
Fiji's National Curriculum Framework (NCF) provides the philosophy and structure of the curriculum from early childhood through Year 13 in Fijian schools. The NCF aims to "ensure the acquisition and development of knowledge, skills and values, and the associated capabilities and competencies that would enable all young Fijians to lead meaningful and productive lives" (Ministry of Education, Heritage, Culture and Arts, 2022a, p.1). In addition, the NCF encourages learners to know themselves better, gain self-esteem to help deal with the risks and constraints of life and acquire the ability to take control of their own lives.

The Fiji curriculum guides teachers to develop teaching and learning programmes. The NCF is flexible enough to allow schools and teachers to use their professional judgment on how best to reflect local and regional contexts in their learning environments. In addition, the NCF promotes multicultural and religious understanding, tolerance, and harmonious global co-existence among students.

Figure 2 shows the different attributes that make up the guiding principles of Fiji's NCF. At the centre of the diagram are the four pillars – Learning to Know, Learning to Do, Learning to Live Together and Learning to Be. Learning to Know- emphasises curiosity in life and the thirst for knowledge after leaving school. Learning to Do - incorporates a person's methods and knowledge skills. Learning to Live Together - is about the soft skills essential in building relationships, and Learning to Be - is about identity and self-esteem.

Figure 2

The guiding principles of the Fiji's National Curriculum Framework



Note. Reprinted from Ministry of Education, Republic of Fiji Islands, 2007. (p.18). http://www.paddle.usp.ac.fj/collect/paddle/index/assoc/fj33.dir/doc.pdf

The Fijian educational system has recently shifted emphasis from summative, examination-oriented assessment to formative outcomes-based assessment. In Fiji, students are currently both assessed through internal and external assessments. The MEHA administers and marks external assessments which normally occur at the year's end. Internal assessments consist of Classroom-Based Assessments (CBA's), either formative or summative, that are part of the teaching and learning process. According to the Ministry of Education, Heritage, Culture and Arts (2022b), assessment in Fiji should provide all students with opportunities to demonstrate achievement of outcomes regardless of geographic location, gender, race, socioeconomic status and/or special needs.

The above literature helps in understanding the Fijian education system and the experiences of Fijian parents and students when they study in Fiji. Fijian students are encouraged to attend school in Fiji. Fijian culture influences the education system in Fiji. Schools in Fiji incorporate different cultural aspects in teaching, such as values and beliefs, language, symbols, rituals, and norms. These experiences are carried by parents and students when they migrate to New Zealand (Pasefika Proud, n.d.). That means that the experiences and expectations of the schooling culture of Fiji may be expected by parents and students in New Zealand classrooms. This idea provides a focus for discussions of culture and differences in school culture that come later in the thesis. The next section briefly discusses the New Zealand education system and its philosophies.

2.2 The education system in New Zealand

New Zealand has three types of schools: state, state-integrated, and private. About 85% of students attend state schools that offer a free education. State-integrated schools attract about 10% of the children. They charge limited fees. About 5% of students go to private schools, which are largely self-funded (although they receive tax rebates as charities) by charging fees to parents (Mitchell, 2016).

Education is compulsory for children in New Zealand from the age of six. However, many children attend daycare or early childhood centres earlier than this. Education in New Zealand is, in some senses, fractured. In most primary schools, students are educated until Year 6. However, full primary schools educate up to Year 8. Intermediate schools cater for Years 7 and 8. Most secondary schools cater to students from Years 9 to 13. In some locations there are junior high schools that cater for students in Years 9 and 10 and senior high schools for Years 11 to 13. These varied patterns reflect local histories and there is a tendency in New Zealand for education to be self-directing at local and institutional levels.

All state and state-integrated schools have an elected Board of Trustees (BOT). The BOT is composed of community members, co-opted specialists (if necessary), the school principal and a staff representative (Ministry of Education, 2018). The principal is responsible for overseeing the management of personnel, curriculum, property, finance, and administration. The BOT is responsible for hiring staff and creating a strategic plan for the school based on the New Zealand Curriculum (NZC) to ensure schools provide quality education for all students

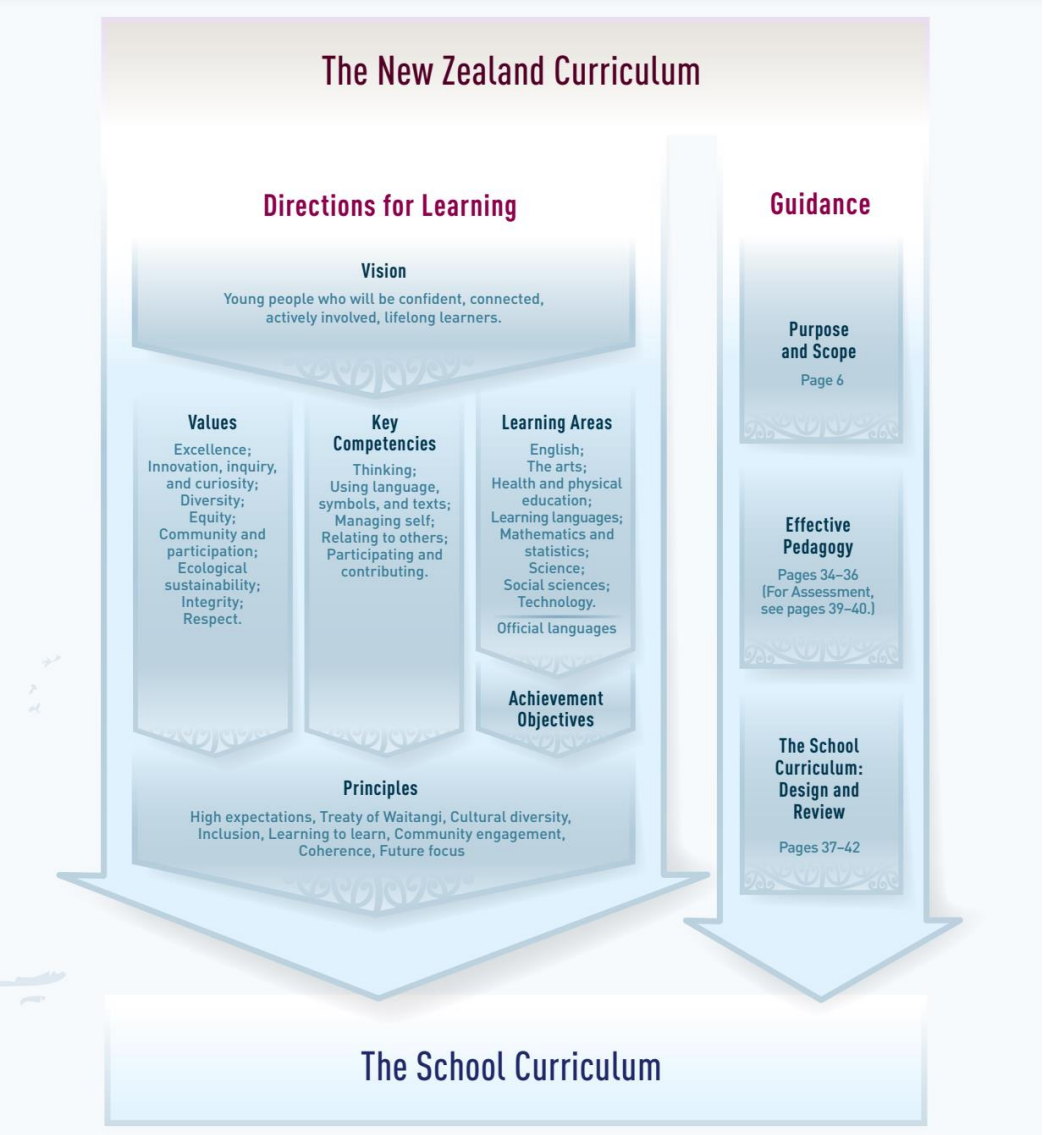
(Ministry of Education, 2007). The NZC provides the framework for schools to develop their own programmes to engage learners in learning in meaningful ways.

The NZC aims to develop students who are resilient, confident, involved in the community and lifelong learners. It promotes social interactions and values learners' cultures and traditions as shown in Figure 3. The NZC also encourages students to use scientific knowledge and skills to make informed decisions about today's issues. There are eight principles of the NZC. They are high expectations, learning to learn, the Treaty of Waitangi (which brings attention to the partnership between Māori and the Crown or government), community engagement, cultural diversity, coherence, inclusion, and a future focus. The permissive nature of the NZC enables teachers to contextualise their programmes to meet the needs of their students (Ministry of Education, 2007).

The NZC supports and empowers all students to learn and achieve personal excellence and encourages all students to reflect on their own learning processes and learn how to learn. The NZC's principles encourage schools to design a curriculum that reflects New Zealand's cultural diversity and values the history and traditions of all students, attempting to ensure that their students' identities, languages, skills, and talents are recognised. Furthermore, the principles encourage students to engage with important future-oriented issues such as sustainability, citizenship, business as entrepreneurship, and globalisation.

Figure 3

Vision, values, key competencies of the New Zealand Curriculum



Note. Reprinted from Ministry of Education, 2007, (p.9).

The New Zealand government introduced successive Pasifika Education Plans to support schools to engage Pacific students in learning (Ministry of Education, 2020). The current Pacific Education Action Plan (PEAP) 2020-2030 (Ministry of Education, 2020) aims to guide stakeholders in the education sector to develop the capacity to uplift the achievements and educational experiences of Pacific students. The PEAP endeavours to meet Pacific people's aspirations and educational goals.

Five key system shifts are outlined in PEAP, recognising the past failure of education in New Zealand to meet the needs and aspirations of Pacific peoples. The shifts are to work reciprocally with diverse Pacific communities, confront systematic racism and discrimination in education, enable teachers to be culturally competent with diverse Pacific learners, place learners at the centre, prepare learners for the future, and provide quality teaching and leadership. Through these means, the PEAP intends to ensure that Pacific learners and families are safe, valued, and equipped to achieve their educational aspirations (Ministry of Education, 2020).

Aside from emphasising the need to change educational philosophies and develop plans to meet the needs of 21st-century students, like Fiji, the New Zealand education system is also evolving and changing in the way students are assessed. Most students in New Zealand are assessed in their last three years of secondary school using the National Certificate of Educational Achievement (NCEA). The New Zealand Qualifications Authority (NZQA) is an independent body that monitors the NCEA and moderates NCEA assessments to ensure consistency across schools and over time (New Zealand Qualifications Authority, 2021).

The NCEA system provides flexible assessment opportunities for students through internal and external assessments. The NCEA also theoretically provides opportunities for students to work in familiar surroundings with an appropriate amount of time to demonstrate an understanding of a particular skill set. Assessments set out to encourage students' learning, provide teachers with information to adjust their teaching strategies, and are driven by the concept of ako. In te ao Māori (and many Pacific languages such as Tongan, Samoan, Tokelauan and Niuean), the concept of ako means teaching and learning without distinction (Kepa, 2016). Ako recognises the knowledge that both teachers and learners bring to learning interactions and how new knowledge and understanding can grow from shared learning experiences. Assessment that is constructed through ako allows for Fijian (and other) students to bring their knowledge and experiences to the assessment process.

By way of comparison, the education systems in Fiji and New Zealand are based on very similar philosophies: the student is at the centre of the learning. In both countries, teachers are encouraged to incorporate the students' worldviews and use culturally appropriate pedagogies. However, the literature indicates that Fiji and New Zealand have their own curriculum and assessment systems. Thus, migrating students (and/or families) may be exposed to different

assessment systems and subject content. Since Fijian students are a minority in New Zealand, they may not experience learning that is reflective of their worldview. The next section looks at science education in New Zealand.

2.2.1 Science education in New Zealand

The New Zealand Curriculum (2007) provides the framework for all subject areas taught in New Zealand from Years 1 to 13. The framework is presented in a 67-page booklet with an eight-fold-out format section that explores eight learning areas: English, Arts, Health and Physical Education, Languages, Mathematics, Science, Social Sciences, and Technology. Learning area statements describe the essential nature of each learning area within the curriculum and how the area can contribute to students' education. The science learning area has four strands: The Living World, Planet Earth and Beyond, The Physical World and The Material World.

The Living World strand is about living things and how they interact with each other and the environment. Students develop an understanding of the diversity of life and life processes, of where and how life developed, of evolution as a link between life processes and ecology, and of the influence of humans on all life forms. This strand enables students to make more informed decisions on important biological issues. The focus is on the biology of New Zealand, including the sustainability of New Zealand's unique flora and fauna and distinctive ecosystems.

The strand titled Planet Earth and Beyond is about the interconnected systems and processes of the earth, the other parts of the solar system, and the universe beyond. Students learn that the earth subsystems, geosphere (land), hydrosphere (water), atmosphere (air), and biosphere (life) are interdependent and that all are important.

The strand of The Physical World provides explanations for a wide range of physical phenomena, including light, sound, heat, electricity, magnetism, waves, forces, and motion. These are united by the concept of energy transformed from one form to another without loss. By studying physics within this strand, students understand the interactions between parts of the physical world and how these can be represented. Knowledge of physics allows students to

understand a wide range of current problems and challenges and devise potential technological solutions.

The strand of the Material World involves the study of matter. Students understand the composition and properties of matter, the changes it undergoes, and the energy involved. They use their understanding of the fundamental properties of chemistry to make sense of the world around them. With their knowledge of chemistry, students can better understand scientific challenges such as environmental sustainability and the development of new materials, medicines, and energy sources.

The Nature of Science (NOS) is a further overarching element of the science curriculum within the NZC, unifying all four strands in science learning. NOS refers to the epistemology of science - science as a pathway to knowledge that includes the beliefs and values underpinning scientific knowledge development (Hipkins, 2006). NOS is organised around four ideas: Understanding about Science, Investigating in Science, Communicating in Science, and Participating and Contributing. Through NOS, students will learn what science is and how scientists work and develop the skills, attitudes, and values to lay a foundation for understanding the world. Furthermore, studying NOS helps students appreciate scientific knowledge, learn how scientists work to carry out investigations and communicate scientific ideas. NOS links scientific knowledge to everyday decisions and portrays science as a socially valuable knowledge system.

The NZC outlines various levels of achievement. In Years 9 to 13, students can learn at any of the eight science achievement levels specified. From Year 11 onwards, students may choose to specialise in one or more science disciplines, depending on the choices offered in their schools. These subjects include Chemistry, Physics, Biology, or combinations of these. Teachers are expected to cover the four contextual strands outlined above, but they can choose what topics are covered. This makes possible the creation of learning contexts familiar to students. A variety of adaptable teaching methods, such as the use of computers, posters, PowerPoint presentations, experiments, and group work are available for teachers to use to deliver the science content of the NZC.

Since science in the NZC is not about finite facts and figures, teachers need a good understanding of NOS to deliver the objectives of the science curriculum (Hipkins, 2006). As

American futurologist Alvin Toffler pointed out, the illiterate of the 21st century will not be those who cannot read and write but those who cannot learn, unlearn, and relearn (Toffler Associates, 2016). In New Zealand, the NOS strand testifies to this idea. The NZC envisages that teachers in classrooms will create a conducive learning environment for students and use appropriate pedagogy to inculcate the nature of science not as a body of knowledge but as a learning process.

In order to keep up with societal changes, adopting new pedagogies to better engage students in learning has been a feature of the New Zealand educational landscape for a number of years. The last five years have been a period of planning and decision-making by the Ministry of Education to refresh the current curriculum (Ministry of Education, 2023). Developments seek to strike a balance between learning that is important globally, nationally, and locally and that which is reflective of students' worldviews. The NZC aims to make learning more inclusive of different worldviews, including te ao Māori [the Māori worldview], strengthen educational commitment towards Te Tiriti o Waitangi, and become increasingly accessible and easy to follow. In the near future, a revised NZC aims to create more flexibility for teachers to provide learning environments that reflect students' worldviews and cultural backgrounds.

Although the NZC places great importance on student-centred learning and the Pacific Education Action Plan (PEAP) provides a framework for Pacific students, teachers still require assistance in developing courses that align with the life experiences and worldviews of Pacific learners. The underperformance mentioned in section 1.1 may be attributed to Pacific students' lack of engagement in science. There are various reasons why students may not be engaged in science-related subjects. One possible factor is that teachers may lack knowledge on how to effectively engage Pacific students in science learning due to insufficient experience of specific ethnic groups in the Pacific region in terms of their culture and worldviews. The next section discusses the role culture plays in the Fijian students' lives and how it affects their learning.

2.3 Culture

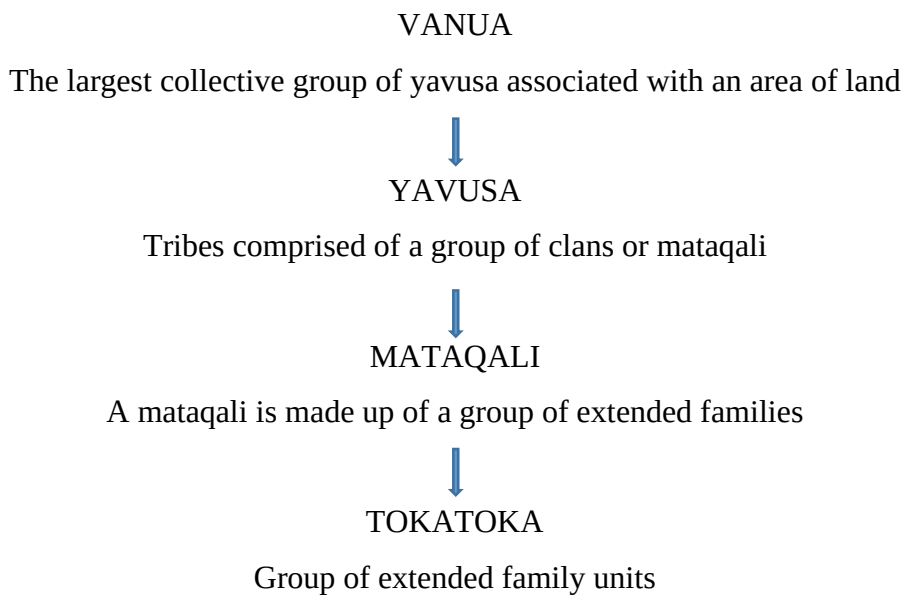
Culture can be defined as people's beliefs, values and behaviours or as a way of life for a discrete group of people (Spencer-Oatey, 2008). The sustainability of Fijian cultures is important to the people of the Fiji Islands (Pasefika Proud, 2021). The two main cultural groups

in Fiji, are iTaukei and Fijian Indians. For both groups (Fiji Indians and iTaukei) culture(s) is important to them (Ali, 2016; Pasefika Proud, 2016).

There are many factors that comprise a person's culture, such as language, education, religion, attitudes and values, and social organisation. In many parts of Fiji, the social organisation of the iTaukei people is based on land ownership. This is because the land is sacred and has important cultural significance in iTaukei lives (Nabobo-Baba, 2006). The ownership of land is not individual. The land is normally owned by tribes or groups of tribes. According to Varani-Norton (2021), 'vanua' refers to the largest collective group of tribes in certain areas in Fiji. Vanua is made up of 'yavusa', a group of clans or 'mataqali'. Mataqali comprises a group of extended families called 'tokatoka' as shown in Figure 4 (Varani-Norton, 2021).

Figure 4

Relationship between Vanua, Yavusa, Mataqali and tokatoka



Note. Diagram drawn from the article published by Varani-Norton, (2021).

Figure 4 illustrates that iTaukei people are related to each other by land ownership. Many of their cultural values are passed on to younger generations through this relationship. Thaman (2010) believes that the sustainability of cultures sits on the shoulders of these social organisations, although this extends into schools and communities. Like other ethnicities,

Fijian people value their culture(s) and strive to pass it on to younger generations. While schools in Fiji do not have a specific subject through which students are taught about their culture(s), teachers try to incorporate elements of students' cultures in their daily teaching. One of the potential reasons teachers use elements of students' culture(s) in their daily teaching is that students get more interested in learning when they can experience learning in their cultural context (Bakalevu, 1997).

Several texts have been written in Fiji to promote and engage Fijian students in learning their cultures and traditions. Both major ethnicities (Fijian Indian, iTaukei) have published books for schools where the context reflects their culture(s) and traditions. An example is Pacific Folk Tales by Benson (1993) which describes local myths and legends using the iTaukei contexts. In one story, Benson talks about Burotukula Island, where beautiful birds and girls once lived. One day, some fishermen killed a strange looking bird and took the bird's meat to their village on another island. The island chief was not happy and mentioned that the men would soon be sorry for what they had done. The next day, when the island people woke up, they could not see Burotukula Island at all. Instead, there was only the blue sea. The author believes that stories such as these will interest Fijian students because they relate to the legends passed on from the previous generation.

Similarly, the Fiji Institute of Education published books called the "Waka Series" with short narrative stories on culture. The Waka Series is written by local authors and is based on Pacific myths and legends. These books aim to promote active learning in students by connecting with their everyday lives (Burnett & Lingam, 2013). Research done in Fiji by The Centre for iTaukei at the University of Fiji shows that many students enjoy reading books which contain stories that relate to their culture(s) (Ali, 2016).

When Indians were brought under the indentured labour system to Fiji by the British to work on sugar cane farms, they also put great emphasis on keeping their culture alive. Indians in Fiji passed their cultural knowledge orally to the younger generation through religion (Gillion, 1958). Many labourers would sit in barracks and recite the *Ramayana* after the hard days of work on the farm. *Ramayana*, a holy book for Hindus, contains the story of Lord Rama and Devi Sita, the two main deities worshipped by many Fijian Indians. These were informal educational sessions and were mostly about passing moral values from the religious texts to the people to maintain the traditions and customs (Voigt-Graf, 2008).

Later, religious groups were formed to maintain the passing of cultural values (see Figure 5). For example, many Hindu families in Fiji belong to one or another religious group made up of individual families who congregate to practice religious protocols and cultural beliefs.

Figure 5

Organisational structure of the Hindu religious group

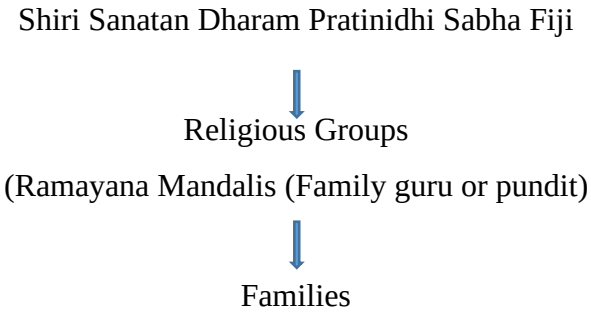


Figure 5 shows the organisational structure used in Fijian Indian societies in Fiji to pass cultural and religious beliefs to people. It also illustrates the emphasis Fijian Indians put on passing the cultural knowledge to younger generations. In Fiji, schools and communities have implemented strategies to pass on culture to the younger generation. Fijian students are eager to learn about their culture and are more interested when the learning process incorporates aspects of their own culture (Sharma, 2006). This is because culture is highly valued and considered an important aspect of their identity by the Fijian people (Nabobo-Baba, 2008), including students.

When Fijian families move to New Zealand, many of them assimilate with different cultures while simultaneously working to keep their cultures alive (Pasefika Proud, 2016). This dual process happens at the level of individuals and families. For example, Waqabitu, an iTaukei female cited in a pro-Pacific website tells the story of moving to New Zealand from Fiji when she was five and was fluent in her mother tongue (Pasefika Proud, 2016). However, after migrating to New Zealand and not having the opportunity to converse in her mother tongue so often, later it became difficult for her to communicate in her mother tongue. According to her, she is a proud iTaukei and will remain an iTaukei no matter where she lives.

> No matter what happens in my life, I will still have these same ancestors, same family lines and same heritage. It will never take away from my Fijian-ness. One of the strengths of Pacific people is that we have strong families, and our networks are strong…. It's where we always go back to in hard times or facing difficulties. Family is what grounds us (Pasefika Proud, 2016, para. 8).

The above narrative signifies the importance of heritage and culture to the iTaukei people. It also shows that some Fijians still rely on each other for support as they used to in the past. Furthermore, it shows Waqabitu's desire to keep her Fijian cultural values alive despite living in a new country, New Zealand.

Similar stories are shared by Fijian Indians living in New Zealand. For example, Janifa Khan, a Senior Advisor for the Ministry of Social Development's E Tu Whanau programme, talks about what it means for her when she is not referred to as a Fijian Indian. Recently appointed a Member of the New Zealand Order of Merit (MNZM) for services to refugee and migrant communities, Khan describes her personal experience of being a Fijian Indian living in New Zealand. She explains how being a Fijian Indian puts you into different categories in the eyes of people in the form of a poem:

> My leanness enabled me to fit
> the "South Asian" box for health officials
> My "Indianess" was not an entry criteria
> to the "Mainland India Club" as I spoke funny Hindi
> and didn't know my caste or class
> In the eyes of Mainland Indians, the generations of hard work
> and prosperity in Fiji by my ancestors could never free me from the shackles of being from a lower class with origins in Bihar and Uttar Pradesh in India I could only be a descendant of the slaves not fit to be associated with. (Oranga Tamariki, n.d. p. 6)

The poem indicates that although Fijian Indians look like and share a very similar gene pool with people from India, they are sometimes not fully accepted as Indians. This is because of their unique language, Fiji baat [Fijian Indian dialect] and their status according to the people of India (Hundt, 2018).

Recently, a group of Fijian Indian students made a video in one of the schools in South Auckland regarding their sense of belonging (Pasefika Proud, 2021). The students said they were looking for their 'box' on the school's application form. This suggests they wanted to be recognised as Fijian Indians rather than Indians. This assertion is consistent with an article published in the New Zealand Herald newspaper that the Fijian Indian community wants the government of New Zealand to recognise them as people from the Pacific (Tan, 2021), not from Asia. Together, these examples suggest a sense of belonging among Fijian Indians that orientates more towards Fiji than India.

The above narratives from Fijian Indian and iTaukei people living in New Zealand suggest that although they have migrated to a new country, they still want to keep their cultures alive. In addition, the narratives may also indicate that Fijian parents and students expect that the school will provide some opportunities for them to share and experience their culture(s). Sharing and experiencing their culture(s) could be a means for Fijian students to feel accepted in New Zealand, which is dominated by Western cultures.

2.3.1 Sense of belonging

A sense of belonging involves acceptance by others, inclusion, or connection with other people. In schools, students' sense of belonging is explained as the degree to which students feel personally accepted, respected, included, and supported (Goodenow & Grady, 1993). Goodenow and Grady describe belonging in school as a merging of the concepts of belonging and connectedness, a combination which, when positive, makes children feel accepted, respected, included, and valued by others. When students have a sense of belonging at school, participation and learning increase, along with a decreased fear of judgment from other students or teachers (Kause-Leavy et al., 2021; Watson, 2005).

A sense of belonging in school supports Pacific students to have high self-efficacy (Ministry of Education, 2018). Schools play an important role in building social networks and providing opportunities to develop belonging. However, different school learning environments can offer support to students in this regard (Allen et al., 2021). When the learning environment reflects students' worldviews, and they feel supported by their teachers, it becomes easier for them to develop a sense of belonging. Documents developed by the Ministry of Education, such as the PEAP, suggest schools need to create a learning environment where Pacific students feel

accepted (Ministry of Education, 2020). Furthermore, the report states that when Pacific students have a sense of belonging at school, they want to come to school and engage in learning.

Other studies have also shown that students' positive experiences of a sense of belonging in school can result in more engagement in learning (Bishop, 2019; Demanet & Van Houtte, 2012; Jose & Pryor, 2012; Sari, 2012). Similar sentiments are echoed in a report by The Organisation for Economic Co-operation and Development [OECD] (2017) that a sense of belonging has implications for students' social experiences and plays a role in their academic performance. According to the OECD (2017) report, at the age of 15, many students have strong perceptions that their teachers behave unfairly, and these perceptions can affect their sense of belonging and engagement at school. According to the OECD (2017) report, schools can also consider regularly collecting feedback from students on the quality of the learning climate and the relationships they maintain at school so that they can better support the students. Conversely, Baumeister and Sommer (1997), mention that the lack of a sense of belonging can negatively impact a person. Therefore, it appears that the sense of belonging of students in a school is important in engaging students in learning.

The school learning environment, created by the teachers, plays an important role in making the students feel valued and engaging in learning. However, it can also be argued that a sense of belonging is also dependent on students' personal characteristics and motivation; some students, may not want to be a part of the school community (Roger-Sirin et al., 2005). The students could have a reserved temperament and lack the necessary skills to link with people of different cultures. In this case, schools can play a vital role in motivating and supporting students to want to be part of the school community.

Apart from engaging Pacific students in learning, having a sense of belonging in schools also helps them with identity formation. Identity formation is a complex social construct that is a lifelong process with many facets. No two people have the same life experiences. Nakhid (2003) mentions that the identification process involves what students do to construct and embrace their identity. Nakhid refers to situations where Pacific students do not 'see' themselves in school, which can negatively impact students' identity formation. To avoid this, teachers and school administrators should create inclusive school learning environments.

Similar sentiments are echoed by Strayhorn (2018), who argues that identity formation can be difficult for students whose worldviews and cultures are not reflected in the school or who do not have a sense of belonging. The authors mention that when students are not able to experience aspects of their culture(s) at school, it affects their sense of belonging. This shows that a sense of belonging is important for students not only to get engaged in learning but to develop their identity. This is particularly important for Fijian students as they value their culture and respond more positively to learning when they are able to experience and share aspects of their culture and have a sense of belonging at school (Ali, 2016).

2.3.2 Border crossing

Another important point to consider is that Fijian students who come from Fiji have a different learning experience. This is because there are differences between Fiji's and New Zealand's education systems as stated in section 2.2. Fijian students coming from Fiji need to adjust to the new learning environment. Aikenhead and Jegede (1999) use the term "border crossing" for the experience of students whose learning experiences (expectations) differ from the classroom culture. The authors mention that teachers who help students mediate or negotiate between these differences (students' expectations and classroom culture) are called brokers. Fraser and Hill (2015) draw attention to classroom culture:

> A classroom culture that encourages deep-level learning, rigorous scrutiny of ideas, respect for people and property, concentration and curiosity, perseverance and passion, and a burning desire to know, is a climate that depends upon a certain culture. This culture is developed by teachers, but with students so that they (the students) are actively involved in making decisions, taking responsibility, learning from errors, and realising accomplishments (p.1).

The above excerpt suggests that a classroom that is based on students' worldviews and aspirations encourages students to get involved in learning. Developing a classroom culture that closely matches the student's expectations can be a challenge for some teachers. This may involve teachers' understanding of the students' worldviews and their perspective of how they want to learn. Fraser and Hill (2015) argue that it is important for teachers to create a culture of collaboration with parents and caregivers in order to gain insight into their expectations. The authors mention that culturally responsive pedagogy can promote classroom relations and

interactions where teachers can come to understand students' home life and how they will best participate in their learning.

2.3.3 Culturally responsive pedagogy (CRP)

Research shows that Fijian students respond better to learning when teachers use culturally responsive pedagogies (Brison, 2011). Culturally responsive pedagogy (CRP) acknowledges cultural heritage and builds bridges between home and school. Gay (2018) mentioned that "Caring teachers expect (highly), relate (genuinely), and facilitate (relentlessly)" (p.57). Enacting CRP means that students' culture takes centre stage when constructing knowledge in class. Creating an effective CRP learning environment can involve teaching using methods familiar to students. For many Pacific students, these methods include high expectations, developing strong relationships with students and families and enacting effective pedagogies which are discursive and collaborative (Bonne & Spiller, 2017).

Effective teachers understand that students are culturally located individuals and can engage students with various strategies that facilitate learning-focussed interactions (Bishop & Berryman, 2009). Thaman (2013) states that teachers of Pacific learners should be not "only professionally qualified but also culturally competent" (p. 1). Various studies have found that the use of CRP in the classroom can be instrumental in engaging disengaged Pacific students in learning (Bakalevu, 1997; Lemon & Edwards, 2017; Richard et al., 2007; Siope, 2013; Savage et al., 2011; Wallace et al., 2012).

An example of effective CRP is illustrated in a study by Lemon and Edward (2017). The study found out how a teacher's deliberate acts of CRP in a classroom helped non-engaged students become interested in lessons. The authors describe some features of CRP used by the teacher to engage students in learning as follows:

1) Knowing students' ethnic background
2) Having high expectations
3) Establishing good relationships with the students
4) Understanding that students are culturally located human beings
5) Communicating with the whanau (extended family) using culture and knowledge to inform the pedagogy

6) Not using deficit theorising, and having students contribute to making classroom guidelines

This set of features illustrates that CRP does not just mean trying to bring students' culture into the classroom or using a few token words of their language in the school. There needs to be a genuine commitment from the school leaders and the teachers to engage students in learning.

Richards et al. (2007) claim that schools need to consider three dimensions if they genuinely want to implement CRP: institutional, personal and instructional. The institutional dimension is concerned with the educational institution's policies, administration, and values. This dimension sits at the top level of how CRP can be implemented and executed in a workplace. The personal dimension deals with the emotional and cognitive process and educators' willingness to become culturally responsive practitioners. Richards et al. (2007) mention that usually, teachers need time, resources, and a mentor to become confident in CRP. The third dimension is the instructional which includes the materials used to teach and the pedagogical approach used to construct new knowledge with students. In addition, teachers can use students' prior knowledge when constructing new knowledge.

For example, Taylor et al. (2008) aimed to explore methods of enhancing elementary science education in Fiji. To achieve this, the researchers adopted innovative teaching techniques based on a constructivist approach to learning which they believed would be more effective in improving students' understanding and enjoyment of science. The study results showed that the innovative approach was effective in enhancing students' enjoyment of science and supporting their learning in this subject.

Schunk (2020) states that when students' life experiences are used in the teaching context, this helps students minimise extrinsic load because these examples do not require learners to engage in extraneous processing to understand the context. Extrinsic cognitive load is the effort associated with learning new materials or concepts, whereas extraneous cognitive load refers to how information or tasks are presented to a learner. Schunk argues that students can process pieces of information faster if teachers use familiar contexts when teaching students new concepts.

Schunk (2020) gives the example of teaching the sine rule in Mathematics. Instead of drawing a triangle on the board and explaining how to use a sine rule, he advocates that teachers can determine the angle of different objects readily found in a classroom, such as dusters, books and cups. According to the author, it will be easier for students to use the sine rule to find the angle of an object than trigonometric problems in a textbook. Shunk (2020) believes because students will be able to relate the sine rule to a context, they are familiar with, they will be able to learn faster.

Bishop et al. (2007) argue that apart from the teaching context, students should be able to relate the learning to their everyday lives. The authors use the word 'relational' in CRP, making it culturally responsive and relational pedagogy (CRRP). According to them, the use of the word relational is key to understanding and defining the effectiveness of CRP. Bishop et al. (2007) mention that success is not just about using culturally relevant or appropriate pedagogy in the classroom; instead, it is about the degree of relatability between students and their learning. Accordingly, CRRP is:

> where power is shared between self-determining individuals within non-dominating relations of interdependence; where culture counts; where learning is interactive, dialogic and spirals; where participants are connected to one another through the establishment of a common vision for what constitutes excellence in educational outcomes. (Bishop et al., 2007, p. 1).

At times, the expectations of school culture conflict with the expectations of the home cultures, a situation which Auxier (2003) coins as a 'cultural gap'. This cultural gap can give rise to differences in the learning expectations of the teachers and students. This situation does not help CRRP. A study done by Rubie-Davies et al. (2006) explores differences in teachers' expectations and student expectations of their reading performance. The participants were 540 students from 21 primary schools in Auckland, New Zealand. The study found that teachers' expectations played a role in students' learning achievement, an effect that is not always positive. According to the authors, this was because the teachers' expectations differed from those of the students.

The gap between the teacher's expectations and the students can be minimised if teachers understand where students come from and work to meet the expectations of the students.

Thaman (2010) argues that for Pacific students, the quality of the student-teacher relationship is linked to the teacher's understanding of the student's cultural background and expectations. Closing this gap between teacher and student expectations is an important aspect teachers need to consider while teaching, especially in multi-ethnic societies such as New Zealand. Chu-Fuluifaga and Reynold (2023) argue that student-teacher relationships can help teachers better understand the expectations of Pacific students. The next section discusses the importance of relationships within the Fijian communities.

2.3.4 Relationships

Relationships between people or groups determine the framework for the appropriate behaviour of the individual in many Pacific cultures (Thaman, 2010). The type of relationship can often decide the kind of conversation one can have with another. For example, there is an expectation that you bow your head and say 'Ramram' [common Fijian Indian greeting] when you greet a 'pundit' [priest] and show respect towards the priest. Fijian parents expect children to behave differently towards their father than with their mother (Brison, 1999; Kurewaka, 2021; Ravuvu, 1983). Often, a daughter will confide in her mother rather than her father regarding personal problems. These examples show that Fijian cultures have traditional customs that expect people to behave in a certain way. Often, when Fijian students come to school in New Zealand, they bring their cultural values with them, and, at times, teachers cannot understand why Fijian students behave in certain ways towards their teachers, students or learning situations.

In Fijian society, there is an emphasis on the teacher-student relationship (TSR). In Fijian culture, the nature of the relationship between the teacher and student plays an important role in understanding the student's life experience and knowledge transmission. According to the Hindu holy books such as the Bhagwat Gita and the Ramayana, prominent books in the Fijian Indian community brought from India, the relationship between the students and the teacher (guru-shisha) is underpinned by reciprocity, mutual trust, and commitments from both the parties (teacher and student). Similarly, in the iTaukei culture, the strength of relationships is reinforced by mutual respect and is important in knowledge acquisition (Thaman, 2010).

TSR is important in the school context, and they are highly effective and supportive in teaching (Hargraves, 2019). There are many different dimensions involved in teaching (Giles et al., 2012). The emotional dimension of teaching is reflected in the definition of a relationship,

which is a state of connectedness between people (Flavell, 2023; Kiesler and Watkins, 1989). Thus, a TSR can be defined as the emotional bond a student and teacher share, where the quality of the relationship is determined by how strong the bond is. Both the students' and teachers' characteristics can shape and change the quality of relationships. Reynolds (2018) signalled that having a positive relationship with Pacific students helps students to engage in learning. Similar sentiments are echoed by Fletcher et al. (2011).

McDonald & Lipine (2011) studied Samoan high school students from six schools and found that a positive TSR was one of the important factors in the academic success of students. Other studies have also highlighted the importance of the TSR among students in terms of the student's academic success in schools (Hawk et al., 2002; Martin & Collie, 2019). Martin and Collie's (2019) study involved a longitudinal sample of 2,079 students from 18 Australian high schools. The results showed that when students reported more positive relationships (relative to negative relationships), they tended to have greater engagement in learning.

Several factors can determine how a positive TRS can be developed. One of them is the vocabulary used by teachers when talking to their students. Spencer-Oatey (2008) claims that when students do not understand the teacher's vocabulary, they switch off and are unable to form a good relationship with their teachers. It is easier for students to understand teachers who use vocabulary that the students use in their everyday lives.

One way teachers can make students understand what they are talking about is to use contexts that are familiar to them. Spencer-Oatey (2008) mentions that to form a positive working relationship with students, teachers need to use appropriate words that students can understand and relate to, reducing any language barrier the students may encounter during the conversation. This highlights that teachers must be mindful of the student's vocabulary and choose known or guessable words when conversing or take steps to ensure students can access the meaning of new words, especially the kind of technical vocabulary used in science. The following section explores some teaching practices that can improve students' engagement in their learning process.

2.4 Ways of engaging students in learning

Students learn meaningfully when the teaching content is tailored to their local context and the specific needs of students (Chu-Fuluifaga et al., 2021). Bangay and Blum (2010) point to the fact that when the context of the teaching relates to students' worldviews, it helps in improving students' academic performance. The authors also suggest that providing learning spaces that encourage students to engage in their local communities in meaningful ways is crucial for educational success. According to Hargraves (2019), learning must be practical and directly related to students' cultural values and beliefs. Hargraves states that when Pacific students' learning is contextualised and reflects their worldviews, they are more inclined to engage in learning.

2.4.1 Contextualised learning

The context through which teachers deliver lessons to teach students is important (Hipkins et al., 2022). The authors argue that familiar teaching contexts can help students make sense of their learning. In this study, learning in a context reflective of students' life experiences and worldviews is referred to as learning in a familiar context. According to Hupbach et al. (2011), learning in a familiar context can motivate students to get engaged in learning. Research done with Pacific students in New Zealand secondary schools in science education found that when students studied in a familiar context, their academic results improved (Taylor, 2014).

Studies in Fiji indicate that students' engagement rate in lessons increased when the context of learning was familiar to them (Bakalevu, 1997; Veramu, 1992). A study by Veramu (1992) showed that Fijian students who do not see the relevance of the curriculum to their everyday lives can easily get disengaged. The author describes how some disengaged iTaukei science students became motivated when allowed to plant cassava in groups and learn about its life cycle. Cassava is a plant whose root is used as a food source in Fiji, which is familiar to students. The study concluded that when iTaukei students understand the relevance of science learning to their everyday lives, they become motivated.

Veramu's (1992) results are consistent with a study by Brison (2011), who showed that kindergarten students in Fiji engage well in in-class activities when the learning context is familiar. The author found that teachers also used familiar pedagogies to engage students in

learning, such as putting them in groups and reciting. Brison noted that the combination of familiar context and pedagogy was a major factor in getting the students engaged in learning. Studies have also shown that Fijian students engage well in learning when actively involved in constructing new knowledge (Hafiz & Farik, 2016; Sharma, 2012; Taylor et al., 2008;). The next subsection discusses the effectiveness of constructing knowledge through active learning.

2.4.2 Active learning

Active learning can support student engagement in a classroom. It involves activities that encourage students to participate in learning and enhance critical thinking through involvement. The findings of Lumpkin et al. (2015) show that when students reflect upon, write about, and discuss what they are learning, their understanding of the subject matter deepens. Similarly, Millis (2010) states that active learning can lead to deep learning, critical thinking, and genuine paradigm shifts in students' thinking when directed by an effective teacher. One of the ways students can be actively involved in learning is through group work.

Group work is a type of active learning that encourages students to develop questions and problem-solving skills (Cook et al., 2023; Colbeck et al., 2000). Group work also promotes the development of social and leadership skills when done well. It can include cooperative learning, team-based learning and collaborative learning. Collaborative learning "refers to various instructional practices that encourage students to work together as they apply course material to answer questions, solve problems, or create a product" (Colbeck et al., 2000, p. 61). The collaborative learning framework is based on constructivist theory, which states that individuals learn by interacting with others to understand the world (Stover & Holland, 2018). Team-based learning includes strategies in which teams (groups) in a classroom are used as central pedagogical mechanisms throughout an entire course (Monk-Turner & Payne, 2005).

Cooperative learning involves structured group work focusing on problem-solving (Millis, 2010). Quin et al. (1995) examined 46 studies to resolve the controversy over whether cooperative learning promotes higher or lower-quality individual problem-solving than competition. They found that collaborative learning led to a higher level of cognitive development and suggested there could be several reasons for this. Examples include students exchanging information among themselves, generating ideas together, increasing the ability to

translate problem statements into equations, and having a shared cognitive representation of ideas.

According to Taylor and Lucas (1997), Fijian students benefit from working in science in groups. The authors emphasised the use of group work as a teaching pedagogy in a teacher education programme. The programme involved discussion and negotiation of knowledge to help students understand scientific concepts based on constructivist theory. The instructions offered to students aimed to teach scientific concepts relating to matter and how it changes. The topics of states of matter, solubility, chemical and physical change, heat, and pressure were used to teach students using group work. The results indicated that neither ethnic iTaukei nor Fijian Indians felt disadvantaged by group work, and their achievement rates increased. Both ethnic groups found group work enjoyable and beneficial (Taylor & Lucas, 1997).

While there are many advantages to group work in learning, there are also some disadvantages (Burke, 2011). Solomon (1987) pointed out that the construction of knowledge cannot be entirely a social activity as we cannot assume that social influences rule at the expense of personal reflection. He argues that what learners construct is their picture of the world and its phenomena. If learners are too passive and accepting of others' views, the picture will have no solidity or reality (Solomon, 1987). The social aspect of group work may encourage passivity under some circumstances.

Johnson and Johnson (2009) believe the success of any group work depends on how well the teacher organises learning activities and group structure. If done effectively, individuals will seek beneficial outcomes for themselves and all other group members. Similar sentiments are echoed by Chang and Brickman (2018), who claim that for group work to be pedagogically successful, teachers should understand how students perceive group work. They state that understanding this will guide teachers in effectively shaping group projects in their classes.

Group work is ineffective if group members lack enough common knowledge to contribute or are inadequately supported by teachers. Literature shows that teacher instruction is very important in making group work an effective strategy to engage students in learning and develop social skills (Li, 2008). Teachers need to consider multiple aspects such as the knowledge level of group members, the type of activities set, group structure, student voice and teacher instruction.

This subsection has presented the advantages and disadvantages of group work and the importance of knowing the learner's view of group work. As stated above, one of the elements for the success of group work is listening to students' opinions.

2.4.3 Student Voice

Students can provide teachers with valuable insights into their lives and learning experiences. Subramaniam (2013) states that student voice plays an important role in creating a learning environment that positively influences learning. Therefore, it would be wise for teachers to use appropriate tools to capture student voices regarding their learning environment and to subsequently make necessary changes to enhance learning. However, in some cultures, out of respect, students may be hesitant to give their opinions about the actions of someone older than them. For example, in iTaukei culture, elders are respected figures in the community, and children will not be willing to express their opinions in front of them. Brison (1999) states that in iTaukei culture, children are often expected to listen to elders' instructions or advice without questioning their authority. This shows that in iTaukei culture, respecting elders is important and explains why children often do not talk back or ask questions about why they must behave in certain ways, including in classrooms. In the iTaukei community, teachers are considered elders, and students show the same level of respect as they would to an elderly family member.

Similarly, in the Fijian Indian community, children are normally expected to respect their elders and follow instructions without questioning them (Oranga Tamariki, n.d.). The norm within the Fijian Indian community is that the tone and volume of a child's voice should be appropriately low when talking to elders. Children are generally not expected to talk or interfere when adults are talking but to listen to the elder's advice which includes teachers. In Fijian Indian communities, teachers are known as 'guru'. A guru can be understood as [a master of certain knowledge or field]. More than a teacher, traditionally, the guru is a reverential figure to their disciples.

Another factor that can sometimes influence how children express their opinions in public in the Fijian Indian community is gender. Walker (2005) points out that in Fijian Indian cultures, parents are generally stricter with their daughters than sons when it comes to expressing opinions in public. Daughters are considered the 'izzat' [honour] of the family, and if the

daughter's name is being tarnished in the community because of views expressed that elders may not accept, then the whole family's name will be tarnished. The word izzat means honour, reputation, or prestige. The girls in the Fijian Indian community are expected to be of good character and behaviour. Being vocal and expressing personal views without thinking them through is not accepted as good behaviour.

Values affect how Fijian students behave when they come to school. At times, within the school setting, these values provide advantages to the students, such as gaining respect from teachers by showing respect and listening to their instructions. However, when Fijian students do not express their opinions to the teachers about their learning difficulties, these values can be a disadvantage. Being quiet can be read by teachers as disengagement or as assent for ineffective teaching strategies. One of the ways teachers may create a conducive environment for students to express their opinions in a class is by seeking regular feedback on the learning environment. The next subsection discusses the advantages of seeking regular feedback from the students regarding classroom control.

2.4.4 Classroom control

Shared control in a classroom can be defined as when teachers and students, in collaboration, decide on how teaching and learning will occur. When students have the opportunity to articulate their learning goals, manage activities, determine assessments and plan the lessons with the teacher, it can give them a sense of ownership over what they want to learn (Eshel & Kohavi, 2003). According to Hargraves (2019), students in the Pacific region want more say in what kind of classroom activities they will be doing. The author believes that this would lead to heightened engagement and a more fulfilling learning experience. A similar result was found by Corbalan et al. (2008), who conducted a study involving 55 first-year university students in a health science programme to find the effect of shared control over the learning environment on learning outcomes in the Netherlands. The results of this study indicate that when teachers and students collaborate to create shared control of the learning environment, students have a greater chance of engaging in the studies.

A study by Hall and Hawk (1998) called Achievement in Multi-Cultural High Schools (AIMHI) on Pacific and Maori students in New Zealand secondary schools over 12 months found that students want teachers to take regular feedback on how they want to learn. The

students mentioned that by taking regular feedback, teachers would be better able to understand our ways of learning (Hall & Hawk, 1998).

However, due to factors such as limited time to cover the syllabus and lack of knowledge on how to facilitate shared learning, many teachers are not able to collaborate with students to share control of the learning environment. Savaci and Berlin's, (2012) study found that some teachers exercised limited shared control in their classes because of pressure from the schools to increase pass rates. The study revealed that teachers align instructional activities with test criteria. This indicates that teachers sometimes get so engrossed in making students pass the examination that they fail to listen to the students' perceptions of their learning environment.

Taken together, the range of studies discussed above shows that teachers collaborating with students to create a learning environment can have a positive effect on students' learning outcomes. Giving students a say in what and how they want to learn gives teachers an idea of students' expectations. The next section discusses the theories that have underpinned this study.

2.5 Theories and theoretical framework

A theory is a scientifically acceptable set of principles offered to explain a phenomenon (Schunk, 2020). The author mentions that theories of learning are ideas about ways students learn and retain information. These ideas about ways students learn help teachers use different pedagogies to meet the learning needs of students. The theory of learning informs teachers to create an atmosphere that is more inclusive to the learning needs of individual students. The theories pertinent to this study are discussed below.

2.5.1 Constructivism

Constructivism is comprised of theories that explain how knowledge is acquired. Constructivism has applications in other disciplines, such as social science, philosophy, politics, and history. Each field recognises that learners interpret and make sense of experiences and the information they receive (Jordan et al., 2008). According to the authors, constructivism is a dynamic process in which small, localised changes in knowledge can accumulate over time to change overall understanding. Constructivism is rooted in the belief that students learn best when they are active participants in their learning rather than passive recipients of information.

The learning process is driven by individual students as they comprehend and interpret their environment without solely relying on the teacher or a textbook for knowledge. Students' pre-existing knowledge heavily influences their comprehension of the key concepts hence enabling them to interpret and make sense of new knowledge.

The constructivist view of learning considers students as active agents in knowledge acquisition (Bada, 2015) and the teacher's main role is to make learning an interactive process for students and build on what they already know. Bada (2005) states that learning is affected by the context in which students are taught. For example, when teaching the concept of electricity generation in Physics, if a teacher uses nuclear power generation as context, it may be difficult for some Pacific students to understand this context, because there is a high possibility many of them may never have heard of nuclear power generation. However, if the teacher used local examples such as hydropower or wind power generation, which is being used to generate electricity in New Zealand, there is a chance that students will be able to relate to the context of the teaching and hence will find it easier to connect with the content.

The constructivist approach could encourage students to construct their new knowledge through student centred activities and teachers facilitating the learning process. There is often confusion surrounding the concept of constructivism in education, as some educational theorists mistakenly equate it with student-centred teaching approaches (Shah, 2019). It is important to note that constructivism is not synonymous with child-centred teaching models that have emerged over the past centuries. In a constructivist classroom, there is a balance between teacher and student-directed learning, with teachers actively facilitating the learning process, including formal teaching. As Dewey (1990), one of the pioneers of modern constructivism stated, balancing teacher-directed instruction and student-centred activities that promote active learning and discovery is crucial. There are different types of constructivist theories which are generally classified according to their emphases (Jordan et al., 2008). Some categories commonly used to characterise constructivism in education, which I believe are applicable to this study, are discussed below.

2.5.1.1 Trivial constructivism

Trivial constructivism points to the common-sense view that knowledge is not acquired through transmission from an external source to a person (Jordan et al., 2008). Rather, people actively construct knowledge to make sense of the world based on their experiences. For example, students construct knowledge in a classroom by doing an experiment. According to trivial constructivism, people construct mental models of how things are (Werhene et al., 2011). The authors state that the term mental model means that learning does not result from passively forming mental representations of our experiences. Rather, our minds interact with the data from our experiences, selectively filtering and framing that data (experiences). These mental models or constructs form personal understandings. As new information is received, new mental models are integrated into existing ones. New knowledge is more likely to be adapted than adopted.

Trivial constructivism can help students in cognitive development (Piaget, 1969). Cognitive development means how children think and explore their surroundings. It is the development of knowledge, skills, and problem-solving that help children to think about and understand the world around them. Piaget (1969) argued that cognitive development results from interactions between existing and new knowledge. For example, students may think that seeds need soil to germinate; however, when they do experiments, they find that plants only need warmth and water for germination. This new knowledge helps students in their cognitive development. On the other hand, Bruner (1966) proposed that cognitive development can also be a result of sequencing the teaching material according to its difficulty level. For example, when teaching students how to solve a problem on kinematics (a branch of mechanics in Physics), teachers can scaffold their learning by solving problems of increasing complexity. In summary, trivial constructivism can be viewed as when students actively construct knowledge based on their experiences. The learning experience results in the cognitive development of the students.

2.5.1.2 Critical constructivism

Critical constructivism refers to a theoretical stance in education related to developing in students an understanding and disposition about knowledge in social and cultural environments (Desautels et al., 1998). Critical constructivism places a strong emphasis on

making students aware of their social status, particularly in situations where they may feel dominated or disempowered. In critical constructivism, it is important that students are able to self-reflect, challenge the status quo, and express opposing viewpoints. This approach encourages students to develop a sense of self-awareness and critical thinking skills (Driscoll, 2000).

The critical constructivist process in education is not to transmit a body of validated truths to students for memorisation; instead, critical constructivists argue that a central role of schooling involves engaging students in an active investigation process. A central tenet of teaching in this context involves engaging students in the analysis of ideas from a variety of viewpoints. The synthesised learning from students' personal experiences intersects with academic learning. For example, in physics, students can critically analyse the ethical issues relating to building a new hydropower station on sacred land. This involves considerable skill from the class teacher to bring all the different perspectives together especially the scientific and the cultural viewpoints. This theory will be very applicable to Pacific students in developing critical thinking as, often the Pacific cultural views differ from scientific knowledge.

2.5.1.3 Social constructivism

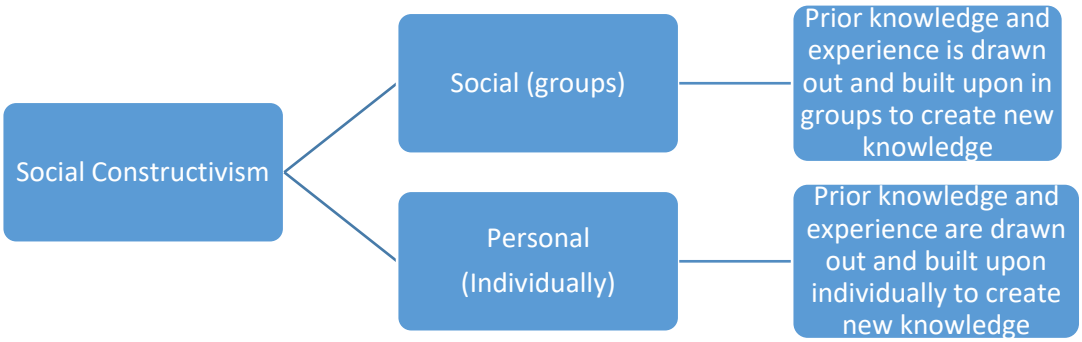
Social constructivism emphasises the role that society and culture play in learning (Jordan et al., 2008). Furthermore, the authors state that in this category, culture and society shape how individuals perceive, interpret, and attach meaning to their experiences. In particular, social constructivists argue that knowledge results from social interaction and language use (Jordan et al., 2008).

The social context refers to the immediate physical and social setting in which people live or the place where it is experienced. This includes the culture in which the individual was educated or lives and the people and institutions they interact with. Since constructivism is primarily a theory about how people learn, we can draw many pedagogical implications from the work of the main constructivist theorists and those who have used constructivist principles (Jordan et al., 2008). According to Rakes (1996), the constructivist teaching approach encourages change from a teacher-centred approach to a student centred. In addition, the student's role shifts from passive listening to active learning by interacting with their peers (Hirumi, 2002).

Kincheloe (2005) states that students' worldviews are constructed by their experiences and the social contexts in which they live. These perspectives actively shape school experiences and learning. He argues that teachers should consider students' worldviews and gain a sense of their prior experiences when teaching. This could be done by getting to know the students and their backgrounds possibly by talking to the students on an individual basis. In a social constructivist learning approach, new knowledge can be constructed either in groups (social) or individually (personal) based on prior knowledge and experience, see Figure 6.

Figure 6

Social Constructivist learning theory



Note. Diagram is drawn from the book by Jordan et al., 2008

Windschitl (1999) believes that intellectual transformations occur when students reconcile formal instructional experiences with their existing cultural and social contexts. This shows that knowledge can be socially constructed; students construct new knowledge when they participate in experiences that accommodate students' worldviews with formal academic instruction. Similar sentiments are echoed by Chen et al. (2022) that students' beliefs, skills, prior knowledge, and worldviews help them to construct knowledge.

The theory of social constructivism was developed by Lev Vygotsky. Vygotsky et al. (1978) were cognitivist, but they rejected the idea that it was possible to separate learning from its social context. Vygotsky's theories stress the fundamental role of social interaction in the

development of cognition (Vygotsky et al., 1978). Vygotsky's theory of social learning has been developed by numerous later theorists and researchers. The next section discusses how sociocultural theory grew out of the work of Lev Vygotsky. He believed that parents, caregivers, peers, and culture at large are responsible for the development of higher-order cognition (Vygotsky et al., 1978). Apart from constructivism, sociocultural theory has also informed this study, which is discussed in the next section.

2.5.2 Sociocultural theory

Sociocultural theory views human activity as inseparable from the contexts, practices, and histories of the individual (Case, 1996; Danish & Gresalfi, 2018). This theory focuses not only on individuals but also on the contexts in which individuals collaborate with others. Vygotsky et al. (1978) consider peoples' culture and worldviews an important element for knowledge construction. Vygotsky's theory acknowledges an individual's culture, ways of reasoning, working together, communicating ideas, and negotiating with others.

Sociocultural theory emphasises the role that social interaction plays in knowledge development. It suggests that human learning is largely a social process and that our cognitive functions are developed based on our interactions with those around us (Bell, 2011). When teaching is theorised as a sociocultural practice, it may be viewed with reference to several related and interacting classroom practices which teachers do in the classroom. According to Bell (2011), sociocultural teaching practice has nine aspects: relational, social, cultural, emotional, caring, ethical, embodied, spatial, and political. Teaching as a relational practice acknowledges that the teacher-student relationship plays a vital role in student engagement in learning. The teacher-student relationship can be theorised as a physical, social or emotional space between the teacher and the student (Bell, 2011). In many Pacific cultures, the space (physical, social or emotional) between the teachers can be referred to as vā. Vā represents one's sense-making of connections as well as disconnections with and between people and space (Fa'avae et al., 2021). The authors state that such relational intra or interconnections are fluid and interdependent based on the vā–relations between people and the space.

From a Samoan perspective, vā is a central organising principle of social relations and governs all 'inter-personal, inter-group, and sacred–secular relations and is intimately connected to a Pasifika sense of self and identity' (Suaalii-Sauni, 2017, p. 163). Pacific researchers draw from

tā–vā (time– space) as a theoretical framework to understand reality, truth, and relationality (Māhina, 2017). This means that 'the self' and the collective are closely interconnected, and the reality of social relations is better realised when considering time, contexts, and generations across places and spaces.

The social aspect of teaching acknowledges that teaching involves social and cultural factors. When theorising teaching as a social practice, Bell (2011) also views teaching as the co-construction of knowledge, mediation of students' daily lives, scaffolding, and interactions with the community. Teaching is an emotional, caring and ethical practice that considers the student's emotional well-being and shows empathy and concern for the welfare of the students. In viewing teaching as an embodied practice, Bell (2011) claims that it involves the use of the mind and the whole body. One example of this practice is that students practice the skill of addition by tossing bean bags and counting. In this way the students are not only using their mind but also other parts of the body when learning the new skill.

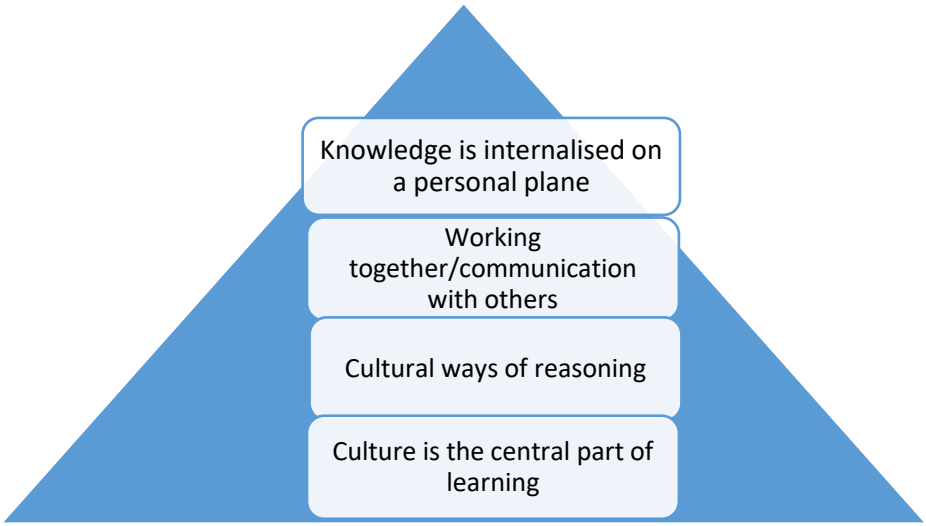
Teaching as a spatial practice can include the physical working spaces in a classroom and its relationship with the students. Reynold (2022) states the importance of the relatedness of this spatial space when engaging Pacific students in learning. The physical classroom space can be designed in such a way as to ensure optimal interaction with the students, thus facilitating effective teaching. Teaching can be viewed as a political practice when teachers address the discourses of power in schools and facilitate practices promoting equality and social justice.

Vygotsky et al. (1978) claimed "social learning as a pre-requisite [sic] for cognitive development and the acquiring of new knowledge is enhanced when learners interact socially within their community" (p. 90). The authors highlighted learning as a social process and argued that much of our learning occurs through interactions with other people. Culture was considered central to knowledge construction, and language was a tool for the development of thinking and reasoning abilities.

Knowledge is first constructed among a community of learners when students work on tasks in small groups and then internalised on a personal plane, as shown in Figure 7. The internalisation of knowledge from a social plane to an individual plane does not happen alike in all individuals (Vygotsky et al., 1978).

Figure 7

Knowledge construction



Note. Diagram drawn from ideas from Vygotsky et al. (1978) about sociocultural theory

Internalising learning at a personal level for some students is not easy if their learning is not supported. In this case, the teacher (a knowledgeable adult) and more capable peers are excellent supports in guiding or scaffolding the process. Vygotsky et al. (1978) defined the Zone of Proximal Development (ZPD) as "the distance between the actual development level as determined by independent problem solving and the level of potential development as determined through problem-solving under adult guidance or in collaboration with more capable peers" (p. 86). Different students require different kinds and levels of assistance to achieve their potential within the ZPD. The author mentions that students bring cultural experiences and knowledge into the classroom and recommends that teachers respond to what the learner already knows.

The way students see the world, their cultural background, and what they have learned before all influence how they build new knowledge. As research has shown, many Fijian students find that connecting new learning to prior knowledge or worldview sparks their interest in learning (Chand et al., 2021).

In constructivist teaching, a one-size-fits-all curriculum is not applicable. This is particularly relevant in diverse migrant populations. The transfer of knowledge from a teacher to a student via textbooks or their personal knowledge base is not the sole way of learning. Instead, students make sense of new knowledge by reinterpreting it based on their prior knowledge and life experiences. As a result, the teacher's role is to facilitate activities that help the learner develop new ideas and skill sets. The next section discusses the theoretical framework that has underpinned this study.

2.5.3 Theoretical Framework

Grant and Osanloo (2014) state that the theoretical framework serves as a guide to build and support one's study. The authors state that it provides a structure for what to look for in the data and helps the researcher discuss the findings more clearly in light of existing theories. In developing the theoretical framework for this study, the following points were considered.

- The research questions and the students on which this study is based.
- Is there a theory that can help to make sense of the data gathered in this study?
- What other researchers had to say about the proposed research question in this study?

The literature shows that Fijian students find it easier to construct knowledge when the learning environment reflects their worldviews. To Fijian students' their culture, values, and being accepted by others are important aspects of their life. They enjoy the social aspects of learning, for example, collaborative learning and actively constructing knowledge based on prior knowledge. Fijian students also seem to find learning easier when the learning context is familiar. The characteristics of the constructivist classroom appear to match how Fijian students want their learning environment to be for success in their studies.

Kivunja (2015) proposes that in a constructivist classroom, active learning takes place in a highly dynamic teaching and learning environment. Students are actively engaged in constructing their own understanding of the content presented to them. They are given the opportunity to plan, do and review activities and concepts they learn. Learning strategies are student-centred and comprised of rich learning tasks that involve collaborative learning. The strategies used by the teacher are challenging and try to extend the student's understanding

based on their prior knowledge. The teacher's role is to motivate the students and help them to form connections with new concepts. The teacher sets high expectations for all the students and challenges each individual to work towards achieving their personal best. Students' voices are heard, and teaching pedagogies are changed to help students to construct knowledge.

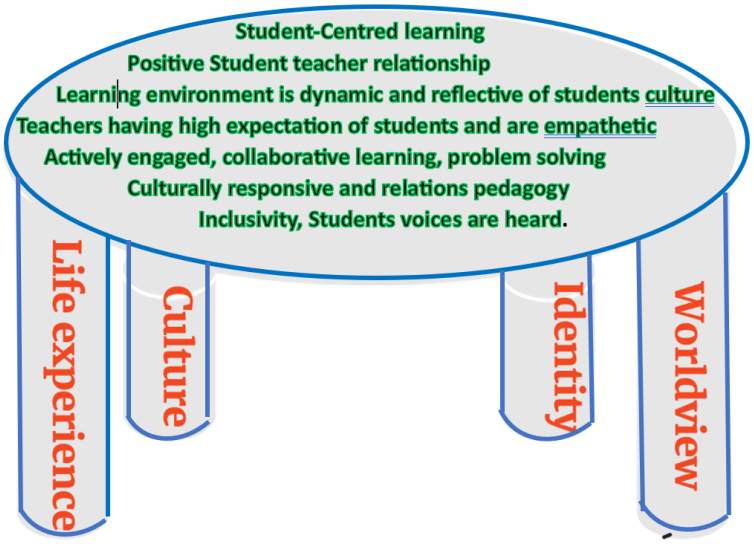
According to Piaget, Vygotsky, and Freire, a constructivist approach to education is one in which learners actively create, interpret, and reorganise knowledge (Gordon, 2009). Windschitl (1999) states that a child's learning is enhanced when a student relates instructions from school to experiences from their existing knowledge base within the cultural and social contexts in which ideas occur. As stated by Windschitl, (1999) that:

> These fluid intellectual transformations occur when students reconcile formal instructional experiences with their existing knowledge, with the cultural and social contexts in which ideas occur, and with a host of other influences that serve to mediate understanding. With respect to instruction, this belief suggests that students should participate in experiences that accommodate these ways of learning. Such experiences include problem-based learning, inquiry activities, dialogues with peers and teachers that encourage making sense of the subject matter, exposure to multiple sources of information, and opportunities for students to demonstrate their understanding in diverse ways (p. 9).

I have used the above ideas when deciding on the theoretical framework for this study as shown in Figure 8. The theoretical framework that I have used for this study is based on the theories of constructivism. The next section discusses the learning environment's role in relation to students' engagement in learning and as this is one of the foci of this study.

Figure 8

Elements of a constructivist classroom



Note. The image was created using various sources (Bakalevu, 1997; Brison, 2011; Burnett & Lingam, 2013; Kavunja, 2015; Taylor et al., 2008; Sharma, 2012; Vygotsky et al., 1978) to represent different elements that compromise constructivist learning.

2.6 Learning environment

The literature on learning environments presents various definitions, understandings, and field dimensions based on diverse epistemological and ontological perspectives. In this study, the definition of the learning environment is based on Fraser's (1998) definition that the learning environment is the "social, physical, psychological, and pedagogical contexts wherein learning occurs and which affects student achievement and attitudes" (p.3). Schuck (2012) states that the learning environment affects students' construction of new knowledge. The author states that new learning can take place via cognitive development or behavioural change. Some behaviourists propose that no new learning has occurred if there is no change in behaviour (Jordan et al., 2008). On the other hand, cognitivism believes that learning results from effectively organising and processing information that focuses on addressing how information is received, organised, stored, and retrieved (Ertmer et al., 2013). Jordan et al. (2008) state that if teachers understand how learners process information, they can create an appropriate learning environment to enhance learning.

In the past few decades, questionnaires have been developed and used to assess students' perceptions of the classroom environment. The understanding of the importance of environmental influences on individuals is rooted historically in Lewin's formula. Lewin (1936) began to study the learning environment by looking at students' behaviour in a classroom. The author explained that human behaviour is a function of their environment and personal characteristics thus:

$$\mathbf{(B) = (P, E)}$$

where B stands for human behaviour, which is a function of individual traits (P) and environmental factors (E).

Thus, Lewin's (1936) findings suggested that students' behaviour in the classroom is not only determined by personal characteristics but is also influenced by the learning environment. Based on the formula of Lewin, Murray (1938) suggested a Needs-Press Model in which he argues that a person's individual goals determine their behaviour; on the other hand, environmental factors either support or hinder the realisation of personal goals.

The idea that the learning environment influences students' learning led other researchers to explore Lewin's model further to explain what else affects learning in an individual. Moos (1979) noted that just as an individual's personality can be characterised, environments can also be characterised by personalities. Social environments, like people, can have qualities such as warmth and support, or rigidity and limitation. Moos (1979) attempted to conceptualise the social environment, measure it, and assess its impact on human behaviour. Based on his analysis of different environments such as school, family, and prison, he concluded that the social environment consists of three dimensions: relationship, personal growth or goal orientation, and system maintenance and change.

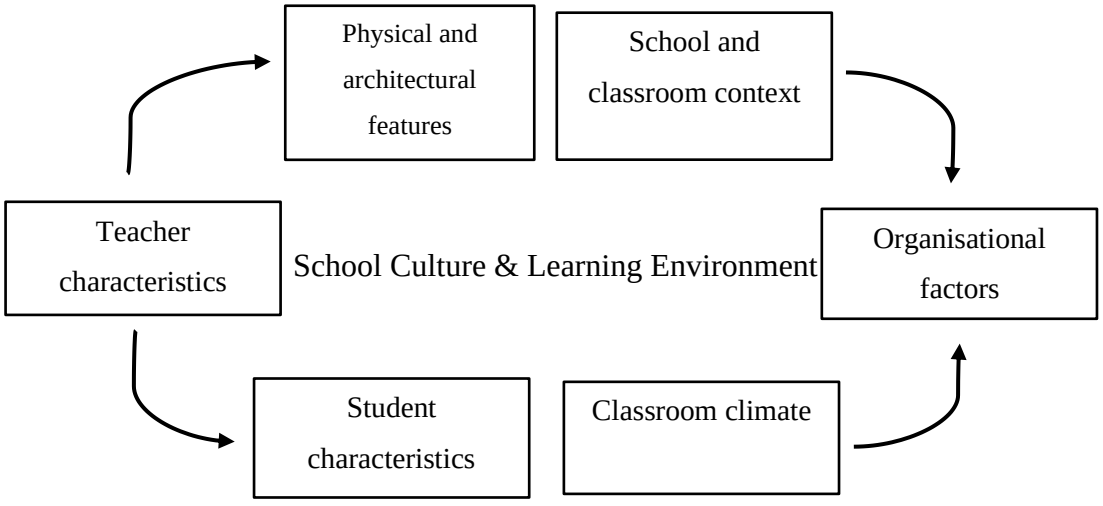
To unpack Moos' (1979) model, the relationship dimension assesses the individual's level of commitment, mutual support, and ability to share and express opinions. This dimension includes factors such as participation, affiliation, teacher support, peer cohesion, and conflict resolution. The personal growth or goal orientation dimension reflects the areas where personal development and self-improvement tend to occur. Factors such as task orientation, competition, achievement, and collaboration are included in this dimension. The system maintenance and change dimension measures whether the environment has been clear in its expectations. This

dimension includes things like expected behaviour in a classroom and students' responses to rules. It also includes factors such as organisation, rulemaking, and rule clarity. Moos (1979) states that student perceptions provide an important perspective on the learning environment.

Additionally, Moos (1979) insisted that special attention should be paid to micro-environments where students spend most of their time, such as classrooms. Moos' model provides a useful theoretical basis for this study by framing the analysis of students' perceptions of their classroom environment, as shown in Figure 9. Moos (1979) also argues that outsiders (people who come to observe the learning environment) can only get some of the information available about the classroom. This is because it is difficult for an outsider to spend a limited time observing the learning environment to obtain full information. Thus, Moos (1979) says that since students have had plenty of time to gain accurate and lasting impressions of their learning environment; it makes sense to ask them, rather than an observer, about the learning environment of their classroom. Moos' logic is one of the reasons why this study asks students to gain an understanding of their perceptions of current and preferred learning environments in science classrooms.

Figure 9

Moos' (1979) Model of the determinants of classroom climate



Note. The above conceptual diagram was developed from the article published by (Moos, 1979)

Haertel et al. (1981) provide a systematic review of literature which involves classroom environment studies. The authors analysed 12 studies with data involving 823 classes and approximately 17,000 students. They found that there is a relationship (connection) between students' perceptions of their classroom environments and their learning outcomes.

To find out more about the learning environments, researchers collaborated and further developed psychosocial scales to assess the dimensions of different aspects of the learning environments. For example, Moos and Trickett (1987) developed the Classroom Environment Scale (CES), which measures the psychosocial characteristics of the classroom environment and Taylor and Fraser (1991) developed a tool called the Constructivist Learning Environment Survey (CLES) that assesses the degree to which a classroom's environment is in line with constructivist teaching principles. According to Taylor and Fraser (1991), although research on the classroom environment has focused on evaluating and improving teaching and learning, it has largely done so in the context of the traditional teacher-centred, didactic approach. They argue that how science is taught and learned has changed, and a new approach is needed to look at the learning environment. It acknowledges that students make sense of their world when constructing new knowledge. The authors believe that this tool (CLES) would be useful in helping teachers analyse their own assumptions and adjust their teaching pedagogies accordingly. The CLES survey tool has since become a valuable resource for educators seeking to create a more supportive, engaging, and collaborative learning environment for their students.

Taylor and Fraser (1991) developed the CLES tool guided by the following principles:

- CLES was designed with a focus on student participation in the management of learning activities, particularly concerning open-ended inquiry processes, and student self-regulation of learning.

- Aware of the time pressures faced by the classroom teacher, the instrument was constructed in such a way that it takes a relatively short time to complete and facilitate including answering and processing, using a relatively small number of reliable scales, each containing of items arranged in cyclic order.

2.6.1 Design of CLES

Initially, CLES was designed to determine students' perceptions concerning open-ended inquiry processes (Taylor & Fraser, 1991). At that time, CLES contained 58 questions called 'items' under different themes called 'scales'. The scales in CLES measure the degree to which students exercise control over their learning activities in a constructivist learning environment, as shown in Figure 10. The survey forms for CLES are in two versions, the Actual and the Preferred versions. The wording of the items is almost identical in the Actual and Preferred forms. Words like 'I wish' are included in the Preferred form to remind students that they are rating their aspirations rather than their experience of actual classroom environments (Taylor & Fraser, 1991).

Figure 10

Descriptions of the scales of CLES (Adapted from Taylor and Fraser, 1991).

Descriptive Information for Each Scale

Scale Name	Description	Sample Item
Autonomy	Extent to which students control their learning and think independently.	In this class, I do investigations in my own way. (+)
Prior Knowledge	Extent to which students' knowledge and experiences are meaningfully integrated into their learning activities.	In this class, the teacher helps me to think about what I learned in past lessons. (+)
Negotiation	Extent to which students socially interact for the purpose of negotiating meaning and building consensus.	In this class, I talk with other students about the most sensible way of solving a problem. (+)
Student-Centredness	Extent to which students experience learning as a personally problematic experience.	In this class, I learn the teacher's method for doing investigations. (-)

All items are measured by a five-point Likert-type scale, ranging from almost never (1), seldom (2), sometimes (3), often (4), to almost always (5), as shown in Figure 18 (See section 4.2, Chapter 4). This average value of each student's responses is a fair indication of students' perception of or aspiration regarding, the classroom environment on a specific scale. Further analysis determines the perceptions of all students in a cohort regarding a specific scale. This is done by finding the average value of a specific scale for all students in the class.

CLES has undergone several revisions over the years, with additional key dimensions and principles of social constructivism being incorporated, as well as extra items highlighting teacher-student interactions (Taylor et al., 1994; Taylor et al., 1997). The revised CLES has been specifically tailored to suit various educational settings and administered to diverse groups of participants. Its efficacy has been widely acknowledged, and it continues to be an important tool in the field of education.

2.6.2 Use of CLES

CLES, either in its original form or modified versions, has been used in various studies to investigate learning environments (Aldridge et al., 2000; Ebrahimi, 2015; Johnson & McClure, 2004; Lee, 2001; Luan et al., 2010; Kwan & Wong, 2014; Roelofs et al., 2003; Taylor et al., 1997) including in science. Taylor et al. (1997) used CLES to explore the learning environment of science students in thirteen different schools with a sample size of 494. They established the scale's factorial validity and reliability. CLES was also used in a study in Korea to investigate the extent to which the science curriculum reflects a constructivist view of learning (Lee, 2001). Aldridge et al. (2000) cross-validated the CLES scale's internal consistency and reliability with a size of 1081 participants in Australia and 1879 from Taiwan in 100 science classrooms.

Luan et al. (2010) used a modified CLES to explore students' preferences toward the constructivist learning environment for a discrete ICT subject in Malaysia. The objective of Luan's et al. (2010) study was to validate the scale to investigate students' perceptions toward constructivist ICT learning environments. A total of 449 participants took the survey in this study (Luan et al., 2010). The data supported the instrument's internal consistency, reliability, factor structure, discriminant validity, and ability to differentiate between ICT classrooms. The study suggests that CLES can be modified to explore different learning environments (Luan et al., 2010). In addition, a modified CLES has been validated by exploring English teachers' learning environments in Iran with a sample size of 622 (Ebrahimi, 2015).

This section has delved into the various techniques that researchers have employed to assess learning environments. It is clear that the methodologies used by researchers to comprehend how knowledge is constructed have undergone significant transformations over the years. This evolution has been driven by a growing comprehension of how students perceive knowledge. As teachers gain a deeper understanding of this process, they can adapt their teaching techniques to facilitate more effective learning outcomes.

Since CLES is underpinned by constructivist theory and has been in various studies overseas to investigate students' learning environment, this study modified the CLES to investigate the learning environment of Fijian students in New Zealand classrooms. The next sections present the chapter summary for the literature review.

2.7 Chapter Summary

This chapter situates this thesis within the broader research field on the teaching and learning of Fijian students. The literature review started by looking at education systems in Fiji and New Zealand. Students are at the centre of learning in both education systems, and teachers are encouraged to tap into the students' worldviews and life experiences when designing the course content.

Section two discussed the role of culture in the lives of Fijian students and its influence on their ways of learning. Studies revealed that teacher's knowledge of their students and having a good relationship with them is vital in understanding the cultural values that students bring to school. The literature review also highlighted ways in which Fijian students can engage in learning. These include learning in a familiar context, collaborative learning, and listening to students' voices. In addition, it also shows that Fijian students find it easy to construct knowledge when teachers utilise their prior knowledge or life experiences. Findings show that these aspects play an important role in the construction of new knowledge.

Research shows that Fijian students use their life experiences to construct new knowledge. Based on this, constructivist theory and socioculttural theory have been selected to interpret and analyse data for this study. These related theories state knowledge is constructed based on prior knowledge and experiences gathered either separately or in a group setting. The theories behind constructivism have been used as the theoretical framework, guiding and enabling adding depth to the data analysis by supporting other researchers with reference to the theories.

The literature review suggested that a learning environment is more than just a classroom. It can be a space in which students feel safe and supported in their pursuit of knowledge and inspired by their surroundings**.** Different types of tools have been developed to capture students' perceptions of their learning environment. One such tool is the Constructivist Learning

Environment Survey (CLES), which has items (questions) that are answered using a 5-point Likert scale to measure students' learning experience**.**

The review of the literature highlights the research gap regarding Fijian students and justifies the need to research the perceptions of Fijian students about their experiences of learning science in New Zealand secondary schools. This is because no studies have explored the perceptions of Fijian students who study science subjects in New Zealand classrooms. A recent literature review on Pacific students talks about education and learning by Chu-Fuluifaga et al. (2021) provided no reference to articles that mention the perceptions of Fijian students regarding learning in New Zealand classrooms, let alone science education. The authors reviewed 181 articles. Similarly, an earlier literature review by Chu et al. (2013) on how to engage Pacific students in learning in the tertiary sector reviewed 141 articles and was unable to reference any research articles that mention the perceptions of Fijian students in New Zealand classrooms, suggesting a lack of literature.

In addition, when doing the literature review pertinent to the study, no reports talked about how Fijian students want to engage in science learning in New Zealand (Education Review Office, 2019; Ministry of Education, 2020). Therefore, one of the aims of this study is to fill the gap that exists in the literature. The next chapter presents the methodology adopted by this study.

गुरूर्ब्रह्मा गुरूर्विष्णुः गुरूर्देवो महेश्वरः ।
गुरूर्साक्षात परब्रह्म तस्मै श्री गुरवे नमः ।। || The guru mantra is the oldest and highest mantra since civilization and learning. Since civilization, human beings used to seek knowledge and wisdom from gurus or teachers.

Chapter 3

Methodology

This chapter discusses the methodological framework used to conduct the study. A methodological framework is a set of procedures, methods, and tools that guide the research process in a systematic and structured manner. The chapter begins with a discussion of the research methodology and the reasons for choosing it. This study uses a methodology that reflects the worldviews of the students involved in the study. In addition, the research questions have also guided the choice of methodology, which are:

1. What are the perceptions of Fijian students about their current and preferred learning environment in science classrooms in New Zealand secondary schools?

2. How can the learning environment be altered to make it easier for Fijian students to engage in learning?

Chapter three is divided into 11 sections. Sections 3.1 and 3.2 discuss the research methodology. Section 3.3 discusses the rationale behind the use of the talanoa methodology for this study and draws on fundamental concepts and practices that reflect the Fijian worldviews. Detailed descriptions of the research paradigm and design are discussed in sections 3.4 and 3.5. Sections 3.6 and 3.7 discuss the research setting and how the data was analysed respectively. The study's conceptual framework is discussed in section 3.8. Sections 3.9 and 3.10 outline the issues relating to the trustworthiness, validity, reliability, and reflexivity of this study. Finally, a chapter summary is given in section 3.11.

3.1 Anchoring the research methodology

It is vital for a researcher to anchor the research by using a relevant methodology. The methodology is a plan of action that links methods to outcomes and governs the researchers' choices for data collection, analysis and interpretation (Creswell, 2018). Wahynui (2012) states that methodology can be referred to as a philosophical discussion on the choice of method(s) used to conduct research. According to Vaioleti (2006), the choice of methodology depends on the type of research and its participants, whereas Sanga and Reynolds (2021) suggest the researcher needs to consider the participants' cultural background and worldviews when deciding on the research methodology.

Biber et al. (2006) mentioned that it is important for the researcher to know what the difference between methodology and method is. The author argues that they are related but not the same. Mayan (2023) describes a method as a tool or instrument the researcher uses to collect data, while the methodology is the philosophy that underpins the method. In this study, the research questions, and the participants on which this study will be conducted have guided the choice of methodology and method. This study is on Fijian students who are from the Pacific, therefore attention to Pacific people's epistemology was considered.

Epistemology refers to the theory of knowledge and how people acquire or perceive it (Pritchard, 2023). The author mentions that the main function of an epistemologist is to explore, describe, and define knowledge. Pacific epistemology lies within peoples' lived realities (Sanga, 2004). The author argues that Pacific peoples' life experiences contribute towards their beliefs. Nabobo-Baba (2006) states that the iTaukei people's worldviews are comprised of three dimensions: heaven, earth, and the spiritual world. She explains that the relatedness of the forces within these three worldviews shapes the beliefs of the iTaukei people. Their lived experiences contribute to the knowledge system (Nabobo-Baba, 2006). The author states that land and other natural resources such as water, plants, and mountains are sacred to the iTaukei people.

Fijian Indians, who are predominately Hindu or Hindu influenced, believe that all things in the universe are interconnected and there is a supreme power that provides energy and synergy to all living beings (Bhawuk, 2010). Many of the philosophical ideas of what constitutes true knowledge for Fijian Indians originate from Hindu religious texts and scriptures, which are based on people's experiences. The earliest traces of Hindu civilisation can be found in the Indus Valley civilisation between 2500 and 1500 B.C.E [Before Common Era] along the banks of the river Indus (Warrier & Dawley, 2018). According to the authors, knowledge of these people derives primarily from early Sanskrit writings, the Vedas; a corpus of texts compiled over many years.

The term Veda means knowledge (Tandon, 2019). According to Tandon (2019), Vedas are thought to contain the fundamental knowledge relating to the underlying cause, function, and personal response of humans to their existence. The worldviews of the people who believe in Hinduism allow for a diversity of ideas and theories (Bhawuk, 2010).

From the literature review, it seems that both Fijian Indians and iTaukei people have some ideas in common between their cultures. These include believing in a supreme power and the acquisition of knowledge based on the lived experiences of the people. Sanga (2004) emphasised that if the research is conducted with Pacific people, Pacific thoughts and ideas should be the driving forces influencing the methodology.

Another important point to consider is that this study setting is in New Zealand, which is dominated by Western ways of thinking, and Pacific people living in New Zealand for some time may have adopted some of these ways. However, research has shown that many Pacific people carry on their culture, tradition and core values despite having migrated to New Zealand from the Pacific Islands (Aporosa, 2019; Chu-Fuluifaga et al., 2021; Ministry of Education, 2020). The fact that Pacific people carry their values even though they live in a western dominated society was critical in deciding on the methodology used in this study. The next subsection discusses some of the research methodologies that Pacific researchers have developed and used over recent years.

3.2 Pacific Methodology

Pacific researchers have devised a number of Pacific research frameworks or methodologies underpinned by their worldviews, such as Kakala (Thaman, 1997), the Vanua Research Framework (Nabobo-Baba, 2008), and Talanoa (Vaioleti, 2006).

Thaman (1997) draws on the analogy of flower arrangement to make garlands in the Tongan culture to conceptualise the Kakala research framework. The author describes three steps to make the garland from the beautiful kakala flowers. The first step is called Toli - beautiful kakala flowers are picked from the plants (data gathering) - a process that demands not only knowledge of what is needed but skills in how and where to obtain the knowledge. In this step, Thaman explains that researchers need to relate to the people they are researching so they can collect accurate data.

The second and third steps are called Tui and Luva. In these steps, flowers are sorted and arranged in a pattern so that the garland looks beautiful (data analysis), and after completion, the garland is gifted to the people (dissemination of findings). The use of metaphor by Thaman (1997) helps contextualise the research and to create an understanding among people who do not know Pacific cultures well.

Nabobo-Baba (2008) uses the iTaukei worldview to conceptualise the Vanua Research Framework. It includes eight steps that guide the researcher to anchor the research to fit the iTaukei customs and traditions. This approach recognises the iTaukei people as knowledge holders and treats them as ‘knowers’. Nabobo-Baba (2008) states the eight steps as follows:

1. Conception - includes identifying all people needed in the research and mapping appropriate gifts, plans, schedules, and timelines.

2. Relationship - researchers consider that people and personal relationships are very important in the community.

3. Sevusevu - Fijian customary process of sevusevu (the presentation of yaqona or piper methystica) is a norm for requesting entry into a Vanua (home, village, community). The researcher asks permission from the participants and seeks blessings from the elders of the community.

4. Na talanoa - The appropriate method or tool for collecting information is through talanoa.

5. Vanua values - protocols of knowledge guide any reporting or writing. The researcher uses appropriate terms to explain and gets information cross-checked with the participants so that what is being written reflects their worldview of the issue under investigation.

6. Reciprocal relationships - the researcher will bond with the Fijian people after the research. The researcher becomes part of the community.

7. Gratitude - it is important for the researcher to thank the people who have looked after him or given something of value to him.

8. Giving back to the people and the land - the research needs to inform practice and the people's lives, especially in the researched community. This could be via community gathering, conferences or journal articles.

Nabobo-Baba (2008) states that the Vanua Research Framework can be used in conjunction with other research frameworks or methodologies such as Kakala or talanoa.

Talanoa methodology uses the knowledge construction processes of Pacific peoples drawing on Pacific worldviews (Cammock et al., 2021). Talanoa is a naturalistic inquiry belonging to the phenomenological research family (Vaioleti, 2006). Phenomenology is concerned with the study of experience, particularly the structures of consciousness and the subjective nature of interpretation. In relation to talanoa, phenomenology is open to cultural experiences and interpretations of

meanings and co-construction of knowledge (Matapo & Enari, 2021; Vaioleti, 2013).

Vaioleti (2006) defines talanoa as a "…conversation, a talk, an exchange of ideas or thinking, whether formal or informal" (p. 23). Furthermore, Vaioleti splits the word "talanoa" into "tala" meaning telling or informing and "noa" talking with no boundaries, for example, discussing something. Halapua (2002), describes talanoa as a Pacific way of communicating and connecting with people and their realities. There are no restrictions on contributions from any perspective, and participants are free to choose how they wish to talanoa about the chosen topic. For example, participants can consider the big picture, or they can focus on part of the subject or related histories. A topic can be discussed on multiple levels and layers due to the freedom that talanoa provides.

When Pacific people use talanoa, it can be to (re)connect with a topic using phrases such as I/We have, I/We know, I/We saw, I/We hear..., which draws the topic of discussion to themselves and constructs knowledge about the subject matter from their experiences and knowledge (Vaka et al., 2016). The concept of talanoa is used by many island nations and communities in the Pacific, including Fiji, Samoa, Solomon Islands, Niue, Hawai'i, the Cook Islands and Tonga (Prescott, 2008).

Talanoa also creates a space for people to connect and build relationships (Tamasese et al., 2010). Some of the key values associated with practising talanoa engagement are respect, trust, relatedness and connectedness (Gremillion et al., 2021). The context of talanoa is dependent on specific situations and people (Farelly & Nabobo-Baba, 2014; Robinson & Robinson, 2005). For example, ‘talanoa lasa’ means sharing a joke or talking about something meaningless (Chand et al., 2021).

Fa'avae et al. (2016) state that for successful talanoa, cultural competency is a crucial research skill. Cultural competency includes an awareness of cultural diversity or differences within the same culture. It involves the ability to function effectively and respectfully when working with and treating people of different cultural backgrounds. Cultural competence, like any competence, takes time to

develop; it has no easily defined characteristics described before a social situation (Fa'avae et al., 2016). Such skills are fluid and context dependent.

According to Farelly and Nabobo-Baba (2014), "valid talanoa research is undertaken with the understanding that it is a culturally and emotionally embedded reciprocal exchange between researcher and participants" (p. 231). The space that is created during talanoa is essential for building a relationship and shared understanding between the researcher and the participant so that participants can feel at ease participating (Anae, 2010). This connection creates an atmosphere or space where the researcher can dig deeper into the participants' true feelings and get accurate and meaningful data (Vaioleti, 2013). According to Farelly and Nabobo-Baba (2014), talanoa is the most prominent research methodology applied across the Pacific. This is because it is underpinned by the values and beliefs of the Pacific peoples (Tunufa'i, 2016). The next subsection discusses the rationale behind the use of talanoa as a methodology for this study.

3.3 Rationale behind the use of talanoa as a research methodology

Before colonisation, the use of talanoa was firmly entrenched in the lives of the iTaukei people. It has been used for many purposes, such as relaxing, sharing knowledge, resolving conflicts/disputes in a formal or informal setting, engaging in discussions, holding village meetings, and expressing opinions. The concept of talanoa was adopted by the colonisers and Indian migrants who came to Fiji under the indentured labour system in the 1800s.

Today, talanoa is widely used in Fijian society, depending on the context and situation. It is even used to assess players' performance on the rugby field. For some, talanoa means enjoying the traditional drink (kava) and conversing. Some people look forward to a talanoa engagement, particularly over the kava bowl (Aporosa, 2019). Irrespective of ethnicities, the talanoa concept is well-grounded in the lives of the many Fijian peoples.

One of the reasons Indians were quick to embrace the concept of talanoa on arrival in Fiji was that it was not a totally new concept to them. They were familiar with practising a similar concept called ‘shistachar’. Shistachar is a Hindi word that means to have a discussion or to talk. It, too, can be a formal or informal discussion where knowledge is constructed together and/or passed on to the younger generation. The essence of shistachar for Fijian Indians is mainly to maintain harmony through dialogue, instil moral values, and create a space for everyone. The origin of shistachar in Indian cultures dates to Vedic culture during the Indus Valley Civilisation some 5000 years ago (Tandon, 2019). During shistachar, people gathered to talk about important issues affecting people’s daily lives, sharing and passing on their knowledge. Shistachar may occur anywhere and under any circumstances between two or more people where ideas are exchanged.

As an example of shistachar, one such occasion happened on the battlefield of Kurukshetra between Arjuna and Krishna - two important figures in the Hindu religion. During the conversation (Figure 11), Arjuna asked questions to Krishna on different topics, and Krishna explained the answers to Arjuna. Both Arjuna and Krishna had mutual respect, and their dialogue was based on trust and honesty. During the discussion, Krishna explained to Arjuna the purpose of life. In one of the verses, Krishna said that 'कर्मण्येवाधिकारस्ते मा फलेषु कदाचन |मा कर्मफलहेतुर्भूर्मा ते सङ्गोऽस्त्वकर्मणि' which translates [you have a right to perform your prescribed duties, but you are not entitled to the fruits of your actions. Never consider yourself to be the cause of the results of your activities, nor be attached to inaction] (Swami Praphupada, 1986, p. 121).

The type of conversation demonstrated in this example is very common during shistachar. The concept of shistachar is still prevalent today for Indians living in Fiji. However, it has been hybridised to some extent. Often, during shistachar, Fijian Indians consume kava. Kava has mythical and spiritual connections for Pacific communities and is considered sacred in the Fijian community (Aporosa, 2019). It is a dry powder made from the root of a secret leafy shrub with approximately six to ten segmented and knotted branches. Fijian Indians combine kava, a frequent element of talanoa and shistachar.

Figure 11

Krishna explains to Arjuna the essence of life.

Note. Vintage Hindu God Krishan Gita Birth Litho Print Original Vasudeo Pandya 1932, Source: https://en.wikipedia.org/wiki/Bhagavad_Gita. CCBY-SA 4.0

After a day of hard work, Fijian Indians sit around the kava bowl to relax and share stories of the day in a way that resembles talanoa. Many Fijian Indians consume kava at religious festivals and share spiritual connections. This is especially true in the sugar cane growing area, where farmers offer kava to the spirits (deities) before the growing season begins, as shown in Figure 12. This is done to invoke Mother Nature's blessings to safely harvest and thank the motherland for providing the food.

Figure 12

Farmers sharing Kava after offering to mother nature.

Note: Image used with permission of the photographer.
Source: https://www.facebook.com/salance.kumar.9

Farmers will sometimes sing about their experiences while drinking kava. This song was composed during the indentured time when Fijian Indians drank kava to relax from the hard workdays (Lal, 2012).

> Des chhoota, jaat chhooti
> Chhootay baap mahtaari
> Nagona hum se chhootay na pyari
> Iss tapoo ka bhang nagona
> Pee ke raat gujaari….(p.116)

The above song can be translated as "I have left my country, my caste, and my parents behind, but I cannot leave yaqona. Yaqona (Kava) is this island's Bhang (drug), which we drink to pass our nights". According to Lal (2012), many songs were composed and passed to the younger generation during talanoa. Furthermore, Lal (2012) also mentioned that Fijian Indian men and women have been singing songs called ‘birha’, ‘phaguwa’, ‘sohar’, ‘bhajans’. Many of these contain people's

life experiences during the indentured labour system. For example, a sohar (song) describes the lifestyles of indentured labourers.

> Chhuri kudaari ke sung
> Ab beetay din ratian
> Gannay ki hari hari patian
> Janey hamri sab batian (Singh, n.d)

This song can be translated as [our days and nights are spent with knives and hoes. The green leaves of the sugarcane are aware of our woes]. During talanoa sessions, songs, poems and stories were passed on to the younger generations that describe the lifestyles of Fijian Indians. The above examples emphasise that the concept of talanoa has become well embedded in the lives of many Fijian Indians.

To reiterate, many Pacific researchers have emphasised the importance of using culturally appropriate methodology for research in the Pacific (Nabobo-Baba, 2008; Vaioleti, 2006; Sanga, 2004; 2016). This is because of the compatibility with Pacific worldviews. Talanoa is a flexible research approach that can adapt to the complexities of interconnected Pacific cultural systems and the subtle differences between various Pacific ethnic cultures. Some have criticised talanoa for its lack of structure, but others argue that this flexibility makes talanoa an effective methodology (Fa'avae et al., 2016; Maniam, 2022).

As stated in section 3.2, many Pacific people carry on their culture, tradition, and core values despite having migrated to New Zealand from the Pacific Islands (Aporosa, 2019; Chu-Fuluifaga et al., 2021; Ministry of Education, 2020). Since I am a Fijian Indian and familiar with the talanoa concept and the participants are Fijians, this study uses talanoa as a research methodology. The next section discusses the research paradigm.

3.4 Research Paradigm

A research paradigm is the framework of any systematic inquiry whereby data is collected, analysed and interpreted in a particular way (Palaiologou et al., 2016).

Talanoa research methodology fits within an interpretive paradigm (Prescott, 2008). Prescott mentioned that the interpretive paradigm focuses on understanding and examining the meaning of human behaviour and perceptions. According to Cohen et al. (2018), interpretivism allows the researcher to understand the experiences of people, which are based on lived reality. Similarly, Wahyuni (2012) says that interpretive study recognises the importance of people's social worlds and experiences. The interpretive paradigm is flexible, blending with cultural protocol and practices to obtain the data in research (Vaioleti, 2013). Vaioleti claims that knowledge does not exist in its own right; instead, it is constructed by human beings as they interact with each other.

Giddings and Grant (2006) claim that interpretivist research enables the use of a mixed-method approach. Mixed-method research incorporates or combines qualitative and quantitative research methods of approaches into a single study (Johnson et al., 2007). The methods share the same research questions.

Since the talanoa methodology fits within the interpretive paradigm, this study mixes a culturally appropriate method, talanoa (qualitative), with a survey (quantitative) to collect data for the study. An advantage of using a mixed-methods approach to collect data in this study is that it captures the voices of many participants - through a survey. In addition, it can offer opportunities to engage meaningfully with participants in today's busy world – achieved via talanoa. The strength of using a mixed-method approach is that data can be triangulated, strengthening the validity of research findings (Yin, 2018).

Many students in New Zealand schools will be familiar with surveys because they are used in teaching subjects, for example, social studies and business studies. The survey used in this study was the modified version of the Constructivist Learning Environment Survey (CLES) called CLES-FS, where FS stands for Fijian students. (See section 3.5.1 for more information regarding why and how CLES has been modified). This study includes CLES because it recognises that students rely on prior knowledge to build new knowledge based on the constructivist theory. The literature review highlights that the lived experiences of Fijian students are crucial in the process of knowledge construction (Chand et al., 2021; Ali, 2016; Bakalevu,

1997; Brison, 2011; Burnett & Lingam, 2013; Sharma, 2012; Taylor & Lucas, 1997; Taylor et al., 2008).

Weaving CLES-FS with talanoa provides narratives to complement the research and enrich the CLES-FS data. The talanoa provides rich qualitative data that supports the interpretation of the data obtained through CLES-FS. According to Denzin and Lincoln (2013), when multiple tools are used, the research becomes more robust and gives meaningful outcomes. This increases the reliability and validity of research findings and helps in data triangulation and trustworthiness. The meaning of trustworthiness in research refers to the level of confidence in data collection used in research (Polit & Beck, 2014). According to Stahl and King (2020), there are numerous types of triangulations, with methodological triangulation being one of them. This type entails utilising multiple methods to collect or analyse the data. Hence this study opted to use a combination of a student survey and talanoa to collect the data, ensuring the research's trustworthiness. The next section discusses the research design of the study.

3.5 Research Design

Research design is a plan for collecting and analysing evidence to allow the researcher to answer the research questions (Flick, 2011). This section presents the methods consistent with the methodology used to answer the research questions. A survey and talanoa were used in this study to collect data from the participants.

3.5.1 Survey

Check & Schutt (2012) describe survey research as "the collection of information from a sample of individuals through their responses to questions" (p. 160). The role of the survey is to collect the information that will allow the researcher to answer the research questions (Bolton & Brace, 2022). The authors argue that the advantage of the survey is that it is a quick and easy means of obtaining large data sets from a large sample. Surveys can be administered individually or in groups that reflect the research's aim (Ponto, 2015).

The survey used in this study was a modified version of the Constructivist Learning Environment Survey (CLES). The main idea behind the modification of the items of the CLES was to help Fijian students comprehend the items of the survey in order to capture accurate data. In addition, the modification was based on the constructivist learning environment, which is reflective of Fijian worldviews.

This is not the first time CLES has been modified to make it fit for purpose. As mentioned in section 2.5.2 of Chapter 2, Luan et al. (2010) used modified CLES to explore students' preferences in Information Technology Subjects (ICT) subjects in Malaysia. The data they analysed supported the instrument's internal consistency, reliability, and discriminant validity. Similarly, in this study before the analysis of the results, the data obtained via CLES-FS was used to check the validity and reliability of the instrument. (For more information, see chapter 4, section 4.2)

The items of the original CLES used by Taylor et al. (1997) were based on personal relevance, uncertainty, critical voice, shared control, and student negotiation themes.

For CLES, Taylor and Fraser (1997) used the following five subscales:

- Personal relevance—the extent to which school activities and knowledge are relevant to their everyday life.
- Uncertainty—the extent to which opportunities are provided for students to experience that knowledge is evolving and culturally and socially determined.
- Critical Voice—the extent to which the students feel that their voice is heard.
- Shared Control—the extent to which students share with the teacher control for the design and management of learning design.
- Student Negotiation—the extent to which students have opportunities to explain and justify as well as test the viability of their own and other students' ideas. (pp. 299)

This study renamed and modified some of the items to make them suitable for this study. The five scales of CLES-FS were considered as five different measures of

the constructivist learning environment. The modified version of CLES (CLES-FS) has the following scales-

- Identity- the extent to which there are opportunities for students to build relationships with their teachers and share and experience different aspects of their culture.
- Familiar context - the extent to which school activities and knowledge are relevant to students' everyday lives.
- Talanoa - the extent to which opportunities are created for secondary school students to experience collaborative learning.
- Critical voice – the extent to which the students feel confident in asking questions in class.
- Shared control – the extent to which students and the teacher share control for the design and management of learning.

After the modification of the CLES, it was piloted with ten secondary school students to test the feasibility of the survey and identify whether the items made sense to the Fijian students. These students comprised two iTaukei and eight Fijian Indian students; four were born in New Zealand, while the others had migrated from Fiji. This study's intent was explained to the students. After this, they were given a survey to complete. Upon completion, talanoa sessions were held to get their feedback regarding the survey.

The results of the talanoa indicated that the modified version of CLES (CLES-FS) captured this study's intent because the items made sense to the students. However, the students who took part in the pilot project mentioned that using the words 'cultural context' might confuse some students, so the term 'learning in familiar context' was used. One of the students mentioned that cultural context may indicate to the students that teachers need to contextualise teaching, which is reflective of students' culture, whereas familiar context would indicate that the context in which the teacher is teaching is familiar to the students. Later, there was more discussion regarding the use of the words "cultural context" with two elders in the Fijian community. The feedback received was very similar to the students who took part

in the pilot study. As a result, the wording was changed to “learning in a familiar context”.

The modified version of the CLES-FS can be found in Appendix F. The next section discusses how talanoa, as a method, was used in the study.

3.5.2 Talanoa as a data collection tool

In addition to the quantitative method (survey), talanoa as a qualitative method was used to collect data from the participants. As mentioned before (see section 3.3), talanoa is a flexible method where the researcher can find out the answers to the research questions from many different viewpoints. Talanoa sessions are underpinned by cultural values such as respect, maintaining a good relationship, and creating a warm and friendly environment where the participants feel at ease to share and co-construct new knowledge (Fa‘avae et al., 2022).

In addition, talanoa sessions allow people to get engaged and ask honest questions, even ones they may worry are "dumb", to clear their doubts. Talanoa also provides a chance to discuss thoughts that may be unrelated to the topic. Another advantage of talanoa sessions is the creation of space where participants are able to discuss various viewpoints. For example, in 2000, when Fiji had a coup, Halapua used talanoa to bring different political parties together to talk about issues that were dividing them (Halapua, 2002).

Talanoa is highly valued because the environment created during the talanoa sessions empowers the participants to take charge of the discussion. According to Ali (2016), when Fijian students can relate the context under discussion to their daily lives and see its benefits, they will be interested in the debate and be open and honest. Similar sentiments were echoed by Bakalevu (1997) and Brison (2011), that Fijian students ‘open up’ and show keen interest when they understand the benefits of participating in research activities. It seems that when Fijian students participate in a talanoa, they are less afraid of being judged by others when speaking out. Furthermore, talanoa is a participant-centred method to collect data for research. The fact that talanoa is underpinned by Pacific values and is familiar to Fijian

students makes it a suitable method to collect data for this study. The next section discusses how the data was analysed.

3.6 Research setting

This study took place in eight secondary schools in New Zealand. All the schools were state-run, co-educational and located in the North Island. The participants self-identified as Fijian. In addition, they identified themselves as Fijian Indian or iTaukei, and by gender, and birthplace. A total of 305 students took part in the survey (CLES-FS), and out of them 131 took part in talanoa sessions. Data was collected from May 2020 to March 2021.

3.6.1 The process of data collection

A letter was sent to principals in the Auckland region seeking approval to conduct research in their schools. When I received a positive response, I went to the school and talked about my study with the principal or a nominated person and answered any questions. I ensured that the principal and the people involved understood the research process.

I was always advised to contact the Head of Science to discuss the time frames and logistics of conducting the research. On meeting with them, a plan was developed as to how the research would be conducted in the school and the consent forms were given to science teachers to be given to the Fijian students in their classes.

Before data collection, relevant staff members completed consent forms. Once the consent forms were returned by students to their science teachers, I was contacted by the Heads of Department to come on a designated day to carry out the research. While collecting the data, I was respectful of the teachers and asked when the best time was to collect data from students. Dates were deliberately chosen so that there was minimal impact on student learning. Following this, I returned to do the survey and talanoa on an appropriate day agreed with the teacher. The number of students participating in the survey on a particular day varied from 7 to 12. Usually, the students took about eight to ten minutes to complete the survey.

Students interested in participating in this study were taken into a separate room. First, I greeted them and introduced myself. After the introduction, I explained the study's intent and how the findings from this study could benefit them in engaging in science education. As stated by Nabobo (2008), when Pacific people see the benefit of what they are doing, they will engage more meaningfully. Students were allowed to ask questions about the research, and ethical issues relating to this study were explained in detail (see section 3.10.1 for more details). After this, students were given both the Actual and Preferred survey forms and were requested to complete the Actual survey form first. The Actual survey form focuses on the current learning environment, while the Preferred survey asks about students' perception of their desired learning environment, see Appendix F.

After completing the survey, I thanked the students for their time and effort. I also gave them information about where they could find the research results. This was deliberately done because researching Pacific people is not only about getting information from them and gaining a qualification, but it is also about giving back to the community to improve people's livelihoods (McNamara & Naepi, 2018; Nabobo, 2008). After thanking them, students who did the survey were invited to take part in the talanoa. Students interested in taking part in the talanoa sessions stayed back while others left the room. The number of students participating in the talanoa sessions varied from 2 to 4. Talanoa sessions normally took about 10 to 15 minutes. If more students were in the room, they were sent to the waiting room.

The process of facilitating the talanoa sessions started by greeting them once again in their mother tongue. For example, "Ramram" or "Namaste" if a student is Fijian Indian or "Ni Sa Bula" for iTaukei students and thanking them for taking part in the talanoa session. To help students feel at ease, they were asked questions such as: "How is your day going?" or "How is your family?". It is crucial to build trust and respect so that, as Vaioleti (2013) describes, the "researcher is not a distant observer but is active in the talanoa process" (p. 203). Gaining the trust of the students means they are more likely to be open in the discussion.

During the conversation, students asked me trivial questions such as "Which part of Fiji are you from?", "Are you married?", How long have you been in New

Zealand?" or "What do you teach?". According to Vaioleti (2013), connection helps participants to establish a relationship with a researcher. Connection through family information provides the researcher and the participants with a bit of background about each other that may support understanding. Otunuku (2011) calls this a compromise, when employing talanoa as a research method, the researcher should have ample time in order to cover the research agenda. This is one of the reasons why a small number of talanoa sessions were scheduled on a particular day to allow for flexibility in the finishing time of the sessions. Students were given back their survey forms (CLES-FS) to refer to, during the talanoa sessions. This was to get an insight into students' thinking processes about their choice of answers for the CLES-FS.

Talanoa sessions were free-flowing conversations. The participants were at ease and able to actively listen and either support or oppose the different viewpoints. However, this was done respectfully so that the relationships remained intact, and there were situations where the participants agreed to disagree. Students took turns speaking; there was no obvious hierarchy during the conversation, and anyone could comment on others' views. This makes the talanoa method unique when conducting research where the conversations are free-flowing and participants critically reflect on themselves (Hindley et al., 2020).

3.6.2 Number of students who took part in the research

The total number of students who participated in the CLES-FS was 305, out of which 248 were Fijian Indians and 57 were iTaukei. Tables 2 and 3 show the number of students who took part in the CLES-FS in terms of gender, ethnicity, place of birth and year levels, respectively. One of the reasons there was a small number of iTaukei students in this study compared to Fijian Indians was that the schools which permitted the research to take place had a smaller number of iTaukei students taking science subjects.

Table 2

Participants by gender, ethnicity and birthplace for each school

School	Students	Males	Females	Fijian Indian	iTaukei	NZ born	Fijian born
A	44	17	27	42	2	27	17
B	45	17	28	38	7	19	26
C	110	56	54	103	7	54	56
D	72	25	47	59	13	38	34
E	14	14	0	6	8	7	7
F	14	9	5	0	14	10	4
G	5	4	1	0	5	4	1
H	1	1	0	0	1	1	0
Total	**305**	**143**	**162**	**248**	**57**	**160**	**145**

Table 3

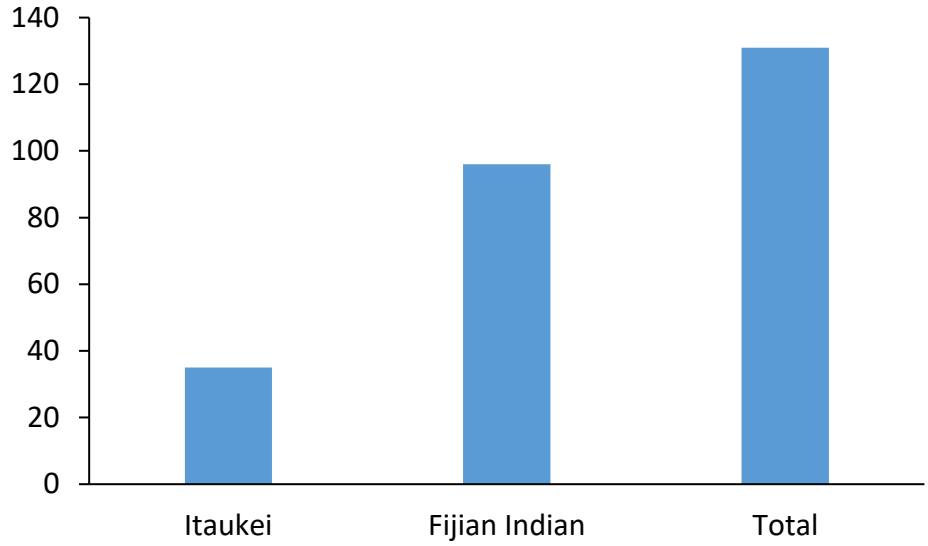
Participants by year levels for each school

	Year Levels					
School	**9**	**10**	**11**	**12**	**13**	**Total**
A	0	1	9	7	27	44
B	10	18	0	9	8	45
C	14	19	42	20	15	110
D	8	4	19	19	22	72
E	0	0	5	4	5	14
F	1	1	7	2	3	14
G	2	1	1	0	1	5
H	0	0	1	0	0	1
Total	**35**	**44**	**84**	**61**	**81**	**305**

Figure 13 shows the number of students who took part in the talanoa sessions. There were 57 talanoa sessions held, and in each talanoa session, participant numbers varied from two to four. The talanoa sessions were coded T1 to T57, where T stands for talanoa, and the number after 'T' represents the number of sessions.

Figure 13

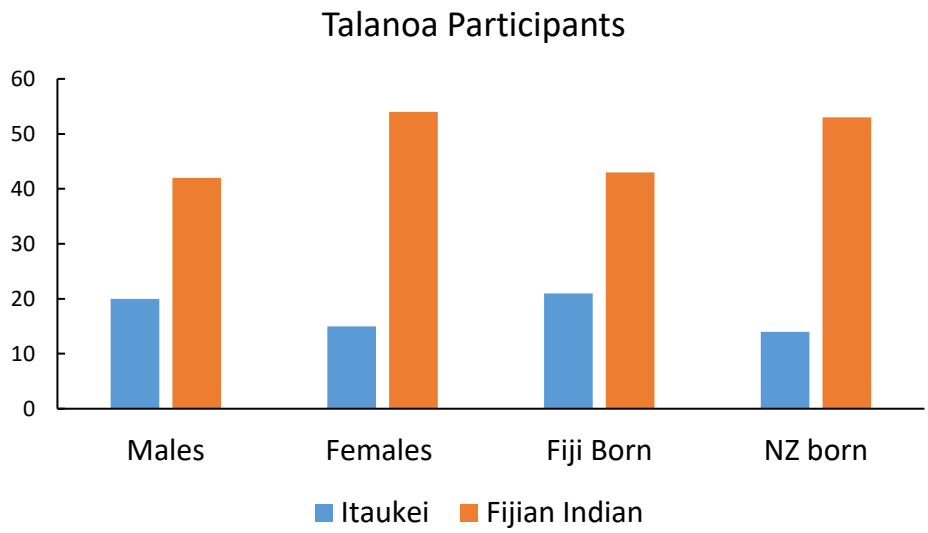
Number of students who took part in talanoa session by ethnicity



Students took part in the talanoa sessions voluntarily. While selecting students for the talanoa sessions from volunteers, I was mindful of balancing numbers in terms of ethnicity, birthplace and gender, although balance was not always possible. Figure 14 shows the breakdown of students by ethnicity, gender and place of birth who took part in the talanoa session.

Figure 14

Number of students who took part in the talanoa sessions by gender and place of birth



3.7 Data analysis

According to Creswell (2018), attention should be given to the type of data collected (qualitative or quantitative) before deciding on the data analysis techniques. If an appropriate method is used to analyse the data, it is highly likely that the interpretation of the data will be valid, reliable, and unbiased. Similarly, Anderson (2010) mentions that it is important to make a considerable effort when deciding on which technique will be used in the data analysis so that it provides confidence to the readers that the data has been analysed appropriately.

In this study, data was collected via survey and talanoa sessions. The survey data contained 50 data points from each of the students (25 from the Actual form and 25 from the Preferred form). This is because 25 items were on the Actual form and 25 on the Preferred form. Cohen et al. (2018) mention that specialised software such as the Statistical Package for the Social Sciences (SPSS), Minitab and Excel can be used to analyse large quantities of data.

SPSS was used to analyse the CLES-FS data. SPSS was chosen because it has also been used by other researchers to analyse the CLES data (Anagun & Anilan, 2013; Ebrahimi, 2015). In addition, researchers widely use SPSS software to analyse

quantitative data because of its built-in special functions within the software that can extract meaningful information (Muijs, 2011). See section 3.7.2 on CLES-FS data analysis. The data obtained by the talanoa method was analysed via thematic analysis. The next subsection details how the talanoa data was analysed.

3.7.1 How talanoa data was analysed

The qualitative data gathered via talanoa was analysed using a thematic analysis. Thematic analysis is a method for identifying, analysing and reporting patterns or themes within data (Roberts et al., 2019). The main objective of thematic analysis was to develop patterns of meaning ('themes') across a data set that addresses a research question (Braun & Clarke, 2006; Nowell et al., 2017). Thematic method of data analysis is versatile and can be altered to make it fit for the purpose (Fereday & Muir-Cochrane, 2006).

The discussion in each talanoa session in this study provided qualitative data to answer the research questions. The thematic analysis steps used to analyse the data obtained via the talanoa method in this study are transcribing, familiarisation, coding, analysing and identifying patterns (themes).

The first phase involved transcribing verbal data from the audio recording. The audio recording was listened to attentively, and in some cases, it was played a few times before transcribing. This was deliberate because, as Bezemer and Mavers (2011) state, "transduction in writing not only involves representing the words but also attaching a 'reality status' to those representations" (p. 197). When transcribing talanoa data, attention was given to the tone and the context in which students told their stories.

Since I am not a native speaker of the iTaukei language, an iTaukei speaking person [native speaker of iTaukei language] was used to help interpret the words spoken in iTaukei. This was done so that the voices of students speaking in their native language (iTaukei) were not misinterpreted. This person was a master's student at the University of Waikato. He used to participate in the monthly group discussions (talanoa sessions) at The University of Waikato organised by Dr Aporosa. He did

not have access to the names of any students who had spoken in iTaukei for ethical reasons. I transcribed the recordings where students spoke in Fiji Hindi and English. One of my colleagues who teaches with me cross-checked the interpretation of some of the Hindi words for accuracy.

The second phase of thematic analysis involved reading the transcribed data. The objective of this phase was to get familiar with the transcribed data. The recordings were listened to again to make sure that I had not misinterpreted any data. This also helped to identify appropriate information that may be relevant to the research question(s) and to further develop meanings and understanding from the data sets (Braun & Clarke, 2006).

The third phase involved developing the codes for the dataset from the transcribed data, for example, the importance of culture, belonging, relationships, worldviews and life experiences. I coded all my transcripts manually. Enari (2019) also did the manual coding of the talanoa data. He mentions that one of the advantages of manual coding over using software is the capture of all the nuances and spirit of the talanoa dialogue.

The fourth phase involved analysing these codes and grouping them together to look for patterns. The quotes were combined into the relevant code group, and any repetition in codes was combined to form themes. According to Kiger and Varpio (2020), this process helps the researcher in looking for patterns.

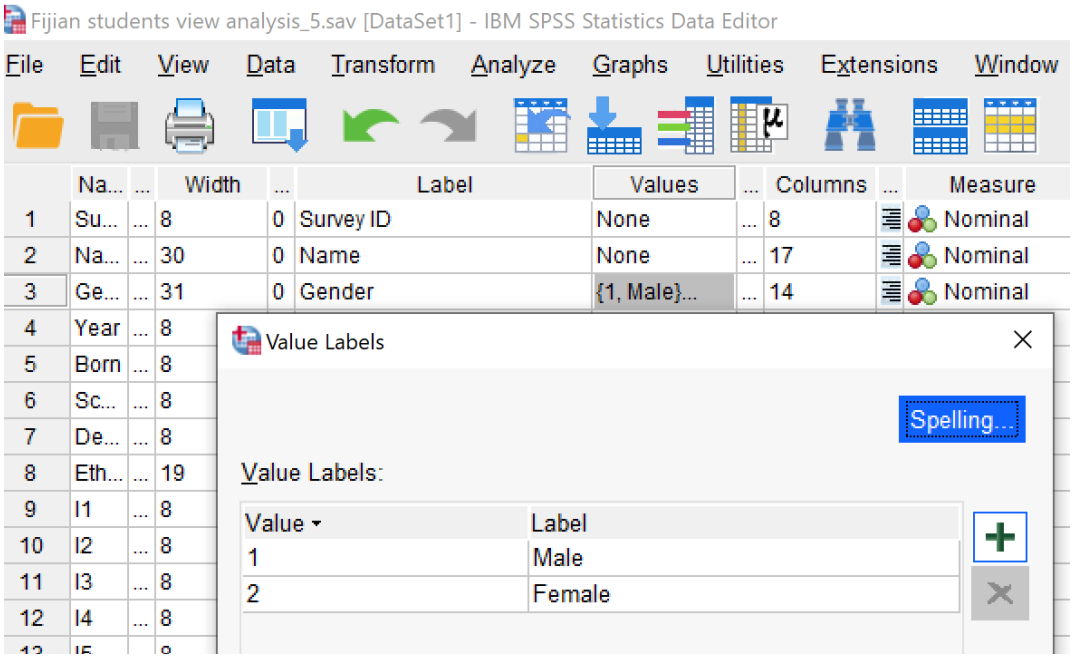
The fifth phase involved refining the themes. It became clear that some themes identified earlier were not worth pursuing as insufficient data supported them, and some themes could be merged. For example, themes such as student's life experiences and prior knowledge were merged to form a theme called the importance of culture. Themes were refined until I identified what aspect of the research questions each theme captured and narrated the "story" with regard to each theme so that it might make sense to the reader. The findings are reported in Chapters five, six and seven. The next subsection details how the CLES-FS data was analysed.

3.7.2 Quantitative data analysis (CLES-FS)

The CLES-FS data was analysed using software called Statistical Package for Social Sciences (SPSS). The data obtained from the CLES-FS was in two forms: non-numerical (nominal scale) and numerical (ordinal scale). The nominal scale categorised various groups, such as males or females, and iTaukei or Fijian Indian. When entering data in SPSS, a nominal scale containing non-numerical values was coded as numerical for data analysis. As seen in Figure 15, instead of male students in SPSS, the numerical value 1 was used and 2 was used for females. This was done so that SPSS would be able to do the necessary computations.

Figure 15

Screenshot showing the coding of nominal data in SPPS



However, ordinal data did not require coding because they were numerical values. After all the data was entered, different computational methods were performed to interpret the data. Previous studies have used various methods, such as finding the mean value, using an independent t-test and performing a one-way analysis of variance (ANOVA) to interpret the CLES data (Fraser, 2003; Kwan, 2020; Nix et al., 2005). This study used similar techniques to analyse CLES-FS data, such as

finding the mean values and independent t-test and ANOVA (See Appendix G, for the SPSS syntax). The next section discusses the conceptual framework that has been developed to help provide clarity to the research design of this study.

3.8 Conceptual framework

A conceptual framework or concept plan is an essential feature of research design (Kivinja, 2018). The author states that a conceptual framework helps frame and conceptualise the research project's overall plan, including anything that forms the underlying thinking, structures, and practices. In this thesis a conceptual framework was developed to provide a coherent picture to the reader of how the research has been carried out. When designing the conceptual plan for this study, the following elements were considered:

- Research questions
- Theoretical framework
- Methodology
- Context of the study
- Method/Data analysis
- Reflexivity

I have named the conceptual plan for this study as ‘Camakau Jahaaj’. The word Camakau in iTaukei means canoe, and Jahaaj in Hindi means a ship. The weaving of iTaukei and Hindi languages is indicative of the knowledge and lived realities of Fijian students in the study. The Hindi word for Jahaaj has been used because Indians were brought to Fiji under the indentured labourer system in a Jahaaj, called the Leonidas (Ali, 1977). Sometimes Indians in Fiji refer to each other as Jahaaji Bhai, a term which refers to the people who came on a ship to Fiji to work on the sugar cane farms under the indentured labourer system. The name Camakau Jahaaj is relevant in this context because it acknowledges the Fijian people, the iTaukei and Fijian Indians.

Camakau Jahaaj means a canoe, which was the essential form of transport in the past to connect people, it symbolises the idea of education as a journey that connects people from various parts of the world. To respect iTaukei, who are the indigenous people to the Vanua (land) of Fiji, I provide a visual representation of the Camakau

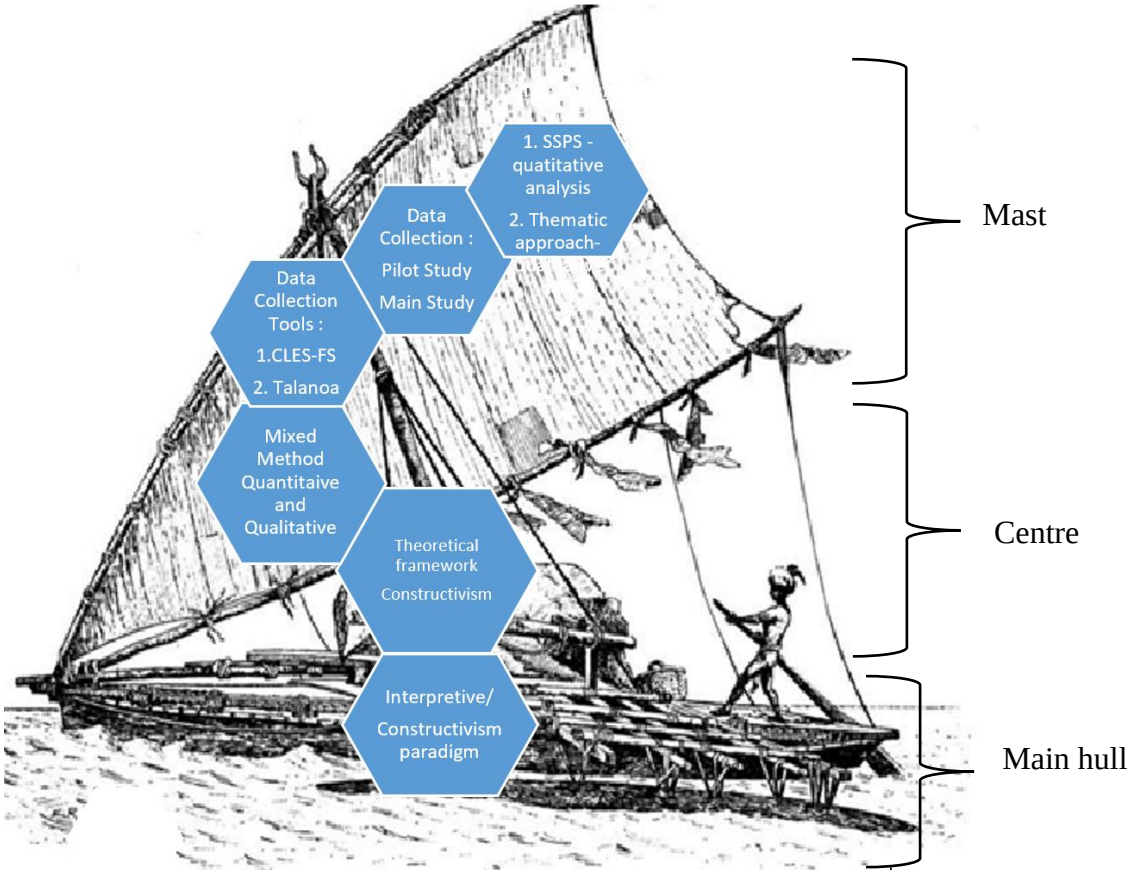
Jahaaj. The conceptual plan (Camakau Jahaaj) is represented by a canoe and is made up of these key elements.

- Main hull
- Centre
- Mast

The main hull of the Camakau has a round bottom and is made from a dugout log of a tree called Vesi (Clunie, 2015). The hull symbolises the epistemological positioning of the research which acknowledges iTaukei as well as Fijian Indian knowledge, language, and worldviews. This study takes the interpretive approach and explores the cultural and historical interpretations of the social world as well as considering that human beings construct knowledge as they interact and engage in interpretation.

Figure 16

Camacau Jahaaj Conceptual Framework



Note. Fijian sailing canoe, 'waqa ni Viti' or 'camakau'. Source: Reg. Number: P 37.6 52, Fiji Museum Fiji Museum Photograph Relevant to 'Lasakau Sea Warriors' article https://en.wikipedia.org/wiki/File:Fijian_Sailing_Canoe.jpg CCBY-SA4.0

As illustrated in Figure 16, the ‘centre’ of the Camakau symbolises the theoretical framework that informed this study’s theory which is constructivism and sociocultural. These theories state that learning occurs as a result of interaction between the learners, adults, and surroundings, including learning in a cultural context (Buntiing, 2019). The author states culture is central ‘centre’ to the learner in order to internalise the knowledge.

In this study ‘mast’ symbolises the methods used and how the data was analysed in this study. CLES-FS and the talanoa research method was used to explore Fijian students' perceptions of the constructivist learning environment in science classrooms. The talanoa sessions were analysed using thematic analysis whereas CLES-FS data was used using SPSS.

In summary, Camakau Jahaaj provides a visual representation of the conceptual plan for this study. The next section discusses the trustworthiness of this research.

3.9 Trustworthiness

The trustworthiness of this study is enhanced by using a theoretical framework and methodology that is likely to be underpinned by Fijian students’ worldviews. This study has used constructivism as the theoretical framework and talanoa research methodology, respectively. Trustworthiness refers to the level of confidence in the methods used in data collection and interpretation (Polit & Beck, 2014; Stenfors et al., 2020).

One of the ways that assisted trustworthiness in this research is the use of talanoa as a research method. This is because talanoa, a Pacific research approach appropriate to this study, is underpinned by Pacific values such as mutual trust and respect (Fa’avae et al., 2021). Vaioleti (2013) argues that the subtleties of talanoa are a window to the minds and hearts of participants, in this case, students. These subtleties make it a uniquely Pacific research method trustworthy. In addition,

Vaioleti (2006) comments that "The reciprocity embedded in talanoa will raise the expectations that researchers and participants have of each other, promoting mutual accountability, which adds to the trustworthiness and quality of the research" (p. 26). Therefore, trustworthiness in this research is a matter of the fit between students, and the research method used, which makes deep reflection and honest data likely.

Havea et al. (2020) argue that researchers using talanoa as a research method should not only understand talanoa through readings but also have lived experience of it. According to them, the lived experiences of talanoa sessions will help the researcher to understand the talanoa values and, as a result, can help in understanding the concept of talanoa better. As a researcher born and educated in Fiji, I have been part of talanoa sessions in many contexts, such as sharing a joke around the kava bowl or resolving a conflict in a school setting. These experiences have helped me understand the concept of talanoa. This adds to the trustworthiness of this study because of my experience in facilitating talanoa in order to encourage participants to reveal their ideas with candidness.

Another aspect of this research that supports trustworthiness is my reputation in the Fijian community. I have helped many families understand the complexities of our education and assessment systems in New Zealand. My reputation in the Fijian community means I am no stranger to the Fijian community. Familiarity is likely to have encouraged Fijian students to respond honestly towards the research questions. As mentioned by Airini et al. (2010), Pacific communities respond better when they are comfortable talking to people they trust.

According to Lincoln and Guba (1985) and Anguila-Salono (2020), collecting large amounts of data and data triangulation can also make research trustworthy. Other reasons for seeking high trustworthiness were why a large amount of data was collected and a mixed-method approach was used to collect data for this study. This study collected data from 305 participants via survey and 57 talanoa sessions. The use of the survey and talanoa has contributed to the data triangulation, strengthening trustworthiness. The next subsections discuss the validity and reliability of the survey used in this study.

3.9.1 Validity

Johnson (1997) states that validity refers to how well the results among study participants represent similar groups of participants outside the study. Muijs (2011) claims that the validation of a quantitative data collection method is usually concerned with the survey's (or other instrument's) content, criterion, and construct.

Content validity refers to whether the survey items (questionnaires) measure what they are supposed to measure, and criterion validity (or criterion-related validity) evaluates how accurately research measures the outcome it was designed to measure. Muijs (2011) says content and criterion validity can be achieved through pilot studies or by setting up expert groups and getting them to comment on items.

In this study, the items were based on the CLES, a research procedure which has been extensively used and validated. In the modified version, CLES-FS items were discussed with three colleagues (teachers at my school) prior to conducting the pilot to manage issues relating to content validity. The feedback from the colleagues and the use of a pilot study indicated that the intent of the items was clear, meaning that the survey items were likely to provide valid data from those involved.

Finally, construct validity relates to the internal structure of the survey and the layout of the items of CLES-FS. This study used the same internal structure as the original CLES, which has been validated in previous studies (Ebrahimi, 2015; Kwan & Wong, 2014; Taylor et al., 1997). I anticipated that issues relating to the construct validity would be minimised by keeping the same survey structure. The modified CLES maintained the five items in each scale and used the Likert scale for the students to respond to an item. The next section discusses how the issues relating to reliability were navigated in this study.

3.9.2 Reliability.

Reliability refers to the internal consistency of measurements; in other words, is the research likely to produce the same results tomorrow as it did today (Elton-Chalcraft et al., 2008). Reliability also means that another researcher could replicate

the research results using the same techniques (Schwandt, 2007). It should be noted that this discussion of reliability refers to the survey (CLES-FS), not the talanoa sessions, which is a relational approach.

To mitigate reliability issues in the surveys, Muijs (2011) suggested that researchers should use more than one item or question to address the same problem when using a survey to collect the data. In this study, CLES-FS had five closely related questions for each scale, similar to the original CLES. The Identity scale provides an example. It has five closely related items. If a respondent makes a mistake or misreports on the first item, there is a high probability that they will not make the same mistake on the second question. In this way, reliability issues CLES-FS were minimised.

Statistical techniques such as factor analysis, Bartlett's Test of Sphericity, and the Kaiser-Meyer-Olkin tests, Cronbach's alpha coefficient, and discriminant validity were performed on CLES-FS data to check for reliability and validity of the survey (See Appendix G for the SPSS syntax). The results of these statistical analysis suggests that CLES-FS is a valid tool. More discussions on these techniques are in Chapter 4, section 4.1.

According to Herland (2017), a researcher can also increase the research's reliability and validity by being cognisant of their own reflexivity. Reflexivity is the conscious use of oneself to shape the meaning of others' opinions when researching (Herland, 2017). The next section discusses how the issues relating to reflexivity have been overcome in this study.

3.10 Reflexivity

Factors such as ethnicity, gender, and age can shape a researcher's reflexivity. In the case of this study, being a Fijian Indian teacher teaching in a New Zealand secondary school has a potential influence on the outcome of this study. This influence can be understood in many ways, including being an advantage to an 'insider' researcher from the Fijian community in terms of establishing

relationships of trust. However, I was aware of issues relating to reflexivity that can impact the outcomes of this study and attempted to minimise any influence on the responses from the students who participated.

For example, during the talanoa sessions, I was mindful that my values and worldviews should not unduly influence the students' perceptions of science learning in New Zealand classrooms. As a strategy, I allowed the talanoa session to be free flow without much interjection from me. In addition, when students were doing the survey, I remained silent. I stood at the end of the room, distancing myself so students did not feel intimidated when answering the survey items.

Undue influence and insider advantage can be balanced as elements important in reflexivity. Coming from the same cultural background as the students also had some advantages. I speak Indo-Fijian and understand some aspects of the iTaukei language, which made it possible for some students to use their first language when they had difficulty expressing themselves in English. This code-switching is likely to have supported trustworthiness. Further, all the talanoa sessions were recorded (see section 3.7.1). I used my colleagues to verify the translations which I undertook myself. I adhered to Waikato University's ethical requirements during the data collection, discussed in the next section.

3.10.1Ethics

Ethical issues were a priority during the research. Since this study involved collecting data from students, I was responsible for protecting them from harm and developing a sense of trust with them. There are four main areas of ethical concerns that were considered in this study: approval from relevant authorities, informed consent, the right to privacy, and protection from harm (Arini et al., 2010; Creswell, 2018).

Approval from the University of Waikato's Human Research Ethics Committee to conduct this study project was obtained on July 8th, 2019 (Approval number - FEDU040/19) - see Appendix A. School principals approved the research to be conducted in their schools using the forms reproduced, see Appendix B. An information sheet for teachers was also given, see Appendix C.

Before the commencement of the research, I sought parents' consent using the documentation in Appendix D. Participants were informed that their participation was voluntary, and there was a right to refuse to answer any question. See Appendix E for more details. Those keen to participate in the research were given an information letter outlining their role in the study and asked to sign a consent form. The parents and caregivers of the students involved in the study were also given the consent form to sign to ask for permission for their child's participation in the research.

Student involvement in the talanoa was voluntary, and they were assured anonymity in the research. All statements made by the students during the research were treated with confidentiality. Ethical processes also acknowledged talanoa values. As a Pacific researcher, I closely followed the talanoa protocols of doing research. Where possible, I applied cultural values to create a respectful and culturally secure environment. For example, I was not looking directly at the eyes of the students when talking to them and not expecting them to look at my eyes either when talking.

Pacific ethic moves beyond not doing harm to doing good. This research seeks to support better teaching of Pacific students in science classrooms in Aotearoa, New Zealand, by providing a window into how education plays out for them. The knowledge generated through dissemination reciprocated the knowledge offered by Pacific students on behalf of themselves, their families and their communities (See Appendix H and I).

3.11 Chapter Summary

This chapter began by describing Pacific epistemology and how it influenced the choice of methodology and methods for this study. Talanoa draws on Pacific epistemological perspectives to study human phenomena and understand human experience from a cultural perspective. When used for Pacific research, talanoa seeks to reveal the meaning behind how Pacific students experience phenomena within their own worldviews. Talanoa research methodology was also considered useful for this study because Fijian students are familiar with talanoa as an everyday practice.

A mixed-method approach (survey and talanoa) was used to collect data from the students. A total of 305 students took part in the survey, and 131 took part in the talanoa sessions. Before the data collection happened, the modified CLES-FS was piloted. A detailed research design and how the talanoa and survey data were analysed are also discussed in this chapter. SPSS software was used to analyse the CLES-FS data, while talanoa data was analysed using thematic analysis. Furthermore, a conceptual framework called Camakai Jahaaj provided an overview of this study.

Issues relating to the trustworthiness, validity and reliability of this study and how it was minimised were described in this chapter. The last part of this chapter dealt with ethical considerations. The next chapter presents the results of CLES-FS data.

सरस्वती नमस्तुभ्यं वरदे कामरूपिणि। विद्यारम्भं करिष्यामि सिद्धिर्भवतु मे सदा || Salutations to Goddess Saraswati, the one who gives boon and grants wishes. As I begin my education, shower me with the knowledge and intellect I need to attain wisdom.

Chapter 4

Findings from the Quantitative Data (CLES-FS)

The previous chapter described the methodology and methods used in this study. This chapter presents a quantitative data analysis through tables, graphs, and general comments. In this study, there were two survey forms that students completed. The Actual form measured the students' perceptions of what is currently happening in science classrooms, and the Preferred form measured students' perceptions of their ideal classroom environment. The survey form's data was gathered and entered into an Excel spreadsheet. SPSS software was used to analyse the data to identify students' perceptions and attitudes on each scale. Scales included Identity, Familiar Context, Group Work, Critical Voice, and Shared Control.

This section 4.1 reports on the validity and reliability of the CLES data. Section 4.1 begins with determining through factor analysis the number of factors present in the modified version of the CLES. This section reports on the validity and reliability of the CLES data. It uses statistical techniques such as Bartlett's Test of Sphericity, and the Kaiser-Meyer-Olkin tests and correlation matrix on the CLES data to check for reliability and validity.

Section 4.2 used the data from CLES when comparing the perception of Fijian students regarding different scales of the CLES-FS. A brief description of the general trend obtained from each scale is presented. Section 4.3 reported on each scale of the CLES-FS data with regard to gender, birthplace and ethnicity, using an independent t-test to determine any significant difference in the data. Section 4.4 represented the mean values of the CLES- FS scales using the spider chart and reports on the patterns and relationships between the scales.

Comparisons are made of CLES-FS data at different year levels in section 4.5. In this section, one-way variance analysis (ANOVA) is used to find whether there is

any significant difference between the mean values of different scales at various year levels.

4.1 Validation of CLES-FS

This section uses different statistical techniques such as factor analysis, Bartlett's Test of Sphericity, and the Kaiser-Meyer-Olkin tests, Cronbach's alpha coefficient, and discriminant validity. These tests are performed to check for the reliability and validity of CLES-FS (See Appendix G for the SPSS syntax).

Factor analysis is a data reduction technique that scans for groups among the intercorrelation of items (Pallant, 2020). According to Pallant (2020), scale developers normally start with a large number of individual items and, by using factor analysis techniques, reduce the number of related items into scales. Factor analysis is done so that large sets of items can be consolidated into scales that can be analysed meaningfully. In this study, factor analysis was performed to determine whether the CLES-FS had the same number of viable scales as the original (CLES).

There are two main issues to consider before doing factor analysis: sample size and strength of the relationship between the variables. Tabachnick and Fidell (2013) suggest that the sample should have at least 300 participants. The strength of the relationship between the variables can be found via inspection of the correlation matrix. Tabachnick and Fidell (2013) argue that the coefficient matrix between the variables should be greater than 0.3 before conducting factor analysis.

Another way to check sample adequacy for factor analysis is to calculate Bartlett's Test of Sphericity and the Kaiser-Meyer-Olkin test (KMO) values using SPSS. According to Pallant (2020), Bartlett's Test of Sphericity should be significant, which means $p < 0.05$ and the KMO index should be more than 0.6 for factor analysis to be considered appropriate. In other words, if the p-values of Bartlett's Test of Sphericity are less than 0.05 and the KMO index is more than 0.6, then the data collected is sufficient to proceed with factor analysis.

In this study, Bartlett's Test of Sphericity and the Kaiser-Meyer-Olkin tests were performed on the CLES-FS (Actual and Preferred) data using SPSS before the

factor analysis to check the appropriateness of the sample size and strength of the relationship among the items. Although Taylor et al. (1997) have completed factor analysis on the CLES, it is essential to do the factor analysis on CLES-FS since some of the items were modified in the study.

Table 4 below shows the KMO and Barlett's test values for Actual and Preferred forms. Bartlett's Test of Sphericity reached statistical significance ($p<0.05$), supporting the correlation's factorability matrix. Further, a KMO value of 0.891 for the Actual form and 0.884 for the Preferred form was obtained using the CLES-FS data. These values exceeded Kaiser's recommended value of 0.6 (Pallant, 2020). Since the p-value of Bartlett's Test of Sphericity is less than 0.05 and KMO exceeds 0.6, it suggests that the sample size is big enough for factor analysis.

Table 4

KMO and Bartlett's test values were obtained using SPSS from the CLES-FS data

KMO and Bartlett's Test		Actual	Preferred
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.891	0.884
Bartlett's Test of Sphericity	Sig. (p-value)	<0.01	<0.001

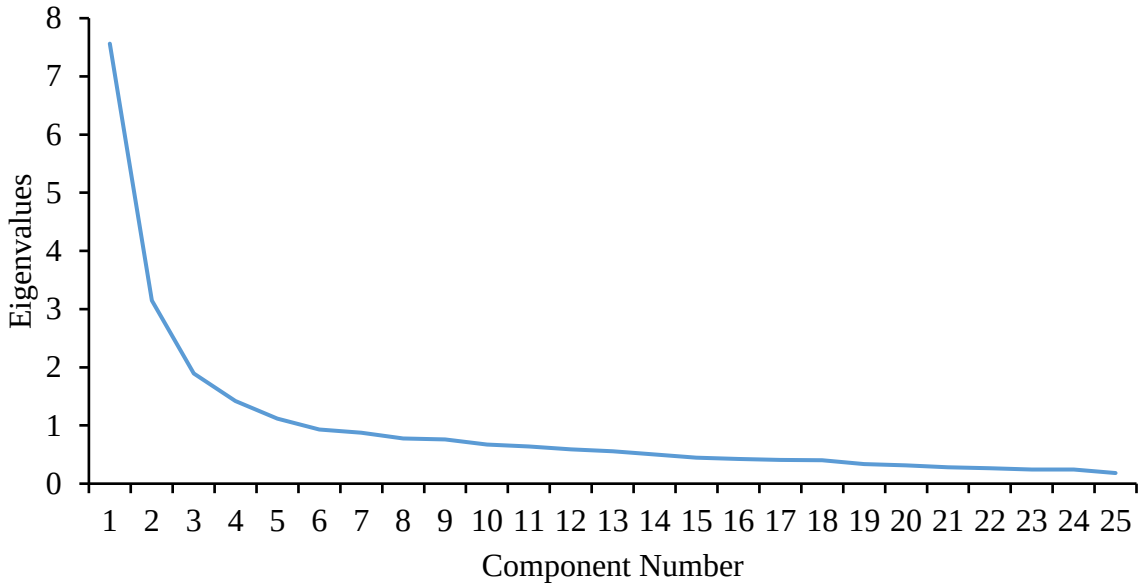
Note. n = 305

After checking the suitability of the data, the Actual and Preferred forms items of the CLES-FS were subjected to principal component analysis (PCA) using SPSS. PCA revealed the presence of five factors with eigenvalues exceeding 1, explaining 61% and 63% of the total variance for the items of the Actual and Preferred forms, respectively. An eigenvalue is a number that identifies how much variance there is in the data. In other words, an Eigenvalue reflects the number of factors that can extracted during exploratory analysis. Exploratory factor analysis can confirm the number of factors present which is not being reported in the study. However, an inspection of the scree plot revealed a clear break after the 5th component, as shown in Figure 17, indicating five factors that can be retained in an exploratory factor analysis. This study's scree plot results are consistent with those obtained by Luan et al. (2010), indicating that the number of factors that can be retained when doing

exploratory factor analysis had not changed even though some of the items were modified.

Figure 17

Scree plot graph of the data obtained from the Actual form of CLES-FS



Note. A scree plot shows the eigenvalues on the y-axis and the number of factors on the x-axis. The point where the slope of the curve flattens out significantly (the elbow) indicates the number of factors to be generated by the analysis. (See Appendix F for SPSS syntax)

4.1.1 Reliability

The reliability of each scale in CLES-FS was determined through Cronbach's alpha coefficient using the individual student as the unit of analysis. Cronbach's alpha is a measure of the internal consistency of the scales. It can also be referred to as "the degree to which the items that make up the scale hang together" (Pallant, 2016, p. 101). According to Taber (2018), if Cronbach's alpha is higher than 0.65, the scale's reliability is acceptable and satisfactory. The author also argues that if Cronbach's alpha is very close to 1, some items may be redundant, meaning items may be very similar and measure similar outcomes.

Table 5 shows the reliability estimate values obtained using SSPS for each scale of CLES-FS (See Appendix G for SPSS syntax). These values ranged from 0.68 to 0.93, suggesting that all CLES-FS Actual and Preferred forms items possess satisfactory internal consistency. The internal consistency of the Identity scale is the lowest compared to other scales for the Actual and Preferred forms, as shown in Table 5.

The low value of the Cronbach's alpha for the Identity scale could be due to several reasons. One of the reasons could be that there were two distinct groups of participants who took part in the research, iTaukei and Fijian Indians. Within each group, some were Fiji born, and others were born in New Zealand. Place of birth and ethnicity may have played a role in determining the lowest value of Cronbach's alpha of the Identity scale compared to other scales.

It is also important to highlight that the value of the Cronbach alpha of the present study of the Shared Control scale recorded the highest Cronbach's alpha value, which is a very similar value to that of Taylor et al. (1997). The high value means that students have provided similar answers to the questions for this scale.

As mentioned above, high Cronbach's alpha values indicate that response values for each participant across a set of items are consistent in each scale. This means that when participants give a high response for one of the items, they are also likely to provide high responses for the other items of the same scale. Consistency indicates that the measurements are reliable and the items might measure the same characteristics. Table 5 shows that Cronbach's Alpha coefficients for Actual and Preferred forms of CLES-FS exceed the recommended value of 0.65, indicating that the data obtained via CLES-FS is reliable.

Table 5

Cronbach's Alpha Coefficients for Actual and Preferred forms of CLES-FS

Reliability Statistics		
	Cronbach's Alpha	
	Actual	Preferred
Identity	0.68	0.74
Familiar Context	0.78	0.76
Talanoa	0.81	0.83
Critical Voice	0.81	0.82
Shared Control	0.91	0.93

Note. Identity; Familiar, Context; Talanoa; Critical Voice; and Shared Control are the scale names of the CLES-FS

(n = 305, See Appendix F for SPSS syntax)

4.1.2 Validity

In a quantitative study, validity usually means that the tools used in an investigation measure what they are supposed to measure (Thatcher, 2010). Different methods can be applied to validate tools used in data collection. The choice of the method is dependent on the tool that has been used in the research. This study uses the CLES-FS survey to collect quantitative data from students. Literature shows that researchers have calculated Pearson's correlation matrix of the scales of CLES to prove its validity (Luan, 2010). This method of validation is called discriminant validity. Discriminant validity measures each scale's mean correlation with the other scales (Streiner et al., 2015).

A similar technique to Luan et al. (2010) has been used in this study to calculate the discriminant validity of each scale of CLES-FS. The five sub-scales of CLES-FS were considered as five different measures of the constructivist learning environment. The chosen method was to ensure that the scales of CLES-FS measure different themes or ideas under investigation.

For example, the Identity scale measured the extent to which there are opportunities for students to build relationships with their teachers and share and experience different aspects of culture. The second scale was learning in a familiar context,

which measured the extent to which school activities and knowledge are relevant to their everyday life. Calculating the correlation matrix between the scales makes it possible to predict how closely scales are related. Lower correlation matrix values indicate that scales are not closely related to each other. On the other hand, the high value of the scales mean correlation matrix would indicate that the scales are closely related to each other.

Table 6

Discriminant validity-mean correlation values of scales in relation to other scales for Actual form

Scales Mean Correlation Matrix

	Identity	Familiar context	Talanoa	Critical voice	Shared control
Identity	1	0.610	0.478	0.392	0.393
Familiar Context		1	0.498	0.359	0.402
Talanoa			1	0.352	0.144
Critical Voice				1	0.451
Shared Control					1

(n=305, See Appendix F for SPSS syntax))

Table 7

Discriminant validity-mean correlation values of scale in relation to other scales for Preferred form

Scales Mean Correlation Matrix

	Identity	Familiar context	Talanoa	Critical voice	Shared control
Identity	1	0.543	0.517	0.37	0.329
Familiar Context		1	0.441	0.316	0.329
Talanoa			1	0.379	0.264
Critical Voice				1	0.519
Shared Control					1

(n= 305, See Appendix F for SPSS syntax))

This study calculated the correlation matrix between CLES-FS scales using SPSS. As seen in Table 6, the mean correlation matrix of the Identity scale, when compared to itself, gives a value of one, but when compared to a Familiar Context, gives a value of 0.610. This means that the Identity and Familiar Context scales are not closely related to each other.

Tables 6 and 7 report the correlation matrix values for each scale for Actual and Preferred forms. The values of one scale with respect to the other four subscales ranged from 0.144 to 0.610 for the Actual form and 0.264 to 0.543 for the Preferred form. Since these values are not close to one, this indicates that each scale measures different aspects of the constructivist learning environment. Luan et al. (2010) found similar results. This indicates that CLES-FS is a valid tool to measure the perceptions of Fijian students of the constructivist learning environment.

In summary the above analysis shows that the modified CLES can be considered a valid and reliable tool to measure the perceptions of the actual and preferred learning environment of Fijian students. Hence, it can be said that the data collected in this study via CLES-FS has a high degree of reliability and validity.

4.2 Comparison of mean values-CLES-FS data

This section reports on the mean values of the Actual and Preferred forms. Section 4.2.1 discusses how these overall mean values of the actual and preferred forms were calculated. Comparison of the mean values of the actual and preferred forms (CLES-FS) are reported in section 4.2.1. In section 4.2.2, paired sample t-tests were performed on the mean values of the actual and preferred CLES-FS data to determine whether their differences were significant.

4.2.1 How were the mean values of the scales calculated?

The mean value of the scale is the average value of all the items (questions) on the scale. The average value is calculated by adding individual scores of each item as highlighted in Figure 18, and then dividing by 5 (the number of items). In this case, the mean value is 14/5 = 2.8. This gives the average value of a scale for a particular student. The overall mean value of scales was calculated by adding the mean values of all students on a particular scale and then dividing by the number of participants. The advantage of calculating the overall mean value of the specific scale is that it can quantify students' perceptions of the actual and preferred learning environment.

Figure 18

Snapshot Actual form of one scale of CLES-FS, for one individual

Identity/Relationship **In this class…..**			Almost Always	Often	Some-times	Seldom	Almost Never
1	Does my science teacher acknowledge me during science lessons?		5	4	3	2	1
2	My science teacher pronounces my name correctly?		5	4	3	2	1
3	I have an opportunity to share my cultural experiences with others during the science lessons?		5	4	3	2	1
4	I have a good working relationship with my teacher during science lessons?		5	4	3	2	1
5	Does my science teacher talk to me during science lessons?		5	4	3	2	1

Note. The overall average value represents the overall mean value of all Fijian students on a specific scale, whereas the average value of a particular student represents the mean value of that student on a particular scale.

4.2.2 Comparing mean values of Actual and Preferred forms

This section compares the mean values of the Actual and Preferred forms for the same scale. The purpose of comparing the mean values is to find out the differences in the perceptions of the Fijian students regarding current and preferred learning environments using CLES-FS data. The differences in the mean values are interpreted in conjunction with the talanoa data in more detail in the discussion section (chapter 6). Table 8 shows the overall mean values of the Actual and Preferred forms for all the scales. It can be seen from Table 8 that for Identity, Familiar Context, and Shared Control scales, the overall mean values are higher for the Preferred form compared to the Actual Form. On the other hand, the overall mean values of the Preferred Form are lower than the Actual form for Talanoa and Critical voice scales. The next five subsections interpret Table 8 in detail with regard to each CLES-FS scale.

Table 8

Mean values for all scales for Actual and Preferred forms

Scales Means Values and Standard Deviations

	Mean Value		Standard Deviation		Mean Diff
	Actual	Preferred	Actual	Preferred	P-A
Identity	3.76	3.83	0.66	0.72	0.07
Familiar Context	3.50	3.96	0.77	0.75	0.46
Talanoa	4.27	4.04	0.68	0.71	-0.23
Critical Voice	3.29	3.07	1.03	0.97	-0.22
Shared Control	2.38	2.97	1.06	1.13	0.59

(n= 305)

Note. P-A denotes the difference between the mean values of the Actual and Preferred forms.

4.2.2.1 Identity scale

The identity scale measured the extent to which there are opportunities for students to build relationships with their teachers and share and experience different aspects of their culture. For the Identity scale, the mean value of the Preferred form was 3.83 and the Actual form was 3.76. The difference in mean value was 0.07 as seen in Table 8. The positive sign indicates that students prefer more opportunities to build relationships with their teachers and share and experience different aspects of their culture than those they are experiencing.

The standard deviation of the Actual form was 0.66, and for the Preferred form, it was 0.72. A standard deviation (SD) measures how dispersed the data is in relation to the mean. A low standard deviation indicates that data is clustered around the mean, and a high standard deviation would show that the data is more spread out. The SD for Identity scale is smaller for both the Actual and Preferred forms when compared to other scales. This indicates that the answers given by the student for the items were clustered together. The smaller SD on the Preferred form, when compared to other scales, indicates that many Fijian students have similar perceptions that they want their teachers to provide opportunities to build relationships with them.

4.2.2.2 Familiar Context

The Familiar Context scale measured the extent to which opportunities are provided for students to experience science learning in a familiar context. The CLES-FS data shows that the Preferred form's overall mean value is higher than the Actual form, as shown in Table 9. For the Familiar Context scale, the mean value of the Preferred form was 3.96, and the Actual form was 3.50, a difference of 0.46. This positive difference between the Preferred and Actual forms is the largest of all scales. This suggests that students wish for more contextualised learning so they can experience science learning in a familiar context.

4.2.2.3 Talanoa (Group work)

Talanoa scale measured the extent to which opportunities students experience in a collaborative learning environment. It was interesting to note that the mean value

of the Preferred form is less than for the Talanoa scale compared to the Actual form. The difference between the preferred mean value and the actual was -0.23. The overall result of this scale indicates that students prefer to experience science learning less through collaboration than through experiential learning. This was an unexpected result as Fijian students generally enjoy working in groups, according to the literature.

4.2.2.4 Critical Voice

The Critical Voice scale measured the extent to which the students feel confident in asking questions in class. The overall mean value for the Actual Form is 3.39, suggesting that students are only sometimes confident to ask their teacher questions in the classroom. However, there is a lower value for the Preferred form, indicating that although students are sometimes confident to ask questions in class, they prefer not to. The difference between the preferred mean value and the actual was -0.22. The SD for this scale is second largest compared to other scales, which shows that the choice of answer is spread out. This may be because students who are born in New Zealand may be confident in asking questions in class compared to students who are born in Fiji or vice versa. Another scenario could be that female students are more confident in asking question than males. This kind of finding shows the value of combining the CLES-FS with talanoa, which makes in-depth investigation possible.

4.2.2.5 Shared Control

The Shared Control scale measured the extent to which students want to share control for the design and management of their learning. The overall mean value of the Preferred form is 2.97 whereas for the Actual form is 2.38, a difference of 0.59. This suggests that students prefer to have more control over the learning than is currently happening. This means that Fijian students would like to contribute more towards planning the lessons. Another interesting point to note is that the SD value is the largest when compared to all other scales. This shows that students have given a wider range of answers for this scale compared to others. One possible explanation is that students who come from Fiji may have difficulty understanding the New Zealand curriculum and, therefore, depend on the teacher to guide them instead of expressing their own learning goals.

In the next subsection, a paired sample t-test is performed on the mean values of Preferred and Actual forms to determine if the difference between the mean values of Actual and Preferred forms is significant or not.

4.2.3 Paired Sample t-test using SPSS

According to Mangal (2013), a paired-sample t-test can compare the mean values of two related scales to find out if there is any significant difference between them. As seen in Section 4.2, from Table 8 there are differences in the mean values of the Preferred and Actual forms. To find out if there are any significant differences between the mean values of the Actual and Preferred form scales, a paired sample t-test was performed on them. Figure 19 below shows the output of a paired t-test using SPPS software done on the mean values of the identity scale (See Appendix G for SPSS syntax).

Figure 19

Screenshot of the SPSS software of the analysed data using paired samples t-test of the identity scale

[DataSet1] T:\Science FACULTY\Science Faculty\5. HOD\Waikatol\Fijian students view analysis_5.sav

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Mean_Identity1	3.7611	305	.66070	.03783
	mean_Preferred_Identity	3.8334	305	.80365	.04602

Paired Samples Correlations

		N	Correlation	Significance One-Sided p	Significance Two-Sided p
Pair 1	Mean_Identity1 & mean_Preferred_Identity	305	.407	<.001	<.001

Paired Samples Test

		Paired Differences					t	df	Significance One-Sided p	Significance Two-Sided p
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper				
Pair 1	Mean_Identity1 - mean_Preferred_Identity	-.07230	.80608	.04616	-.16312	.01853	-1.566	304	.059	.118

Paired Samples Effect Sizes

			Standardizer[a]	Point Estimate	95% Confidence Interval Lower	Upper
Pair 1	Mean_Identity1 - mean_Preferred_Identity	Cohen's d	.80608	-.090	-.202	.023
		Hedges' correction	.80808	-.089	-.202	.023

a. The denominator used in estimating the effect sizes.
Cohen's d uses the sample standard deviation of the mean difference.
Hedges' correction uses the sample standard deviation of the mean difference, plus a correction factor.

This paragraph discusses how the data from Figure 19 was interpreted to determine if there is a significant difference between the mean values of the Actual and Preferred forms of the Identity scale. The blue circled area in Figure 19 represents the mean values and standard deviation of the Actual and Preferred forms of the Identity scale. The black circle represents the difference in the mean values. The negative sign (circled in black on the mean value) indicates that the preferred mean value of the Identity scale is higher than the actual. For the mean values of the Actual and Preferred forms to be statistically different, the p values (circled in red) should be less than 0.05 ($p < 0.05$). In this case, as in Figure 19, the p-value is 0.118, which means that there is no statistical difference in the overall mean values of the Actual and Preferred forms for the Identity scale.

Paired sample t-tests were performed on the mean values of Actual and Preferred forms of all scales to find any significant difference in the mean values. The mean values of the Actual and Preferred will be significant if the p-value is less than 0.05.

Table 9

Paired sample t-test of Actual and Preferred scales (two tailored)

Paired Samples Test			
Actual versus Preferred scales	**Mean Difference**	**t Value**	**Sig 2 tailored**
Identity	-0.072	(-)1.566	0.118
Familiar Context	-0.464	(-)9.191	0.000**
Talanoa	0.230	5.743	0.000*
Critical Voice	0.220	3.758	0.000*
Shared control	-0.590	(-)10.438	0.000**

Note. *Significant-close to zero, **Very Significant- very close to zero
(-) indicate that the mean value of the Preferred form is larger than the Actual form
n = 305

Table 9 shows that the two tailored significant values of Familiar Context, Talanoa, Critical Voice and Shared Control scales are zero. This means there is a significant difference in the mean values of the Actual and Preferred forms for these scales. In other words, the perceptions and attitudes of Fijian students vary significantly on these scales between what is currently happening in class and how students want it

to happen. However, the results also indicate that although there is a difference between the mean values of the Actual and Preferred forms of the Identity scale, this difference is not significant because the p-value is more than 0.05, as shown in Table 9.

A negative t–value for the Familiar Context and Shared Control scales indicates that the difference between the mean values of the Preferred form is significantly larger that for the Actual form for these scales. This shows that students think there are more opportunities for teachers to use students' worldviews when teaching than are executed, and students want greater freedom to decide what and how they learn.

Table 9 shows that the mean values of Talanoa and Critical Voices scales are also significant. However, the t-values are not negative, indicating that the mean value of the Actual forms is larger compared to the Preferred Forms. The results suggest that students prefer less group work than present and are not keen to voice their concerns to teachers.

In summary, the results show a significant difference between the perceptions of students between the current and preferred learning environment for Familiar Context, Talanoa, Critical Voice, and Shared Control scales. On the other hand, the difference between the current and preferred learning environments is insignificant for the Identity scale.

The next sections further investigate the CLES-FS data to find differences concerning the mean values of Preferred and Actual forms with regard to ethnicity, gender, and birthplace for each of the scales.

4.3 Report on different scales of CLES-FS

This subsection reports on the mean values of the Actual and Preferred form of CLES-FS data concerning gender, birthplace and ethnicity. Furthermore, for each scale an independent t-test is done on the mean values of the Actual form to determine any significant differences.

4.3.1 Identity Scale

The mean value of the Preferred and the Actual forms for all subcategories (gender, birthplace and ethnicity) for the Identity scale are shown in Table 10. Table 10 illustrates that the mean values of Preferred forms in all subcategories are higher compared to the Actual form for this scale. This indicates that irrespective of gender, birthplace or ethnicity, most students prefer greater opportunities to build relations and share their cultural experiences with their teachers and peers than are experienced.

The biggest difference between the actual and the preferred means values between the categories is for iTaukei students. The mean value for the Preferred form is 3.80, and the Actual form is 3.56, a difference of 0.26. This suggests that iTaukei students prefer greater opportunities to build relationships and share their cultural experiences with their teachers and peers than those experienced by Fijian Indian students.

It is important to note that the standard deviation (SD) value is lowest for the Actual form of male students. This means the answers given by the male students for the Identity scale were not very spread out compared to other subcategories. One of the reasons could be that male students were more conscious of how many opportunities they are provided to build relationships and share cultures with their teachers and peers.

Table 10

Mean values of the Actual and Preferred forms with respect to gender, birthplace, and ethnicity of the Identity scale

		Mean Values		Standard Deviation	
Identity Scale		Actual	Preferred	Actual	Preferred
Overall		3.77	3.83	0.66	0.80
Gender	Male	3.69	3.79	0.64	0.71
	Female	3.82	3.88	0.68	0.73
Birthplace	Fiji	3.78	3.87	0.71	0.82
	New Zealand	3.75	3.80	0.81	0.79
Ethnicity	iTaukei	3.56	3.80	0.64	0.81
	Fijian Indian	3.80	3.82	0.66	0.80

Note. Males-143, Females-162, Fijian Indian-248, iTaukei-57, NZ born-160, FJ born-145

The next three paragraphs discuss the difference between the mean values of the Actual form of these subcategories (gender, birthplace, ethnicity). The mean value for the Actual form for female students is higher than for males. This shows that female students had more opportunities to build relationships with their teachers and peers than their male counterparts.

There was little difference in the mean value of the Actual form for the students born in Fiji or New Zealand. Initially, it was anticipated that Fijian students born in New Zealand may find it easier to look for opportunities in class to build relationships and share cultural experiences compared to Fiji-born students. However, the results suggest that the perceptions of Fijian born students are similar to New Zealand born students for the Identity scale.

It is interesting to note that the biggest difference in the mean values for the Actual form was in the category of ethnicity. There was a difference of 0.24 points between the iTaukei and Fijian Indian students, as shown in Table 10. This suggests that iTaukei students perceived that their teachers were facilitating fewer opportunities to develop student-teacher relations compared to Fijian Indian students.

On the other hand, the biggest difference for iTaukei students is between the mean values of the Actual and Preferred forms for ethnicity. This indicates that iTaukei students prefer more opportunities to build relationships with teachers and peers. In the next subsection, further analysis was done on the mean values of the Actual forms to find any significant difference in students' perceptions concerning gender, birthplace, and ethnicity.

4.3.2 Independent t-test using SPSS

An independent t-test can determine statistically significant differences between the means of two unrelated groups (Cohen et al., 2018). An independent-sample t-test tells whether there is a statistically significant difference in the means of the two groups. For example, in this study, there is a difference in students' perceptions of their learning environment regarding gender for the Actual form, as shown in Table 10. However, to determine whether this difference is significant or not, an independent t-test was performed (See Appendix G for the SPSS syntax).

According to Pallant (2020), Levene's test for Equality of variance can be used to interpret the data of the independent t-test results. Pallant (2020) states that if the significant value (sig. value) for Levene's test is greater than 0.05 (e.g. 0.07, 0.10), one should use the first row in the table which assumes equal variances. If the p = 0.05 or less (e.g. 0.00 1, 0.00 1), this means that the variances for the two groups are not equal. Therefore, the data violates the equal variance assumption; hence, SPSS software provides an alternative t-value that compensates for the variances being unequal. In this case, the information in the second row of the t-test table should be used.

Figure 20

Independent samples test for the Actual form of male and female students

Independent Samples Test

		Levene's Test for Equality of Variances		t-test			
						Significance	
		F	Sig.	t	df	One-Sided p	Two-Sided p
Mean_Identity1	Equal variances assumed	.619	.432	-1.689	303	.046	.092
	Equal variances not assumed			-1.696	302.100	.045	.091

Note. Shows Levene's test sig value of 0.432 (circled in red). This is greater than the 0.05 limit. This does not violate the assumption of equal variances. Therefore, the value from the first row of the table is used (circled black). In this case, it will be t = -1.689

The column labelled Two-Sided p (circled in blue) was referenced to find out if there is a significant difference between the two groups, as shown in Figure 20. Two values are given, one for equal variance and the other for unequal variance. The procedure involves choosing the column according to Levene's test results. In this example (Figure 20), the choice is column one. The choice was made based on the Sig value which is greater than 0.05 (circled in red).

In this case, the value is 0.092, which is more than 0.05, meaning there is no significant difference between the two groups. If this significant value was less than 0.05 then there would have been a significant difference between the mean values. Because 0.092 is above the required cut-off of 0.05, one can conclude that there is no statistically significant difference in the mean values of the male and female figures on the Actual form.

4.3.2.1 Independent t-test on Actual forms (Identity Scale)

An independent t-test was done on the Actual form's mean values to find any statistical difference between gender, birthplace and ethnicity on the Identity scale. The results indicate no significant difference in the mean value of gender and birthplace since the p-value is bigger than 0.05.

However, the independent t-test shows that the p value less than 0.05 for ethnicity, as shown in Table 11. Therefore, it can be stated that there is a significant difference between Fijian Indian and iTaukei students' perceptions regarding opportunities to build relationships in science classrooms and the sharing of cultural experiences. Since the mean value of the iTaukei students is lower for this scale compared to Fijian Indians, this indicates that they believed that they had fewer opportunities to build relationships with their teachers compared to Fijian Indians.

Table 11

Independent t-test of the mean values of the Actual form for the Identity scale.

	Independent t-test	
	Equal Variance Assumed	
Identity Scale	t	Sig (2-tailored) p-value
Gender	1.69	0.09
Birthplace	0.45	0.65
Ethnicity	2.49	0.01*

Note. * Indicates P<0.05, Males-143, Females-162, Fijian Indian-248, iTaukei-57, NZ born-160, FJ born-145

4.3.3 Familiar Context Scale

The mean values concerning all subcategories (gender, birthplace and ethnicity) is larger for the Preferred form compared to the Actual for this scale as shown in Table 12. This indicates all Fijian students (irrespective of gender, birthplace and ethnicity) want more opportunities to learn science in familiar context. However, the biggest difference is in the ethnicity category concerning iTaukei students which is 0.59. This suggests that the iTaukei students preferred further opportunities to experience learning in a familiar context in comparison to Fijian Indians.

Table 12

Mean values of the Actual and Preferred forms with respect to gender, birthplace, and ethnicity of the familiar context

Familiar Context		Mean Values		Standard Deviation	
		Actual	Preferred	Actual	Preferred
Overall		3.50	3.96	0.77	0.75
Gender	Male	3.39	3.87	0.73	0.74
	Female	3.57	4.02	0.80	0.75
Birthplace	Fiji	3.45	3.96	0.81	0.77
	New Zealand	3.54	3.96	0.74	0.75
Ethnicity	iTaukei	3.38	3.97	0.77	0.83
	Fijian Indians	3.51	3.95	0.78	0.73

Note. Males-143, Females-162, Fijian Indian-248, iTaukei-57, NZ born-160, FJ born-145

In addition, the results show that the least difference in the mean value when comparing Preferred to the Actual form (between subcategories- gender, birthplace, ethnicity) was the New Zealand-born students. It does make sense that New Zealand-born Fijian students will be more familiar with the context used to teach in their science classes than Fiji born students because students born in Fiji may not be familiar with the examples used by teachers in New Zealand classrooms.

This paragraph discusses the differences in the mean values of the Actual forms between these subcategories. It was interesting to find out that the biggest difference between these subcategories for the mean values for the Actual form is for gender. Female students thought that there were more opportunities to experience science learning in their current learning environment than males. The mean value for females the Actual form was 3.57, compared to 3.39 for males. To find out whether this difference is significant or not, an independent t-test was performed on the data of the Actual form of these subcategories.

4.3.3.1 Independent t-test

An independent t-test was performed to determine whether there is a significant difference between the mean values of the Actual form. As seen in Table 13, the p-

value of gender is 0.04, which is lower than 0.05, signifying that statistically, there is a significant mean value for the Actual form between female and male students. This indicates that female students perceive that they are given more opportunities to learn science in familiar context than male students.

However, birthplace and ethnicity have a p-value larger than 0.05, signifying no significant difference. This was a surprising result, especially for the subcategory of birthplace, because it was anticipated that mean value of the Actual form for New Zealand-born students would be higher than for Fiji-born students. After all, they are more likely familiar with the local context and environment than Fiji-born students. However, this was not the case.

Table 13

Independent t-test of the mean values of the Actual form for the Familiar context scale

	Independent t-test	
	Equal Variance Assumed	
Familiar Context	t	Sig (2-tailored) p-value
Gender	2.06	0.04*
Birthplace	1.00	0.32
Ethnicity	1.14	0.26

Note. * denotes statistical differences. P<0.05

Note. Males-143, Females-162, Fijian Indian-248, iTaukei-57, NZ born-160, FJ born-145

4.3.4 Talanoa scale

The mean values of the Actual and Preferred forms concerning gender, birthplace and ethnicity for Talanoa scale are displayed in Table 14. The Preferred form mean values are lower than the Actual form for all categories. This suggests that students prefer to have fewer opportunities to participate in group work than what they are currently experiencing.

The biggest decrease between the Preferred and Actual forms mean values for this scale is for females, which was 0.33. This suggests that out of all subcategories, females prefer to work less in a collaborative environment compared to others. However, the smallest decrease is for iTaukei students for this scale.

Upon closer examination of the mean values of the Actual form, it was noticed that the largest differences in students' perceptions in terms of opportunities provided to work in a group were between Fijian Indians and iTaukei. This finding indicates that Fijian Indians think that they are provided with more opportunities to participate in group work compared to iTaukei. However, both groups indicated that they prefer to have fewer opportunities for group work than currently.

An independent t-test was performed on the mean values of the Actual form to determine if this difference was significant.

Table 14

Mean values of the Actual and Preferred forms with respect to gender, birthplace, and ethnicity of the Talanoa scale

		Mean Values		Standard Deviation	
Talanoa		Actual	Preferred	Actual	Preferred
Overall		4.27	4.04	0.68	0.71
Gender	Male	4.21	4.10	0.69	0.68
	Female	4.29	3.96	0.67	0.72
Birthplace	Fiji	4.24	4.07	0.67	0.65
	New Zealand	4.26	4.00	0.69	0.76
Ethnicity	iTaukei	4.04	3.99	0.67	0.61
	Fijian Indians	4.30	4.04	0.68	0.72

Note. Males-143, Females-162, Fijian Indian-248, iTaukei-57, NZ born-160, FJ born-145

4.3.4.1 Independent t-test

Table 15 shows the results of the independent t-test done on the Talanoa scale. As expected, the p-value concerning ethnicity is below 0.05. This reveals that there is a significant difference between the perception of iTaukei and Fijian Indian students

about opportunities to work in groups. The difference in the mean values of the Actual form was 0.26 points between iTaukei and Fijian Indians. Thus, Fijian Indian students think they have more opportunities to experience science learning in a collaborative environment than iTaukei. However, other categories, such as gender and birthplace, do not show the two tailored sig values of more than 0.05, indicating no significant differences.

Table 15

Independent t-test of the mean values of the Actual form for the Talanoa scale

	Independent t-test	
	Equal Variance Assumed	
Talanoa	t	Sig (2-tailored) p-value
Gender	-0.97	0.33
Birthplace	0.25	0.81
Ethnicity	2.50	0.01*

Note. * denotes statistical differences. P<0.05

Note: Males-143, Females-162, Fijian Indian-248, iTaukei-57, NZ born-160, FJ born-145

4.3.5 Critical Voice Scale

It is important to highlight that the mean values of the Preferred form concerning gender and birthplace are lower than the Actual form; however, an anomaly in the result for this scale is for ethnicity. As can be seen from Table 16, the mean value of the Preferred form of iTaukei students is slightly higher than the Actual form, whereas the mean value for the Fijian Indian students is lower. The mean value of the Actual form of Fijian Indian students is 3.32, and for the Preferred form is 3.06, a decrease of 0.26. However, the mean value of the Actual form of iTaukei students is 3.08 and the Preferred form is 3.18, an increase of 0.1. This is an interesting finding suggesting that iTaukei students are more confident in voicing their concerns to the teacher compared to Fijian Indians.

Table 16

Mean values of the Actual and Preferred forms with respect to gender, birthplace, and ethnicity of the Critical Voice scale

		Mean Values		Standard Deviation	
Critical Voice		Actual	Preferred	Actual	Preferred
Overall		3.29	3.07	1.03	0.97
	Male	3.34	3.24	1.00	0.96
Gender	Female	3.19	2.94	1.04	0.97
	Fiji	3.33	3.12	1.00	0.92
Birthplace	New Zealand	3.22	3.06	1.12	1.03
	iTaukei	3.08	3.18	0.96	0.98
Ethnicity	Fijian Indians	3.32	3.06	1.04	0.97

Note. Males-143, Females-162, Fijian Indian-248, iTaukei-57, NZ born-160, FJ born-145

When the mean values of the Actual form were compared against each other for subcategories, it was noted that the biggest difference was in terms of ethnicity. As seen from Table 16, there is a difference in the mean value of the Actual form of 0.24 for ethnicity. This shows that Fijian Indians feel more confident in asking questions in class than iTaukei.

A surprising result that emerged from this analysis is that students born in New Zealand did not feel as confident in asking questions in class compared to students born in Fiji. This was a surprising result as it was anticipated that New Zealand-born Fijian students would be more confident to ask the questions in the class than Fiji born. However, this proved not to be the case. An independent t-test was conducted on the Actual form data for the subcategories to find out if there is any significant difference between them.

4.3.5.1 Independent t-test

Table 17 shows the independent t-test values obtained from the data of the Actual concerning gender, birthplace and ethnicity. The sig values (2 tailored) shows that the p values of all the subcategories are more than 0.05. This indicates that for Fijian students there are no significant differences between the mean values of the Actual form across subcategories.

Table 17

Independent t-test of the mean values of the Actual form for critical voice scale

		Independent t-test	
		Equal Variance Assumed	
Critical Voice		t	Sig (2-tailored)
	Gender	1.53	0.13
	Birthplace	0.09	0.38
A-F	Ethnicity	1.48	0.14

Note. * denotes statistical differences. P<0.05

Note: Males-143, Females-162, Fijian Indian-248, iTaukei-57, NZ born-160, FJ born-145

4.3.6 Shared Control Scale

The mean values of Actual and Preferred forms are shown in Table 18 of Shared control scale. Although the mean values of Preferred forms are higher than Actual form in all categories, the biggest difference is for ethnicity. The difference in the

mean value for iTaukei students is 0.82 compared to 0.53 for Fijian Indian students. This indicates that iTaukei students want more control of their classroom learning activities compared to Fijian Indians.

Table 18

Mean values of the Actual and Preferred forms with respect to gender, birthplace, and ethnicity of the shared control scale

		Mean Values		Standard Deviation	
Shared Control		Actual	Preferred	Actual	Preferred
Overall		2.38	2.97	1.06	1.11
Gender	Male	2.47	2.99	0.99	1.15
	Female	2.34	2.97	1.11	1.08
Birthplace	Fiji	2.42	3.04	0.98	1.09
	New Zealand	2.36	2.89	0.82	1.12
Ethnicity	iTaukei	2.43	3.25	0.98	0.94
	Fijian Indians	2.38	2.91	1.07	1.13

Note. Males-143, Females-162, Fijian Indian-248, iTaukei-57, NZ born-160, FJ born-145

When the mean values of the Actual form for different subcategories were compared, it was found that the biggest difference was observed in gender. The mean value of the Actual scale was 2.47 for males and 2.34 for females, indicating a difference of 0.13. This suggests that male students perceived themselves to be more in control of the shared classroom than their female counterparts. An independent t-test was conducted to determine the significance of this difference.

4.3.6.1 Independent t-test

An independent t-test was performed to determine any significant difference between the mean values of the Actual concerning gender, birthplace and ethnicity. Table 19 shows that there is no significant difference between the mean values concerning gender, birthplace and ethnicity, as the two tailored p-values are more than 0.05. This means that students' perception of how much shared control of the classroom activities is very similar across all categories.

Table 19

Independent t-test of the mean values of the Actual form for Shared control scale

	Independent t-test	
	Equal Variance Assumed	
Shared Control	t	Sig (2-tailored)
Gender	1.03	0.30
Birthplace	0.49	0.62
Ethnicity	0.31	0.76

Note. * denotes statistical differences. P<0.05

Note: Males-143, Females-162, Fijian Indian-248, iTaukei-57, NZ born-160, FJ born-145

In summary, this subsection further processed the CLES-FS data concerning subcategories (gender, birthplace and ethnicity) using SPSS software. For the Identity scale, the mean values of the Preferred form of all subcategories are bigger than the Actual form. It was also found that there is a significant difference in the mean values of the Actual form concerning ethnicity. This means there is a significant difference in the perception of iTaukei students and Fijian Indians in the mean values of the Actual form.

For the Familiar context scale, the mean values of the Preferred form of all subcategories are bigger than the Actual form. There is a significant difference in the mean values of the Actual form concerning gender. This means there is a significant difference in the perception of male students and females in the mean values of the Actual form.

The mean values of the Preferred form of all subcategories are bigger than the Actual form for the Talanoa scale. There is a significant difference in the mean values of the Actual form concerning ethnicity. This means there is a significant difference in the perception of iTaukei and Fijian Indians in the mean values of the Actual form.

For the Critical Voice scale, the mean values of the Preferred form concerning gender and birthplace are lower than the Actual form. However, for ethnicity it is the opposite. The mean value for the Fijian Indian students for the Actual form is higher than the Preferred form compared to iTaukei students. There is no significant difference in the mean values between the subcategories for the Actual form.

The mean values of the Preferred form of all subcategories are bigger than the Actual form for the Shared Control scale. There is no significant difference in the mean values between the subcategories for the Actual form.

Having discussed the difference in the mean values of individual scales concerning gender, birthplace and ethnicity, the next section of this chapter will compare these categories using a graphical representation.

4.4 Representation of means values on a Spider chart

This subsection provides a graphical representation of the means values of CLES-FS data concerning gender, birthplace and ethnicity. The main objective is to represent the different scale mean values (Preferred and Actual forms) of these subcategories in a spider chart, looking for patterns and relationships between different scales. A spider chart, sometimes called a radar chart, is often used to display data across several dimensions. A spider chart is chosen to represent the data because it provides a visual representation which is easy to comprehend. The first graph is of gender, followed by birthplace and ethnicity.

4.4.1 Gender

The mean values of Actual and Preferred forms are drawn on a spider chart concerning gender. As can be seen from Figures 21 and 22 for both genders, the mean values of the Preferred form are higher for the Identity, Familiar Context and Shared Control scale than the Actual form.

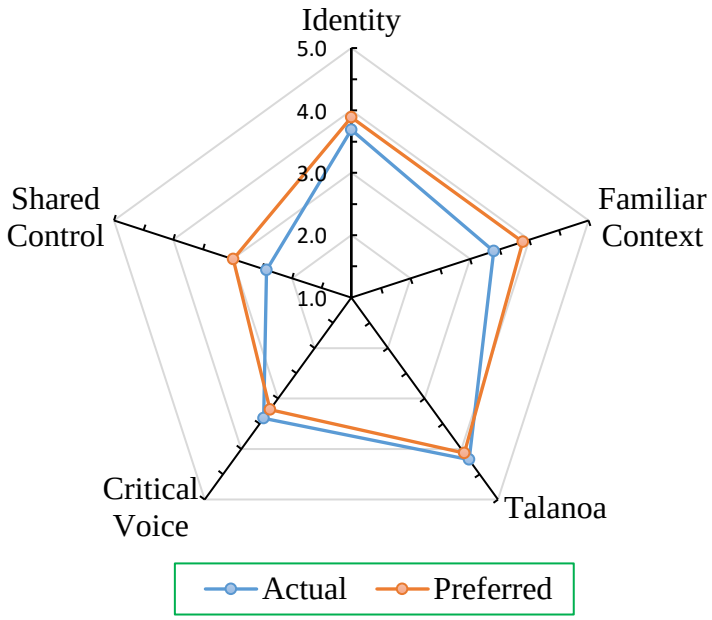
On the other hand, the mean values of the Preferred form of Talanoa and Critical Voice scales are lower than the Actual form. It is important to note that although

the mean value of the Preferred form for Talanoa scale and Critical Voice scale are lower for male and female students, the largest difference is for females in both scales. This shows that female students in this study prefer to be less involved in group activities and are less confident in asking questions in class than their male counterparts.

If teachers can create a learning environment where female Fijian students are comfortable to ask questions in class, learning might become more accessible to them. It is anticipated that female students may allude to the fact that they do not like working in group activities as much as they currently do. Hence, in doing so the gap (mean differences) between the males and females can be reduced for Talanoa and Critical voice scales.

Figure 21

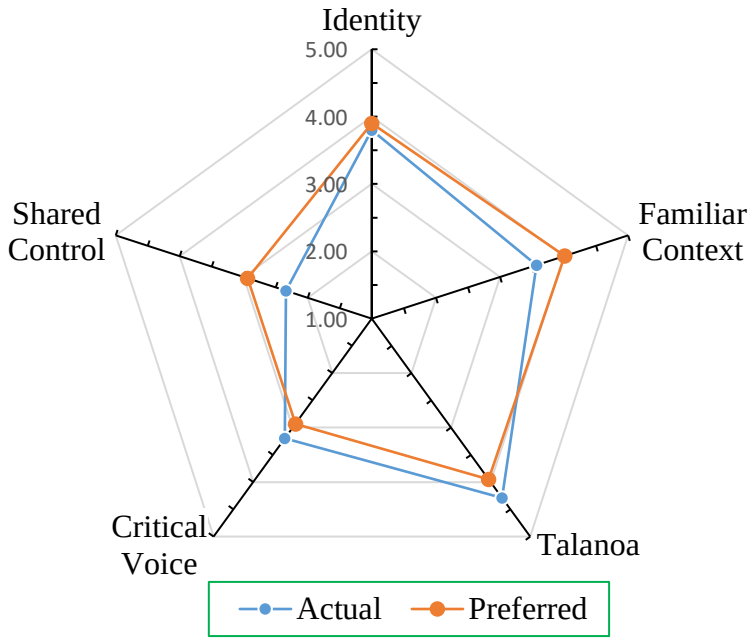
Mean values of Actual, Preferred forms of all scales-Male students



Note: n=143

Figure 22

Mean values of Actual, Preferred forms of all scales- female students



Note: n=162

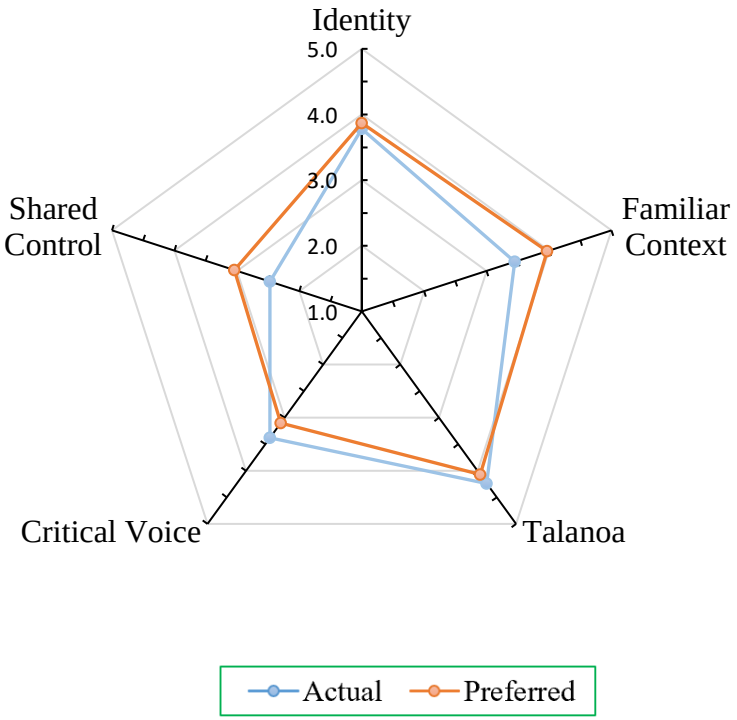
4.4.2 Birthplace

The subsection compares the CLES-FS data of each scale concerning the place of birth. As shown in Figure 23, there seems little difference in mean values of all scales with respect to where participants were born. It is worth noting that the largest difference in terms of the mean value of the Actual and Preferred forms is for the Shared Control scale. This suggests that regardless of where students are born, they want to have a say in what kind of learning activities they want to do.

Shared Control and the Familiar Context scale seem to have a relationship, as shown in Figure 23. If students are given the opportunity to have more shared control of their class, they might be able to let the teacher know what they want to learn. Hence the difference between the mean values of the Actual and Preferred forms concerning birthplace can be decreased.

Figure 23

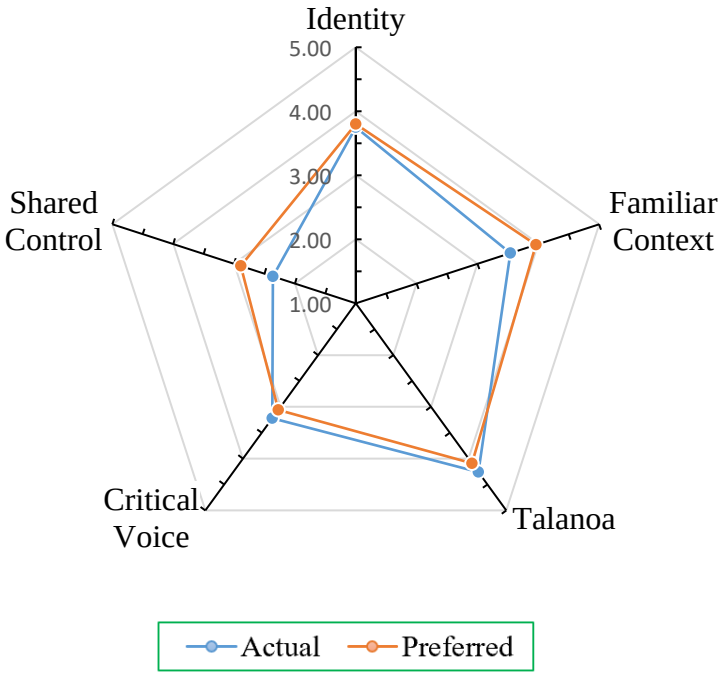
Mean values of Actual, Preferred forms of all scales -Fiji Born



Note: Fiji born students – 145

Figure 24

Mean values of Actual, Preferred forms of all scales -NZ born



Note: NZ born students – 160

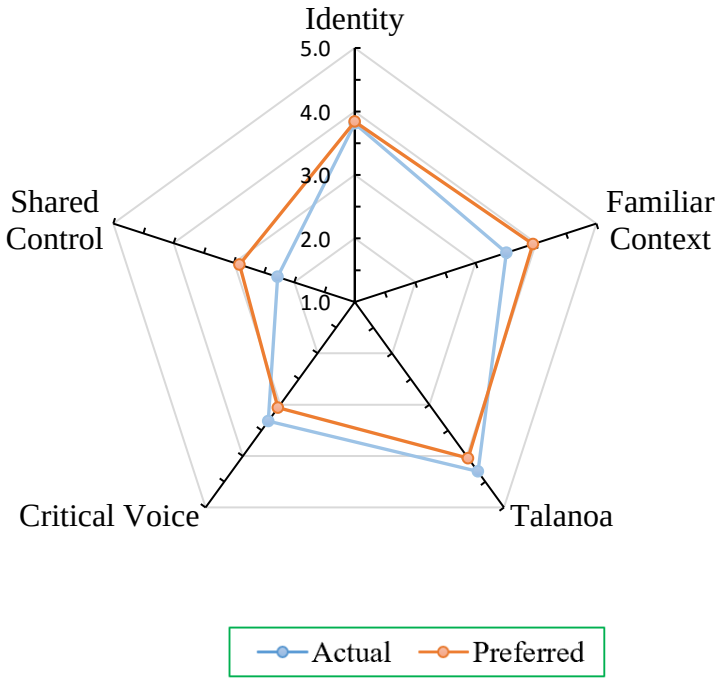
4.4.3 Ethnicity

The mean values of the Preferred and Actual forms are represented on spider chart for iTaukei and Fijian Indian students for all scales, as shown in Figures 25 and 26. It shows that for iTaukei students, the difference between the mean values of the Preferred form and the Actual form is less for Critical Voice Scale compared to Fijian Indian students. A similar trend is also obtained for the Talanoa scale.

This pattern suggests a relationship between Critical Voice and Talanoa scale. It seems that when students are confident in asking questions in class, they can let their teachers know how they want to learn. Hence teachers are able to adjust their ways of teaching.

Figure 25

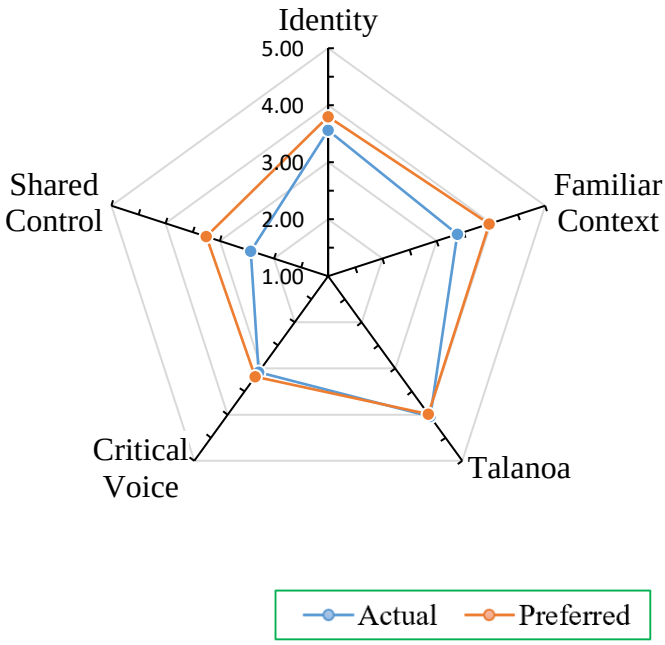
Mean values of Actual, Preferred forms of all scales -Fiji Indian



Note: Number of Fiji Indian students 248

Figure 26

Mean values of Actual, Preferred forms of all scales -iTaukei



Note: Number of iTaukei students = 57

In summary, it can be stated that some of the scales are interrelated. For example, when the difference between the mean value of the Actual and Preferred form is less for the Critical Voice scale, a similar trend is also noticed for the Talanoa Scale. The next subsection discusses the difference between the perception of Fijian students of learning at different year levels.

4.5 Different year levels

This subsection compares the means of the Actual and Preferred forms for different year levels. Table 20 shows the percentage of students who completed the survey at each year level.

Table 20

Percentage of students who participated in the study at different year levels

Year Level	Percentage of Students
9	11
10	15
11	26
12	21
13	27

Statistical differences between the mean values of different scales at various year levels were analysed using a one-way analysis of variance (ANOVA). ANOVA compares the means of two or more independent groups (in this case, year levels) to determine whether they are statistically different. ANOVA produces an F-value (a number), a measure of variation, or how widely the data are spread from the mean. An F value is the ratio of the variance between the groups divided by the variance within the group. A larger F factor indicates greater variability between the groups than within each group.

As shown in Table 21, the F-value of the Identity scale for the Actual form is the largest compared to all scales. This indicates greater variability in the mean values of these scales at different year levels. The variability in the mean values of the Identity scale of the Actual forms may be due to the fact that this scale measures students' perceptions of the opportunities offered to build relationships in the classroom and because different students have different ways of building relationships; hence, variability in the dataset.

On the other hand, the F value for the Preferred form is small compared to the Actual, suggesting less variability in the answer choice. Since the mean value of the Preferred form is larger than the Actual, this indicates that many students want more opportunities to build relationships and share aspects of culture with their teachers and peers.

Another important point to highlight is the F value of the Preferred form of the Familiar Context scale, which is 1. This shows the variability in the mean values of the Preferred form of the Familiar context scale. As can be seen from Table 21 the

mean values increase as you move along from Years 9 to 13 (ages 12 to 18). This may be because as students move to higher year levels, scientific concepts in the curriculum may be difficult to understand; therefore, students prefer concepts to be explained in a familiar context.

The F value of the Preferred form of the Talanoa scale is also more than one, signifying a variability in the mean values for this scale. This may be because students have different ways of learning, and some may prefer to learn more individually than others.

ANOVA also calculates the sig values, which indicate whether the difference between the year levels is statistically significant. Significant values below 0.05 indicate a significant difference between the means of different year levels. All significant values in Table 21 are greater than 0.05, indicating no significant difference between the means of different year levels. The identity scale had a small sig value, 0.06, compared to other scales, suggesting the largest difference in mean within different year levels.

Table 21

One-way Analysis of variance (ANOVA) of the mean values of the Actual and Preferred forms data of different year levels

	Mean Values Year Group					ANOVA Groups	
Scale	Year 9	Year 10	Year 11	Year 12	Year 13	F Value	Sig
Identity (A)	3.65	3.63	3.73	3.73	3.95	2.35#	0.06*
Familiar Context (A)	3.43	3.46	3.42	3.63	3.50	0.76	0.55
Talanoa (A)	4.10	4.26	4.19	4.33	4.32	0.92	0.45
Critical Voice (A)	3.07	3.35	3.29	3.24	3.34	0.49	0.74
Shared Control (A)	2.35	2.33	2.27	2.50	2.48	0.47	0.71
Identity (P)	3.79	3.90	3.81	3.79	3.90	0.30	0.88
Familiar Context (P)	3.81	3.85	3.93	4.03	4.05	1.00#	0.40
Talanoa (P)	3.83	4.12	3.99	4.10	4.07	1.06#	0.37
Critical Voice (P)	2.93	3.06	3.22	2.96	3.13	0.79	0.54
Shared Control (P)	2.86	2.79	3.02	2.89	3.12	0.99	0.42

*Note: *Denotes P very close to 0.05, # F value greater than or equal to 1 (See Appendix G for SPSS Syntax)*

4.5.1 Comparisons between Year 9 and 13 Cohorts

After analysing the data between the different year levels, this subsection aims to identify differences in the perceptions of students who are new to the school (Year 9) compared to those who are about to leave school (Year 13). Of the 305 students who participated in the study, 11% were in Year 9 and 21% in Year 13.

Table 22

Mean values of year 9 and 13 students of the Actual and Preferred form

	Mean Values Year Group			
	Year 9		Year 13	
Scale	Actual	Preferred	Actual	Preferred
Identity	3.65	3.79	3.95	3.90
Familiar Context	3.43	3.81	3.50	4.05
Talanoa	4.10	3.83	4.32	4.07
Critical Voice	3.07	2.93	3.34	3.13
Shared Control	2.35	2.86	2.48	3.12

It is important to note that the mean values of the Actual form for all scales are lower for Year 9 students than for Year 13 students. This suggests that Year 13 students perceive that they have more opportunities to develop relationships, learn in a familiar context, learn in groups, ask questions, and share control of the learning environment. This finding could signal that year 13 students have formed a positive student-teacher and professional relationship with their teachers over the four years. This leads them to perceive that they have more confidence in forming relationships with their teachers and asking questions of their teachers. Since many teachers specialise in their subject areas, they may be more confident in contextualising their teaching contents compared to teachers at junior school.

For the Talanoa scale, both groups of students want their teachers to provide fewer opportunities for them to work in groups. However, for the Critical Voice scale year, 13 students proved more confident in asking their teachers questions. However, both Year 9 and Year 13 students think they need more opportunities to have Shared Control in the class.

In summary, this subsection indicates variability in the perceptions of Fijian students between different year levels. In particular, Year 9 students perceive that there is less opportunity to build relationships and share their culture with teachers and peers. The next section provides the chapter summary.

4.6 Chapter Summary

In summary, CLES-FS can be considered a reliable and valid instrument. This is because Cronbach's alpha values and discriminant validity lie within the expected ranges, which is consistent with the previous research.

Secondly, the overall mean values of the Preferred forms of Identity, Familiar Context and Shared Control scales are greater than the mean values for Actual Forms. This highlights students' preference for greater opportunity for building relationships and sharing different aspects of their culture with teachers and their peers. Fijian students also want to experience more familiar contexts in their learning. In addition, students prefer to have more shared control of their learning.

On the other hand, the Preferred forms mean values are lower than the Actual forms for Talanoa and Critical Voice scales. This shows that students want less group work than they have now and are less inclined to express their opinions in a whole class situation in the ideal than at present.

Data from the CLES-FS was further analysed concerning gender, birthplace and ethnicity to find out if there is any significant difference between the mean values of the Actual forms. It was found that there is a significant difference between the mean values of the Identity scale concerning ethnicity. This indicates that the mean values of the Identity scale concerning Fijian Indian and iTaukei students are significantly different for the Actual form.

For the Familiar Context scale, it was found there is a significant difference between the mean values of the Actual form concerning gender. This suggests female students have a significantly higher mean value than male students.

The mean value concerning ethnicity was significantly different for the Talanoa scale for the Actual scale. This indicates that the mean values of the Talanoa scale concerning Fijian Indian and iTaukei students are significantly different. No significant difference in the mean values of the Actual form for the Critical Voice and Shared Control was found concerning gender, birthplace and ethnicity.

Finally, the analysis of CLES-FS data concerning different year levels showed no significant difference in the year level for any of the scales. However, Year 9 students indicate that they want more opportunities to build relationships with their teacher and peers than Year 13 students.

ॐ सः शनैश्चराय नमः (Sanskrit): शनि, Sani is the Lord of discipline and control. He shows us the truth and keeps us honest.

Chapter 5
Findings from Qualitative Data (Talanoa)

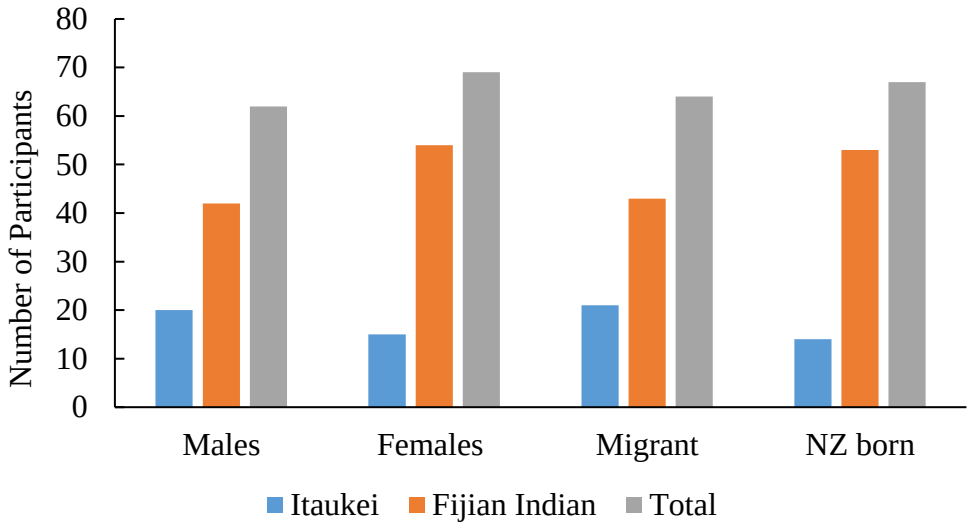
This chapter presents the findings from the talanoa sessions on Fijian students' perceptions of the science learning environment in New Zealand classrooms. The talanoa method was used in this study to collect the qualitative data because the concept of talanoa was familiar to the students. In addition, many Pacific researchers have used talanoa as a research method to collect data on Pacific people. Thematic analysis was used to analyse the talanoa data obtained in this study.

There are five sections in this chapter which are named after the CLES-FS scales: 5.1-Identity, 5.2-Familiar Context, 5.3-Talanoa, 5.4-Critical Voice and 5.5-Shared Control. The main reason the sections were named after the CLES-FS scale names was to distinguish the findings obtained from each scale.

Fifty-seven talanoa sessions involving 131 students were conducted. Talanoa sessions were held with the students after students had done the CLES-FS survey. The breakdown of students in terms of ethnicity, gender, and birthplace is shown in Figure 27. Each talanoa session lasted between 10 to 15 minutes. At times, probing questions were asked to get an insight into the Fijian students' perceptions of their science learning environment. To protect the anonymity of the students, they were assigned a code such as S131, where S stands for student and 131 is the student number. The description of their ethnicity, gender, and place of birth was also recorded. For example, an iTaukei male student, born in Fiji - S131.

Figure 27

Breakdown of students who took part in talanoa sessions in terms of gender, place of birth and ethnicity



5.1 Identity Scale

This subsection is named after the first scale of the CLES-FS which is the Identity scale. It reports data on Fijian students' perceptions of science learning focussing on the extent to which there were opportunities for them to build relationships and share culture with their teachers and peers. The key findings from this scale are the importance of culture to Fijian students, students' sense of belonging in a class, the importance of teacher-student relationships and teacher empathy.

5.1.1 Importance of culture

During the talanoa, the students talked about the importance of their culture(s) in their lives. In this context, the term culture is referred to as the way of life, such as values and beliefs. Students reported that cultural festivals are an important aspect of their lives. They mentioned that they learn about values by celebrating cultural festivals. For example, a Fijian Indian male student mentioned that when they have the festival of 'Ram Naumi', the elders in the community recite verses from the

holy book of Hindus called Ramayana and talk about moral values. Fijian students mentioned that culture identifies who they are. It gives them their identity. In addition, students mentioned that culture helps shape their identity, as reflected in the following quotes:

> Culture is important to us. It constructs our belief system and values, without language and culture, we would not be what we are today. For example, 'Sevusevu', [drinking of kava]. I do not want to be a different person from my parents. I want to preserve my culture and traditions. I want to carry the family traditions and pass them on to our children. (iTaukei male student, born in Fiji - S131)

> Diwali and Holi celebrations are important to me. It's part of my culture. I believe we have also adopted some of the culture from the native people, such as drinking kava, and I am happy to share it with my peers and teachers. (Fijian Indian male student, born in Fiji - S129)

The above quotes show that culture is important to students as they distinguish Fijian students from others. The quotes also indicate some aspect of cultural similarities between Fijian students (iTaukei and Fijian Indian), such as the drinking of kava. The quote of student S129 suggests that Fijian Indians have adapted some aspects of iTaukei culture such as drinking kava as part of their own identity.

Most (about 80%) of the students who participated in the talanoa sessions mentioned they wanted to preserve their culture(s). Students alluded that preservation can be done by passing their cultural knowledge to future generations through sharing as illustrated in the quote below.

> I believe that by sharing the culture with people we will be able to preserve our culture (iTaukei male student, born in Fiji - S131)

During the talanoa sessions students mentioned they are happy to share different aspects of their culture with their peers and teachers. This study has found that Fijian students hold their culture in high regard. They have expressed a strong desire

for schools to provide them with ample opportunities to showcase and share their cultural practices in school.

5.1.2 Sense of Belonging

Students mentioned that sharing their culture gives them a feeling of being accepted in the class. Students mentioned that they get excited and feel accepted when the school celebrates their cultural festivals, or they see some of the arts being displayed in the class which is familiar to them. It appears that when Fijian students are able to share their culture and take part in their cultural festivals in schools, it gives them a sense of belonging in the class.

Furthermore, students mentioned that having the feeling of being accepted in class helps them to engage in class discussions with other students in science learning. A Fijian Indian male student (born in Fiji, S129) said:

> When I feel that I am part of the class, I feel like giving my opinions during the class discussions (S129).

It appears that the feeling of being accepted in class gives Fijian students the confidence to participate in class discussions. It seems that Fijian students perceive that when the teachers and their peers know about their culture, their views will be better accepted and, hence, want to share their ideas during class discussions.

Fijian Indian students indicated that they often had negative experiences at school when it comes to being recognised as students from the Pacific. This is because Fijian Indian students thought that they were left out and not given enough importance compared to other Pacific Island students. Fijian Indian students who took part in the talanoa sessions mentioned that there was a prevalent issue in schools of them being categorised solely as Indians and not recognised as Fijian Indians or of Pacific origin.

> At times, I feel that my culture is not important as others. This is because I feel other cultural activities and languages are given more importance than mine. For example, we hardly see our cultural art and craft displayed in

> school. This [displaying art] makes me feel good about myself and proud. (Fijian Indian male student born in Fiji, S129)

This quote shows this student wants some aspect of his culture to be present in the school. It suggests that this student (S129) thought not having cultural artefacts in school made them feel unwanted or rejected.

An interesting finding was that Fijian Indian students felt that they have more cultural connection to Fiji than India. For example, during the talanoa sessions students mentioned the use of kava in the Fijian Indian community and love for traditional iTaukei dishes like lovo. Lovo is a traditional iTaukei way of cooking food under the ground in an earth oven. It is not an Indian cultural practice.

About 80% of the Fijian Indian students who took part in the talanoa session mentioned that they do not like it when teachers fail to recognise that they are from Fiji. The quote below, from a Fijian Indian female student born in New Zealand, is typical.

> I am proud of my Fijian Indian heritage and not happy when teachers think I am not from the Pacific. I want my teachers to know about our history. (Fijian Indian female student born in New Zealand, S99)

Other students showed frustration when teachers thought Fijian Indian students were from India. Here is a quote from a Fijian Indian female student who was born in Fiji.

> Some teachers think that I am from India. They should ask at least if they do not know. Although we (Fiji Indians and Indian Indians) look similar, it does not mean that we have exactly the same values and culture. 'हम लोग इंडिया इंडियन के जैसे बोलता है!' – which translates into [do I talk like Indians from India!]. (Fijian Indian female student born in Fiji, S63).

The above quotes (S99, S63) show that when teachers fail to understand student's cultural backgrounds, students get agitated. It would be helpful if teachers could

ask the students about their cultural background if in doubt. Teachers can foster cultural awareness in their classroom by actively demonstrating to their students that they genuinely care about their cultural, emotional, and intellectual needs. There are several strategies teachers can use to incorporate cultural awareness into their classroom, such as asking students to research and share information about their ethnic background as a means of fostering a trusting relationship with peers and celebrating different cultural festivals.

5.1.3 Teacher-student (Guru-Shisha) relationship

During the talanoa sessions, students mentioned that they want their teachers to have a positive relationship with them. In this study, a positive teacher-student relationship refers to teachers who care for students' learning and make students feel comfortable talking to them.

Students mentioned that when teachers frequently talk to them, they develop a better understanding of their lifestyles and understand their culture(s) and their learning needs. Students claimed that knowing them well is related to the type of relationship that exists between them and their teachers as stated by S5.

> If we have a positive relationship with our teachers, we feel comfortable talking to them and will better understand each other's cultural backgrounds and learning needs. (iTaukei -female, Fiji born student, S5)
>
> Researcher: What is your understanding of a positive relationship?
>
> Student: A positive relationship means when the teachers who care about our learning and know us on a personal basis…our culture, language…do not growl at us when we make mistakes but correct us and put us on the right path. We like talking to that teacher. (S5)

The above quotes indicate that students are at ease with the teachers with whom they have a good relationship. Many students (about 90%) of the Fijian students who took part in the talanoa sessions shared similar views as shared by student S6

that teachers can build positive relationships by getting to know us on a personal basis. It appears that teachers can build better relationships with their students by taking time to care for and get to know them as individuals rather than as a collective group. This is beyond just finding out the students' names, ethnicity and family backgrounds.

> Researcher: How can the teachers build a good relationship with you?
>
> Student: Teachers can talk to us…..um…. show care, understand our views on different topics, build trust, know us on a personal basis (S6).

It seems that students want teachers to hear their opinions and consider their interests. Some of the ways teachers can also get to know the students and their families is by giving students attention during class and giving them the opportunity to talk about their families or share their cultural backgrounds.

Students also indicated that a positive working relationship has in the past, helped them share their cultural experience with their teachers. A Fijian Indian female mentioned that she was depressed because of a death in her family, and a teacher helped her to reengage in her studies again.

> My grandma used to live with us, and when she died, we did prayers for 13 days. each day, there would be family members coming, and there would be prayers. After the prayer, the relatives will stay back and sing bhajans and kirtans [religious songs] and drink kava. These bhajans and kirtans will go overnight and it will be hard for us to have a good night's sleep. The next morning, I have to go to school. During school time, I will normally get drowsy and sleepy. I told a teacher about my circumstances, with whom I had a good relationship and knew would understand me. After sharing my situation, the teacher helped me by providing me with notes and giving me extra time to complete my internal assessments. I passed the assessments, which boosted my morale (Fijian Indian female student born in Fiji – S120).

The above quote shows this student confided in a teacher with whom she had a positive relationship. Her story also highlights that when students have good relationships with their teachers, they are more confident about discussing their problems.

Students indicated that teachers do not always have to be 'nice' to establish a good relationship. They mentioned that they value teachers who are strict and, at the same time, show affection, as illustrated in the quotes below.

> Student: I do not want teachers to be nice in order to establish a good relationship (S120).
>
> Researcher: What do you mean by the term nice?
>
> Student: Some teachers give us lollies to please us. I do appreciate this gesture, but I want my teachers to be firm and, at the same time, friendly. Some students take advantage of teachers who are too friendly and do not show respect towards them (S120).

The above quotes show that students think that if teachers are too kind to them, it can result in students disrespecting their authority, and the boundaries set by the teacher will not be respected.

5.1.4 Empathetic teachers

Another finding was that Fijian students want their teachers to be genuine. Genuine in this context means teachers who are honest, truthful, and sincere in their relationships with other students. They respect teachers who show genuine care for them and take an interest in their lives. Here is a typical example of a student's voice from a talanoa session.

> If teachers are friendly and pleasant to us or give us lollies and do not push us to do our personal best, it is not good for our future. We want teachers to be firm and guide us in the right direction. We want teachers to genuinely

care for us and show us the path to success. (Fijian Indian male student born in Fiji, S117)

Furthermore, students mentioned that teachers' attitudes towards them form a major factor in determining their relationship with their teachers. They indicated that they like teachers who are calm and are not discriminating. They also mentioned that, where possible, teachers should talk to them on an individual basis so that they come to know about their strengths and weaknesses, and in that way, teachers can help the students succeed.

Student I can judge which teachers genuinely care about my education. Teachers should not be judgmental and make assumptions. Communication is the key to building a relationship and knowing our background will be helpful (iTaukei female student born in NZ, S78)

Researcher What kind of communication are you talking about?

Student My teacher can come and have a chat with me during science classes or meet me during break time and say hello (S78).

Researcher How will knowing your background help you?

Student If teachers know our background culture, they can use some examples of my daily life to explain some of the science concepts to us (S78).

The above dialogue shows that students judge a teacher's commitment to their studies. It also indicates that students do not want teachers to stereotype students. Student S78 wants her teacher to know them personally through having an individual conversation during class time. Furthermore, it also indicates that the student (S78) thinks that if teachers know students' backgrounds, teachers can use examples in science lessons which are familiar to them. The next subsection reports on the findings that emerged out of the Familiar Context scale.

5.2 Familiar Context Scale

This section reports on students' perceptions regarding the Familiar Context scale. This scale explored students' perceptions with regard to what extent there were opportunities provided for students to experience science learning in a familiar context. The findings from this scale are that familiar contexts engage and motivate students in learning and make it easy for students to make sense of their new knowledge.

Many (about 80%) of students who took part in this study mentioned that familiarity motivates them to get involved in their studies. It appears that when students already know the context in which the lesson is being taught, it encourages them to participate in the lessons, as quoted by a Fijian Indian female student born in Fiji.

> If the learning context is familiar to us, it makes sense, and we will be motivated to learn more about it. It makes understanding easier because you know what the teacher is talking about (S120).

The above quote suggests that familiarity in the context encourages Fijian students to participate in science lessons. One of the key points from quote S120 is making sense of the learning. It seems that when students are able to make sense of what they are learning, they get motivated. This could be because the context aligns with their life experiences, leading them to feel a sense of ownership over their learning experience.

Furthermore, students mentioned that familiarity of the context helps them to visualise because they can associate learnings with everyday life experiences.

> Learning in a familiar context helps us because we know the context in which the teacher is teaching. You can imagine the context and relate it to whatever you have seen and….oh this is how it works. the light bulb blinks in our heads. (iTaukei, male student -NZ born, S48).

The above quote suggests that students can helpfully visualise situations used in teaching if the learning context is familiar. It also highlights that this student (S48) learns by connecting the lesson's context to his daily life experience.

5.2.1 Familiar context makes new learning easier

Another finding was that students indicated that learning in a familiar context helps them to grasp science concepts more easily. This may be due to the fact that students are able to relate to a familiar context and make sense of new knowledge easily, as shown by the quote below.

> I tend to get the idea easily when the context of the learning is familiar, and I take longer to process the information when it is unfamiliar, and often, I get disengaged (Fijian Indian, male student -Fiji born S75).

The above descriptions show that comprehending new knowledge becomes simpler when students encounter a learning context that is familiar to them. The quote from student S75 also shows that if the concepts taught are foreign to them and they cannot relate to or make sense of them, they tend to lose interest. This could be one of the reasons students get disruptive in class and do not want to learn.

Students also mentioned that when they get interested in the topic, they can comprehend context that may not be familiar to them. It appears that when the students get interested in learning, they are eager to venture into unfamiliar contexts, as indicated by the student (S103).

> Teachers should start with easy things which are familiar to us to understand and relatable to our everyday lives. Once we get interested and become familiar with the science, abstract ideas can be introduced (iTaukei, female student -Fiji born S103).

It was interesting to note that some students want the learning context to be exciting and relatable to their career pathways. They also mentioned that if the learning content is boring and repetitive, they lose interest in the topic.

> I want the learning context to stimulate our interest in the subject. I tend to get bored when the content is too easy or monotonous. I want to learn about relevant things related to my career pathways. Teachers should be able to make connections to what we are learning and where we will use the knowledge when we leave the school (Fijian Indian male student born in Fiji, S71)

The above quote (S71) shows that this student wants to know the relevance of the learning to his future. Understanding students' interests can help teachers provide quality learning opportunities for them. It seems that by giving students the opportunity to explore areas of interest, students can engage in the learning process. There are many practical ways to encourage students to pursue their interests. Some students may need a little guidance such as joining a school club, science fair or advocacy groups. Membership in such groups can strengthen students' sense of belonging to the school community as they learn to use their voices for change and advocacy. The next subsection reports on the findings from the Talanoa scale.

5.3 Talanoa Scale

This subsection presents results on students' perceptions regarding the use of collaborative learning approaches as a way of constructing knowledge, such as group work. The findings from the talanoa sessions are that Fijian students generally like working in groups as it creates a safe space to collaborate.

> I enjoy working in groups to get the other person's perspective of the topic under discussion. I also get a chance to clear up doubts if I don't understand, and at the same time, [I'm] able to talk to my mates. It's like a safe space to share ideas. (Fijian Indian male student born in NZ, S40)

The above quote shows that students get assurance from their peers about their understanding of the new knowledge they are studying. Furthermore, students like sharing ideas with peers as this helps them clarify misconceptions and, at the same time, they are able to socialise. The quote from students S40 also show that the

benefit of group work is both for cognitive development and emotional wellbeing. It appears that Fijian students perceive group work as a safe space for them to share ideas with their colleagues.

Students also said they prefer to ask their peers if they do not understand something rather than the teacher.

> I prefer to clear my confusion with my peers than the teachers. This helps the teacher to concentrate on another important thing. (S40)

The above quote shows that student S40 felt responsible for other students' learning by clarifying doubts in the group setting rather than with the teacher. This student (S40) may be thinking that group activity frees up teachers to focus on other tasks or they do not want to get unnecessary attention since they may be insecure. Another reason could be that the student (S40) did not want to bring undue attention to himself in class. This may be because he feels embarrassed when asking questions in front of a class.

> Sometimes, it is also the confidence to ask a question to the teacher in front of our colleagues, which can be a bit embarrassing, so it's easy to ask them. (S40)

The above quote shows that asking questions of peers helps students to feel safe. Students spoke of sharing ideas as a way to help them construct knowledge together because they can relate to each other personally. This may be because Fijian students are usually the minority in their class, and it can be that they do not want to be judged or stereotyped by teachers as poor learners. Being taught by a peer can break down barriers that might exist for some otherwise disengaged students. For example, some students may feel more comfortable and more willing to ask for the help they need from their peers. Some students may also feel an increased sense of motivation because they are being taught by someone like them who has managed to learn and who is passionate about the material. In other words, they have a success story right in front of them that inspires them to achieve the same results.

5.3.1 Importance of relationships among peers during group work

Another finding from the Talanoa scale is that relationships with peers play an important role during group work. The study found that the quality of students' peer relationships is a fundamental substrate for developing engagement in group learning. Quality relationships are reported to protect against conflict, rejection, and bullying. The quotes below show that students do not like working in groups if they do not have a good relationship with their peers:

> I don't like working in a group if we are not familiar with the students. The success of the group discussion is dependent on the relationship with other group members. It is not easy to work in groups if we do not know each other well. (Fijian Indian female student born in Fiji, S64)

Students in the study said that they feel comfortable asking questions in groups if they have a good relationship with their peers. A good relationship between students involves mutual respect and students feeling supported. It seems this is important from the perspective of the students.

In addition, group work provides a safe space for students to draw on their cultural experiences to share them with others in the process of making sense of, and constructing, new knowledge. Here is what a student had to say about why they felt safe asking their colleagues rather than the teacher.

> We feel confident discussing ideas because we know them and relate to each other. (S64)
>
> Researcher: So, what makes you relate to each other personally?
>
> Student: We respect and understand each other's language and culture. I know the background of my colleagues, which makes me connect with them. (S64)

It can be said that a high level of peer trust and good relationships increases willingness on the part of students to work together in groups. However, when peer trust is low, relationships are more distant, making it difficult for students to work in groups. Students mentioned that at times, they do not like working in groups.

5.3.2 Where groups do not work

The findings reveal that students are not able to take full advantage of the group activities when the task is too difficult for them. In addition, students mentioned that the design of group activities plays a major role in the success of group work.

> I often struggle to learn when the activity is poorly designed by the teachers, which can cause confusion. (iTaukei male student born in Fiji, S63)

The quote from student S63 shows the importance of the design of the group activity and how the task can lead to little learning when not designed properly. Teachers can consider designing activities which motivate students or select some relevant examples, analogies, or real-life situations that can help students explore the topic.

Another time students do not like working in groups is when teachers give them tasks to complete without clear guidance. Students mentioned that they want to work in groups where the tasks are designed well and clear guidelines are given.

> We want to work in groups if the tasks given have a time limit and groups are structured so that each member knows what they are supposed to do or say. (Fijian Indian male student born in Fiji, S94)

> Researcher: How does structured group work help you?

> Student: So that we don't go off task, most of the time, I have seen teachers put us in groups to discuss specific topics and sit at the table and look at their laptops. We waste our time and get off track. (S94)

Apart from the activity design, students also mentioned that teachers should think about what each member has to do during the group work. Equal distribution of responsibilities among the group's members by the teachers is preferred.

> I have to do everything when the group members don't contribute equally towards a project or task. I might prefer doing this on my own than in a group. Then it becomes unfair for each group member to receive the same grades. (S63)

It seems that students want teachers to consider designing activities that are fairly distributed among group members. The quote from student S63 shows frustration with working in a group and the importance of the fair distribution of work during group activities is clear. It appears that when teachers monitor learning outcomes during group work using either group assessment or a combination of group and individual assessments it frustrates Fijian students. While group grading may be the simplest approach, it encourages free-riders and provokes unfair experiences for students that they do not like. The next subsection reports on the findings from the Critical Voice scale.

5.4 Critical Voice Scale

This subsection reports from the talanoa sessions on students' confidence in asking questions in the class. The finding from this scale is that students are hesitant to ask questions in whole class situations. However, it is easier for students to ask questions to the teacher when there is a positive students teacher relationship, and the classroom room environment is conducive to learning. An iTaukei student (S6) explained why she lacked confidence in asking questions to the teacher in a whole class situation.

> Student: No, I am not confident in asking the question. Because I feel that the whole class might look at me and I will get unnecessary attention. (iTaukei female student born in Fiji, S6)

> Researcher: Is it the teacher's fault that you feel this way?

Student: No, it is not the teacher's fault. It is just me. It's just me. I am a shy person. (S6)

Researcher: What can the teacher do to make you comfortable asking a question in class?

Student: Maybe the teacher can come and talk to us personally or find out whether I have understood the concept. Asking a general question in class is of no help to me. I feel confident in asking my science teacher a question on a one-to-one basis because if I ask a dumb question, no one is there to listen. (S6)

Researcher: If you do not understand concepts in class will you ask your teacher to explain again?

Student: No, I will not. (S6).

Researcher: Why?

Student: I think the teacher may feel offended. (S6)

Researcher: How will you learn the concepts then?

Student: I will go home and do my own revision. (S6)

The above conversation shows that students lack courage, which makes them apprehensive about asking questions. It seems student (S6) perceives asking questions as a pathway to attention seeking, which she finds unattractive. This can lead to silence. While it is reasonable to assume that student (S6) is shy to speak up as an individual, it is important to recognise that there can also be cultural and environmental aspects to silence in public arenas. It may be that it is her culture that hinders student (S6) from asking questions during class. In some cultures, asking questions in a whole class situation can imply that the teacher is not teaching well,

or the student is challenging the teacher on a particular topic. Interestingly, some students mentioned that, generally, they do not like questioning the teacher. They said that according to their culture, teachers are respected figures, and they tend to follow the instructions from the teachers without question.

> In our culture, we do not question the person in authority. My parents have told me to respect the teachers. This is how we have been brought up in our home to respect the elders because teachers are like our elders. (S40)

The above quote shows that culture plays a major role in students' self-confidence when it comes to interacting with the teacher. Even though Fijian students have migrated to a new country, some still carry their values and traditions with regard to respecting the person in authority. In education, this means a teacher. Asking teachers to repeat the explanations of concepts under study is like challenging their authority and disrespecting them. If teachers are respected figures in the class and disrespecting them is against a student's culture, what matters is how the teacher creates ways for students to check and build their understanding that does not feel disrespectful or culturally dangerous. However, values can be misinterpreted by teachers who do not understand the cultural norms of the Fijian students, resulting in teachers misinterpreting reticence on the part of students to ask questions to be an individual trait about which the teacher can do little.

It can also be interpreted that student (S6) seems to be aware of her surroundings and is afraid of being judged. This may be a personal response, or it may be related to racism previously experienced as a student from a minority background. It appears that speaking up in class could indicate publicly that they do not understand the material or create judgment based on the idea that their questions will make them appear unintelligent to their classmates, perhaps conforming to a pre-existing stereotype. It was interesting to find out that students felt comfortable asking questions when the environment was conducive to learning. This points to the idea that it is not asking that is problematic, but who will hear them asking and how it will be interpreted.

5.4.1 When are students comfortable in asking questions.

According to the students, the learning environment plays a major role in their confidence in asking questions in class. The learning environment, in this instance, refers to the prevailing mood, attitudes, standards, and tone that students perceive in the classroom. A negative climate in the classroom can feel hostile, chaotic, and out of control. Chaos does not engender safety. A positive classroom climate feels safe, respectful, and welcoming and supports student learning.

The class climate is not created by chance. Regardless of students' past experiences, there are things teachers can do to intentionally transform the classroom into a positive learning environment. Students indicated that if the classroom climate is welcoming, there is a higher chance of them asking a question in the class.

> I am confident in asking questions in class when the atmosphere is relaxed, and I have a good relationship with our teacher. (Fijian Indian male student born in Fiji, S40)

The above quote shows that the teacher-student relationship and the classroom learning environment can encourage students (S40) to ask questions in class. Being relaxed suggests a place where judgement is not a main aspect of the lesson so that students do not need to defend themselves through silence. Teachers can develop and reinforce class rules and norms that clearly support safe and respectful behaviour. Classroom rules help teachers create a predictable, safe learning environment for the students. Rules give students clear boundaries and opportunities to practice self-regulation and make good decisions. When students feel safe and respected, both emotionally and physically, they are better able to focus on learning and are confident in asking questions in class.

During the talanoa sessions, students shared sentiments similar to those above, such as that they are confident in asking questions in class when the teachers make them feel comfortable. This perception mediates away from the idea of personal shyness and re-focusses attention on the shared environment. The next subsection reports on the findings from the Shared Control scale.

5.5 Shared Control Scale

This subsection reports on the findings regarding the students' perceptions concerning the extent to which students want to share control of the class. The finding reveals that students have little control over how they learn.

> Most of the time, my teacher comes to class and starts teaching. They hardly ask us how we want to learn. (Fijian Indian girl born in Fiji, S10)

The above quote shows that often teachers control how students would be learning. This may be due to many reasons, such as teachers do not have time to prepare how students want to learn, so they do not bother asking them, or teachers are not concerned about knowing how students want to learn.

Students who participated in the talanoa sessions mentioned they would like to let teachers know how they learn in class. By understanding how students want to learn, teachers can apply appropriate pedagogy to suit students' needs. As a result, this may provide students with quality learning opportunities and make them more engaged in learning.

> Student: It will be good to let teachers know how I want to learn because I am a hands-on person, and when I do stuff, I learn faster. (Fijian Indian female student born in Fiji, S63)
>
> Researcher: What stops you from telling your teachers how you want to learn?
>
> Student: We respect teachers and do not want to hurt their feelings by telling them what they should do. I do not want to interfere with the teacher's job. It can also be rude to tell the teachers how I to learn. (S63)

The above quote shows that although some students want to tell teachers how they want to learn, they are hesitant because they perceive they have an obligation to

protect the feelings of the teacher. Students personally do not want to upset the teacher or hurt their feelings, as mentioned by student S63. It could indicate that Fijian students often do not want to interfere in teaching and learning for cultural reasons and would rather go with the flow, or they lack the confidence to intervene, as discussed in section 5.4 of this chapter.

Another reason why Fijian students do not want to let their teachers know how they should be taught is that they believe teachers know better than them.

> Student: I do not want to tell the teacher how I want to study because teachers know better than us, and I trust my teachers. (iTaukei male students born in Fiji, S132)
>
> Researcher: Why do you think teachers know better how you want to learn?
>
> Student: This is because teachers have more knowledge than us. This is because, in our culture, teachers are supposed to know what is best for us. (S132)

The above quotes suggest that culture plays an important role in deciding how students talk to their teachers. The quote from the student (S132) indicates that Fijian students perceive a hierarchy in education. Teachers are knowledge holders, implying that students are relatively empty vessels. Cultural discrepancies between students and teachers can lead to students not asking questions in class, but teachers have the power to change the way classes are run to moderate the effects of cultural constructs of respect on ‘ako’ as a way of learning. Ako is a Māori term which means to both [teach and learn]. Ako represents a reciprocal, non-hierarchical relationship between the student and the teacher.

Surprisingly, some students mentioned that they are hesitant to let their teacher know how they want to learn because they are not sure what is important for them to learn in order to enter higher education.

> I followed the teacher's plan (standards being offered to me) because I was not sure what was important for me to learn to go to university. Teachers have been to universities, so they know better than us. (Fiji Indian male student born in Fiji, S118)

The above quote shows that student (S118) does not know what is needed for situations he has yet to encounter. As a result, he relies on his teachers to determine what should be taught. Although this is understandable, teachers could unlock students' reliance on them by offering outlines that explain the relevance of content and where it might lead, rather than revealing material a step at a time and fostering this kind of helplessness in students.

5.5.1 Teacher pedagogy

Students stated that giving them the choice of different learning activities in class would be helpful. They would like to have some options when it comes to how and what they learn.

> At times, I prefer to learn alone by reading through the notes and doing questions from the book. However, it depends on what I am learning. Sometimes, I prefer to do practicals in groups. It also depends on the time of the day. Normally in the mornings, I want to learn silently without interference from others. However, during afternoons I am a bit flexible. (Fiji Indian male student born in Fiji, S117)

The above quote shows that the student's preferred learning ways change during different times of the day. It also shows there is no preferred way of learning for student S117, so it would be a good idea for teachers to ask students how they would like to learn. The respect Fijian students hold towards their teachers can be a barrier for them to query the teacher's pedagogy. It seems that Fijian students have confidence in their teachers to let them decide how they should be taught. However, students mentioned that it would be good if they were given options regarding the range and type of activities they want to do in class.

5.6 Chapter Summary

In summary, it can be said that many Fijian students have a strong sense of identity and belonging from their cultural values. The relationship between the students and their teachers plays an essential role in their learning. Furthermore, the findings indicate that teachers having a positive relationship with their students and valuing who they are and where they have come from increases students' self-efficacy and helps in their identity formation.

Many students want to learn science ideas in a familiar context. Learning in a familiar context helps them connect with their everyday life experiences, which makes learning more relevant. They claim to connect and understand better if everyday examples are used in the class. In addition, the findings reveal that learning in a familiar context motivates students in class and helps them learn faster than in an unfamiliar context. Abstract ideas can be usefully introduced once students get interested in a topic. It was interesting to note that apart from learning in a familiar context, students want to know the relevance of their learning to their career pathways.

The large majority of students feel comfortable learning in groups. Students indicated they were more comfortable having scientific ideas explained by their peers than by the teacher. This study found that Fijian students are confident in asking questions in group discussion rather than in the whole class. However, group work needs to be structured and purposeful for effective learning to occur. They do not like working in groups when group activities are poorly designed or where they do not have a good relationship with other group members.

Not many students like to question the teacher about how they are being taught. Students implied that they regard the teacher as a respected figure and do not like questioning them. Students indicated that in their cultures it may be disrespectful to question the authority of the teacher because they are regarded as gurus or mentors. Some students lack the courage to tell the teacher what and how they want to learn and trust their teachers to make the correct choices instead.

'त्वमेव माता च पिता त्वमेव ।त्वमेव बन्धुश्च सखा त्वमेव ।त्वमेव विद्या द्रविणम् त्वमेव ।त्वमेव सर्वम् मम देव देव ॥' [You are my mother and you are my father.
You are my family and you are my friend.
You are my wisdom and you are my wealth.
You are truly my all, my true God].

Chapter 6

Interpretation and Discussions from Findings

The purpose of this chapter is to interpret and discuss the findings. This chapter reports a synthesis of the findings, quantitative (CLES-FS) and qualitative (talanoa) and provides an overall discussion that endeavours to link them together. Selected statistical data from individual items of the CLES-FS survey, as well as quotes from the talanoa sessions, are used to provide clarity and greater depth of understanding. It is divided into two major sections. The first major section responds to research questions one and two of the research, which are:

1. What are the perceptions of Fijian students about their current and preferred learning environment in science classrooms in New Zealand secondary schools?

2. How can the learning environment be altered to make it easier for Fijian students to engage in learning?

Section 6.1 is divided into five subsections according to the scale names of the CLES-FS. The names of the scales are Identity, Familiar Context, Talanoa, Critical Voice and Shared Control. This was done to provide clarity to the research questions from the different scales. The findings from the talanoa sessions are used to provide insight into the students' perceptions of each of these scales.

Section 6.2 of this chapter provides an interpretation and discussion of CLES-FS findings to answer the supplementary question. This question was to find out the differences in perception between the ethnic groups, gender, place of birth, and year levels. In other words, the supplementary question sought to highlight any

significant differences in Fijian students' perceptions of science learning across groups characterised by gender, ethnicity, place of birth and year levels.

6.1 Discussions based on research questions

In this section, the discussion and interpretation are based on findings from the 305 Fijian students who participated in the CLES-FS survey and the 131 students who took part in 57 talanoa sessions. There are five subsections in this section. Each section is named after the scales of CLES-FS. As mentioned before, the names of these subsections are: Identity, Familiar Context, Talanoa, Critical Voice and Shared Control.

6.1.1 First scale - Identity

This subsection interprets and discusses the findings from the Identity scale of CLES-FS. The purpose of this scale was to find out the extent to which there are opportunities for Fijian students to build relationships and to share and experience different aspects of their culture with their teachers and peers. The results from the CLES-FS show that the overall mean value of the Preferred form of this scale was 3.83, which is higher than the 3.76 of the Actual form. Paired-sample t-tests were carried out to find out if this was a significant difference in the mean values of Actual and Preferred forms. The paired sample t-test of this scale shows a p-value of 0.118, as shown in Table 9 of Chapter 4, section 4.2.4. It shows that the overall difference in the mean values is not statistically significant, however, the higher value of the Preferred form does indicate that students want more opportunities to build relationships with their teachers and share and experience different aspects of their culture.

Key findings from the talanoa sessions concerning this scale were that the students reported an emphasis on valuing their Fijian culture in the classroom. The students discussed the importance of the teacher creating a culturally safe learning environment. Furthermore, they mentioned that a culturally safe learning environment can be based on positive student-teacher relationships, mutual respect, trust, caring and a sense of belonging.

6.1.1.1 Significance of culture

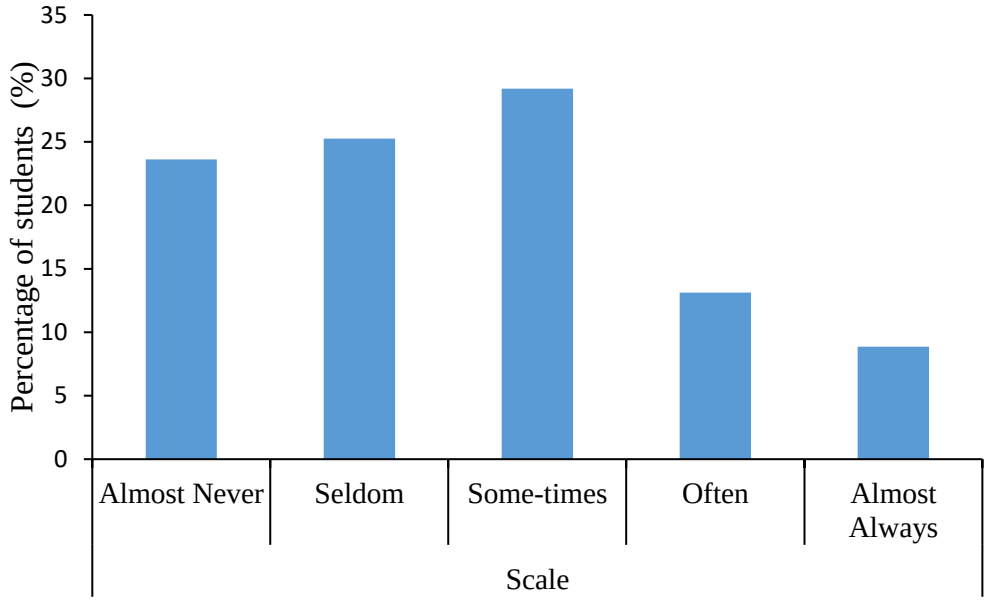
This study found that Fijian students perceive their culture as an important aspect of their life. In the talanoa sessions, students said they wanted their teachers and peers to know more about their culture. For example, a Fijian Indian male student who had recently migrated from Fiji said that they celebrate the Diwali festival in schools in Fiji, but in New Zealand, they do not. He mentioned that since Fijian Indians are a minority in the school their cultural festivals are being overlooked. This could be due to the fact that Fijian students celebrate their cultural festivals in their schools. However, when Fijian students migrate to New Zealand, they do not experience this. Being unable to experience their cultural festival in school would be frustrating to some Fijian students. If teachers are able to facilitate the celebration of different cultural festivals of their students, it could be a solution.

Similar sentiments are shared by the Education Review Office (2023), their reports show that often ethnic minority students in New Zealand schools have limited opportunities to share their cultural experiences in a classroom. One reason is that there are challenges for classroom teachers in terms of providing opportunities for the growing ethnic diversity in the student population. However, Bell (2011) states that when students share their cultural experiences in class, they often feel accepted in class, which motivates them to take an active part in learning.

To quantify how many Fijian students are able to share their cultural experiences in science classes, item three of CLES-FS was analysed. Item three on the Actual form examined responses to the statement, “I have an opportunity to share my cultural experiences with others during the science lessons” Of the 305 participants, 22% signalled that they “almost always” or “often” had the opportunity to share their cultural experiences in science classes. This indicates that 78% of the students who took part in the survey have sometimes, seldom or never had the opportunity to share their cultural experiences, as shown in Figure 28. This is significant given the importance Fijian students give to sharing of their culture with others in schools.

Figure 28

Responses for item number 3 of the Actual form (CLES-FS)



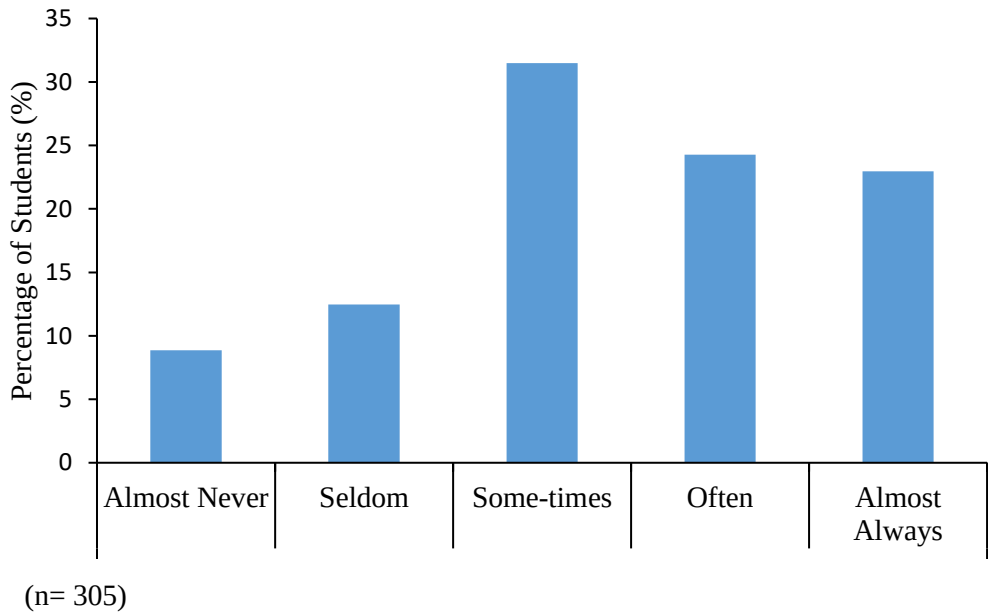
(n= 305)

Note. Item three- "I have an opportunity to share my cultural experiences with others during the science lessons" (Appendix F)**,** On a Likert scale, 1 - Almost Never, 2 - Seldom, 3 - Sometimes, 4 – Often, 5 - Almost Always

Item number three of the Preferred form (See Appendix F) was also analysed in order to find out how many Fijian students want to share their culture with their teacher. Interestingly, about 50% of students indicated that they either want "always" or "often" to share their cultural experiences, as shown in Figure 29. This is an important point because it shows that 23% of students who want to share their cultural experiences think they are not given enough opportunities.

Figure 29

Responses for item number 3 of the Preferred form (CLES-FS)



Note. item three- "I want to share my cultural experiences with others during the science lessons" (Appendix F)

Possible reasons Fijian students are not able to share their cultural experiences could be that teachers are under pressure to cover the curriculum, and they do not have time to ask students about their cultural experience, or that teachers see their role as subject experts and that cultural matters are not an essential part of their job. Nevertheless, the findings indicate that nearly a quarter of the students are keen to have further opportunities to share their culture in science lessons.

Studies show that many Fijian students prefer to relate learning to their cultural experiences (Ali, 2016; Bakalevu, 1997; Puamau, 1999; Sharma, 2012). Teachers should consider innovative ways to create opportunities for students to share each other's culture and relate it to their learning outcomes. This could include asking questions of students about their culture and the use of some cultural contexts in their everyday teaching. For example, during Diwali celebrations, Fijian Indian students make a lot of different kinds of food. Science teachers can use this food

(Fijian Indians make during the Diwali celebration) for food testing and also allow other students from different ethnic backgrounds to do the same.

6.1.1.2 Implications for developing the teacher's understanding of students' culture

Students said sharing their culture would help teachers understand them better, so teachers would be able to give greater support in their learning. For example, a student said during talanoa session that "Sharing our culture with teachers and other students will bring cultural understanding" (Fijian Indian, female students born in Fiji, S11). Many students shared a similar sentiment that allowing them to share their cultural knowledge could foster greater understanding between the teachers and themselves. Fijian students also mentioned that when teachers know at least some aspects of their cultures, it will help them contextualise their teaching, so it is easier for them to understand the concepts. This aligns with sociocultural theory which considers peoples' cultures and worldviews to be important elements for knowledge construction (Vygotsky et al., 1978). Vygotsky's theory acknowledges an individual's culture, ways of reasoning, working together, communicating ideas, and negotiating with others.

Similar insights were obtained by McDonald and Lipine (2011), who studied Samoan students in New Zealand secondary schools about the value of sharing their culture with their teachers. McDonald and Lipine (2011) found that one of the advantages of teachers knowing about the learner's culture is better personal support for students in their learning. Gay (2018) calls this kind of support culturally responsive teaching (CRT). CRT makes learning relevant and effective for students by drawing on students' cultural knowledge and life experiences. Culturally responsive teaching would involve teachers acknowledging and utilising students' cultural experiences in the classroom. This can include recognising various aspects of cultural experiences brought by the students and incorporating them into teaching practices.

Bishop and Berryman (2009), who hold Māori perspectives, share a similar view that if teachers understand students' culture, they are better prepared for culturally responsive teaching. They argue that this makes teachers more responsive in their cultural ways of teaching. Understanding students' cultures can also help teachers develop culturally responsive pedagogies (CRP), a way to enact CRT. Lemon and Edward (2017) found that teachers can use CRP to help engage disengaged students. Similar sentiments are echoed by Bishop (2019), who says that teachers who try to develop their understanding of their students' culture are able to engage disengaged students compared to those who do not.

According to Bishop (2019), knowing one's culture fosters greater understanding between people. This study on Fijian students consolidates what Bishop (2019) has stated as a general principle and offers an application in a school setting. Knowing about students' cultural backgrounds can help teachers make appropriate decisions about supporting students' learning. As discussed in section 5.1.3, for example, if someone dies in a Fijian Indian Hindu family, the rituals go on for 13 days. If teachers understand the Fijian Indian funeral process, they can be more supportive of students during this time. It might be possible to extend deadlines, organise a catch up of missed work and appoint another student to take notes for the absent class member. In this study, it is clear that Fijian students advocate that knowing about students' culture can help to use culturally responsive teaching.

Fijian students also indicated that they feel proud '**गव**' when they see their teachers are responsive towards their culture by incorporating some elements into daily teaching. **गव** - a Hindi word that means [being proud of yourself]. "I get excited when I hear the teachers give examples from my culture to explain concepts in class" (iTaukei, male student born in New Zealand, S133). This enthusiasm is because Fijian students value their culture and regard it as an important part of their lives. A study done by Ali (2006) in Fiji shows that iTaukei students are interested in learning about their own culture and history. Similar sentiments are echoed by a group of Fijian Indian students' who commented that they are proud of their culture and appreciate when their teachers also show interest in learning about it (Pasefikaproud, 2021).

6.1.1.3 Relationship

Another theme that emerged from the data analysis was the importance of a positive relationship between the student and the teacher. About 90% of the students mentioned that they want to have a positive student-teacher relationship with their teachers because it helps them to feel comfortable in class. This result is not surprising as Bell (2011) mentioned that teaching can be theorised as a relational practice and a relational practice acknowledges that the teacher-student relationship plays a vital role in student engagement in learning. According to the Fijian students, a positive relationship can help the teacher to understand the students better and to encourage high expectations from them. Teachers with high expectations show a commitment to their students so they will achieve academically and not be based on deficit thinking (Te Kete Ipurangi, 2023).

According to Giles et al. (2012), positive relationships can be underpinned by the conscious practice of reflection in teaching. The authors state a range of conceptualisations which students can bring to student-teacher relationships. In Pacific culture, teachers are looked upon as role models, people who can be trusted, and go-to people in times of difficulty (McNamara & Naepi, 2018; Thaman, 2014). In this study, many Fijian students mentioned that they regard teachers as having a special status in society. In the Fijian Indian culture, they regard them as their gurus. A guru in Hindu culture can mean a person with knowledge and wisdom. Gurus are often looked upon for guidance in difficult times. This finding shows that Fijian students can carry cultural values with them into school. However, if the Fijian students' expectations are not met, it can put a strain on building a positive relationship with their teachers. It might be helpful for teachers who are not familiar with Fijian students' expectations of them to think about the implications of being a 'guru' and the responsibilities this entails.

Reynolds (2018) argues that when teachers lack cultural understanding of their students, it can impact the student-teacher relationship. He also talks about teachers' responsibilities to fulfil their students' expectations. Students said that a positive student-teacher relationship helps them to trust their teachers, so they can share

problems with them regarding the subject matter or even with matters related to their personal life. “If we have a positive relationship with our teachers, we feel comfortable talking about our learning difficulties (iTaukei -female, Fiji born student, S5). It seems the nature of positive student-teacher relationships encompasses trust, care, believing in students’ abilities, knowing the students’ worldviews and reciprocity and responsiveness. In addition, the quote by student S5 also shows that when teachers have positive relationships, students seem to become more open about their learning issues. Tait et al. (2018) found similar results that a positive relationship is crucial in understanding Pacific students. They asserted that teachers of Pacific students should be mindful of this and endeavour to build positive relationships with their students. The next subsections discuss how teachers of Fijian students can build positive relationships.

6.1.1.4 Developing positive (good) student-teacher relationship

During the talanoa sessions, Fijian students said there are several ways teachers can establish positive relationships with their students. Examples include one-on-one talking, cracking a joke or sharing knowledge about sports, culture or music. It seems that when teachers talk to students on an individual basis, they are able to form connections, as stated by iTaukei, a female Fiji born student (S5), "I like friendly teachers who talk to me". According to Flavell (2023), when students and teachers have one-on-one conversations, they can connect and better understand each other's viewpoints which helps in building positive relationships. This is aligned with Fletcher et al. (2011), who mentioned that a positive relationship can be developed between the student and the teacher when teachers are able to connect with the students on a personal level by talking to students individually.

Some students mentioned that teachers making connections with their whānau (families and/or guardians) can be a way to establish a positive relationship with them. “One of my teachers knows my family; I feel comfortable talking to this teacher”, a Fijian Indian female student born in Fiji (S120). It appears that knowing the families of Fijian students helps teachers to understand the students better. Similar sentiments are also echoed by Mutch & Collins (2012), who conducted an

external evaluation of over two hundred New Zealand schools and found that enhancing and strengthening home-school partnerships strengthens the student-teacher relationship. The report mentions that mutual trust and respect are critical to building a genuine relationship between teachers and students (Mutch & Collins, 2012).

The findings from this study also show that mutual respect between students and teachers is important in building a positive relationship. Hargraves (2019) claims that Pasifika students prefer responsive, reasonable, and available teachers who 'teach from their hearts' [show commitments] and regularly describe and frame students as competent. Respect is important. Students in this study report that when they feel the teacher is not respecting them, they respond by ignoring the teacher and avoiding participation. Pacific students want the teacher to be a strong authority figure in the classroom so there is order and discipline in a class. They do not want teachers to act as substitute parents, which they see as an insult (Hargraves, 2019; Rimoni & Averill, 2019). The building of relationships is a matter of great skill.

A possible way for teachers to develop positive relationships with Fijian students is to talk to them on an individual basis. The findings suggest the students wanted more time to share stories and life experiences. They reported the challenges of crossing cultures between school and home life, and understanding the beliefs and assumptions of Fijian culture and other cultures is important. One suggestion is to make a designated time in the lesson for this to happen so it is seen as worthwhile. A positive relationship not only helps engage students in learning but also has other advantages, as discussed in the next subsection.

Another way to establish a good working relationship with Fijian students is by greeting them in their mother tongue. Generally, for iTaukei students, the greeting is "Ni Sa bula", and for Fijian Indian students is either "Ramram, Namaskaram, Salan Walekum or Sasriikaal" The reason for different types of greetings for Fijian Indian students is due to the fact that Fijian Indians came from many different states in India (Ali, 1977) bringing with them different cultures and languages. Thompson et al. (2019) shared a similar view that, generally, Pacific students appreciate it

when teachers greet them in their own language, which helps teachers form good relationships with them.

6.1.1.5 Implications of a positive learning relationship

This study identified a range of positive outcomes for Fijian students when they have a good relationship with their teachers. It revealed that having a good relationship helps students to have the confidence to trust their teachers. Students mentioned that when they trust their teachers, sharing problems related to the subject matter and their personal life is easier. According to Reynolds (2018), a positive student-teacher relationship creates an atmosphere where Pacific students feel comfortable talking to the teacher. This corresponds with a claim made by Hunter et al. (2016), who stated that having a good relationship enhances teacher and student interactions. In other research, Pacific students talked about how having a good relationship with teachers helps them to open up and ask questions in class (Te Kete Ipurangi, 2023).

This study found a similar outcome that having a good student-teacher relationship makes students feel comfortable talking to their teacher. One of the reasons may be that having a positive relationship removes the fear from the students of being stereotyped. One example from the talanoa encounter was a narrative from a female student when she spoke of how she fabricated her science understanding to please the teacher. She wanted her science teacher to think she had a good understanding of the science ideas, but in reality, she did not have the confidence to reveal her true thoughts. This shows that when teachers have a positive relationship with their students, they are honest in giving the answers to their teachers.

It appears that Fijian students perceive that they are being stereotyped if they do not understand science concepts, so they do not let their teacher know of their difficulties in learning. Positive relationships remove this perception of Fijian students, and they are able to let the teachers know if they do not understand science concepts. This claim is backed up by the results of the study by Brison (2011), who

found that a positive relationship often makes Fijian students feel comfortable giving honest answers to their teachers.

In summary, the result of this study indicates that Fijian students are more comfortable in talking and giving honest answers to teachers when they have positive relationships with them. The advantages of having a positive student-teacher relationship can lead to students enjoying learning experiences at school. In addition, positive teacher-student relations are related to better class performance and a stronger sense of belonging at school (Darling–Hammond et al., 2020; OECD, 2017).

6.1.1.6 Belonging

The current study found that a sense of belonging in a classroom is important to Fijian students because it boosts their self-confidence which helps them to actively engage in learning. In this case, a sense of belonging means the feeling of being accepted by others for who they are. For example, an iTaukei female student born in Fiji (S6) mentioned that "when I feel that I am part of a class, I tend to participate in discussions". This quote shows that when students feel they belong to the class, it encourages them to take an active part in their learning. It appears that students tend to be more motivated to learn when they have a sense of value and connection with their teachers and peers. Similar views are expressed by Krause-Levy et al. (2021) that a sense of belonging in the class increases students' learning engagement, and they take ownership of their learning.

Many students who took part in the talanoa sessions said that teachers could make them feel a part of the class by displaying some of their cultural artefacts in class. A female Fijian Indian student mentioned during the talanoa sessions that there was no Fijian Indian art on display in her school. In addition, she said that to provide better representation and support for Fijian students in New Zealand, teachers can display posters that reflect Fiji's culture and identity, such as the flag or images of the country and its people. Allen et al. (2021) mention teachers can give a sense of belonging in a class is by creating a learning environment that reflects students'

worldviews. The authors mention that students' cultural and ethnic knowledge, language, values, and practices can consolidate a sense of belonging in class. This is similar to a socio-cultural view of learning that acknowledges students' worldviews (Ministry of Education, 2018).

Fijian Indian students reported that schools often do not see Fijian Indians as an ethnic group that belongs to the Pacific region. During the talanoa sessions, Fijian Indian students mentioned that they are proud to be from the Pacific (rather than Asia). Fijian Indian students said they feel connected to Fiji because many of their parents were born in Fiji, and they have family ties. Similar sentiments were echoed by a group of Fijian Indian students who made a small video clip in one of the schools in South Auckland regarding their wish to be regarded as Fijian Indian in their school (Pasefikaproud, 2021).

In another example, a female Fijian Indian student said that their teachers often think that because she looks like an Indian, she must be from India. According to her, there are subtle differences between herself and her Indian friends from India. For example, Fijian Indians have a dialect called 'Fiji Baat' or Fiji Hindi. Fiji Baat/Fiji Hindi is a Hindi dialect spoken by people of Indian descent in Fiji. It is a mixture of Hindi, English, and iTaukei languages. These sentiments are shared by most (about 80%) of the Fijian Indian students who took part in the talanoa sessions. This finding makes sense because Fijian Indians have been living in Fiji for over 150 years, which would have allowed many Fijian Indians to adapt to iTaukei languages and cultures.

As mentioned by Gillion (1958), many Indians, when they arrived from India, needed to make their daily living by relying on local resources such as food. In order to access these resources, Indians would have been talking to the iTaukei people and, in the process, incorporated some words into their language. This is because the iTaukei word could not be translated into Hindi, so Fijian Indians started to use the iTaukei word as part of their language. For example, the use of the word Kava in Fiji Hindi. In doing so, Fijian Indians have developed a unique language. Janifa Khan, a Senior Advisor for the Ministry of Social Development, describes her experience as a Fijian Indian. She noted that many people in New

Zealand are unaware of the history of Fijian Indians, so they cannot understand the Fijian Indians' view of being part of the Pacific. Hundt (2018) reported a similar result that Fijian Indian people speak a different dialect of Hindi he called Fiji Hindi and concluded that because Fijian Indians have adopted iTaukei cultures, they are often seen as 'other' by the people from India who live in New Zealand. Similar views are echoed by the Fijian Indian community living in New Zealand. They want the government of New Zealand to recognise them as Pacific peoples (Tan, 2021).

During the talanoa sessions students mentioned that a sense of belonging not only encourages students to take part in learning but also helps in identity formation. According to Nakhid (2003), identity formation is a process of constructing a clear view of themselves and their identity. The author claims that a sense of belonging at school can help students with positive identity formation. This is an important part of students' lives. Nakhid (2003) says schools should help students in this process. Similar sentiments are echoed by Siteine (2017) that a sense of belonging helps in shaping students' identity formation. According to Siteine (2017), when the school learning environment is not in favour of students' identity formation there is a negative impact on their wellbeing. Siteine argues that identity should not be assigned to the student; rather, students should be able to choose which ethnic category they want to belong to. A reason why this does not happen in schools is because Fijian students are in the minority and may not be receiving adequate attention, or teachers may be mistakenly assuming that Fijian Indian students are from Asia. Therefore, it is worthwhile for teachers to find out from the students where they are from and create a learning environment where they feel part of the class.

This subsection revealed that culture is important to Fijian students. Students tend to be more comfortable talking to their teachers when they have a positive relationship with them. In addition, a sense of belonging in a class motivates Fijian students to participate and can help shape their identity. Identity can be a slippery term, is context-dependent and is not fixed (Steadman, 2023). The author mentions that identity can be referred to as our sense of who we are as individuals or how others perceive and label us, which is important for self-respect. This deserves careful attention, particularly concerning Fijian Indian students, because a lack of a

sense of belonging in a school can lead to a negative impact on their identity formation. The next subsection provides the answers to research questions one and two concerning the Familiar context scale.

6.1.2 Second scale - Learning in a Familiar Context

This subsection discusses students' perceptions regarding opportunities they are provided to experience learning in a familiar context. The familiar context in this study refers to learning in a context reflective of students' life experiences and worldviews. The Actual form of CLES-FS for this scale contains items such as "In science, I relate learning to everyday life" and on the Preferred form, "I want to relate science learning to everyday life". (See Appendix F for more details).

The overall mean value of this scale for the Preferred form was 3.96, which was greater than the value of 3.50 for the Actual form. Paired-sample t-tests were carried out to find out if this was a significant difference in the mean values of Actual and Preferred forms. The paired sample t-test of this scale shows a p-value of very close to zero, as shown in Table 9 of Chapter 4 (section 4.2.3). It means there is a significant difference in the mean values of the Actual and Preferred forms. In other words, Fijian students perceive that what is currently happening in class and how students want it to happen can vary significantly. This indicates that students want to experience science learning more often in a familiar context than currently takes place.

The key findings from the talanoa sessions for this scale were that learning in a familiar context increases their engagement in learning and motivation; on the other hand, an unfamiliar context makes them lose interest in learning. Students said their teachers often try to use familiar contexts to explain science concepts to them, but it would be good to see this structure used more often. Students said everyday examples would help them engage in learning. This result is consistent with Taylor's (2014) results which show that many Pacific students are eager to engage in learning when this is contextualised in a familiar context. Similar views are held by Chu-Fuluifaga et al. (2021) and Siope (2013) that many Pacific students get engaged in learning when they experience the context of the learning activities as

familiar to their everyday lives. Pacific parents also hold similar views that their children are more engaged in learning when the context of learning is familiar to them (Ministry of Education, 2020).

Bell (2011) describes contextualised teaching as an aspect of culturally responsive pedagogy (CRP). To provide more effective science education for Fijian students, it may be helpful to use contextualised teaching methods. For example, discussing the kava plant, which is a significant part of many Fijians' daily lives, could be an effective way to teach topics like photosynthesis and plant structure. However, contextualised teaching does not always happen in science classrooms. This may be due to science textbooks lacking contextual information, being written in other countries, teachers not having enough time to contextualise their lessons or a lack of knowledge about how to effectively contextualise teaching.

6.1.2.1 Implications of familiar contexts in learning

Students claimed that learning science concepts in a familiar context is motivating. In this context, it means giving Fijian students a reason to learn more. This result was strong - echoed by about 80% of the students who took part in the talanoa sessions. A possible explanation for why students are eager to find the answers to some of their questions regarding how familiar things work could be they wanted to know from an early age. For example, teachers could use a cooking method that students are already familiar with to teach scientific concepts such as conduction, convection, radiation, and heat loss. This motivates the students because they would be watching cooking every day at home and wondering how heat cooks the food, and how cooking actually works. A study done by Hafiz and Farik (2016) found a similar result. The authors found out that students in Fiji who see learning as relevant to their everyday lives get motivated to learn. Similarly, Brison (2011) found that Fijian kindergarten (preschool) students became inspired to learn when the learning context was familiar to them. This is an issue for science teaching in New Zealand schools which, from experience, can be decontextualised and presented as individual units.

Students also reported that when they can relate to the context, it motivates them to attend science classes. An iTaukei female student said that her teacher used spearfishing to explain the example of refraction in her year 12 Physics class, which motivated her to learn about refraction. Refraction is a physics phenomenon that can help explain why an object seems to be at a different depth than it actually is. This is because when light travels from a less dense medium to a denser medium, it bends, forming an optical illusion for the eyes. She mentioned that she had heard from her parent that when spearfishing, you do not aim directly at the fish; you need to aim a little lower. She said that when the teacher explained why you do not directly aim at the fish using the Physics phenomena of refraction, it captivated her attention for the whole lesson. This result is in accord with the studies done with Māori students showing that when students are familiar with the context in which they are learning, they are more inclined to become involved (Bishop, 2019). This finding suggests when students relate learning to their everyday life experiences, it creates curiosity and motivates them to attend science classes.

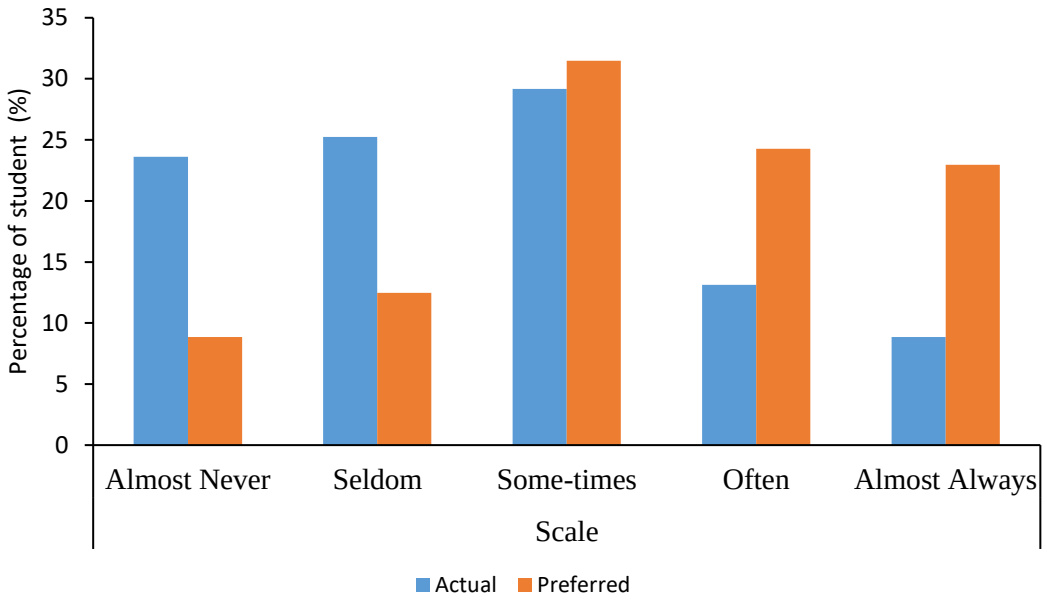
An iTaukei female student who migrated to New Zealand recently said that it takes less time to process the information when the learning context is familiar. This suggests that when students can relate their previous experience with the new learning, they can make sense of the information more easily than when the context is unfamiliar. This result is consistent with cognitive development, which states that children transform their experiences based on knowledge and characteristics to reorganise their mental structures (Schunk, 2020).

Vygotsky's zone of proximal development can also be used to explain why many students who took part in the study found learning in a familiar context motivating (Vygotsky, 1978). It seems that when students' prior knowledge is used in consolidating new knowledge with the help of the teacher, students easily absorb the new knowledge. For example, in a science lesson, many Fijian students have prior knowledge that some native plants can be used to heal sores. If teachers can build upon this knowledge when teaching science lessons on the medicinal uses of plants, it will make more sense to students rather than talking about a plant which Fijian students have never heard of.

During the talanoa session, some students indicated that they wanted more examination questions in familiar contexts. Item number 9 of CLES-FS asked students about this. The mean value of the Preferred form for item 9 is higher than the Actual form. Item number 9 of the Actual form stated, "The exam questions that are given during the exam are in a familiar context" and the Preferred form stated, "I want to get the exam question in a familiar context". A closer inspection of the Likert scale shows that more than 50% of the students who did the CLES-FS survey indicated that they want the examination questions to be given in a familiar context, either 'almost always' or 'often' as shown in Figure 30. This suggests that Fijian students prefer to have more opportunities to answer questions in a context which is familiar to them. Research done by Robbins (2006) in Fiji at the University of the South Pacific found a similar result. One of the reasons could be that the exam questions in New Zealand are based on a Eurocentric perspective, meaning focusing more on European culture or history and excluding a wider view of the world. One possible solution could be that teachers could give some options to choose a context, especially in internal research assessments. This could increase student interest in completing assessments and provide some choices to the students.

Figure 30

Students' responses to the item number 9 of the Actual and Preferred forms of CLES-FS.



Note. n=305

Item number 9 Actual form reads, "The exam questions that are given during the exam are in a familiar context" and the Preferred form reads, "I want to get the exam question in a familiar context". (Appendix F)

6.1.2.2 Unfamiliar context can make students to lose interest in learning

The findings from this study is that Fijian students tend to lose interest in learning when the learning becomes too abstract for the students. An iTaukei student who recently migrated to New Zealand said that when the context used by the teachers is not familiar to them, this makes the ideas difficult to comprehend, hence making him lose interest. Analysis of item number 6 CLES-FS's Actual and Preferred form further supports the idea that students want to learn in familiar contexts. The Actual form of the CLES-FS asked students to respond to, "I learn science ideas in a familiar context." The overall mean value for this item is 3.01. Whereas the Preferred form of CLES-FS asked students to respond to, "I want to learn science ideas in a familiar context", producing an overall mean value for the Preferred Form

of 3.65. A significant positive difference in the mean value suggests a strong desire within the Fijian students to learn science concepts in familiar contexts.

Previous studies of other ethnic groups in New Zealand have shown that students want to learn in a familiar context (Savage et al., 2013). Similar sentiments are echoed by Hipkin et al. (2022), that students wanted more everyday examples to be incorporated into the learning. The theory of constructivism can be used to explain why students prefer to learn in a familiar context. It states that children use prior knowledge when constructing new learning (Windschitl, 1999). The author mentions that students' life experiences heavily influence their comprehension of the key concepts, enabling them to interpret and make sense of new knowledge.

Despite the evidence that students want to learn in a familiar context, some teachers seem unable to do this. Possible reasons may be that they are often under constant pressure to get students to cover the syllabus. They have little time to think about how to make learning relevant to students. Teachers could be unfamiliar with the student's background and feel uncomfortable contextualising. Based on my 17 years of experience teaching science in New Zealand secondary schools, I have observed a range of teaching styles from teachers. However, many present a Eurocentric view and forget to facilitate alternative cultural viewpoints in their day-to-day teaching. However, many of these teachers may lack the necessary cultural competencies to cater to a diverse student population (Ministry of Education. (2021). Whatever the reasons are, there is a potential for schools to incorporate professional learning for teachers to think of familiar contexts which can be used in their classes.

In summary, the results of this study indicate that incorporating Fijian students' prior knowledge helps them to engage in lessons. This is because students can relate what they are learning in class to their life experiences and become more curious. In addition, this study also found that Fijian students lose interest in science learning when the context is not familiar to them. In order to engage more Fijian students in learning, it may be worthwhile for teachers, where possible, to incorporate familiar contexts in science learning. The next section discusses students' experiences of learning in groups.

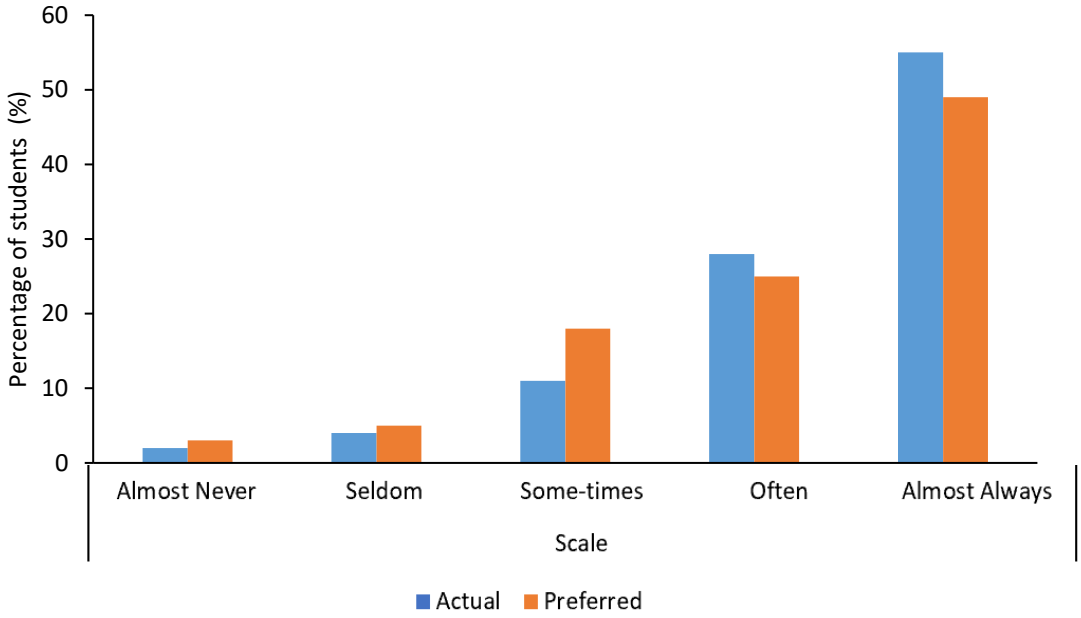
6.1.3 Third scale -Talanoa

This scale measures the extent to which opportunities are created for secondary school students to experience collaborative learning. The overall mean value for the Preferred form was 4.04 and the Actual form 4.27 respectively. A paired-sample t-test was carried out to find out if there was a significant difference in the mean values of Actual and Preferred forms. The paired sample t-test of this scale shows a p value of zero, as shown in Table 9 of Chapter 4 of Section 4.2.3. It means there is a significant difference in the mean values of the Actual and Preferred forms. This shows that students prefer not to indulge in as much collaborative learning. The key findings from the talanoa sessions for this scale were that although Fijian students like working collaboratively, it is often overdone or not done in the way students prefer. Students mentioned that teachers often use group work as a way for them to collaborate.

To find out how many students prefer not to collaborate via group work, item number 15 of the Preferred and Actual form was analysed. The item on the Actual form reads: “I can work in groups to learn science concepts”, and the Preferred form reads: “I want to work in groups to learn science concepts”. The result of the Actual form reveals that 86% of participants signalled that they either “almost always” or “often” had the opportunity to work in groups to learn. On the other hand, only 73% said they wanted to learn science concepts in a group setting (see Figure 31). This shows that 13% of students do not want to learn in a group setting, although there are opportunities for them to do so.

Figure 31

Students' responses to item number 15 of the Actual and Preferred forms of CLES-FS



Note. n = 305

Item number 15 of the Actual form reads: "I can work in groups to learn science concepts", and the Preferred form reads: "I want to work in groups to learn science concepts". (Appendix F)

Figure 31 also shows that students who almost never, seldom or sometimes had the opportunity to experience learning science ideas in groups would prefer to work more often in group settings. This shows students want to have opportunities to work in a group setting on a regular basis. Figure 31 indicates that Fijian students want to work in groups but not too often. They provided various reasons for not always wanting to work in a group setting, although they had the opportunity. More discussion on this will be done in section 6.1.3.1.

Students mentioned that they value group work for various reasons, and in addition to that, it is beneficial to their learning. An iTaukei female student said she could get peer perspectives during the group discussion to check her understanding. This is in line with other research done in the past with iTaukei students (Bakalevu, 1997; Ravuvu, 1983; Taylor et al., 2008) that students share ideas during group work and check their understanding of the concepts under discussion. Studies with Māori students also confirmed similar results that students are often more comfortable

getting assurance from their peers about their knowledge of the concepts than from their teachers (Bishop, 2019).

It appears that when Fijian students share ideas with their peers, they generate greater certainty, enhancing their understanding. Studies by Lumpkin et al., (2015) also show that students learn through conversation and by exploring their thinking and understanding. The authors state that because group work is dialogic and interactive, it allows the students to scaffold from where they are to gain new knowledge.

Some students said that, at times, they prefer to learn from their peers because it is easier to communicate with them. This suggests that these students may have found difficultly in understanding the teacher's use of science jargons. It could be worthwhile for teachers to get some regular feedback on whether students can understand their explanations. Similar views are shared by Palmer (2007) that teachers should take regular feedback from students on whether or not the science jargon used to do the explanation is comprehensible.

Many Fijian students mentioned that they enjoyed working in groups. One of the reasons could be that these students come to class already familiar with constructing knowledge in groups, as this is common practice in their culture. This study's findings also align with the theory of social constructivism, which highlights that students create new knowledge through social interactions (Vygotsky et al., 1978). Vygotsky et al. (1978) state that social constructivism focuses on the collaborative nature of learning. Knowledge develops from how students interact with each other, their culture, and society. Students rely on others to help them create an understanding of new knowledge. As a result, learning from others helps them construct their own knowledge and reality.

Students also mentioned that group work creates a safe environment for discussion. A Fijian Indian male student who has recently migrated to New Zealand said that it provides a safe place to share different points of view. A safe place in the context means where students are comfortable expressing their views. Importantly, this

study reveals that group work provides Fijian students a 'वातावरण' (whatawaran) to have a conversation with their peers. वातावरण is a Hindi word that translates to a [space or environment where people can make connections with each other]. It shares some similarities with the concept of 'vā' important to many indigenous Pacific cultures. Vā describes [the relational space between people and places] (Te Kete Ipurangi, 2023). This space is important because it helps students to clarify their understanding of the concepts or doubts, they have in their classes.

Although many Fijian students said that group work did support their learning, they also mentioned that, at times, they did not have a positive experience of group learning. It appears that it is the teaching pedagogy that surrounds group work, not group work, that is problematic for some Fijian students. They indicated that little learning occurs when the task is too difficult when it is not scaffolded properly, or when the task is poorly designed. Another reason students preferred not having so much group work was when teachers used it as a time filler at the end of the lesson. Their concerns echo other research into non-Fijian students' group work experiences, where task difficulty, purpose and set-up were found to influence how much students believed they could learn (Chmelárová & Pasiar, 2023; Li & Campbell, 2008).

6.1.3.1 Students' preference for not working in groups

This study has found that while many students prefer to learn science concepts in groups, not all do for various reasons. Some students mentioned it is unfair to use group work to assess students when all members do not contribute equally. They said some group members could be lazy (free riders) and not contribute as much. It appears that students do not like other students to take credit for their hard work. This seems to be a fair call, and teachers should endeavour to avoid situations like this. These negative experiences may have led these students to form a bad perception regarding group work. Chang and Brickman (2018) revealed that free riders are a major perceived risk to group work. They argued that teachers must define roles and responsibilities for different group members to reduce this risk.

The Fijian students in this study mentioned that they appreciated a clear purpose, an obvious structure, and well-scaffolded tasks. Teachers need to plan group work carefully and gauge students' perceptions regarding the group work. Designing group work-based student feedback can positively impact students' learning. One effective method for teachers to obtain feedback from Fijian students is through one-on-one interactions. This is because students often view teachers as respected figures, which can prevent them from freely expressing themselves in a whole class situation.

During the talanoa sessions, an iTaukei male student said he felt comfortable working in groups when group members have good relationships with each other. Stover and Holland (2018) shared similar sentiments that students are comfortable working in groups when they have good relationships among them. As mentioned before, relationship plays an important role when it comes to engaging with Pacific students. On the other hand, students said that they feel uncomfortable asking those with whom they do not have a good relationship. An iTaukei student mentioned that he felt ‘madua’ asking for help in these circumstances. Madua is an iTaukei word which can be translated as being [ashamed]. It could be helpful for Fijian students if they have some flexibility in choosing their group members.

In summary, group work holds the potential to enable the sharing and building of knowledge in ways that create room for personal and cultural experiences. Group work that is set up well creates a culturally safe environment that creates space for knowledge construction in which students can query and be curious. Group work engenders an element of cultural confidence, connection and being able to contextualise their learning in regard to their personal experiences. Done well, the learning environment created during group work provides Fijian students with the space to co-construct ideas that they can relate to their worldviews. The next section discusses students' perceptions regarding confidence to ask questions in class regarding learning.

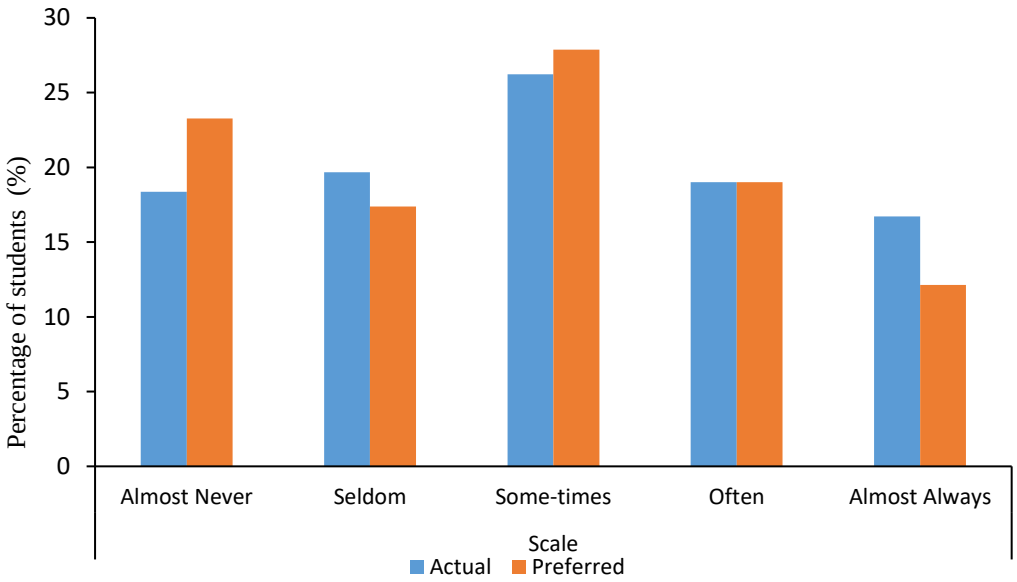
6.1.4 Fourth scale - Critical Voice

This scale measured the extent to which the students felt confident in asking questions in class. This scale contained items in the CLES-FS scale such as 'I feel confident to ask the teacher, "Why do I have to learn this?", On the other hand, the Preferred forms contained items such as: Will you prefer to ask the science teacher, "Why do I have to learn this"? The overall mean value of this scale of the Preferred form was 3.07, which is lower than for the Actual form, 3.29. The paired sample t-test of this scale shows a p value of zero, as shown in Table 9 of Chapter 4 of Section 4.2.3, indicating a significant difference in the mean values of the Actual and Preferred forms. This indicates that students often were confident to ask questions, but they chose not to.

In order to find out what percentage of students are not confident in expressing their opinions in class, item 16 of CLES-FS of both the Actual and Preferred forms was explored. On the Actual form, item 16 was "I feel confident in expressing my opinion". On the Preferred form it read, "Will you prefer to express your opinion in class?" Results show that 35% of the students surveyed stated that they could "almost always" or "often" feel confident to ask questions in the class. However, only 31% of the students indicated they would take advantage of this opportunity, as shown in Figure 32.

Figure 32

Students responses to item number 16 of the Actual and Preferred forms of CLES-FS



Note. n = 305

On the Actual form, item 16 read "I feel confident in expressing my opinion". On the Preferred form, it read, "Will you prefer to express your opinion in class?" (Appendix F)

This is an interesting find and there may be possible explanations for the results obtained. The key finding from the talanoa sessions concerning this scale was that students do not prefer to question the teacher in the whole class situation, but they would rather ask on an individual basis. Students gave various reasons such as culture, having a strong accent, and fear of being judged or stereotyped.

Williksen-Bakker (2004) found that in iTaukei culture, children are discouraged from asking questions of their elders. They were encouraged to follow the instructions from the elders or risk being told off. According to Nabobo-Baba (2006), verbalisation is not considered a positive trait in growing children in iTaukei culture, an idea instilled in many iTaukei students from a very early age. Teachers are given the same respect as elders in the community. This may be one of the reasons why iTaukei students are hesitant to ask questions to their teachers.

Similarly, in Fijian Indian culture, people follow the preaching of a guru without asking too many questions. If, for some reason, a Fijian Indian person started questioning a guru, the others around them would tell the questioner to keep quiet and listen to the guruji -'तारक नहीं लगाओ'. This translates as [Do not disturb]. Students said that they learn these values at home and carry them to school. A Fijian Indian female student mentioned that teachers are people with special status equivalent to a guru who normally decide what is best for our future. In Hindi, this can be translated as -[हमारे समाज में यह एक सांस्कृतिक आदर्श है कि शिक्षक महत्वपूर्ण व्यक्ति हैं और यह तय करते हैं कि छात्रों के लिए सबसे अच्छा क्या है]

It seems these cultural values are instilled in Fijian students from a very early age and prohibit them from asking questions to their teachers. In both iTaukei and Fijian Indian cultures, teachers are given special status and are normally considered the go-to persons for advice and guidance. As Brison (1999) mentioned, Fijian students respect their elders and do not express their views to them in public. One of the ways teachers of Fijian students can encourage them to ask questions in class is by understanding their cultural values. It is crucial teachers understand and embrace the values that are important to Fijian students. To meet the expectations of Fijian students, teachers can embody the characteristics that are highly respected in the societies of their students. This may involve showing empathy and a sincere concern for the student's well-being and academic success. Teachers can demonstrate these traits and make a positive impact in their students' lives.

Another intriguing finding was that some Fijian Indians mentioned that, at times, they do not want to ask questions in class because of their accent. A Fijian Indian male student said that his accent is different, and he does not want others to make fun of him if he mispronounces some English words. According to him, it is often a good idea not to say anything in class to avoid humiliation by the other students. According to this student, it is safer to ask peers or the teacher on a one-on-one basis. It appears that accent could be a barrier for some Fijian students asking questions in class especially if they are in the minority in a class. According to Allen et al. (2021), ethnic minorities within a class often feel vulnerable and afraid to

come out of their comfort zone. A possible solution could be for teachers to tell students that it is ‘OK’ to speak in a different accent and it is normal to speak in different accents. This would encourage students of ethnic minorities with accents to ask questions in class.

A Fijian Indian male student who recently migrated from Fiji said he was uncomfortable asking a question in class because he was afraid that other students might judge him. The fear of being stereotyped could be making this student uncomfortable. A study done on Samoan students studying in New Zealand secondary schools found a similar result that, at times, fear of making mistakes prohibits them from asking questions in class (McDonald & Lipine, (2011). One of the reasons why students feel that they are being judged could be due to bad experiences they had during their school years.

During the talanoa sessions, an iTaukei female student shared a similar sentiment. She worried that other students might think she is not intelligent if she asks questions in class. A study done at the university by Florescu and Pop-Pacurar (2016) revealed that one of the main barriers to students not being able to ask questions is the fear of being seen to be making mistakes. Hang (2011) in Samoa revealed similar results as to why students are hesitant to provide answers to the teacher in whole class situations in case, they make a mistake.

However, this study found that some students are confident in asking questions in class on a one-to-one basis with the teacher. An iTaukei female student said that asking questions on a one-on-one basis removes the fear of being judged because no one will watch her. It seems that students are conscious of their surroundings and feel less intimidated when asking questions of the teacher on an individual basis. This is an important finding because, at times, teachers assume that when students are not asking questions, they are not interested in learning, or they are struggling with the subject content. However, this study has revealed that in the Fijian students' case, there may be other underlying explanations as to why students are not asking questions in a whole class situation.

In summary, this study revealed that Fijian students are inclined to abstain from asking questions in a whole class situation for various reasons. These include cultural norms and worrying about being judged for their accent. However, some Fijian students feel more at ease asking questions on a one-on-one basis. In order to effectively address this matter, teachers may consider cultivating a learning environment that actively supports and motivates students to freely express their curiosity (Leong & Ahmadi, 2017). This can be done by talking to the students on an individual basis and allowing them to ask questions. The next subsection discusses when Fijian students have opportunities for shared control in their learning.

6.1.5 Fifth scale - Shared control

This subsection interprets and discusses the extent to which there are opportunities for students to have shared control of their lessons. This scale measured the extent to which students want to share control for the design and management of their learning. The overall mean value of the Preferred form for this scale was 2.97 and for the Actual, 2.38. The paired-sample t-test shows a significant difference in the mean values of Actual and Preferred forms, as shown in Table 9 of Chapter 4 of Section 4.2.3. It means there is a significant difference in the mean values of the Actual and Preferred forms. This indicates that students want more shared control of the classroom than they have experienced. The key findings from the talanoa sessions concerning this scale were that Fijian students want teachers to ask them more often about how they want to learn and explain the subject content's relevance to their everyday lives.

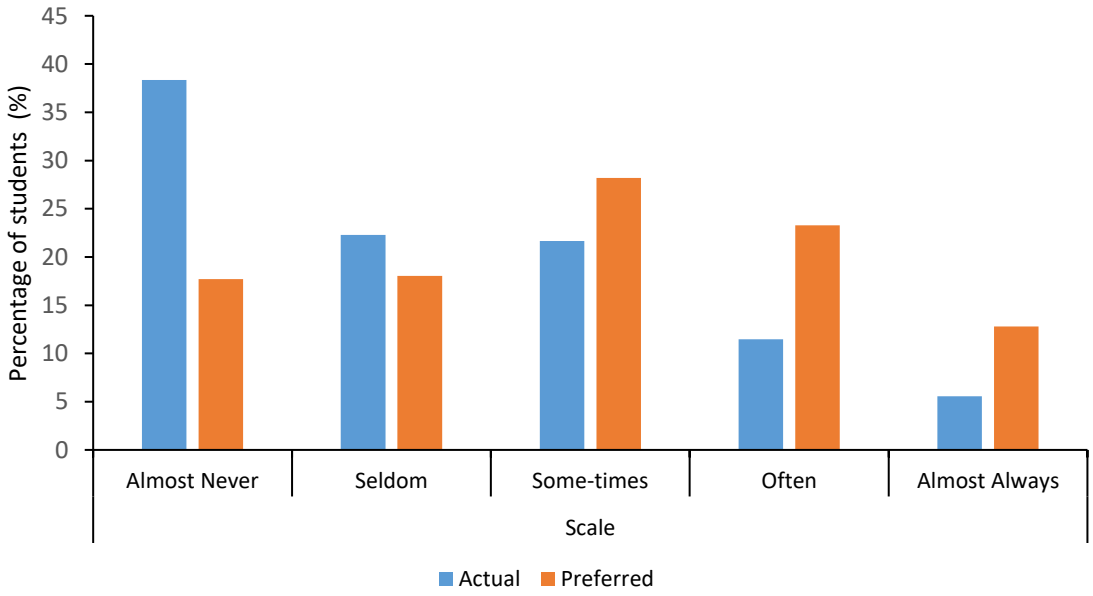
A Fijian Indian male student said that, at times, he would prefer to learn by himself rather than in a group. He said that teachers should take regular feedback on how students want to learn. This is because having a say in learning gives him a sense of ownership, which makes him want to complete the task. It appears that, at times, Fijian students want to learn in a particular way, depending on the time of the day. This study indicates that it would be useful for teachers to ask Fijian students more often how they want to learn and prepare the lessons accordingly.

For example, if there are three science lessons in a week, it will be worth discussing with the students what they will be learning and asking how they would like to learn. Studies done by Hall and Hawk (1998) and Utumapu-Mcbride et al., (2008) shared a similar view that asking Pacific students for feedback on a regular basis on how they want to learn helps students to take ownership of their learning.

Item number 25 of the Actual and Preferred form is further analysed to determine how many students want to let the teachers know how they want to learn. Item 25 of the Actual form stated that "I help the teacher decide which activities I do", and on the Preferred form, it asked, "Will you prefer to help your teacher decide which activities you will do?" Figure 33, shows that about 35% of the students who either almost always or often want to help the teachers decide how they want to learn, compared to 16% who currently are able to let their teacher know how they want to learn.

Figure 33

Students responses to item number 25 in the Actual and Preferred forms



Note. n = 305

Note: item number 25 of the Actual form reads: "I help the teacher decide which activities I do" and on the Preferred form states, "Will you prefer to help your teacher decide which activities you will do?" (Appendix F)

This is an important finding because about half of the Fijian students who want to tell their teachers how they want to learn are not able to do so. Students said that teachers normally decide how students will learn in class. There may be reasons for this, such as Savasci and Berlin (2012) found out that teachers are under time pressure to complete the syllabus and provide students with information so that they can pass the qualifications. Whatever the reason is for teachers not asking students how they want to learn, it is evident from this study that Fijian students want to give regular feedback to their teachers on how they want to learn. According to them, this will give them ownership of their learning, hence increasing their engagement.

Interestingly, both iTaukei and Fijian Indian students mentioned that they want to know more about the relevance of subject content to their everyday life experiences. Students mentioned that this could be related to either their cultural knowledge experiences or something they can use in the future. A male student of Fijian Indian descent shared an example that was not related to science, but to put his point across, he used an example from an economics class. He mentioned that he would like to learn how to invest in housing because, in future, it might be useful to him. It appears that this student is interested in making a living. One of the reasons could be that some students are recent migrants from Fiji and are seeing their parents struggling to meet their needs, students would like to help them by finding a job.

During talanoa sessions, an iTaukei female student said that when she is able to relate science content with prior knowledge, it motivates her to learn more. She said when learning about medicines teachers should use examples which she is familiar with. For example, she uses herbal medicine at home and allowing her to share her knowledge would contribute to the greater body of knowledge in science. Additionally, she mentioned that gaining knowledge about our ancestors' historical use of herbal medicine would enable students to share their insights and contribute to the scientific community's pool of knowledge. Hill and Hawk (1998) found a similar result in the Aim High Project (AIMHI).

One possible explanation for the difference in priorities between Fijian students when it comes to education could be their parents' past experiences. Some parents

may prioritise their children's cultural education over their academic education, believing that traditional values and customs are more important for their children to learn than what is taught in school. On the other hand, some may be placing a greater emphasis on academic success at school due to their past experiences in Fiji. Parents' experiences may have a significant impact on the educational priorities of Fijian students, potentially resulting in variations in their perceptions concerning what they aspire to learn while attending school.

It is evident that students place importance on the opportunity to collaborate with their teachers in determining their preferred learning methods. Students think that if they have the chance to collaborate with their teachers, they will be able to let them know that they want to relate what they learn to their daily lives. One effective way for teachers to obtain this information is through talking to students or administering regular surveys to gather feedback from their students. This approach can offer valuable insights to teachers on how to enhance their teaching styles. As mentioned before, some teachers may encounter difficulties implementing these strategies due to time constraints or uncertainty about the process. However, it seems from this study that to generate more interest in Fijian students concerning science education; teachers may consider different strategies to seek feedback about their teaching and learning rather than assuming that students should conform to the classroom culture without question.

This major section discussed the findings concerning the research questions. In summary, Fijian students desire their teachers to communicate with them on a one-one basis so that they are able to let them know how they want to learn. This is because they prefer not to question in class the authority of their teachers. They also want to experience learning in a familiar context and have a sense of belonging in class. They believe this can be achieved by sharing their cultural experiences with their teachers and peers. The next major section interprets and discusses the findings related to the supplementary question of the research. This is to find out the differences in perceptions between the ethnic groups, gender and place of birth.

6.2 Discussions based on supplementary question

This section discusses findings related to the supplementary question of the research. The supplementary question was designed to find out any significant differences in Fijian students' perceptions of science learning across groups characterised by gender, ethnicity, and place of birth and year levels. To reiterate, in order to find the significant difference an independent t-test was performed on the data of the CLES-FS of the Actual form. The independent t-test is an inferential statistical test that determines whether there is a statistically significant difference between the means in two unrelated groups. The total number of students who participated in the CLES-FS was 305, out of which 248 were Fijian Indians and 57 were iTaukei (see Table 2 in the methodology section 3.7.2 for more breakdown). For clarity purposes, this section is divided according to the scale names of CLES when providing answers to the supplementary question.

6.2.1 Identity Scale

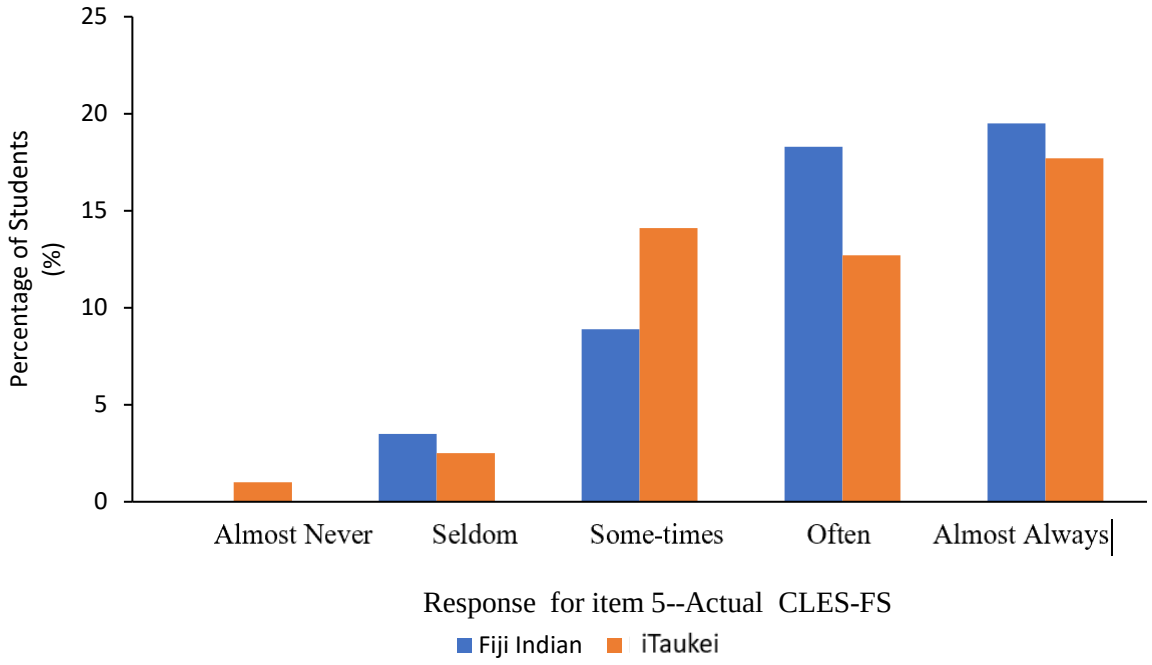
The first scale of CLES-FS measured the extent to which there are opportunities for students to build relationships with their teachers and share different aspects of their culture. This subsection reports on any statistical differences across groups characterised by gender, ethnicity, and place of birth for identity scale. This study found no significant differences for this scale in the perceptions of students when data was sorted by gender and place of birth.

However, the study found a statistical difference concerning ethnicity. The mean value of the Actual form of this scale for iTaukei students is 3.56 and for Fijian Indians, 3.80. The difference in the mean value of the Actual form of this scale was 0.26. An independent t-test on the Actual form's values revealed p value of 0.01, which is less than 0.05, suggesting a significant difference (see Table 11, Chapter 4). This indicates that Fijian Indian students felt that there were more opportunities for them to build relationships and share their culture within class than iTaukei students.

To investigate this further, item 5 of the CLES-FS survey of the Actual form was analysed. This asked students about how often their science teacher talked to them in class. It was anticipated that if teachers talked to the students on a more regular basis, there would be opportunities for the students to share their cultural experiences with the teacher. The results of this item are shown in Figure 34. It appears that more Fijian Indians feel that their teachers "often" or "almost always" talk to them during science lessons in comparison to the iTaukei students.

Figure 34

Students responses to the item number 5 in the Actual form.



N = 305, 248 were Fijian Indians and 57 were iTaukei

Item number 5 of the Actual form reads: "My science teacher talks to me during me during science classes" (See Appendix F)

This was an interesting finding as more Fijian Indians have indicated that their teachers have talked to them during lessons compared to iTaukei. A possible explanation for this result may be that the schools or classes have relatively few iTaukei students who may be overlooked. Hence these students are not able to share their cultures with teachers and peers. A report published by the Education Review Office (2023), supports the above idea that students of ethnic minorities in the class are often not able to share their cultural experiences.

However, when the data from the CLES-FS Preferred form of item 5 was compared to the Actual in terms of ethnicity, there was a significantly higher difference in the mean value for the iTaukei students. The mean value of the iTaukei students for the item 5 was higher than the Fijian Indian students. This shows that iTaukei students want their teachers to talk to them in the lessons.

Therefore, it is of importance for teachers to acknowledge the diverse ethnicities present among their students and take steps to ensure they feel included in the classroom. This can help break down barriers and promote understanding and appreciation of different cultures ultimately leading to a more enriched learning experience for all students. The next subsection answers the supplementary question concerning the Familiar context scale.

6.2.2 Familiar Context

Although the results indicate that Fijian students generally prefer to learn science in a familiar context, surprisingly, the study found that there is a significant difference in the perceptions of the students by gender. The overall mean value for female students was 3.57, and for male students was 3.39 for the Actual form of the Familiar Context scale. The Independent sample t-test performed shows the statistically significant difference in the overall mean value of this scale between female and male students as shown in Table 13 (See section 4.3.3.1, Chapter 4). This shows female students' perception that science teachers are using more examples in the classrooms that are familiar to them compared to male students.

This is an interesting finding and has multiple possible explanations. One reason could be that female students may be better at adapting to a new situation or environment than their male counterparts and familiarise themselves faster than male students. A study by Lui et al. (2021) found similar results when adopting a new learning environment. The study found that female students were better at adopting to the new online learning environment compared to their male counterparts. The results of this study may indicate that it will be helpful for

teachers to ask Fijian male students more often in what context they want to learn science concepts.

This study found that there was no significant difference concerning the place of birth and ethnicity for this scale. It was anticipated that students who were born in Fiji would like to study in a familiar context more often than students who were born in New Zealand. This study has revealed that irrespective of where students are born students want teachers to include familiar context more often in their teaching. The next subsection discusses the differences in Fijian students' perceptions of science learning across groups characterised by gender, ethnicity, and place of birth concerning the Talanoa scale.

6.2.3 Talanoa scale

This study has found that there is a significant difference in Fijian and iTaukei students' perceptions when it comes to collaborative learning. The independent t-test shows that this difference is significant (see Table 15, Chapter 4). Fijian Indian students perceive they get more opportunities for collaborative learning compared to iTaukei. The Fijian Indian students' overall mean score was 4.30, while iTaukei students had an overall mean value of 4.04.

This finding can be interpreted in several ways. One possibility could be that the schools that participated in the study had large numbers of Fijian Indian students who were actively involved in collaborative learning. On the other hand, the schools that do less collaborative learning may have a large number of iTaukei students compared to the Fijian Indians. Whatever the reason is, this is a significant find which suggests that within the Fijian group there is a difference in the perceptions in terms of opportunities provided to construct knowledge using a collaborative approach.

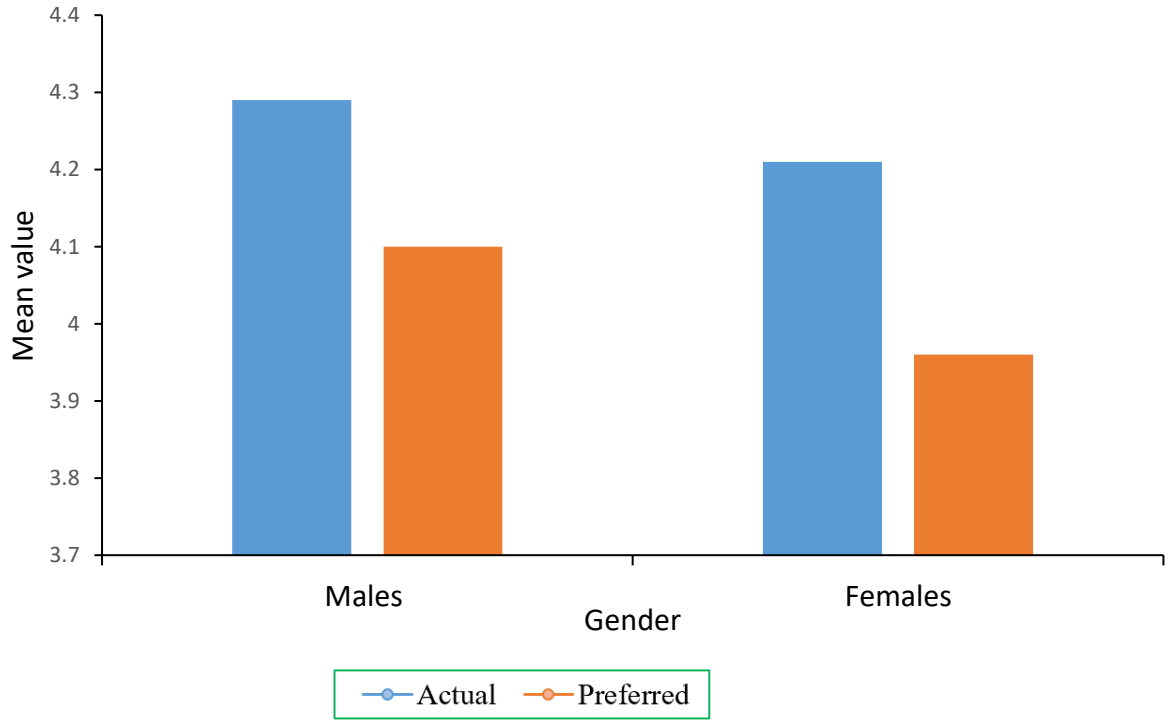
The finding suggests that it would be incorrect to lump Pacific students together and assume that they all learn in a particular way as suggested by Kalavite (2020). Florescu and Pop-Pacurar (2016) argue that it is critically important for teachers to know how students want to learn in class. This will help teachers to modify their

teaching methods to suit the needs of their students. It is important for teachers to regularly seek feedback from their students in order to better understand their learning needs and preferences and avoid simplistic stereotypes such as 'All Pacific students love group work'.

Although this study has found no statistical difference using the quantitative data concerning gender, it is worth noting that females prefer not to have as many group activities in their lessons. The data of the CLES-FS was analysed with regard to gender, it revealed that the difference in the mean value of Actual and Preferred forms was bigger for females than males, as shown in Figure 35. The difference for females is 0.33 and for males is 0.19. This data shows that females prefer not to learn in groups compared to males.

Figure 35

Showing the mean values of Actual and Preferred forms of CLES-FS concerning gender



N = 305, Number of females = 162, Number of males = 143

There could be multiple reasons for the difference in the mean values. For example, females who took part in this study may have experienced ineffective group work. Another possible reason could be that females do not want to learn in a social environment. A study done in Fiji agrees with this idea that Fijian Indian girls normally do not mix and mingle with strangers as much as boys (Walker, 2005). In Fijian Indian culture, girls are expected not to share their thoughts openly with strangers. Similarly, in an iTaukei culture, females are expected to listen and talk only when necessary, in public (Ravuvu, 1983). A helpful approach for teachers to tackle this issue and encourage female students to participate in group activities is by providing them with the opportunity to select group members. When given the choice, it may be more likely that female students would choose individuals whom they feel comfortable working with leading to a greater chance for open communication and the sharing of ideas.

6.2.4 Critical Voice and Shared Control Scales

The study found no significant difference in the perception of students for Critical Voice and Shared Control scales, characterised by gender, ethnicity, and place of birth. It is worthwhile noting that for the Critical Voice scale, the biggest difference in the overall mean value for the Actual form is for gender. This difference in the mean values is not statistically different; however, it shows that male students are more confident in expressing their opinions in class than females. In many families of iTaukei and Fijian Indians, girls are not encouraged to express their opinions freely to strangers (Tamariki, n.d.). A Fijian Indian female student born in New Zealand said that in her culture, she is sometimes discouraged from openly expressing her opinions in public places. Fijian Indian students may have inherited this trait from their cultural practices. Society and cultural norms may have influenced Fijian Indian girls so that they tend not to question authority figures (Walker, 2005).

Similarly, in iTaukei culture, females are generally encouraged not to talk loudly in public areas (Ravuvu, 1983). A study by White (2013) revealed that iTaukei female students in Fiji were generally hesitant to answer or ask questions in classes when needing assistance. According to White (2013), female students know the answers

but whisper rather than speak compared to their male counterparts. White (2013) suggests that the pattern described above may involve female students putting their views through males to avoid being labelled 'vocal' during large social gatherings.

In order to promote equal participation among all students, it is crucial for teachers to be mindful of cultural norms that may impact female students' involvement in the classroom. One effective way to encourage female students to express their thoughts is by facilitating small group discussions, perhaps organised by considering gender, where they feel comfortable sharing. When all students actively participate in discussions, teachers can foster an environment of inclusivity and promote a more equitable learning experience. The next subsection discusses the findings in terms of different year levels.

6.2.5 Differences in perceptions at different year levels

This subsection interprets and discusses the variation in the overall mean values of Actual and preferred forms at different year levels. This study has found no significant difference in the overall mean value of Actual and preferred forms concerning all scales. This is an interesting finding as it seems that the Fijian students' perceptions concerning all the scales are very similar, meaning they do not vary significantly. It may be that Fijian students generally congregate in school and share thoughts and ideas; hence, there is no significant difference in their perceptions concerning all the scales of CLES-FS. A study by Thelamoaur et al. (2019) supports the above idea that students of the same ethnic background tend to congregate in a school because of the commonalities between them, such as culture and language.

This study has found the largest variations in overall mean values for the Identity scales among different year levels compared to other scales, as illustrated in Table 21 (see Chapter 4, section 4.5). However, it is important to note that although this variation in the overall mean value is largest it is not significant. The mean values of Year 9 and 10 cohorts of the Actual forms are lower than Years 11 to 13. This suggests that Years 9 and 10 students think that they are given less opportunity to share their culture and build relationships in class compared to Years 11 to 13. A

possible explanation for this might be that junior students are new to the school and are trying to find their feet compared to seniors who may have already familiarised themselves with school culture and feel more comfortable sharing their own culture and building relationships.

During the talanoa sessions, a Year 9 Fijian Indian male student said he wanted to share his culture with his peers in the class but was afraid to do so because others might judge him. He said that he is new to the school and wants to do things as told by the teacher. Bledsoe and Baskin (2014) stated that student fear is a normal part of growing up. The authors mentioned the common types of student fear, such as performance-based anxiety, fear of failure, fear of being laughed at, and cultural components of fear.

One of the possible ways to reduce the fear of being judged is to make Year 9 students more comfortable in their new learning environment. Schools can host family days at school grounds to connect with 'whanau' [families] of junior students. This would allow parents to visit the school and engage in discussions with their teachers. As a result, students will be able to build positive relationships between the student and the teacher making them more comfortable in sharing their culture with teachers.

Another way teachers could provide opportunities for junior students to showcase their cultural identities within the classroom is by inviting the students to share their stories using visual constructions on the classroom walls. This could be developed through discussion regarding food, language, and festivals but also their beliefs and values as a learner in science. These visual constructions could include a form of drawings, sketches, diagrams, wall charts and maps. By celebrating the students' cultural backgrounds in this way, teachers can create a safe and inclusive learning environment that fosters respect, understanding, and appreciation for diversity.

6.3 Chapter Summary

A number of ideas were raised when the findings of the CLES-FS and talanoa sessions in the chapter were interpreted and discussed. The data sources captured

snapshots of Fijian student perceptions of learning in the science classroom in New Zealand classrooms. It is evident from the findings that Fijian students want more opportunities to build relationships with their teachers and to share different aspects of their culture with their teachers and peers. Culture, positive relationships with the teachers, and a sense of belonging are important aspects to consider when engaging Fijian students in learning.

This study found that Fijian students want more opportunities to learn in a familiar context than they are currently experiencing. The study has also found that some students become disengaged from their learning when the learning context is unfamiliar. Learning in a familiar context motivates many Fijian students because they are able to relate it to their everyday life experiences. It seems that students find it easy to construct new knowledge when teachers capitalise on their prior knowledge. This somewhat aligns with the constructivist view of knowledge construction. Constructivist's view is that students interpret and make sense of experiences and the information they receive (Jordan et al., 2008).

It appears that teachers have a tendency to assume that Fijian students all prefer to learn through group work. This may be one of the reasons why they create a lot of opportunities to work in a group setting. However, they fail to recognise that while Fijian students do enjoy group work, they do not always prefer it. When they do opt for group work, they expect it to be organised and structured. Therefore, it is crucial for teachers to have a clear understanding of what constitutes effective group work. This aligns with the socio-constructivist view of learning Vygotsky et al. (1978). The authors consider social interaction as a central part of knowledge construction. Vygotsky's theory acknowledges an individual's cultural ways of reasoning, working together, communicating ideas, and negotiating with others. Culture is an important factor in this thesis.

The Fijian students in this study reported that they were generally hesitant to ask questions in whole class situations. This is because of various reasons such as accent, fear of making mistakes, and culture. However, students mentioned that they are more confident to ask questions of their teachers on an individual basis. In order to

allow this to happen, teachers can approach students individually when seeking feedback from them.

Fijian students want to have more control over what and how they want to learn in a classroom, which can be achieved by taking regular feedback from them. They mentioned they would like to relate the learning to their everyday experiences. In addition, students said that relating the relevance of the learning to a real-life situation motivates them to engage more in learning.

There is a significant difference in the perceptions of iTaukei and Fijian Indian students regarding building relationships with their teachers, sharing different aspects of their culture and collaborative learning. iTaukei students perceive that they have fewer opportunities to build relationships with their teachers, share different aspects of their culture and want to do more collaborative learning than Fijian Indian students.

In addition, there is a significant difference in the perceptions of males and females when it comes to learning in a familiar context scale. Female students perceive they are given more opportunities to learn in a familiar context than male students. Although there is no significant variation in the overall mean values of different year levels concerning all scales, the Junior student perceive that they have fewer opportunities to share their culture and build relationships in class compared to Years 11 to 13. The next chapter draws the conclusion and presents a summary of the answers to the research questions.

ॐ त्र्यम्बकं यजामहे सुगन्धिं पुष्टिवर्धनम् ।

उर्वारुकमिव बन्धनान् मृत्योर्मुक्षीय मामृतात् ॥ The Maha Mrityunjaya mantra is one of yoga's most important mantras. It restores health and happiness and brings calmness in the face of death. The Maha Mrityunjaya mantra restores health and happiness and brings calmness in the face of death.

Chapter 7

Conclusion

This chapter reports a summary of the key ideas and offers a final conclusion to the research. It describes the limitations of the study and suggestions for further study. This chapter has been divided into six sections. The first section, 7.1, delves into the uniqueness of the research, explaining why it was worth doing. Section 7.2 provides answers to the research questions, while section 7.3 focuses on the validation of the CLES-FS research tool. Section 7.4 provides recommendations allowing a deeper understanding of the key findings and takeaways. Section 7.5 outlines the study's limitations, offering a nuanced and insightful analysis of its potential shortcomings. Finally, the last section of this chapter, 7.6, offers suggestions for those interested in pursuing further study on this topic. The chapter ends with a final comment.

7.1 Why this study is unique

This study is unique because it is the first time that a study has focussed on Fijian students' perceptions of studying science subjects in New Zealand secondary schools. The findings of this study have been shared at various conferences in New Zealand and Fiji (See Appendix H). The study's findings have been published through four different journal articles, reaching both local and international audiences (See Appendix G). It has been important for me to report the findings of this research.

Furthermore, this study was unique because it utilised a combination of two methods, namely CLES-FS and talanoa, which have not been previously used with Pacific students. The CLES-FS method allowed for rapid data collection from multiple participants and provided quantifiable results using the statistical software

SPSS. On the other hand, talanoa, a research approach from the Pacific region, provided opportunities to capture the narratives of the students regarding the research questions. The narratives from the talanoa sessions have provided further data to respond to the research questions. Although it took more time to gather data using the combination of these two methods, it has provided valuable personal insights into the perceptions of students' science which may not have been possible if one of the methods had been used.

Through the combination of CLES-FS and talanoa, acquiring both qualitative and quantitative data, this study has benefitted from the mixed-method, which has strengthened synthesis and validity of this study. According to Amankwaa (2016) and Merriam (2009) appropriate research method(s) used in research increases its validity. The use of these two approaches has helped in data triangulation. As a result, this study has established a robust research design that can be utilised in studying the learning environments of Pacific students.

In addition, this is the first time a modified version of CLES has been used with Pacific students. This study has validated the effectiveness of the modified CLES, now called CLES-FS. The validated CLES-FS provided an opportunity for researchers to use the survey in future on different groups of Fijian students studying science in New Zealand classrooms. One notable aspect of using CLES-FS was its ability to easily quantify the differences in perceptions regarding ethnicity, gender, place of birth and year levels using SPSS software with a large sample size.

7.2 Answers to research questions

The findings of this study have offered valuable responses to the research questions. It has the potential to help teachers better understand how Fijian students prefer to learn science. The research findings are based on the research questions, which are:

1. What are the perceptions of Fijian students about their current and preferred learning environment in science classrooms in New Zealand secondary schools?

2. How can the learning environment be altered to make it easier for Fijian students to engage in learning?

This study has shown that Fijian students prefer greater opportunities to share different aspects of their culture and life experiences with their teachers and peers than what they are currently experiencing. The students consider that their culture plays a significant role in their lives and influences many of their choices. They have reported that sharing their culture with teachers and peers will foster greater understanding between them. This will help teachers be more aware of students' values, beliefs, and expectations. Students envisage that if teachers are better informed of their expectations, they will be able to better serve their learning needs.

The Fijian students reported that they preferred to have a positive student-teacher relationship. This study found that having a positive relationship helps students to have the confidence to trust their teachers. Students reported that when they trust their teachers, sharing problems related to the subject matter and their personal life is easier. One way to foster a positive student-teacher relationship is by one-to-one conversation and showing empathy and valuing the well-being of Fijian students, not just their academic performance.

The study found that a sense of belonging in a classroom was important to Fijian students because it boosted their self-confidence which helped them to actively engage in learning. A sense of belonging was determined as the feeling of being accepted by others in the class for who they are. Their culture and identity were valued by their peers and teachers. Some of the ways that the feeling of belonging could be achieved are by incorporating some aspects of their culture into teaching and learning or by displaying some of their cultural artefacts in class.

This study also found that Fijian students have expressed a desire to learn in familiar contexts as they have found it helpful in the past. They were more motivated to participate in classroom activities when the learning context was familiar to them, as it allowed them to visualise the context in which the learning was taking place. Additionally, they have shared that they find it easier to engage and learn when they can connect the context of the subject matter to their everyday lives. One of the

ways teachers could incorporate familiar learning contexts in science learning for Fijian students was by asking them to provide examples from their daily lives where science concepts can be applied. For example, when teaching concepts related to heat transfer, teachers could inquire how students cook food at home and relate their answers to the heat transfer methods in physics. As such, many Fijian Indian students make roti at home. Roti is a flatbread made from wheat flour. The type of heat transfer that takes place when cooking roti is mostly conduction. Contexts like this could be used by teachers when teaching science concepts to Fijian students.

The Fijian students reported that they had opportunities in science lessons to engage in collaborative learning, such as group work. Many Fijian students reported that they like working in a group setting because it creates opportunities to share ideas with their peers. Fijian students generally enjoyed working in groups, but this was not always the case. This could have been due to some teacher's use of group work in class, which may not have been engaged with by the students. Some students reported that they had poor perceptions of group work. Fijian students reported that effective group work was structured when every member contributed, had good relationships with each other, and there were objectives. This finding was significant, as it challenges the assumption that Pacific learners excel in group settings. The finding from this study indicated that Fijian students preferred less group work than they were currently experiencing. Teachers could regularly seek feedback from Fijian students to determine their preferred learning style. Teachers could further consider the context and parameters of group-based learning to ensure maximum benefits.

This study has also found that some Fijian students liked to ask questions during their science classes, but many preferred not to do so. Those who preferred not to ask questions reported that it was a fear of making mistakes, and they felt they were challenging the teacher's authority were the reasons prohibiting them from asking questions in class. In Fijian society, teachers are highly respected figures, and questioning their authority in front of others is usually not a habit. From an early age, children are taught not to challenge the authority of their elders. Teachers could establish a conducive learning environment by facilitating individual question-and-answer sessions. Furthermore, this study emphasised that teachers could make the

learning environment for Fijian students more engaging by actively listening to their voices to achieve a deeper understanding of their learning needs. This may require some fundamental shifts in how class time is utilised, reducing dependence on whole class discussions.

The Fijian students also reported that they were not given enough opportunities to choose the learning activities they wanted to do in their classrooms. This study found that Fijian students wanted more control over the learning activities they undertook. They believed that being given more opportunities to choose activities that interested them would motivate them to engage more in their science learning. Teachers could explore further possibilities to enhance students' class responses by seeking their input in the choice of activities provided.

In summary, this study investigated the perceptions of Fijian students regarding their science learning environment. The findings suggest that there is further opportunities for teachers to enhance the learning environment, enabling Fijian students to engage more effectively in science education. A greater constructivist learning environment appears to be a preference for the Fijian students. A learning environment which is more constructivist tends to incorporate student worldviews, considers what students already know, focuses on interactive learning and is student-centred. Teachers in constructivist settings tend to listen to student's views to help them construct knowledge. The next subsection offers responses to the supplementary question of the research.

7.2.1 Response to the supplementary question

This subsection sheds light on the supplementary question in this study. The aim was to determine if there were statistically significant differences in Fijian students' perceptions of science learning based on factors such as gender, ethnicity, place of birth, and year levels. This was accomplished by performing an independent t-test on CLES-FS data using SPSS.

This study found a significant difference between the perceptions of Fijian Indian and iTaukei students in terms of opportunities to share cultural experiences with

their teachers and peers. Fijian Indian students perceived they had more opportunities in this regard compared to iTaukei students. In addition, this study also found a significant difference in the perceptions between iTaukei and Fijian Indian students when it comes to collaborative learning. While both groups enjoyed collaborative learning, Fijian Indian students perceived they had a greater chance of participating in science-related collaborative learning than iTaukei students.

There was a significant difference between how male and female Fijian students perceived learning in a familiar context. Most male students perceived that teachers were using fewer familiar contexts in their teaching of science concepts compared to female students. Interestingly, there was no statistically significant difference between students' perceptions of their learning environment when it came to birthplace. This suggests that irrespective of where the Fijian students were born, their perceptions towards their learning environment were similar.

It is also worth noting the differences in the perception of students when it came to asking questions in class, although it is not a significant difference. The study has found that female students were more reluctant than male students to ask questions in a whole class situation. Another valuable insight into the perceptions of Fijian students in Years 9 and 10 (junior school) was that students had fewer opportunities to share their cultural experience with their teachers and peers than in Years 11, 12, and 13. This difference was not significant, however, it suggests avenues for future research.

The differences in the perceptions of the Fijian students on their current learning environment indicate that there was diversity not only among Pacific students in general but also among Fijian students when it came to their perceptions of their learning environment. This supports Kalavite's (2020) argument that Pacific students are a diverse group and cannot be treated as homogenous.

Therefore, a unified approach to engaging Fijian students in science learning is not the solution. This suggests that to enhance the involvement of Fijian students in science education, teachers may like to consider Fijian students as a heterogeneous group and to cater to their individual learning needs.

The study also highlighted the fact that there were some similarities between the Fijian Indian and iTaukei students' perceptions regarding cultural values. One such classic example was the respect of their elders which also includes teachers. The above example suggests that Fijian students who have migrated to a new country, such as New Zealand, still possess their values and cultural norms. It appears that parents impart these values to their children, which explains why Fijian students place great importance on their cultural values. The next section provides a detailed summary of techniques used to validate CLES-FS.

7.3 Validation of CLES-FS

An important purpose of this study was to validate the CLES-FS. The validation of the CLES-FS was done through various techniques that have been used by other researchers (Anagun & Anilan, 2013; Ebrahimi, 2015). These included the Kaiser-Meyer-Olkin analysis, Bartlett's Test of Sphericity and finding the values of Cronbach's alpha and discriminant.

Firstly, the sample adequacy of the Actual and Preferred forms was determined using Bartlett's Test of Sphericity and Kaiser-Meyer-Olkin (KMO). Bartlett's Test of Sphericity and KMO measures how suited the data is for factor analysis. In other words, Bartlett's Test of Sphericity and KMO test whether enough data was collected to perform factor analysis computations. According to Pallant (2020), Bartlett's Test of Sphericity should be significant, which means $p < 0.05$ and the KMO index to be more than 0.6 for the factor analysis to be considered appropriate. In other words, if the p-value of Bartlett's Test of Sphericity is less than 0.05 and the KMO index is more than 0.6, then the data collected is sufficient to proceed with the factor analysis.

In this study, the p-value of Bartlett's Test of Sphericity was less than 0.05, and the KMO value of 0.868 for the Actual form and 0.871 for the Preferred form was obtained using the CLES-FS data. These values fall within the range of Kaiser's recommended values (Kaiser, 1974), indicating that enough data was collected to proceed with the factor analysis.

Furthermore, the CLES-FS's Actual and Preferred forms were subjected to principal component analysis (PCA) using SPSS to check the number of factors present. The number of factors indicates the number of scales present in the modified version of CLES. PCA revealed the presence of five factors for both forms. The presence of five factors in the CLES-FS was consistent with the results obtained by (Ebrahimi, 2015). This shows that even though some of the items of the CLES were modified, it still has five factors. The presence of five factors indicates that there are five scales present in CLES-FS.

In addition, the data of the CLES-FS was subjected to Cronbach's alpha and discriminant analysis to determine the reliability and validity of the data. Cronbach's alpha values show the degree to which the items that make up the scale hang together (Pallant, 2016). In other words, it means how closely the items on the scale are related to each other. The Cronbach's alpha scores ranged from 0.68 to 0.93, which meets satisfactory internal consistency for the five scales' Actual and Preferred forms of the CLES-FS. The result shows a close association of Cronbach's alpha values with other researchers, such as Anagun and Anilan (2013) and Kwan (2020), suggesting that the scale items hang together.

The discriminant values were calculated using the mean values of the Actual and Preferred form scales through a correlation matrix. These values indicated how closely the scales of CLES-FS are related to each other. If the discriminant values were closer to 1 for two different scales, it indicated that these two scales measured the same things. However, if the correlation matrix values are closer to zero, it indicates that the scales measure two different concepts (Pallant, 2020). In this study, the discriminant values ranged from 0.26 to 0.62. Similar values were obtained by Kim et al., 1999; Ovbiagbonhia et al., 2019, which indicated that CLES-FS scales are unrelated and measure different things. This concludes that the discriminant values showed the scales are measuring contrasting concepts. These results highlight the modified scales are trustworthy.

In summary, based on the analysis conducted, it can be concluded that the modified version of CLES-FS is a reliable and valid tool for determining the perceptions of

Fijian students regarding their current and preferred learning environment in science classrooms in New Zealand secondary schools. The validation of CLES-FS suggests that CLES can be modified to find the perceptions of Pacific students. CLES-FS provides opportunities for researchers to collect data regarding the perceptions of other Pacific students of their constructivist learning environment.

7.4 Recommendations

The findings of this study are valuable for teachers and senior leadership when developing their professional learning programmes to cater for the learning needs of Fijian students. This study offers four recommendations, and these are:

1. In order to create a more inclusive learning environment for Fijian students' teachers could consider strategies to involve cultural Fijian perspectives in their teaching and learning programmes. This could be achieved by actively encouraging Fijian students to share their cultural experiences with others in the class and by teaching using familiar contexts.

2. Teachers could consider further developing positive teacher-student relationships with Fijian students. This could be achieved by engaging in greater one-on-one conversations with them or developing greater communication with Fijian families on occasions such as information evenings, social gatherings and prize giving days. Schools may also consider serving kava during these nights when welcoming them to school, as it is a traditional Fijian welcome.

3. When incorporating group work into lessons, teachers could further develop collaborative and cooperative structures, and organise group tasks effectively. Teachers could consider asking students whether they would like to work in a group setting or individually and then subsequently cater for students' preferences.

4. Teachers could also be mindful of the way they ask questions in class. They might like to consider avoiding asking questions to the whole class setting. Teachers may like to consider asking questions individually to Fijian students. This approach may help students feel more comfortable and confident in their responses.

7.5 Limitations of the study

This study does have some limitations, which are explained as follows. The first is the selection of the schools. Due to the COVID-19 pandemic, some schools were uncomfortable allowing outsiders to enter their premises due to the need to reduce the spread of the virus. The schools that did allow the research to take place had a small number of iTaukei students taking science subjects. This is one of the reasons for the smaller sample size of iTaukei students (57) compared to Fijian Indians (248). A more comprehensive understanding of students' perceptions of science learning could be achieved by including more iTaukei students. Any conclusions drawn from the data relate only to this sample of students.

Another limitation was the duration of time when conducting the talanoa sessions with the students. The talanoa sessions sometimes needed to be cut short because the students had to go to their next class. This may have limited some of the responses of the students in reflecting on what to say about the topics under discussion.

Another limitation of the study is that it did not account for students' academic abilities in their science classes. It would have been beneficial to find the connections between the perceptions of the Fijian students of their learning environment and their academic achievements. However, in retrospect, this study took place in eight different schools, and students were in different year levels; hence, linking the student's achievement with standardised assessment would have been problematic due to the different science assessments in the schools.

7.6 Suggestions for further study

This study has helped to gain greater insight into the perceptions of Fijian students regarding their experiences of learning science in New Zealand secondary schools. In order to suggest further research, it is noted that a similar research approach could be used to determine the perceptions of Fijian students in other subjects at New Zealand schools such as English, Mathematics, and in other curriculum areas. Comparing the results with this study could yield interesting insights. Additionally,

a study involving Fijian primary school students in New Zealand could be conducted, albeit with some modification of the CLES-FS items. After all, interest in science should begin at the primary level.

Similar study could be conducted with Fijian students in Fiji, and the results could be compared to other similar studies. This would provide a wider range of literature on the learning environment of Fijian students and isolate contextual factors that point at successful engagement of Fijians in science.

Similar research methods could be used to determine the perceptions of other underserved ethnic groups of Pacific students in science learning. By doing so, the similarities and differences between these students' perceptions of science subjects can be compared so that teachers can better respond to the learning needs of these diverse groups of students. The research mentioned above can provide teachers with valuable information to help motivate Pacific students to take an interest in science related subjects. By implementing the changes in their classes based on the findings, teachers may see an increase in the number of Pacific students who pursue science in senior subjects and future careers.

Additionally, this methodological approach could be used to explore other curriculum areas in which Pacific students study, thus providing a wide range of literature on student perceptions of their learning environment in New Zealand classrooms. This would further strengthen the literature which already exists and subsequently develop new understandings of the perceptions of students from the Pacific region.

Final comments

One of the findings from this study was that Fijian students encounter difficulty in expressing their perceptions of their learning environment to their teachers. This is because of Fijian students' cultural values in terms of behaviour and attitudes towards learning. For example, Fijian students show respect to their teachers and follow instructions from them without questioning them. This study has given Fijian students a voice to express their perceptions of the actual and preferred

learning environment. I believe that for some of them, it may have been the first time they could openly express their perceptions about their learning environment in a New Zealand classroom.

Upon reflection of this study's findings, it is evident that teachers play a crucial role in the lives of their students. It has also made me aware that although Fijian students embrace the new way of life in Aotearoa, New Zealand, they still hold on to their cultural values. This study has also made me think about Fijian students' internal struggles as they try to negotiate their way in embracing a new way of life.

This study has also made me reflect on my PhD journey. I realise that the values deeply ingrained in me through my own cultural and religious experiences have inspired me to keep pursuing this postgraduate journey despite encountering challenges during the COVID-19 pandemic. In one of the shlokas of the Hindu scriptures of Bhagwat Gita, Krishna says that "तस्मादज्ञानसम्भूतं हृत्स्थं ज्ञानासिनात्मन: which translates into [therefore, with the sword of knowledge, cut asunder the doubts that have arisen in your heart] (Mukundananda, 2014). Krishna is one of the most widely revered and most popular of all Indian divinities. There are 700 shlokas in Bhagwat Gita, which I listened to during the difficult times of my life as I was completing my studies.

Last but not least, I would like to end this thesis with a Hindu prayer normally recited at the very end of all programmes.

ॐ द्यौ: शान्तिरन्तरिक्षँ शान्ति:,
पृथ्वी शान्तिराप: शान्तिरोषधय: शान्ति:।
वनस्पतय: शान्तिर्विश्वे देवा: शान्तिर्ब्रह्म शान्ति:,
सर्वँ शान्ति:, शान्तिरेव शान्ति:, सा मा शान्तिरेधि॥
ॐ शान्ति: शान्ति: शान्ति:॥

May peace radiate there in the whole sky as well as in the vast ethereal space everywhere.

May peace reign all over this earth, in water and in all herbs, trees and creepers.

May peace flow over the whole universe.

May peace be in the Supreme Being Brahman.

And may there always exist in all peace and peace alone.

Om Shanti, Shanti, Shanti to us and all beings!

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Appendices

Appendix A Ethical Approval

Te Kura Toi Tangata
Faculty of Education
The University of Waikato
Private Bag 3105
Hamilton, New Zealand, 3240

FEDU Ethics Committee

fedu.ethics@waikato.ac.nz
07 8384500 ext. 7870
www.waikato.ac.nz/education

THE UNIVERSITY OF WAIKATO
Te Whare Wānanga o Waikato

8/7/2019

Dear Alvin Vikash Chand

FEDU Ethics Application Approved FEDU040/19

I am pleased to advise you that your ethics application for the project entitled "Secondary Science Education: A comparative between Fiji and New Zealand" was approved by Te Kura Toi Tangata Faculty of Education Ethics Committee on July 8th, 2019.

Please be aware that the Te Kura Toi Tangata FEDU Ethics Committee must be advised (by memo) of any changes to the details recorded in your ethics application. Please send any such advice to fedu.ethics@waikato.ac.nz. You will receive a memo of approval once the change(s) has been considered.

Kind regards

Co-chair
Te Kura Toi Tangata Faculty of Education Ethics Committee

Appendix B Principals Letter

THE UNIVERSITY OF WAIKATO
Te Whare Wānanga o Waikato

Dear Sir/Madam,

Subject: Request permission to conduct educational research in your school

I am Alvin Chand, a PhD student at the University of Waikato. My study aims to explore how do Fijian students perceive their current learning environment in science classrooms. The participants can be: *Fijians Indian or iTaukei students born in New Zealand or migrated to New Zealand*). There is **almost no research in this area**, and it will likely provide insights for our schools in this growing group of students. The study is ethically and COVID sensitive and approved by the University of Waikato's ethics committee.

I would like to conduct this research at your school. In this research, the participants will do a small multichoice survey which will not take more than 10 minutes. A small group of students can also take part in the talanoa session after the survey. I assure you that the data collected will be anonymous, and participation in this research is voluntary. The information gained will mainly be used to produce my thesis. A part of the study may also be used for other academic purposes, such as scholarly publications and educational presentations. As this study may involve students below the age of 16, informed consent in writing will also be obtained from the parents of the students participating in this study.

Thank you so much for giving me your time. If you have any questions about this study or would like to know more about it, please feel free to contact my supervisors or me. Their contact details are Associate Professor Sashi Sharma, sashi@waikato.ac.nz, Phone: +64 7 838 4466 ext. 6298 and Dr. Simon Tylor, simont@waikato.ac.nz, Phone: +64 7 838 4466 ext. 3112. All participants will go in the draw to win a voucher for $100. This study has been approved by the University of Waikato, Faculty of Education Ethics Committee. Approval number: FEDU040/19.

Alvin Chand
Alvinchand54@gmail.com
Ph: (0212624713)

Appendix C Information sheet for teachers

Information Sheet for teachers

I am Alvin Chand, a PhD student at the University of Waikato, New Zealand My study aims to explore how do Fijian students perceive their current learning environment in science classrooms. I am looking at education expectations and outcomes for students who have Fijian whakapapa (e.g. were either born in Fiji or 'first-born' in NZ from immigrant parents). This includes all groups within the Fijian 'identity'. There is almost no research in this area, and it will likely provide insights for our schools in this growing group of students. The research is both ethically and COVID sensitive.

I would also like to reassure you that the risks involved in students participating in this research will be minimised to the maximum of my potential. I will try to make sure that most of the data is collected within the normal working hours or when convenient for you. I also give assurance that the data collected will be anonymous and there will be no risk of this research on your teacher appraisal and professional growth and position.

While all the hard copies of the information you provide will be kept in a safe place in my house, the soft copies will be saved, and password protected in my laptop. When reporting the findings pseudonyms will be used instead of your real name and the name of your school. The information gained will mainly be used for producing my thesis and a part of the research may also be used for other academic purposes such as scholarly publications and academic presentations.

Upon completion of my studies, you will be able to access my thesis published in the University of Waikato Research Commons, the digital repository
for thesis.

Should you have any queries related to this study or would like to know more about it, please feel free to contact me:

Alvin Chand

Head of Faculty
James Cook High School
Manurewa
Auckland
a.chand@jchs.school.nz
0212624713

Appendix D Parent information Sheet

THE UNIVERSITY OF WAIKATO
Te Whare Wānanga o Waikato

Information Sheet

Bula vinaka, Namaste, Ramram, and warm Pacific greetings.

I am Alvin Chand, a PhD student at the University of Waikato. My study aims to explore how do Fijian students perceive their current learning environment in science classrooms. The participants can be: *Fijians Indian or iTaukei students born in New Zealand or migrated to New Zealand*). There is **almost no research in this area**, and it will likely provide insights for our schools in this growing group of students. The study is ethically and COVID sensitive and approved by the University of Waikato's ethics committee.

I am originally from Navoli Ba Fiji from a cane farming community, and my parents migrated to New Zealand in 2000. I have taught various schools around New Zealand, such as Mangakino Area School in Central North Island for three years, Hamilton Girls' High School for eight years. Currently, I am Head of Science at James Cook High School in Manurewa for the last four years. I completed my Bachelor of Science in Fiji, Graduate Diploma in Teaching at Massey University in Palmerston North, Master of Science at the University of Waikato, and currently completing my doctorate from the University of Waikato.

Participants will do a small multichoice survey which will not take more than 10 minutes. A small group of student can also take part in the talanoa session after the survey. I assure you that the data collected will be anonymous, and participation in this research is voluntary. The information gained will mainly be used to produce my thesis. A part of the study may also be used for other academic purposes, such as scholarly publications and educational presentations

Thank you so much for giving me your time. If you or your parents have any questions about this study or would like to know more about it, please feel free to contact my supervisors or me. Their contact details are; Associate Professor Sashi Sharma, sashi@waikato.ac.nz, Phone: +64 7 838 4466 ext. 6298 and Dr. Simon Tylor, simont@waikato.ac.nz, Phone: +64 7 838 4466 ext. 3112. All participants will go in the draw to win a voucher for $100.

Alvin Chand
Alvinchand54@gmail.com
Ph: (0212624713)

Students below the age of 16 need the parent's approval before doing the survey

I…… (name of the parent) **allow/do not allow** (circle one) my child…… (name of the child) of …… (school name) to participate in this research.

Signature…… Date……

Appendix E Student information sheet

THE UNIVERSITY OF WAIKATO
Te Whare Wānanga o Waikato

Research Information Sheet

Bula vinaka, Namaste, Ramram and warm Pacific greetings.

I am Alvin Chand, a Ph.D student at the University of Waikato, New Zealand My study aims to explore how do Fijian students perceive their current learning environment in science classrooms. I am looking at education expectations and outcomes for students who have Fijian whakapapa (e.g. were either born in Fiji or 'first-born' in NZ from immigrant parents). This includes all groups within the Fijian 'identity'. There is almost no research in this area, and it will likely provide insights for our schools in this growing group of students. The research is both ethically and COVID sensitive.

As a secondary student, you have the chance to participate in my research. I have a moral obligation to maintain the confidentiality of data collected and anonymity of the participating schools and their participants and I humbly request the same from you. Even though your principal has given permission to do this research at your school, your participation in this study is your own choice. You may decide not to continue participating in this research at any time before I start working with the information you have given me, and you will not have to give anyone any reasons for doing that.

There are two sets of survey questions. The first set asks you what happens in your science learning environment and the second set asks about your preferred science classroom learning environment. It will not take you more than ten minutes to finish the survey. I want you to know that no one will be told about the information you give me, and your name will not be written in the report. If you want you can also take part in the semi-structured group interview (2-3 students per group).

Thank you so much for giving me your time. If you or your parents have any questions about this study or would like to know more about it, please feel free to contact me or my supervisors. Their contact details are: Dr. Sashi Sharma sashi@waikato.ac.nz, Phone: +64 7 838 4466 ext. 6298 and Dr. Simon Tylor, simont@waikato.ac.nz, Phone: +64 7 838 4466 ext. 3112.

The ethics application has been approved by Te Kura Toi Tangata Faculty of Education Ethics Committee on July 8th, 2019. (Approval number -FEDU040/19).

The survey will take you about ten minutes to complete. All participants will go in the draw to win a voucher for $100.

Alvin Chand
21 2624713
Alvinchand54@gmail.com
धन्यवाद/Vinaka

CONSENT FORM
(Below 16 years of age need parents' permission)

Please fill the information below and sign the consent form. As your child is under the age of 16, you need to fill in the form below.

I…… (name of the parent) **allow/do not allow** (circle one) my child…… (name of the child) of …… (school name) to participate in this research.

Description	✓
I have read the information sheet provided about the research entitled above and I agree to allow my child to participate in the survey. or a paper copy	
I agree to allow the researcher to have an interview with my child. I am aware that the conversations will not last for more than 15-25 minutes. This may be done in pairs or in threes.	

Signature…… Date……

---

16 years and above do not need parents' permission

I…… (name) of …… (name of school) **have agreed/not agreed** (circle one) to participate in this research.

Description	✓
I have read the information sheet provided about the research entitled above and I agree to allow my child to participate in the survey. or a paper copy.	
I agree to allow the researcher to interview me. This may be done in pairs or in threes at school.	

Signature: …… Date: ……

This research has been approved by the University of Waikato Faculty of Education Ethics Committee on 8th July 2019. Approval number: FEDU040/19.

Please note if you want to complete an online consent form and survey, please type this in the

Appendix F CLES-FS

Constructivist learning enviornmnt survey-Fijian students (CLES-FS)

Secret Number_____	Are you a Male or Female (circle your answer)
Are you a Migrant or born in New Zealand (circle your answer)	School Name:_____
Are you an Indigenous Fijian or Fijian Indian (circle your answer)	Year Level: _____

DIRECTIONS

1. **Purpose of the Questionnaire**
   This questionnaire asks you to describe your science classroom learning environment.
   There are no right or wrong answers. This survey is not a test, and your answers will not affect your assessment. Your opinion is what is wanted. Your answers will enable us to improve future science classes.
2. **How to Answer Each Question**
   For each question, circle only one number corresponding to your answer. For example:

		Almost Always	Often	Some-times	Seldom	Almost Never
1	The teacher asks me questions.	5	4	3	2	1

   - If you think the science teacher *almost always* asks you questions, circle the 5.
   - If you think the science teachers *almost never* ask you questions, circle the 1.
   - Or you can choose the number 2, 3, or 4 if one of these seems like a more accurate answer.

3. **How to Change Your Answer**
   If you want to change your answer, cross it out and circle a new number, For example:

8	The teacher asks me questions.	⑤	④	3	2	1

4. **Completing the Questionnaire**
   Now turn the page, and please answer every question.

Actual form

Identity/Relationship **In this class…..**			Almost Always	Often	Some-times	Seldom	Almost Never
1	Does my science teacher acknowledge me during science lessons?		5	4	3	2	1
2	My science teacher pronounces my name correctly?		5	4	3	2	1
3	I have an opportunity to share my cultural experiences with others during the science lessons?		5	4	3	2	1
4	I have a good working relationship with my teacher during science lessons?		5	4	3	2	1
5	My science teacher talks to me during science lessons?		5	4	3	2	1
Personal relevance- Learning in a familiar context- means the context of learning is familiar to you **In this class….**			Almost Always	Often	Some-times	Seldom	Almost Never
6	I learn science ideas in a familiar context.		5	4	3	2	1
7	I have an opportunity to explain scientific ideas in familiar contexts to my teacher?		5	4	3	2	1
8	I have the opportunity to explain scientific ideas in a familiar context to my peers?		5	4	3	2	1
9	The exam questions that are given during the examination are in a familiar context?		5	4	3	2	1
10	In science classes, I relate learning to everyday life?		5	4	3	2	1
Uncertainty-Group work/Talanoa **In this class….**			Almost Always	Often	Some-times	Seldom	Almost Never
11	I get the chance to talk to my science teacher during science classes?		5	4	3	2	1
12	I can talk with other students about how to solve problems.		5	4	3	2	1
13	I can explain my ideas to other students.		5	4	3	2	1
14	I can ask other students to explain their ideas.		5	4	3	2	1
15	I can work in groups to learn science concepts.		5	4	3	2	1
Critical Voice **In this class…**			Almost Always	Often	Some-times	Seldom	Almost Never
16	I feel confident to ask the teacher, "why do I have to learn this?"		5	4	3	2	1
17	I feel confident to question the way I'm being taught.		5	4	3	2	1

18	I feel confident to complain about confusing activities.		5	4	3	2	1
19	I feel confident to complain about anything that prevents me from learning.		5	4	3	2	1
20	I feel confident in expressing my opinion in class.		5	4	3	2	1

Shared Control **In this class…**			Almost Always	Often	Some-times	Seldom	Almost Never
21	I help the teacher to plan what I'm going to learn. e.g., lesson planning		5	4	3	2	1
22	I help the teacher to decide how well I am learning.		5	4	3	2	1
23	I help the teacher to decide which activities are best for me.		5	4	3	2	1
24	I help the teacher to decide how much time I spend on activities.		5	4	3	2	1
25	I help the teacher to decide which activities I do.		5	4	3	2	1

Preferred form

Identity/Relationship			Almost Always	Often	Some-times	Seldom	Almost Never
In this class…							
1	I want my science teacher acknowledge me or my cultural background during the science class?		5	4	3	2	1
2	I want my science teacher to pronounce my name correctly?		5	4	3	2	1
3	I want to share my cultural experiences with others in your science class?		5	4	3	2	1
4	I want to have a good working relationship with my science teacher during lessons?		5	4	3	2	1
5	I want my science teacher to talk to me during lessons?		5	4	3	2	1
Personal relevance- Learning in a familiar context			Almost Always	Often	Some-times	Seldom	Almost Never
In this class…							
6	I want to learn science ideas in a familiar context?		5	4	3	2	1
7	I want to explain scientific ideas in familiar contexts to my teacher?		5	4	3	2	1
8	I want to explain scientific ideas in a familiar context to my peers?		5	4	3	2	1

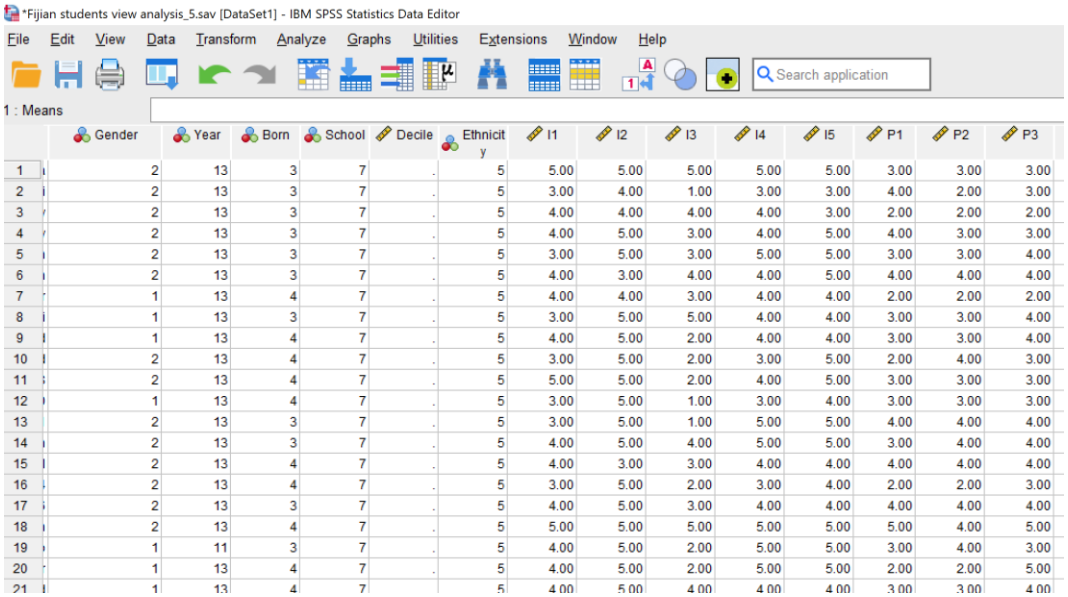
9	I want to get the exam questions in a context that familiar to me?		5	4	3	2	1
10	I want to relate science learning to everyday life?		5	4	3	2	1
-Group work/Talanoa			Almost Always	Often	Some-times	Seldom	Almost Never
In this class…							
11	I want to talk to my science teacher during the science class?		5	4	3	2	1
12	I want to talk to other students about how to solve science questions during lessons?		5	4	3	2	1
13	I want to explain my ideas to my peers?		5	4	3	2	1
14	I want my peers to explain their ideas to me?		5	4	3	2	1
15	I want to work in groups?		5	4	3	2	1
Critical Voice **In this class…**			Almost Always	Often	Some-times	Seldom	Almost Never
16	Will you prefer to ask the science teacher why do I have to learn this?		5	4	3	2	1
17	Will you prefer to question the teacher on the way you are being taught?		5	4	3	2	1
18	Will you prefer to complain about confusing activities?		5	4	3	2	1
19	Will you prefer to inform someone if anything prevents you from learning?		5	4	3	2	1
20	Will you prefer to express your opinion in class?		5	4	3	2	1

Shared Control **In this class…**			Almost Always	Often	Some-times	Seldom	Almost Never
21	Will you prefer to help your teacher to plan what I'm going to learn.		5	4	3	2	1
22	Will you prefer to help your teacher to decide how well you are learning?		5	4	3	2	1
23	Will you prefer to help your teacher to decide which activities are best for you?		5	4	3	2	1
24	Will you prefer to help your teacher to decide how much time you will spend on each activity?		5	4	3	2	1
25	Will you prefer to help your teacher to decide which activities you will do?		5	4	3	2	1

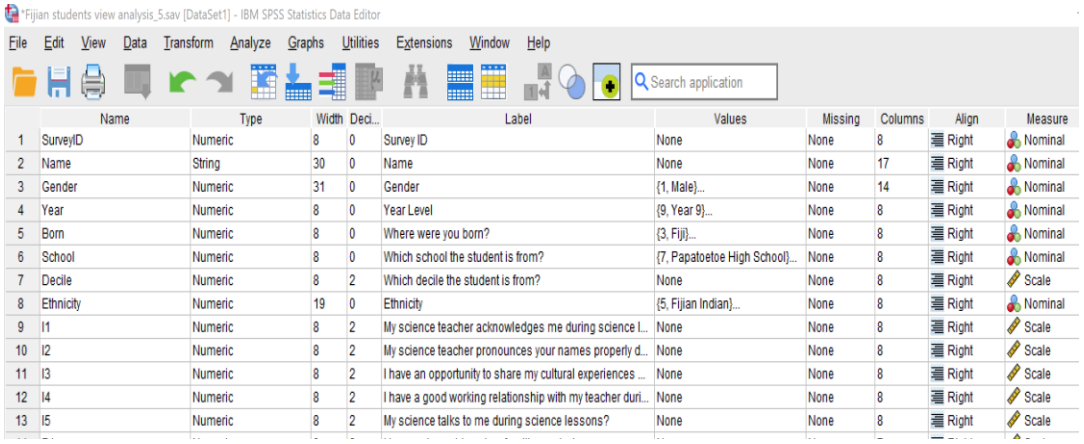
Thank you/Vinaka/धन्यवाद

Appendix G Screen shots of SPPSS

SPSS Spreadsheet



	Gender	Year	Born	School	Decile	Ethnicity	I1	I2	I3	I4	I5	P1	P2	P3
1	2	13	3	7	.	5	5.00	5.00	5.00	5.00	5.00	3.00	3.00	3.00
2	2	13	3	7	.	5	3.00	4.00	1.00	3.00	3.00	4.00	2.00	3.00
3	2	13	3	7	.	5	4.00	4.00	4.00	4.00	3.00	2.00	2.00	2.00
4	2	13	3	7	.	5	4.00	5.00	3.00	4.00	5.00	4.00	3.00	3.00
5	2	13	3	7	.	5	3.00	5.00	3.00	5.00	5.00	3.00	3.00	4.00
6	2	13	3	7	.	5	4.00	3.00	4.00	4.00	5.00	4.00	4.00	4.00
7	1	13	4	7	.	5	4.00	4.00	3.00	4.00	4.00	2.00	2.00	2.00
8	1	13	3	7	.	5	3.00	5.00	5.00	4.00	4.00	3.00	3.00	4.00
9	1	13	4	7	.	5	4.00	5.00	2.00	4.00	4.00	3.00	3.00	4.00
10	2	13	4	7	.	5	3.00	5.00	2.00	3.00	5.00	2.00	4.00	3.00
11	2	13	4	7	.	5	5.00	5.00	2.00	4.00	5.00	3.00	3.00	3.00
12	1	13	4	7	.	5	3.00	5.00	1.00	3.00	4.00	3.00	3.00	3.00
13	2	13	3	7	.	5	3.00	5.00	1.00	5.00	5.00	4.00	4.00	4.00
14	2	13	3	7	.	5	4.00	5.00	4.00	5.00	5.00	3.00	4.00	4.00
15	2	13	4	7	.	5	4.00	3.00	3.00	4.00	4.00	4.00	4.00	4.00
16	2	13	4	7	.	5	3.00	5.00	2.00	3.00	4.00	2.00	2.00	3.00
17	2	13	3	7	.	5	4.00	5.00	3.00	4.00	4.00	4.00	4.00	4.00
18	2	13	4	7	.	5	5.00	5.00	5.00	5.00	5.00	5.00	4.00	5.00
19	1	11	3	7	.	5	4.00	5.00	2.00	5.00	5.00	3.00	4.00	3.00
20	1	13	4	7	.	5	4.00	5.00	2.00	5.00	5.00	2.00	2.00	5.00
21	1	13	4	7	.	5	4.00	5.00	4.00	4.00	4.00	3.00	3.00	4.00



	Name	Type	Width	Deci...	Label	Values	Missing	Columns	Align	Measure
1	SurveyID	Numeric	8	0	Survey ID	None	None	8	Right	Nominal
2	Name	String	30	0	Name	None	None	17	Right	Nominal
3	Gender	Numeric	31	0	Gender	{1, Male}...	None	14	Right	Nominal
4	Year	Numeric	8	0	Year Level	{9, Year 9}...	None	8	Right	Nominal
5	Born	Numeric	8	0	Where were you born?	{3, Fiji}...	None	8	Right	Nominal
6	School	Numeric	8	0	Which school the student is from?	{7, Papatoetoe High School}...	None	8	Right	Nominal
7	Decile	Numeric	8	2	Which decile the student is from?	None	None	8	Right	Scale
8	Ethnicity	Numeric	19	0	Ethnicity	{5, Fijian Indian}...	None	8	Right	Nominal
9	I1	Numeric	8	2	My science teacher acknowledges me during science l...	None	None	8	Right	Scale
10	I2	Numeric	8	2	My science teacher pronounces your names properly d...	None	None	8	Right	Scale
11	I3	Numeric	8	2	I have an opportunity to share my cultural experiences ...	None	None	8	Right	Scale
12	I4	Numeric	8	2	I have a good working relationship with my teacher duri...	None	None	8	Right	Scale
13	I5	Numeric	8	2	My science talks to me during science lessons?	None	None	8	Right	Scale

Note. Screenshot of CLES-FS data in SPSS

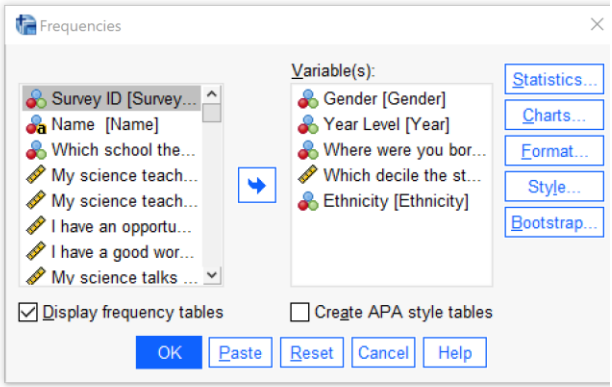
Descriptive analysis

Gender

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	143	46.9	46.9	46.9
	Female	162	53.1	53.1	100.0
	Total	305	100.0	100.0	

Year Level

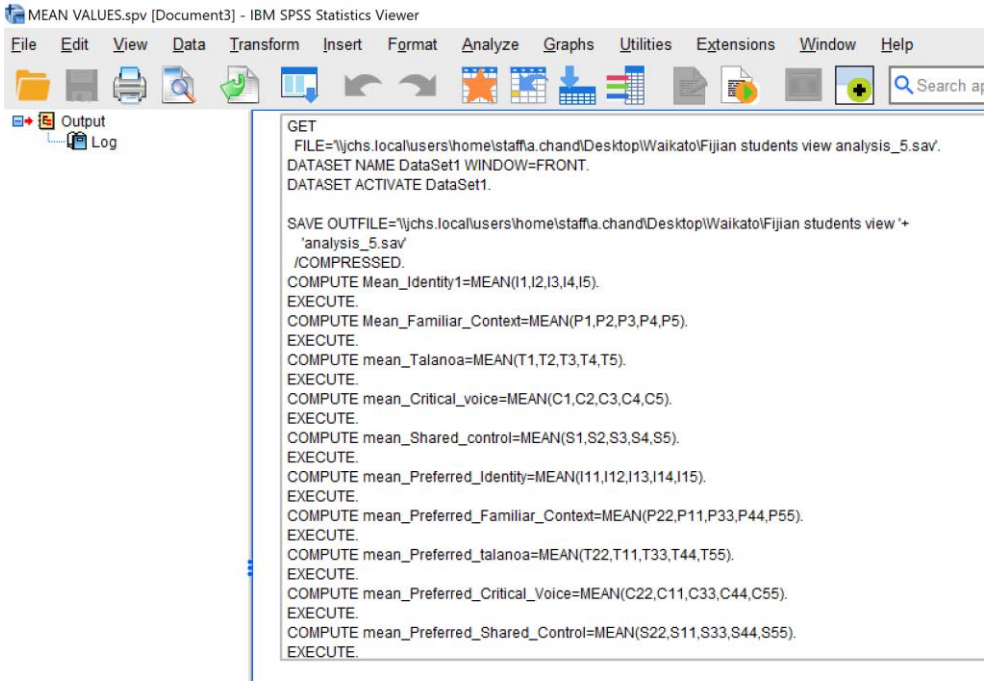
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Year 9	35	11.5	11.5	11.5
	Year 10	44	14.4	14.4	25.9
	Year 11	84	27.5	27.5	53.4
	Year 12	61	20.0	20.0	73.4
	Year 13	81	26.6	26.6	100.0
	Total	305	100.0	100.0	



Where were you born?

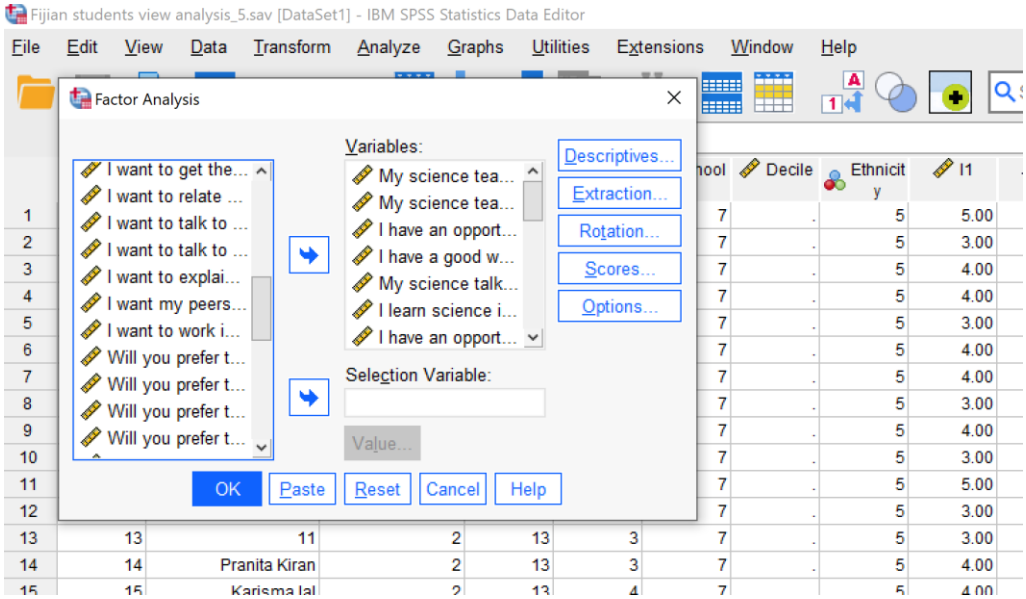
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Fiji	160	52.5	52.5	52.5
	New Zealand	145	47.5	47.5	100.0
	Total	305	100.0	100.0	

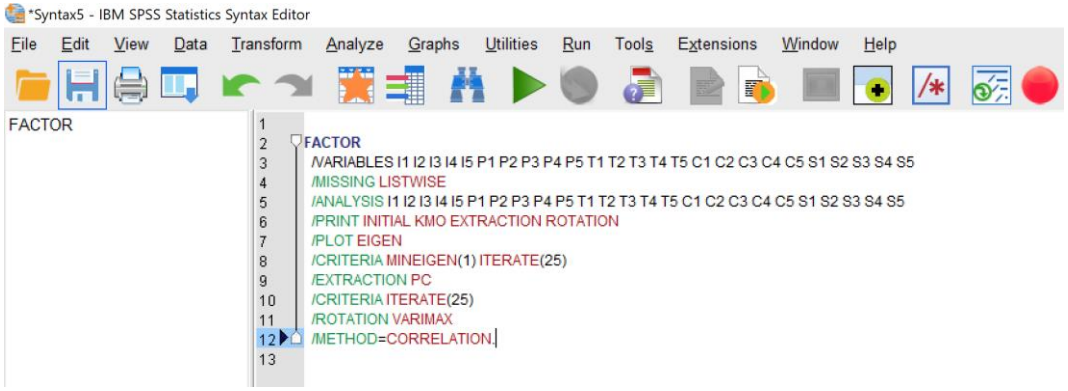
Calculation of the means values (Syntax for SPSS)

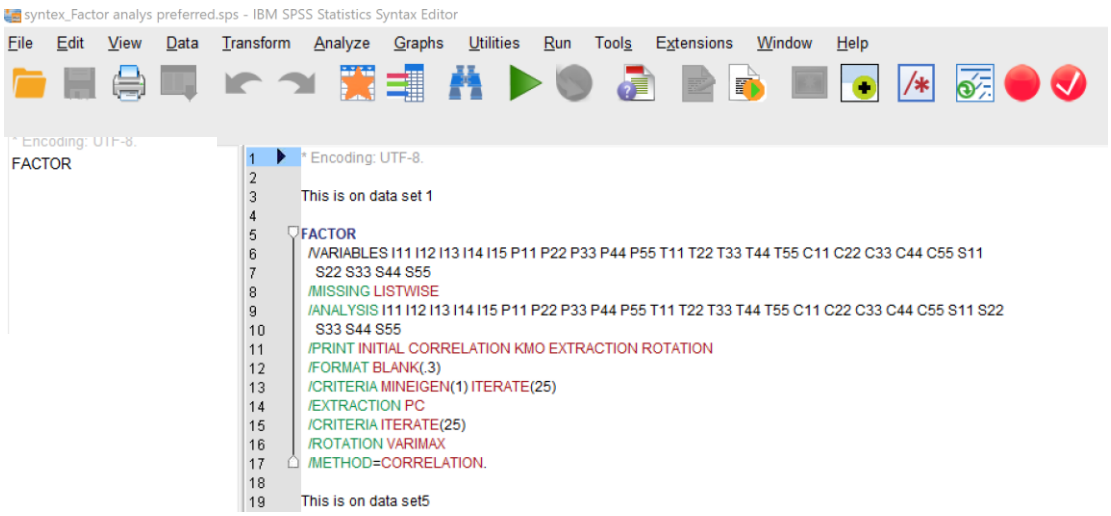


Note. Data obtained is presented in Table 8, Chapter 4

Syntax for Factor Analysis for Actual and Preferred forms

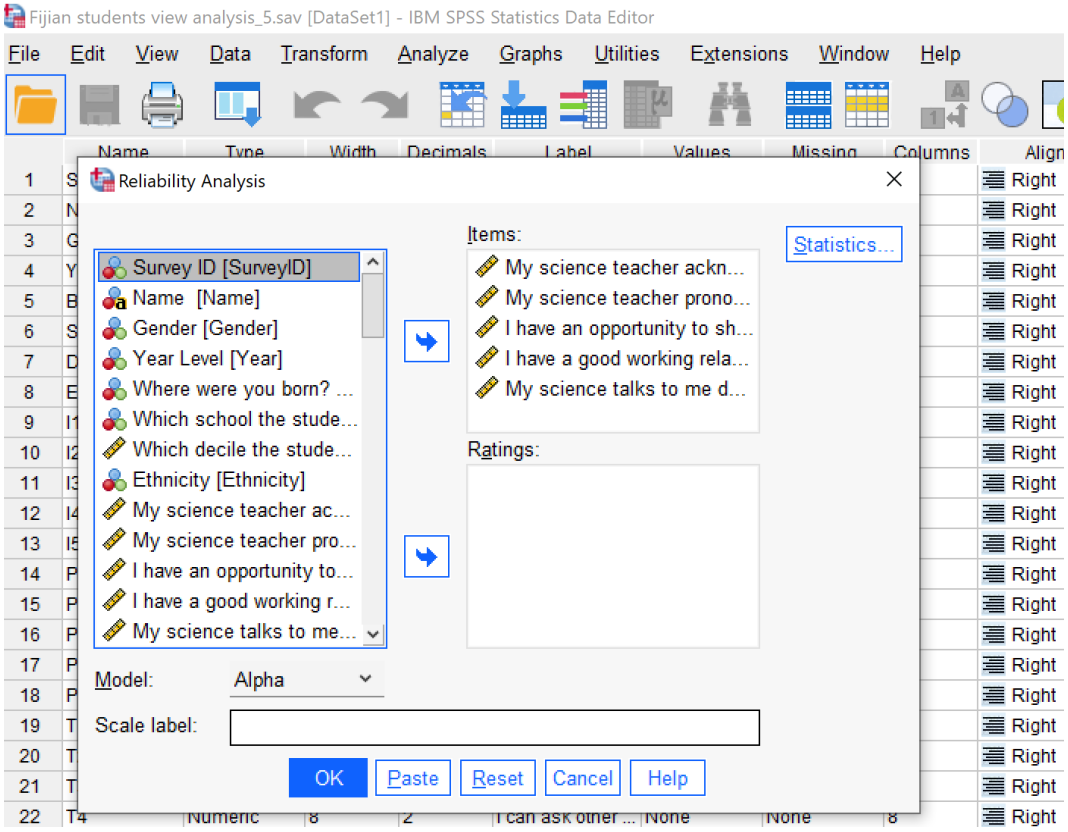


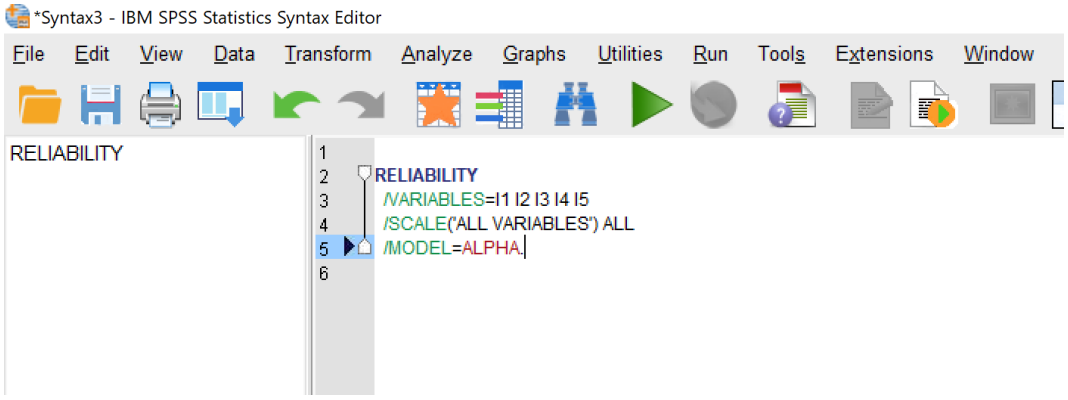




Note. The items of each scale are taken as variables. The Bartlett's Test of Sphericity, and the Kaiser-Meyer-Olkin tests values obtained are presented in Table 4 of Chapter 4

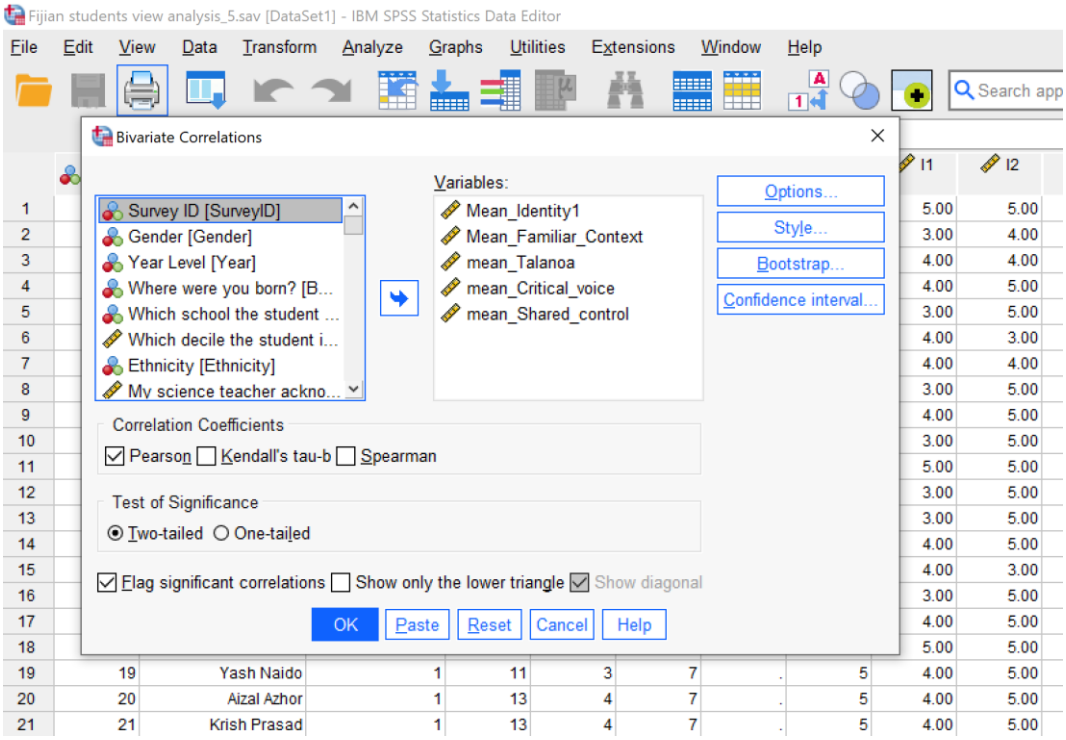
Syntax for Reliability for Identity scale (Cronbach's Alpha)

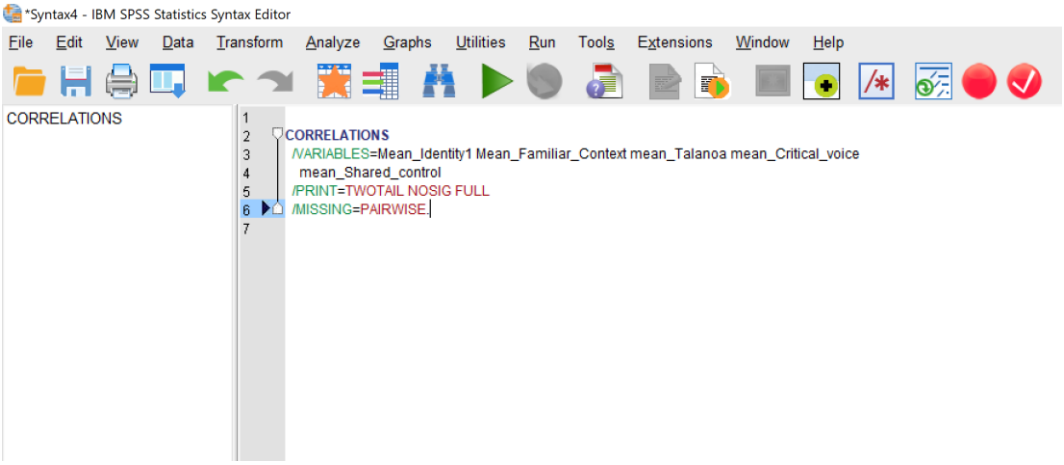




Note. Similar calculations were done for all the scales of Actual and Preferred forms. The data obtained is presented in Table 5, Chapter 4

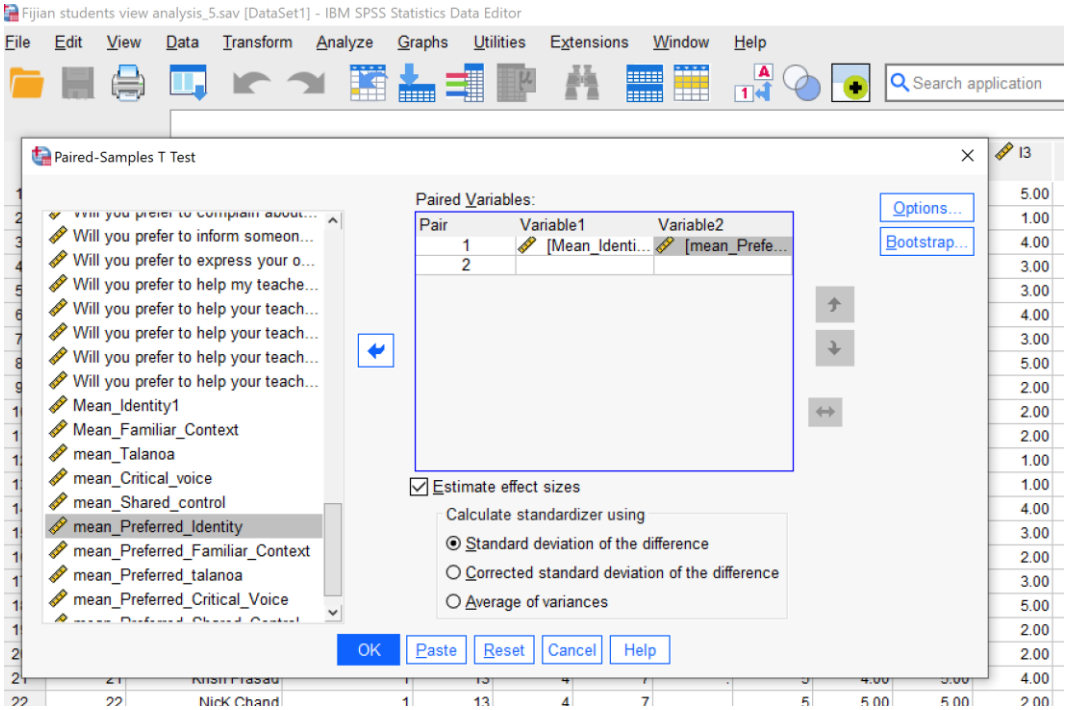
Syntax for discriminant validity-mean correlation values of scales in relation to other scales for Actual form

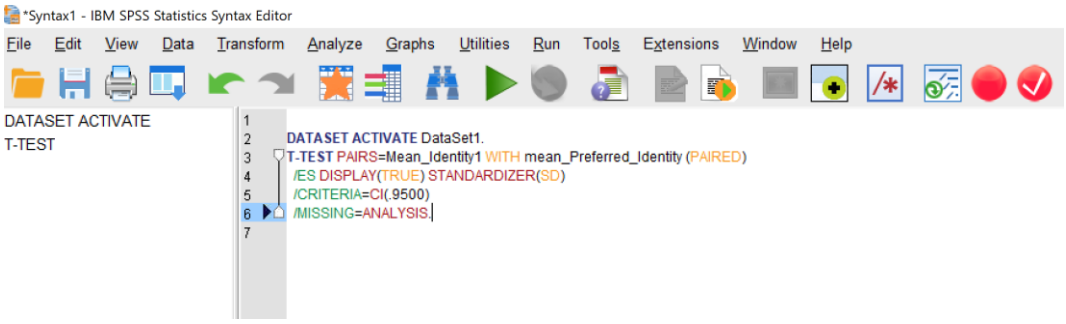




Note. Similar calculations were performed on mean values of the different scales of Preferred form. Data obtained through this calculation is displayed in Table 6 and 7 of Chapter 4.

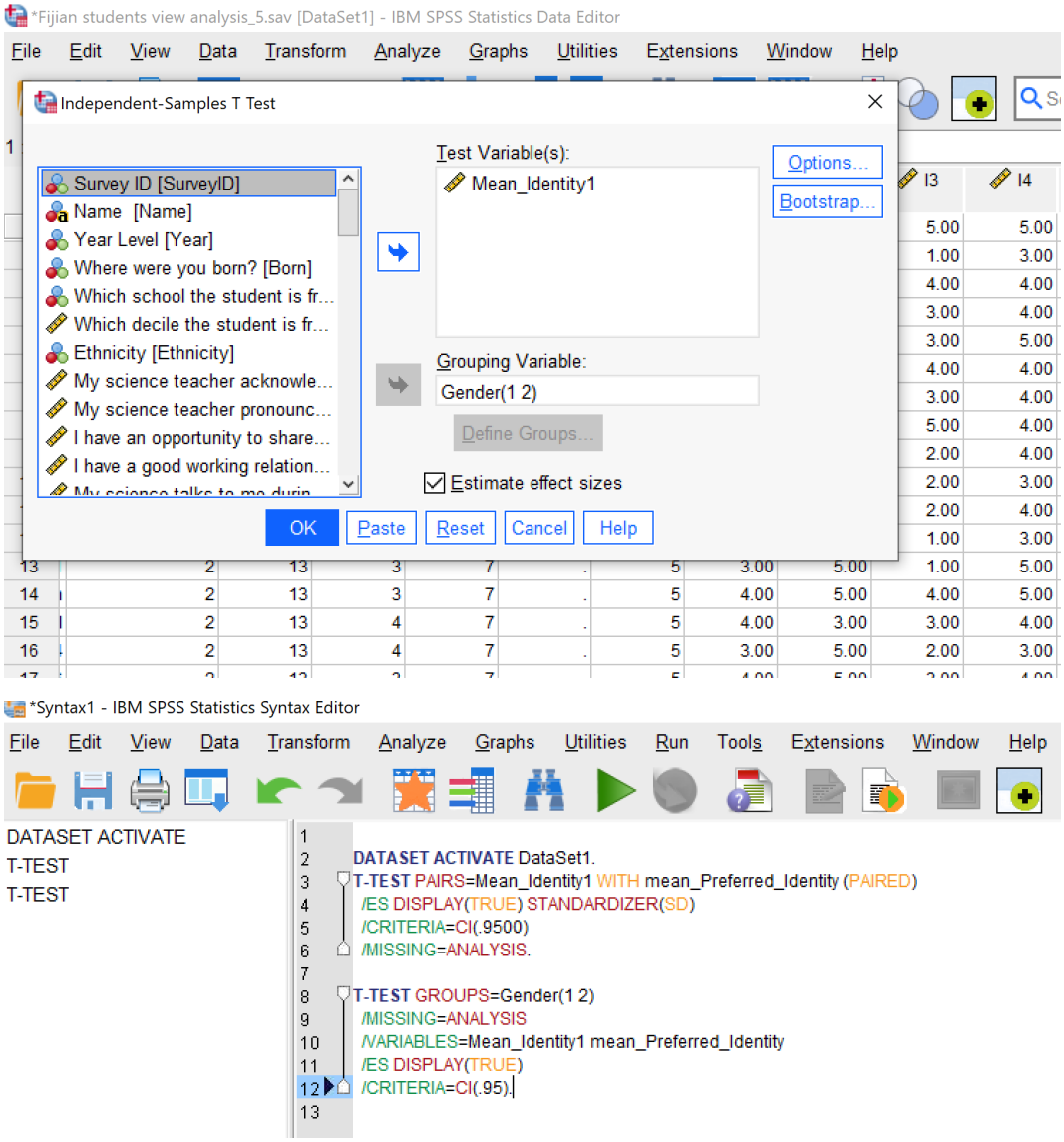
Syntax for Paired sample t-test (Identity scale)





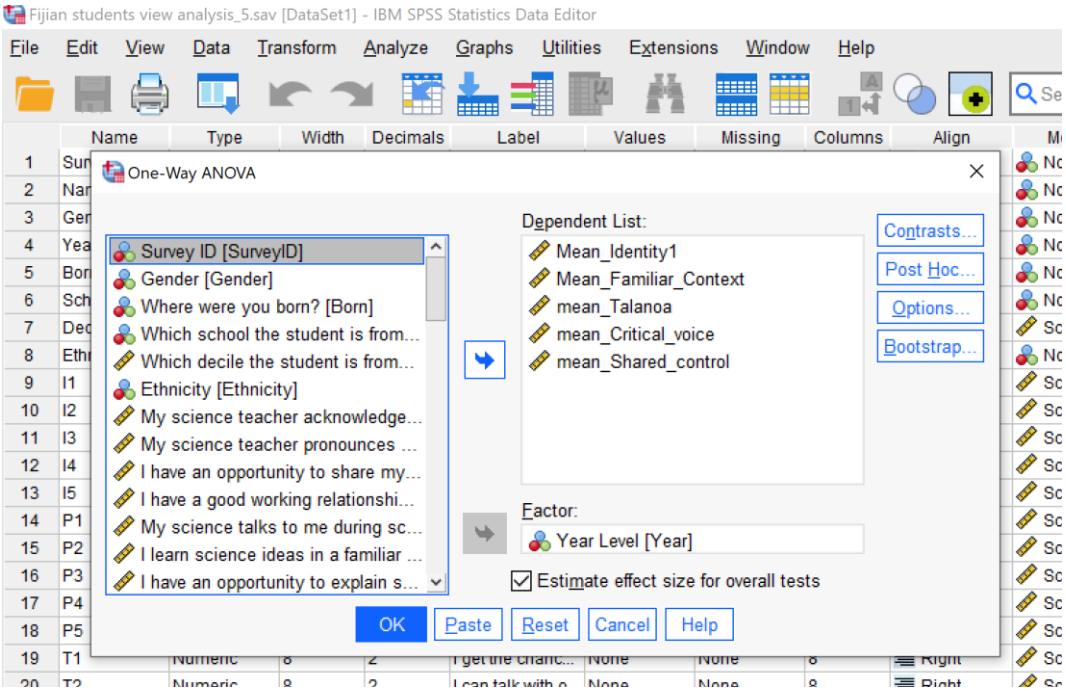
Note. The data generated via this syntax is displayed in Figure 19 of Chapter 4. Calculations for the paired sample t-test were also done for other scales using the same technique and presented in Table 9

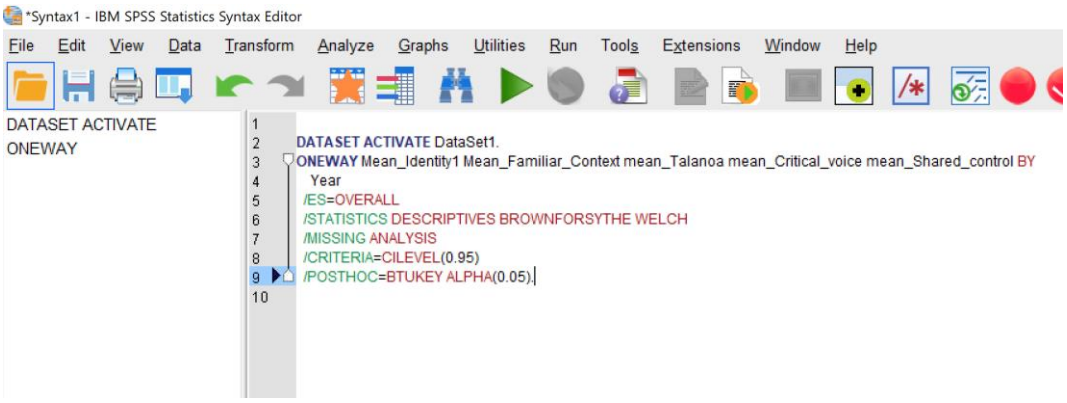
Independent – Sample T test for Identity scale of Actual and preferred forms



Note. The independent – sample T test was performed for all the scales of CLES-FS. The data obtained is presented in Figure 20. Similar calculations were done on birthplace and ethnicity for all scales.

One-way Analysis of variance (ANOVA) of the mean values of the Actual forms data of different year levels





Note. Similar calculations were done using SPSS on Preferred forms data and results obtained are displayed in Table 21

Appendix H Conference presentation pictures

Some pictures from research presentations at various conferences and seminars

Fiji conference (November 2022) Revisioning education in Oceania: Walking backward into the future, together.

At a local school (June 2021)

Post Primary Teachers Conference (April 2021)

Pacific conference at (October 2020)

Education conference (November 2020)

Talanoa sessions at Waikato University

Other conferences where finding was presented are:

New Zealand Associations for Research in Educations (November 2021)

Fiji Aotearoa Research Symposium (2020, 2021)

Appendix I -Journal article

(1 out of 4)

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THE UNIVERSITY OF WAIKATO

Volume 26, Special Issue 2021
Talanoa Vā: Honouring Pacific Research and Online Engagement

Weaving CLES-FS and talanoa to capture Fijian student's science learnings: Exploring possibilities

Alvin Vikash Chand, Sashi Sharma, Simon Taylor

Editors: David Taufui Mikato Fa'avae, S. Apo Aporosa, & Keaka Hemi

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Waikato Journal of Education
Te Hautaka Mātauranga o Waikato

Volume 26, Special Issue: Talanoa Vā: Honouring Pacific Research and Online Engagement

Weaving CLES-FS and talanoa to capture Fijian student's science learnings: Exploring possibilities

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The University of Waikato
New Zealand

Abstract

This study seeks to explain how a modified Constructivist Learning Environment Survey (CLES) was implemented together with talanoa to explore Fijian students' perceptions of a constructivist learning environment in the science classroom in New Zealand secondary schools. The modified CLES, called CLES-FS, was developed explicitly for Fijian students in the New Zealand secondary schooling context. The adapted CLES-FS instrument included five components of constructivist learning: relationship and identity, familiar context, talanoa, critical voice and shared control. The inclusion of talanoa within the CLES-survey tool has not been done before to collect data from iTaukei (Indigenous) and Fijian-Indian students. The implication of using talanoa alongside CLES-FS has provided the unfolding of possibilities when weaving together qualitative as well as quantitative data. As an emerging Pacific researcher, the exploration exercise is essential learning that helps make sense of what it means to engage in research, particularly within the post-COVID context.

Keywords

Talanoa; Fijian; education; constructivist learning environment survey; Fijian Indians; Pacific

Introduction

Talanoa vā has enabled the thinking and working-through ideas linked to research engagement and practice in this paper through the call for papers in the special section within the *Waikato Journal of Education*. Positioning the paper within education research allowed me to relate to myself.

Relational positionality is a way to ground a researcher's connection to the topic and the communities involved in their study (Fasavalu & Reynolds, 2019). I am a fourth-generation Fijian-Indian, born and raised in Fiji. My ancestors were brought to Fiji on the Indentured Labour System to work on sugarcane fields in the late 1800s by the British Government. My family and I now reside in Aotearoa, New Zealand. My service and contributions have been towards high school science teaching and leadership in Auckland and Waikato Regions. My desire for more Fijian and Pacific students to

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(pp. 195–209)

succeed in the Science Learning Area is a priority. It places a heavy emphasis on why I do what I do, including embarking on my doctoral project.

Grounding my relational positionality is culturally appropriate and respectful. It helps to position my entry point into exploring talanoa possibilities for iTaukei (Indigenous Fijian) and Fijian-Indian young people in New Zealand. The social labels or identifiers used to refer to Fijian people with Indian heritage are Indo-Fijian, Indian Fijian, or Fijian-Indian. In this paper, I use Fijian-Indian, which refers to Fijians whose descendants were indentured labourers brought to Fiji in the late 1800s by the British Government. When referring to Fijians or Fijian students in the study, I refer to both ethnicities iTaukei and Fijian-Indians

Statistics show that more Fijian students are coming to New Zealand (NZ) for study purposes. Between 2004 and 2017, about 6000 student visas were granted to Fijian students to come and study in New Zealand (New Zealand Statistics, 2018). It is estimated that about 90,000 Fijians live in New Zealand. As more Fijian students come to New Zealand and enter secondary school, they experience science education in an NZ context. The study aims to identify their perceptions and experiences of science learning in New Zealand classrooms settings. This research uses both a quantitative survey (CLES-FS) and a qualitative approach (talanoa) to explore Fijian students' perceptions of a constructivist learning environment in science classrooms.

The study's findings can provide support for teachers through professional development programmes to accommodate Fijian students' learning needs. Furthermore, this will contribute to the literature about Fijian students' perceptions regarding learning science content in New Zealand. This study may also help highlight pedagogies used in some schools that help Fijian students engage in science learning or barriers that inhibit science learning for them.

Fijian students are engaged and interested in learning when they can relate learning experiences to their everyday life (Sharma, 2012; Thaman, 2010). A case study done by Brison (2011) found that some kindergarten teachers in Fiji successfully engage students in learning when they use local examples in their teaching. Brison (2011) concludes that students construct new knowledge based on their interaction between what they already know and believe and experience. Similar sentiments are echoed by (Eley & Berryman, 2019; McKinley et al., 1992) that most Pasifika (a label used by the Ministry of Education to group Pacific ethnicities) students learn better when the context in which they learn is familiar to them because they can relate the concepts to their everyday life. According to Bakalevu (1997) "A Fijian set to work on his own easily loses heart and becomes lackadaisical and without interest in the task" (p. 74). She further states that students become immediately enthusiastic and energetic when learning relates to their cultural context.

This study seeks to explain how CLES-FS, a modified version of CLES, incorporates talanoa to explore how Fijian students perceive the constructivist learning environment in science classrooms. The students' perceptions will be studied through a popular quantitative survey instrument, the Constructivist Learning Environment Survey (CLES-FS) and the talanoa method, an emerging cultural approach used by Pacific researchers to capture students' learning experiences.

Literature review

Talanoa

Talanoa is more than just a conversation (Vaioleti, 2006). Talanoa is an exchange of ideas or thinking, whether formal or informal. The word talanoa may mean different things to different people. In Fiji, talanoa is a practice associated with conversations enabling people to relax, share knowledge, discuss information, or resolve conflicts or disputes (Farrelly & Nabobo-Baba, 2014). The talanoa context and topics can vary from informal conversations such as making decisions about the next day's work to

formal engagement between people of status in society (Farelly & Nabobo-Baba, 2014; Robinson & Robinson, 2005). 'Talanoa lasa' means sharing a joke or talking about something meaningless. People look forward to talanoa engagement in Fiji, particularly over the kava bowl (Aporosa, 2019). Some key values associated with the practice of talanoa engagement are respect and trust. This is because the people who are involved in talanoa are trusted people and knowledge is gained or shared in these sessions.

In the context of formal research in academia, Pacific researchers have framed talanoa as either a methodology or method. Tunufa'i, (2016) argued why talanoa is a method and not a methodology for Samoan research communities. However, Vaioleti (2006) and Farrely & Nabobo-Baba (2014) have contextualised talanoa as a research methodology in Tongan and Fijian contexts. According to Farrelly & Nabobo-Baba (2014), talanoa is conceivably one of the most prominent research methodologies utilised in the Pacific. Nabobo-Baba (2008) states that a researcher needs to use culturally appropriate framings and methodologies that recognise Fijian world views, cultural knowledge, and epistemologies. This approach recognises the Fijian people as holders of the knowledge and therefore treated them as knowers and participants of research. Nabobo-Baba (2008) states the eight steps as follows:

- Conception—includes the consideration of all people who are involved in this research.
- Relationship—researchers bear in mind that in the community, people and personal relationships are significant.
- Sevusevu—customary Fijian process of a i sevusevu is thought of.
- Na talanoa—the appropriate method or tool for collecting information is through talanoa.
- Reporting or writing—are guided by Vanua values and protocols of knowledge.
- Reciprocal relationship—even after the research, the researcher will have a bond with the people involved in the research.
- Thank you—it is essential for the researcher to thank the people who have taken part in the research.
- Giving back to the people—the researcher shares the knowledge gained during the research. (pp. 147)

Nabobo-Baba (2008) further states the eight steps can be used with other methodologies (multiple methodologies) to address their research questions appropriately and their realities, as has been suggested in the case of Kaupapa Māori Research (Pipi et al., 2004).

Vaioleti (2013) states the talanoa research methodology shares a commonality with the interpretive and flexible nature of phenomenology, blending it with cultural protocol and practices to obtain the most valid data of phenomena. In interpretive/constructive approach of research, the researcher tends to rely upon the participants' views of the situation being studied and recognises the impact on the research of their background and experiences (Creswell, 2018). According to O'Donoghue (2018), interpretive research focuses on understanding and interpreting human behaviour meanings or perceptions rather than generalising and predicting the cause and effect. He further states that interpretivism seeks to understand motives, meaning, reasons, and other subjective experiences which are bound by time and context.

A similar sentiment is echoed by Ponelis (2015) that the interpretive research paradigm is categorised by a need to understand the real world as it is from a subjective point of view and pursues an explanation within the context of the participant rather than merely the objective observer of the action. Talanoa provides a platform where researchers and participants engage in a "social conversation which may lead to critical discussions, knowledge creation or co-constructed stories" (Vaioleti, 2006, p. 24). Nabobo-Baba (2008) contends that Pacific researchers need to use culturally appropriate framings and methodologies that recognise "Pacific world views, cultural knowledge and epistemologies" (p. 143).

The interpretivist ontology states that reality is multiple, created and dependant on us in our interpretation. The epistemological position is that knowledge is constructed and subjective. Interpretivism recognises personal narratives are neither true nor false, but the representation of realities conserved with subjectivities and lived experiences of participants (Makombe, 2017). The constructivist/interpretivist researcher can use qualitative and quantitative methods when carrying out research (Giddings & Grant, 2006; Mackenzie & Knipe, 2006). Many postgraduate projects by Pacific educators have focused on talanoa to collect and analyse narrative data (Tunufa'i, 2016). In this research, talanoa will be used as a qualitative method to gather information regarding how Fijian students perceive science learning in a constructivist environment.

The Constructivist Learning Environment Survey (CLES)

CLES either in its original form or modified versions have been used in various studies; (Aldridge et al., 2000; Ebrahimi, 2015; Fraser, 1991, 2003; Johnson & McClure, 2004; Kwan & Wong, 2014; Roelofs et al., 2003; Taylor et al., 1997) to investigate the learning environments. It is a valid tool and has been used by researchers a lot in different parts of the world. CLES assesses the degree to which the principle of constructivism is evident in specific classroom learning environments. Moreover, the CLES helps researchers determine the degree to which a particular classroom's environment is consistent with constructivist epistemology (Taylor & Fraser, 1991, p. 293).

CLES's autonomy scale measures the degree to which students exercised control over their learning activities in a constructivist learning environment. The items are measured by a five-point Likert-type scale, ranging from almost never 1), seldom 2), sometimes 3), often 4) to almost always 5). The numerical responses indicate the secondary school students' perceptions about the degree or frequency that the stated practices occur or are experienced. For CLES, Taylor and Fraser (1997) used the following five subscales:

- Personal relevance—the extent to which school activities and knowledge are relevant to their everyday life.
- Uncertainty—the extent to which opportunities are provided for students to experience that knowledge is evolving and culturally and socially determined.
- Critical Voice—the extent to which the students feel that their voice is heard.
- Shared Control—Extent to which students share with the teacher control for the design and management of learning design.
- Student Negotiation—the extent to which students have opportunities to explain and justify as well as test the viability of their own and other students' ideas. (pp. 299)

Taylor et al. (1997) used CLES to explore the learning environment of science students in thirteen different schools with a sample size of 494 and established the scale's factorial validity and reliability. Also, CLES was selected in a study in Korea to investigate the extent to which science curriculum reflects a constructivist view (Lee, 2001). Furthermore, Aldridge et al., (2000) cross-validated the CLES scale's internal consistency and reliability with a size of 1081 participants in Australia and 1879 from Taiwan in 100 science classrooms altogether (Aldridge et al., 2000).

Luan et al. (2010) used modified CLES to explore students' preferences toward the constructivist learning environment for a discrete ICT subject in Malaysia. The objective of Wong's study was to validate the scale to investigate students' perceptions toward constructivist ICT learning environments. A total of 449 participants took the survey in Wong's research. The data analysed supported the instrument's internal consistency, reliability, factor structure, discriminant validity, and ability to differentiate between ICT classrooms. Wong's study suggested that CLES can be modified to explore the learning environment in different settings (Luan et al., 2010). In addition, modified CLES was also validated, which explored English teachers' learning environment in Iran with a sample size of 622

(Ebrahimi, 2015). Despite the wide use of CLES in many countries, this may be the first time a modified version of CLES will be used in a Pacifika context.

Constructivism

Constructivism is a dynamic process where small localised changes in knowledge construction may lead to a significant shift in overall understanding (Jordan et al., 2008). Constructivism emphasises the importance of knowledge, beliefs and skills that an individual brings to the experience of learning. As Windschitl (1999) states, "intellectual transformations occur when students reconcile formal instructional experiences with their existing knowledge, with the cultural and social contexts in which ideas arise" (p. 9). Vygotsky's et al. (1978) work considered culture as central to social interaction. Knowledge construction and the use of language as a tool are significant for developing thinking and reasoning abilities. His sociocultural theorisation and description added a layer to constructivism. They acknowledged an individual's cultural ways of reasoning, working together, communicating ideas, and negotiating with others. Vygotsky et al. (1978) claimed, "social learning as a pre-requisite for cognitive development and the acquiring of new knowledge is enhanced when learners interact socially within their community" (p. 90).

Social constructivism

Vygotsky believed that knowledge is first constructed among the community of learners when students work on tasks in small groups and then is internalised at a personal plane. To Vygotsky, the internalisation of knowledge from a social plane to an individual plane does not happen in all individuals alike. Vygotsky recognised that for some students internalising the learning at a personal level would not have been easy if their learning was not supported. In this case, the teacher (a knowledgeable adult) and more capable peers are said to be excellent support in guiding one's performance.

Vygotsky et al. (1978) defines the Zone of Proximal Development (ZPM) as "the distance between the actual development level as determined by independent problem solving and the level of potential development as determined through problem solving under adult guidance or in collaboration with more capable peers" (p. 86). To Vygotsky, the difference between a child's actual potential, as in solving problems alone, and the maximum possible as in solving the problem under adult guidance or in collaboration with more capable peers must be identified. He highlighted that different students require different types of assistance to achieve their potential with the ZPD. Vygotsky et al. (1978) acknowledged prior experiences and knowledge that learners bring to the learning situation and recommended teachers to be responsive to what the learner already knows. And what the teachers can do so the learners can be assisted appropriately to achieve what is to be learnt. Learning is located centrally in a sociocultural environment, whereas individual learning can be an outcome of social learning (Vygotsky et al. 1978). The actual practices make up the learning hence the thinking that arises from the activities and tasks. The teacher is a mentor of students who works with students to develop and sustain classroom learning (Bell, 2011; Cowie, 2015). During communication and shared meaning-making, the teacher helps the student "close the gap between their existing understanding and actions and the learning goals" (Bell, 2011, p. 31).

Constructivism, as a learning theory, has assisted in the development of constructivist pedagogy. According to Gordon (2009), a constructivist approach to education helps learners actively create, interpret, and reorganise knowledge in distinctive ways. This allows students to reconcile formal instructional experiences with their existing knowledge, with the cultural and social contexts in which ideas arise, and with a host of other influences that mediate understanding. Concerning instruction, this belief suggests that students should participate in experiences that accommodate these ways of learning.

These ways of learning include problem-based learning, inquiry activities, dialogues with peers and teachers that encourage making sense of the subject matter, exposure to multiple sources of information, and each student's opportunity to demonstrate their understanding in diverse ways.

In the constructivist approach of learning, knowledge is constructed in groups or individually based on the prior knowledge, experience either separately or in the group, as shown below in Figure 1.

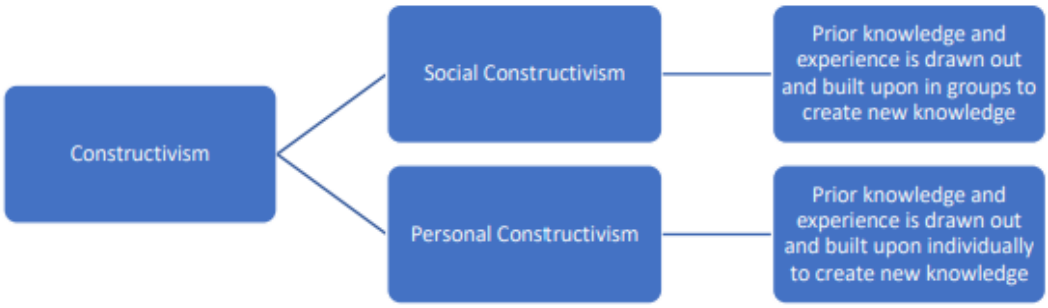

Figure 1. Showing the constructivist theory.

Furthermore, constructivist teaching can also include drawing out the learner's prior knowledge (Baviskar et al., 2009), and the initial stages of identifying a student's current ideas are the focus. The teacher can gather students' prior knowledge through informal questioning, portfolios, discussion, pre-tests, and concept maps. The second feature is where students build new ideas from the tasks given to them by their teachers. Through this activity, the student can make new links with their existing knowledge and constructs and clarifies new concepts being developed. (Baviska et al., 2009). According to Rakes (1996), the constructivist teaching approach changes the teachers' role from the sole authority to that of a guide or a facilitator. Simultaneously, the students' role shifts from being passive listeners and dependant learners to being active learners (Hirumi, 2002)

Why and how CLES was modified?

A study was done in Korea using CLES to investigate the learning environment of high school students studying science found that respondents struggled to make sense of items. Interviews revealed a severe mismatch between local cultural practices of Korean teachers and students and the cultural practices of the Australian CLES designers. (Lee, 2001). The study concluded that the questionnaire's cultural adaptability should be considered so that results can be interpreted meaningfully within its specific context. Also, the interpretation should emphasise understanding a particular context rather than merely representing the results of respondents' answers to the questionnaire numerically. Ebrahimi (2015) also modified the CLES before exploring the perceptions of the English language teacher education (LTE) version of the Constructivist Learning Environment Survey (CLES). The instrument, called the CLES-LTE, was field-tested with a sample of 622 Iranian English language student teachers in 28 classes.

This study used the literature to modify questionnaires before conducting the study. Studies have shown that Fijian students learn better when they have a good working relationship with their peers, have a sense of belongingness in class and the context of learning is familiar to them (Nabobo-Baba, 2008). Waka series is a collection of books that are being used to teach students in an everyday context, which contains small narrative stories on culture written by local authors based on Pacific myths and legends. The word waka has a dual meaning in the Fijian language. In one sense, 'waka' means the root of the yagona plant and in another sense, it means the canoe (Burnett & Lingam, 2013). The books aim

to motivate the students to read and make connections with their everyday lives (Burnett & Lingam, 2013).

Another example is Pacific Folk Tales by Benson (1993), in which he talks about local myths and legends. In one of the stories, he talks about "Burotukula island", which means gold in Fijian, on which lived beautiful birds and girls. One day while the fishermen were resting on the island, they saw a big bird coming their way. They killed the bird and took the bird's meat to their village on the other island. The next day when the people woke up, they could not see Burotukula island at all. Instead, there was only the blue sea. Stories like this fascinate the Fijian students as they can relate this to their everyday life (Benson, 1993).

Bakalevu (1997) states the term identity represents learners as an individual and also collectively. Students prefer the relationship as an essential aspect of learning, making them understand each other's values and beliefs. In one study W. Ali (2016) concludes that students' culture is linked to their identity, who they are and what they stand for. Most Pasifika parents' communities indicate a strong desire not only to engage with and succeed in the mainstream culture but also to maintain their own cultural identity (Fletcher et al., 2009).

A study conducted in Fiji reported that science taught within a constructivist learning environment, involving extensive use of group discussion based on problem solving activities, significantly improved Fijian students' performance. This approach not only reduced the performance gap between iTaukei and Fijian-Indians but precluded diminishing the performance of Fijian students (Taylor et al., 2008).

According to Veramo (1992), Fijian students who do not see the curriculum's relevance to their everyday life or are unable to relate to it can quickly get unmotivated and disengaged. In his research, he talks about how some disengaged Fijian students of science got motivated when allowed to plant cassava and learn about its life cycle in groups. Cassava is a root crop that is used as a source of food in Fiji and students are familiar with the plants.

The questionnaires developed in this study were modified based on the literature mentioned above. The themes of the five scales on CLES used by Taylor et al. (1997) were personal relevance, uncertainty, critical voice, shared control, and student's negotiation. In this research, minor adjustments were made to scale names and some questionnaires—the new scale names and their measures are listed below.

- Identity/Relationship—the extent to which secondary school students can relate to their teachers and colleagues.
- Personal Relevance/Learning in a Familiar Context—the extent to which school activities and knowledge are relevant to their everyday life.
- Uncertainty/Group Work/Talanoa—the extent to which opportunities are created for secondary school students to experience learning in groups.
- Critical Voice—the extent to which the students feel that their voice is heard.
- Shared Control—the extent to which students share the control and management of the learning protocol with the teacher.

Research design

The research design adopted CLES and modified the tool to ensure that it captured how do Fijian students perceive the constructivist learning environment in science classrooms. As a result, the CLES was renamed CLES-FS, where FS means Fijian students. A pilot study was conducted with the CLES-FS questionnaires to ensure its relevance and applicability for Fijian students in New Zealand science classrooms.

The conceptual framework is an essential feature of research design. To ground the addition of talanoa into the traditional CLES tool, this required a conceptual framework that aligned with the talanoa data from Fijian students. The conceptual framework that guided the study is called *Camakau Jahaaj*.

A conceptual framework helps frame and conceptualise the research project's overall plan that includes anything and everything that forms the underlying thinking, structures, and practices (Kivunja, 2018). The word *Camakau* in iTaukei means canoe and *Jahaaj* in Hindi means a ship. The weaving of iTaukei and Hindi languages is indicative of the knowledge and lived realities of Fijian students in the study. The Hindi word for *Jahaaj* has been used because Indians were brought to Fiji under the indentured labourer system in a *Jahaaj*, called the Leonidas (Ali, A. 1977). Sometimes Indians in Fiji refer to each other as *Jahaaji Bhai*, a term which refers to the people who came on a ship to Fiji to work on the sugar cane farms under the indentured labourer system. *Camakau Jahaaj* is relevant because it acknowledges the Fijian people, the iTaukei and Fijian-Indians.

To respect iTaukei, who are the indigenous people to the Vanua (land) of Fiji, I provide a visual representation of the Camakau Jahaaj. It carries CLES-FS and the talanoa research method to explore Fijian students' perceptions of the constructivist learning environment in science classrooms. The main hull of the Camakau has a round bottom and is made from a dugout log of a tree called Vesi (Clunie, 2015). The hull symbolises the epistemological and ontological positioning of the research which acknowledges iTaukei as well as Fijian-Indian knowledge, language, and worldviews. This study takes the interpretive approach and explores the cultural and historical interpretations of the social world as well as consider that human beings construct knowledge as they interact and engage in interpretation. Camakau Jahaaj presents possibilities within the post-COVID context to unfold the specificities linked to iTaukei and Fijian-Indian constructions and sense-making of science learning as learners of Fijian heritage in New Zealand education. Camakau Jahaaj also provides a visual representation of the design and early conceptualisation of what it means to weave and modify a predominantly western research tool with the addition of talanoa which is about capturing social-cultural narratives.

As illustrated in Figure 2, the 'centre' of the Camakau symbolises the theoretical framework that formed this study: sociocultural and social constructivism. The sociocultural theory states that learning occurs as a result of interaction between the learners, adults, and surroundings, including learning in a cultural context. Culture is central to the learner in order to internalise the knowledge. The 'mast' symbolises the direction in which the Camakau will sail. In this study, the mast signifies the method that will be used to do this study. In conclusion, an analogy of the Camakau Jahaaj as the conceptual framework grounding the design of the study. Different parts of the Camakau Jahaaj symbolises and represents the design aspects of the framework guiding the research.

During talanoa sessions, the participants discussed their chosen answers indicated in their CLES-FS. The data gathered via talanoa was analysed using a thematic based approach. Thematic analysis is a method for identifying, analysing and reporting patterns (themes) within data (Braun & Clarke, 2006; Fereday & Muir-Cochrane, 2006). The authors state that the thematic approach is flexible, meaning that it can be modified to suit the circumstance. On the other hand, Statistical Package for the Social Sciences (SPSS) was used to analyse the CLES-FS data. According to Muijs (2011), the SPSS statistical software is widely used by researchers to analyse quantitative data as it is easy to use and extract meaningful information.

Initial findings

Figures 3, 4, 5, 6, and 7 illustrate visual graphs and representations of the findings collected in the main study using CLES-FS. A total of 133 students were surveyed using the CLES-FS, together with 30 talanoa sessions held across two different schools. The schools are co-educational and located in an urban centre with many Fijian students studying science. The participants consist of students who were recent migrants from Fiji while others were born here. The findings are grouped into five themes: (1) identity, (2) learning in a familiar context, (3) group work, (4) critical voice, and (5) shared control. An

item from each of the themes were analysed to consolidate the findings coming through the talanoa sessions.

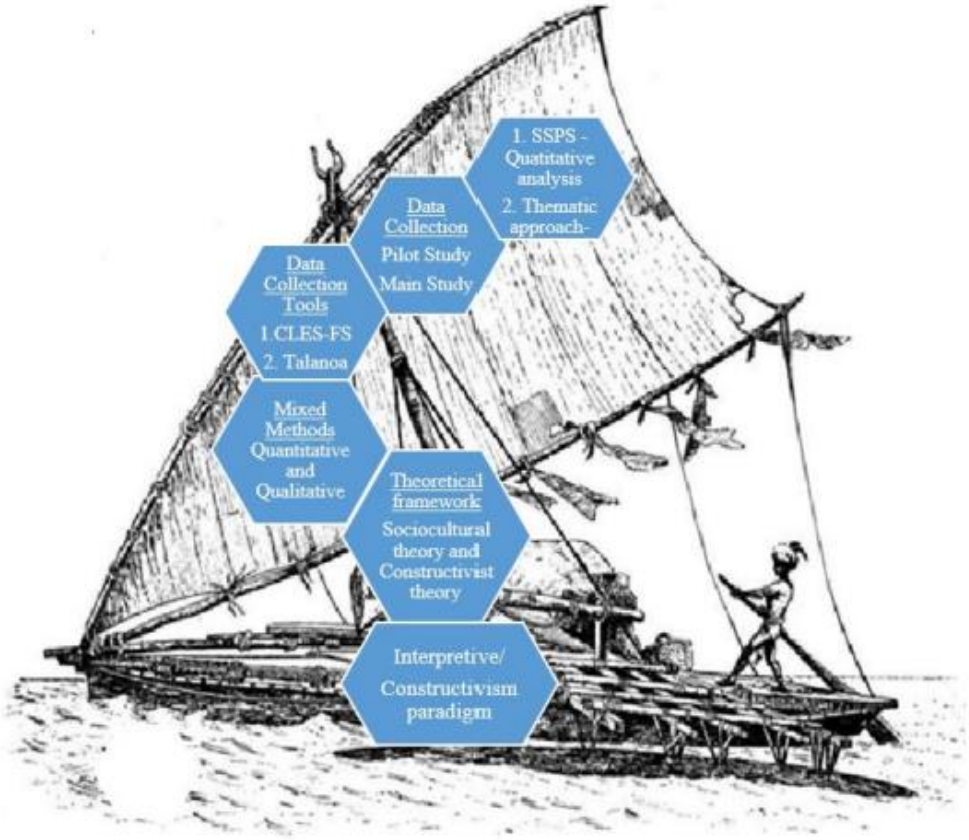

Figure 2. Camacau Jahaaj Conceptual Framework and Research Design.
(Background picture source: https://en.wikipedia.org/wiki/File:Fijian_Sailing_Canoe.jpg)

Findings from theme one indicated students have a strong sense of identity, that is, who they are and their relationship with teachers play an essential role in their learning. Figure 3 is a graph showing a large majority of students feel happy when the science teacher acknowledges them and their cultural background and identity. During the talanoa session, student A said: "Knowing my culture is vital because it is my heritage … that's where my family comes from. Also, because I want to let my children know where we come from, it is essential to keep the family traditions going."

According to student B: "At one stage, I was not proud of my culture because of the environment I was in. Primary to Junior years because students were making jokes about what I ate, e.g., curry jokes".

Figure 4 shows that a large majority of students want to learn science ideas in a familiar context. Students indicated during the talanoa sessions that they can connect to their everyday life if the context of learning is familiar to them.

Student C said: "Because it gives me a better understanding of what I am learning".

Student D was a recent migrant and she said:

> I understand science better if the teachers explain to us using everyday life examples because it will be familiar to us. In Fiji, when the teachers were explaining, I understood better because I could relate learning to my everyday life experiences. At times, I do not understand my science teachers in New Zealand because I cannot link the science ideas to my daily life.

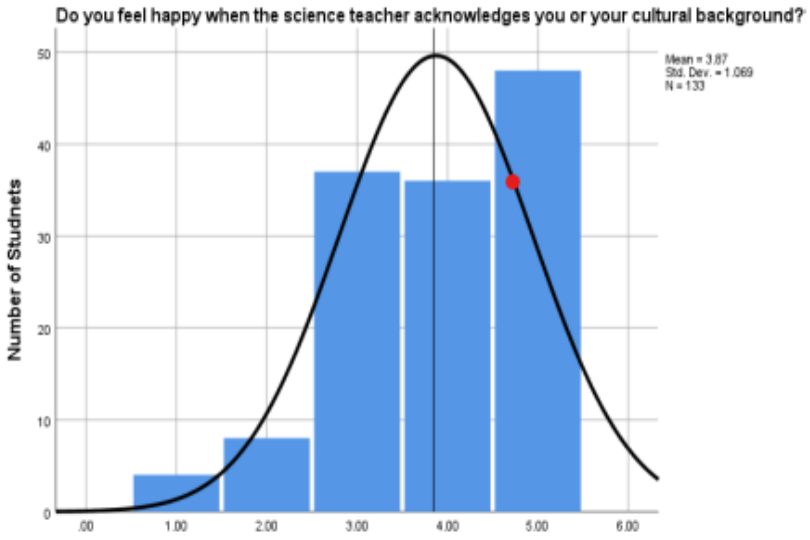

Figure 3. Showing how students feel when teachers acknowledge their cultural background.

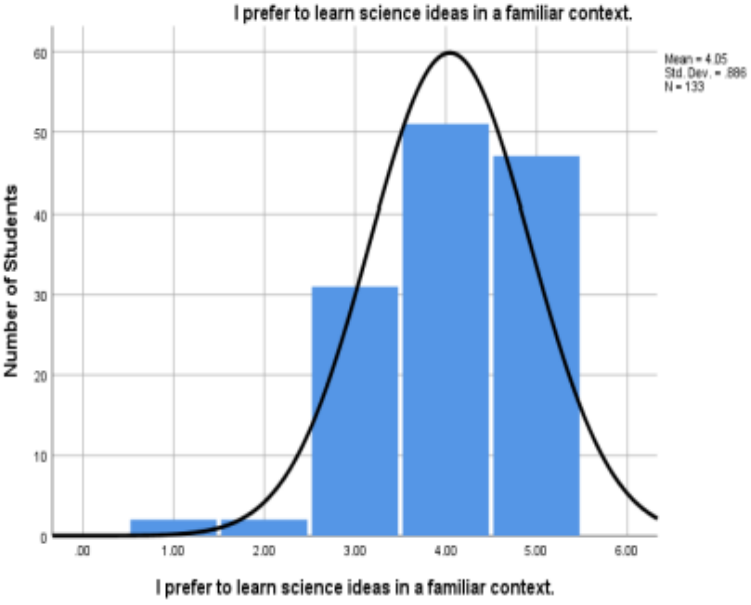

Figure 4. Showing that more students prefer learning science ideas in a familiar context.

Figure 5 suggests that students like to learn science in groups. Students indicated they were comfortable in explaining scientific ideas to their peers than the teacher. Some also said that they could converse in their mother tongue while in groups (Fiji baat—for Fijian-Indians or Fijian for iTaukei students) to explain their peers' complex concepts.

Student A said: "Everyone has different viewpoints so that we can learn from each other. We do not mind participation in class discussion but would prefer small group discussions".

Students F said: "We like working in groups because we feel safe to share ideas without fear of being wrong".

Not many students like to question the teacher how they are being taught, as shown in Figure 6. Students imply that they regard the teacher as a respected figure and do not like questioning them. Students indicated that it is our cultural thing not to question teachers because they are our gurus or

mentors. Student F said: "We can say it but in a respectful way. I believe that teachers are always correct".

Student G stated: "I am not confident because I am a shy person and sometimes, I take things home to learn by myself. What is making you shy? Because everyone looks at me."

Figure 5. Showing students like working in groups.

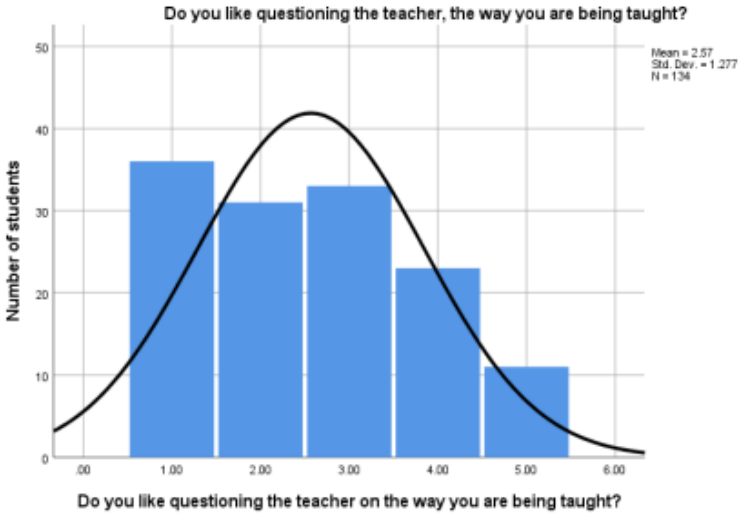

Figure 6. Showing not many students like to question the teacher the way they are being taught.

When asked, if they liked helping the teacher to decide which activities are best for them? Students were not sure what to say. Some connoted they wanted to have a say in learning about things that interested them while others didn't care as far as it made sense to them.

> Student A: No, we don't want to tell the teacher what we want to study because he knows better than us and we trust our teachers. We never thought of what and how we want to

learn. If given options, we will learn something that we understand and will not get bored.

Figure 7 shows the students' evenly spread responses when asked, do you like helping your teacher decide which activities are best for you.

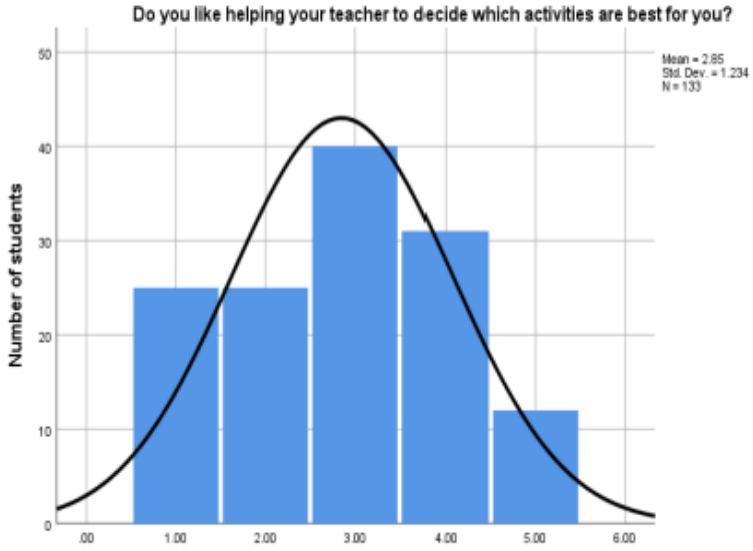

Figure 7. Showing that students have divided opinions when asked, do you like helping your teacher decide which activities are best for you?

Limitations

There are limitations to the study. Firstly, the number of participants in the initial findings is small, limiting the results' generalisability. Secondly, not all the items in the scale of CLES-FS were analysed. As the study progresses further, more data will be collected from participants, which may be used to generalise. We did not intentionally break down the results by gender and ethnicity, iTaukei and Fijian-Indians, as the sample size was small; however, it will be done once all the data is collected. Nevertheless, the study manifests that it is possible to weave indigenous research method (talanoa) with the western methods (CLES-survey) to explore the perceptions of Fijian students studying science in New Zealand.

Conclusion

CLES was modified to CLES-FS based on the literature and responses in the pilot study. Data gained through CLES-FS evince that participants understood the research purpose and were eager to engage in the discussion. Data collection through CLES-FS can be collected faster by many participants; however, it lacked the participants' descriptions or statements or their choice of answers.

On the other hand, talanoa, a Pacific research method, provides the participant's commentary to why they have chosen the answers for the CLES-FS but take time to collect data from the participants. However, it gives rich qualitative data, which affirms the interpretation of the data gained through CLES-FS. Talanoa sessions provide a platform where participants feel at ease and comfortable. This is because, during talanoa sessions, participants can relate to the researcher and understand its purpose. In this process, knowledge is shared rather than given. The feedback of the participants provides meaning and the wairua to the data gathered through surveys. Weaving CLES-FS and talanoa not only provides

the narratives and quantitative data, but it also enriches and supplements the research findings and gives rigour to the results obtained during the research.

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Going back and researching in the Pacific community

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Abstract

The move to focus on Pacific indigenous research methodologies and methods is a complex yet ongoing experience for researchers of Pacific heritage. The relational positionalities of Pacific researchers allow a move away from a dual or binary perspective of one's research responsibilities to a more fluid understanding of what it means to do research by, for, with Pacific communities. This paper highlights the diverse experiences of three Pacific researchers taking into consideration heritage connections, socio-cultural backgrounds and research contexts. We utilise talanoa as a method of engagement, reflexivity, and sharing of our experiences with Tongan, Samoan and Fijian communities. We argue that talanoa as a Pacific research method enables the diverse layers of experiences that take into particular consideration our connections to land, people and knowledges in the diaspora.

Keywords

Pacific research methodology; talanoa; diaspora; positionality.

Introduction

The move to focus on Pacific indigenous research methodologies and methods is a complex yet ongoing experience for researchers of Pacific heritage. The complexities for such researchers are related not only to the navigation of research contexts and relational spaces marked by the colonisation era (Fa'avae, 2018) but also to the internal becoming as a 'Pacific' researcher conscious of a decolonial intent (Tecun et al., 2018) in the process of working out their positionality in relation to the research context (Fasavalu & Reynolds, 2019). Engaging with talanoa research as both research methodology and method offers early career researchers the opportunity to find their place within a growing body of research by, for, with Pacific peoples (Sanga, 2016) that is culturally democratic (Thaman, 2014) and takes into particular consideration our connections to land, people and knowledge in the diaspora.

In recognition of the naming debate of research for, by and with Pacific people or the people of the Oceania region (Cobb, et al., 2019; Teaiwa, 2017) as variously 'Pacific' research (Sanga, 2004, 2016), 'Moana' research (Ferris-Leary, 2013), or Pacific indigenous research, we choose to refer to Pacific research as research that is undertaken by, for, or with people of Pacific or Oceania heritage.

The idea of relational positionalities is one that positions and relates the researcher within the research context and communities associated (Fasavalu & Reynolds, 2019). It calls to question our

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diverse identities, and connections to land, people, and spaces in the diaspora. In this paper, our collective talanoa brings together the diverse positionalities of three early career researchers. Elisapesi, a Tongan woman born, raised and educated in Tonga, engaged in higher learning and research at the University of Waikato in Aotearoa New Zealand. Tepora is Samoan by birth and heritage and sees herself on a journey of self-discovery and way-finding while immersed in postgraduate research. Alvin identifies himself as a Fijian Indian man who has strong connections to the land in which his forefathers have worked for generations and which he calls home. In this paper, we share our experiences with using talanoa as a research methodology and research method in our research with our Pacific communities. The paper begins with a review of the literature on Pacific research methodology/ies including talanoa and vanua, then outlines each of our methodological approaches before focusing on our findings and reflections on the efficacy of talanoa for our research projects. We then conclude by highlighting the importance of using talanoa as a cultural relevant research method when researching by, for, with the Pacific community.

Literature review

A brief overview of Pacific research

Sanga (2004) theorised that the ontology of indigenous Pacific research is subjective, contextual, experiential, accepting of spiritual and cultural beliefs, spatially and chronologically situated and, above all, changing and accepting of other realities. In the same paper, Sanga (2004) also submitted that indigenous Pacific epistemology is situated in the lived realities of Pacific peoples and that ways of knowing reality includes metaphorical constructs drawn from and relevant to the Pacific peoples' everyday lives. Sanga's (2004) description of indigenous Pacific research as focused on contextual descriptions and insider perspectives suggests that Pacific research theory is predominantly interpretivist (Tualaulelei & McFall-McCaffery, 2019).

A recent summary of documented Pacific research by Tualaulelei and McFall-McCaffery (2019) shows that the body of research literature drawing on Pacific ontology and epistemology has increased in recent years. Research methods and methodological frameworks based on indigenous Pacific ways of knowing range from 'Kakala' (Thaman, 1993b), Kaupapa Māori (Smith, 1999), 'Talanoa' (Vaioleti, 2006, 2011), and 'Vanua' (Nabobo-Baba, 2008) including those with a distinctly Samoan origin such as 'Faafaletui' (Tamasese et al., 2005), 'Tofa'aanolasi' (Galuvao, 2018), 'Teu le Va' (Anae, 2010, 2016), and 'Ula' (Sauni, 2011) among others.

One of the commonalities in the Pacific research literature mentioned above is the use of metaphor to conceptualise the research process and research tools. For instance, 'Faafaletui' research (Tamasese et al., 2005) draws on the metaphors of weaving and house, 'Kakala' (Thaman, 1993b) draws on the metaphor of flower garlands (preparation and giving away), and 'Ola' (Mcdonald & Tufue-Dolgoy, 2013) uses the metaphor of a woven basket. Such metaphors might seem simplistic out of their cultural context, but within the cultural, social and intellectual context in which they were constructed, such metaphors have powerful meanings and applicability beyond their physical depictions.

The importance of relationality and negotiation of the relational space, the va, between researcher and research participants has also been underscored as an integral aspect of Pacific research methodology (Anae, 2010, 2016; Fa'avae, 2018; Muliaina, 2018). Research that involves interaction with Pacific participants must be cognisant of the 'charged' relational space between researcher and research participant, where the researcher has the responsibility "to value, cherish, nurture and take care of the 'va', the relationship" (Anae, 2010, p. 2). The presence of the participant is valued not just for the insight and data contributed to the research, but is also intentionally valued as an individual, as a contributor to the research process.

Talanoa method

Within talanoa, there are several methods for data collection such as talatalanoa (preparatory exchanges), talanoa faikava (focus groups), talanoa faka'eke'eke (interviewing), tālanga (interactive dialogue) (Vaioleti, 2011, 2013). In Tongan, talatala can mean consultative (Vaioleti, 2016) and noa means in this context flexible, or talking without the influence of predetermined agenda (Halapua, 2003; Vaioleti, 2006). Therefore, talatalanoa can be defined as a consultative talk with a view to uncover something (Vaioleti, 2016). Talatalanoa involves speaking and listening. While a participant or the researcher is doing the talatala (talk), the other participant/s are expected to be silent (noa), listening attentively. As trust is vital for a good talanoa, talatalanoa is crucial to building trust, harmonious relationship and respect among participants. Paea (2015) translates talatalanoa as a process of "maintaining warm relationships based on the good spirit of freely committing to one another's needs" (p. 56), through talanoa. Talatalanoa is normally carried out with positive spirit (Vaioleti, 2016).

Tālanga is a type of talanoa that involves a friendly discussion (Churchward, 1959). It is a "dialogical process that involves both the acts of speaking and listening, and they must always go together" (Vaka'uta, 2009, p. 129). Tālanga is interactive and purposeful (Ofanoa et al, 2015); it is an open-ended conversation which navigates numerous perspectives, options, solutions and/or meaning (Vaka'uta 2009).

Vanua

Nabobo-Baba (2008) asserts that a researcher needs to use culturally appropriate framings and methodologies that recognise Fijian world views, cultural knowledge and epistemologies when doing Vanua research. The Vanua approach recognises the Fijian people as holders of the knowledge and therefore treated them as knowers and participants of research. Nabobo-Baba (2008) states the eight steps in Vanua research as follows:

1. Conception – Includes the consideration all people that are needed in the research are identified, and appropriate gifts, plans, schedules and timelines are mapped out.
2. Relationship – Researchers bear in mind that in the community people and personal relationships are very important. Part of good preparation will be to appreciate that such relationships exist and may either deter or support research processes.
3. Sevusevu – Fijian customary process of a i sevusevu (the presentation of yaqona 'piper methystica) is a norm for requesting entry alternative into a vanua (home, village, community).
4. Na talanoa – The appropriate method or tool for collecting information is through talanoa.
5. Reporting or writing is guided by vanua values and protocols of knowledge.
6. Reciprocal relationship – Even after the research the researcher will have a bond with the Fijian people.
7. Thank you – It is important the researcher thanks the people who have looked after you or given something of value to you.
8. Giving back to the people and the land – If possible, the research needs to inform practice and the lives of people, especially the researched community.

Nabobo-Baba (2008) further states these eight steps can be used with other methodologies (multiple methodologies) to address appropriately their research questions and their realities, as has been suggested in the case of Kaupapa Mäori Research.

Methodology

This section outlines the different methodological approaches that each researcher used in conducting research in their community.

Talanoa methodology

'Elisapesi used talanoa methodology in her research in order to gain acceptance into the intellectual and spiritual inside of the community in Tonga, such as an extended family, a school community, or a church community. It is crucial for researchers in the Pacific context to follow the structures of appropriate research methodology and have the competency to engage participants authentically and respectfully. Nabobo-Baba (2008) claims that Pacific researchers need to use culturally appropriate framings and methodologies when researching with Pacific participants.

Critical realism

Tepora adopted a critical realism lens towards her talanoa research in order to examine the underlying narrative structures that influenced the agency of research participants within the context of higher education quality assurance policy development and enactment in Samoa. Underlying influences refer to discursive or narrative structures and systemic or relational social structures (Scott, 2010) influencing individual actions and social events (Danermark et al, 2002) such as educational policy frameworks (Tikly, 2015) and human behaviour in general (O'Mahoney & Vincent, 2014). Critical realists accept there is an empirical reality described as 'intransitive', but also accept that our knowledge of that reality is relative (Archer et al., 1998, p. x), constructed (Walsh & Evans, 2014, p. e3), or construed (Easton, 2010).

The proposed blending of critical realism and a Pacific research paradigm in Tepora's research project is not a seamless fusion. On the one hand, critical realism asserts that reality has both a transitive and intransitive dimension (Bhaskar, 2008), that "it must be acknowledged that reality is what it is and continues to be so independently of the transitive theories or knowledge we may have of it" (Lopez, 2003, p. 76). On the other hand, the ontology of Pacific research assumes that "the social world and hence the phenomenon under investigation is intangible, soft and internal to people's cognition" (Sanga, 2004, p.44). As noted by Tualaulelei and McCaffery (2019), Pacific research approaches seem to be predominantly interpretive and use Pacific linguistic nomenclature and metaphors from everyday life in the Pacific. It would seem the ontological premise of critical realism and Pacific research are at odds.

However, Tepora sees the utility of critical realism in that it allows exploration of why individuals and groups make the decisions that they do, to what extent they act in alignment with their own internal beliefs and suggest why this may sometimes not be possible, as well as examine the external influences on such decision making within the realm of educational policy in the Samoan context.

Interpretivism

The theoretical framework that underpins Alvin's study is interpretivism and constructivism. According to Dickson et al. (2016), the mother of constructivism is the interpretivism paradigm of philosophy. They further state that this "paradigm as an approach asserts that people construct their understanding and knowledge of the world through experiencing things and reflecting on those experiences" (p. 2). A similar sentiment is echoed by Ponelis (2015) that the interpretive research paradigm is categorised by a need to understand the real world as it is from a subjective point of view and pursues an explanation within the context of the participant rather than merely the objective observer of the action. The term ontology refers to the nature of reality and epistemology is concerned with the theory of knowledge regarding its methods, validation and possible ways of gaining knowledge of social reality (De Kock, 2015). The interpretivist ontology states that reality is multiple, created and dependant on us in our interpretation. The epistemological position is that knowledge is constructed and subjective. Interpretivism recognises personal narratives are neither true nor false, but a representation of realities conserved with subjectivities and lived experiences of participants (Makombe, 2017). The constructivist/interpretivist researcher can use a combination of both qualitative and quantitative methods when carrying out research (Giddings & Grant, 2006; Mackenzie & Knipe, 2006). As this study

seeks to find out the perceptions of Fijian students studying science in the constructivist learning environment, a talanoa and CLES will be used to gather data from the participants.

Findings: How we have used talanoa in our research

'Elisapesi Havea

In my research, the two types of talanoa that I used for my data collection were talatalanoa and tālanga. Talatalanoa and tālanga were both employed during the 'talanoa fakataautaha' (one-one-one talanoa) and 'talanoa fakatokolahi' (group talanoa). However, the time of their application during the talanoa varied due to the nature of each method. Talatalanoa was always conducted at the beginning of the talanoa so that I could lay a foundation for tālanga at a later stage. Since talatalanoa is done calmly and with a positive spirit, using simple language, it brought clarity leading to maintenance of respect and humility within. My participants involved high school students, and using talatalanoa would be effective in establishing relationship as well as

At the beginning of the talatalanoa, I did a lea fakafe'iloaki (salutation) to welcome and to acknowledge my kaungā fa'u (participants) for their willingness to take part in my research. Instead of going straight to discuss the researched issues, we started by talking about how they were doing in terms of work and also with family. My research involved high school students, and talatalanoa acted as an ice-breaker. We started by talking about their hobbies and I asked them to share about what they wanted to be in the future. It gave them an opportunity to feel more comfortable and be able to be familiar with me as a researcher. For me, it was crucial to build trust and respect between myself and my kaungā fa'u in the entire research relationship. Talatalanoa then has a vital role in ensuring that harmonious relationships were maintained and all exchanges are open and came from the participants' hearts. Talatalanoa allowed the participants to talk from their heart and to express their emotions towards the subjects being discussed. The application of talatalanoa provided a platform for the researcher and the participants to share information that was helpful to answering my research questions. Starting off the talanoa fakataautaha and talanoa fakatokolahi with talatalanoa helped me to lay a foundation for tālanga which is discussed next.

In my research, tālanga was referred to as an interactive dialogue which involves discussions, exploring meanings, views and perspectives, options, and solutions about/for the issue researched. The credibility of the data will be high as they will be co-constructed from participants' life stories in good spirits and in an environment of mutual respect. I found out from this research that it was during the tālanga that the participants had the opportunity to discuss their views and to co-construct ideas on a particular topic given to them. The interactive and dialogic nature of tālanga led the talanoa to a state of heightened engagements, a state similar to euphoria caused by clarity of meaning that Tongan people call mālie, which Manu'atu (2000) alludes to as an energising energy that uplifts spirits to a positive state of connectedness and enlightenment. Tālanga is often reached when both parties involved start to participate in a more in-depth discussion to navigate and make meanings together and co-construct ideas about the particular topic of discussion. In tālanga, the talanoa is more empowering, interactive, collaborative, participatory, encouraging and purposeful. For these reasons, teachers and students in Tonga could use tālanga to co-create understandings on the impacts and solutions to climate change on the people and the environment.

Using talanoa as my method of data collection also encountered some problems. For instance, in the Tongan context, young people are sometimes not included in the decision making or sometimes their views and perspectives are considered unimportant. It happens a lot when young people in Tonga are interrupting during a conversation, and they sometimes get told off by adults saying that they are kauitalanoa which means that the young people are speaking while they are required to be silent. And that concept of kauitalanoa sometimes hindered the ability of the young people to contribute to any talanoa. Since my research involved high school students, it was paramount to ensure that the talanoa environment was welcoming so that all participants felt secured and welcome. Some students appeared to be so quiet during the talanoa, so I included them in the discussions by constantly mentioning their

names. I ensured that I catered to everyone's needs and allowed them to engage in the talanoa. I've come to the realisation that some of my student participants took time and effort to navigate their way through the talanoa and most likely they were worried and concerned about being told off for being 'kauitalanoa'. It took a little while for the students to actually gain full confidence to talanoa openly and contribute effectively to the talatalanoa and the tālanga.

Tepora Wright

As a data collection tool, the definition of talanoa in a Samoan context ranges from an informal non-directed conversation (Suaalii-Sauni & Fulu-Aiolupotea, 2014) to a more formal discussion of matters of importance (Tunufai, 2016). Cognisant of these conceptualisations, I used talanoa as an informal one-on-one conversation with a research participant on the themes of my research. While I had a set of standard questions to guide the talanoa, there was flexibility in the conversation to follow themes that the participant deemed important. I carried out 41 talanoa conversations in total, 15 of which were follow-up conversations, with individuals involved in the development, setting and enactment of higher education policy at various levels. Each talanoa ranged from 45 minutes to two hours.

In the next few paragraphs, I share some insights on the use of talanoa as a research tool in my Samoan (or Pacific) community. They relate to the different talanoa formats necessarily undertaken because of the different relationality ('va') between the researcher and each participant, the need to authentically engage in the talanoa as a two-way conversation and not a one-sided interview, and the importance of physical sustenance.

Firstly, while I had a list of talanoa questions prepared to facilitate the conversation, I found that the order in which I asked them as well as the way I asked them were slightly different for each participant. These differences were determined by how well I knew the participant, how much they 'warmed up' to the conversation, and the degree of respectful distance I needed to keep with the participant due to cultural etiquette. Thus, I felt the conversation with a participant that I knew professionally as well as personally, who warmed up to the topic quickly, and with whom I was more or less on an equal cultural footing, was more open on both sides. In contrast, the talanoa with participants that I did not know well, who took some time to be comfortable with the theme of the conversation, and who were my cultural elders, were not so open and free. Reflection on this pattern made me realise that there was freedom in allowing the talanoa format to vary depending on the research participant. In essence, I felt that in order to conduct ethical and authentic research in my Samoan community, I must allow the format of the talanoa to vary depending on the participant because a different 'va' exists between me and every participant, and I have to act in accordance with that 'va'. Hence the relationality between me and each participant was slightly different, and of necessity, the order in which I asked my questions and followed the participant's thoughts would vary depending on the participant.

Secondly, I faced a dilemma in the first few talanoa conversations when I realised that I was holding back from offering my own views in the conversation because I did not want to influence the thoughts of the participant and thereby perhaps influence my data. My career to date has been mostly in a field where verifiable data and evidence are seen as paramount to good decision making. However, I realised that holding back from fully engaging as a conversation partner defeated the purpose of using talanoa as a data collection tool in three ways. Firstly, I was not being fully committed to the concept of talanoa as a conversation between two people, in which there is a two-way interaction. Secondly, I was not demonstrating the cultural value of reciprocity if I only sought to 'take' the participant's thoughts and conversations without responding with my own at appropriate times in the conversation. Reflection on these two points led me to a third concern, that I was perhaps forgetting that my participants were not merely sources of data, but also individual human beings who by allowing me to engage with them at this level, had granted me a gift, the gift of talanoa.

Moreover, I found that having the talanoa in an informal setting, such as a café or over food or a hot beverage, greatly facilitated the conversation, as participants seemed to be more comfortable to engage with the conversation. For me, this is more than providing something to eat or drink. Food and

drink are nourishment for the body, but it is also nourishment for the soul to know that the researcher considers the physical comfort of the participant important enough to provide sustenance for the conversation.

Alvin Chand

Alvin has used Talanoa as a method to collect qualitative data for the research and CLES (survey) to collect quantitative data. The research is about finding the perceptions of Fijian students studying science in secondary schools in New Zealand. Students were given the survey to do before the Talanoa sessions. Talanoa sessions were held to gather the information from the participants on the answers they have chosen for the survey. Talanoa sessions took place in a room that was familiar to the students.

Talanoa sessions started with greetings, usually in their mother tongue. E.g., "Ramram" or "Namaste" if a student is Fijian Indian or "Ni sa bula vinaka" for iTaukei students. To make students at ease, they were asked questions such as: How is your day going? How is your family? etc. After welcoming the students, Alvin introduced himself and explained the research questions and asked if they had any questions. Ethical issues relating to the research were then explained to the students. Students sat on chairs and made themselves comfortable before being handed the survey questionnaires (CLES). During the talanoa, students referred to the survey from time to time and were encouraged to let Alvin know if they did not want to speak on specific issues. Students took turns speaking, and there was no hierarchy during the conversation. A recording device was placed in the middle of the group, with the explanation that the recording would only be used for study purposes. Students were encouraged to ask questions so that it became a reciprocal conversation. At the end of the talanoa session, Alvin acknowledged the students' participation and shared with them information on how to access the research findings. The talanoa gives the meaning to the data gathered during the survey. It provides the rich narratives and provides an explanation for the results that are produced by the survey data (CLES).

The Constructivist Learning Environment Survey (CLES) assists researchers to find out the degree to which a particular classroom's environment is consistent with a constructivist epistemology (Taylor & Fraser, 1991). It is a tool for assessing the degree to which the principles of constructivism are evident in specific classroom learning environments. The autonomy scale measures the degree to which students exercised control over their learning activities in a sociocultural context. The items were measured by a five-point Likert-type scale, ranging from almost never (1), seldom (2), sometimes (3), often (4) to almost always (5). Hence the numerical responses indicate the secondary school students' perceptions about the degree or frequency that the stated practices occur or are experienced. The CLES tool is organised into five domains which are personal relevance, uncertainty, critical voice, shared control, and student negotiation.

These CLES questionnaires have their origins in Western Australia and have been used in a variety of studies to study the perceptions of students' learning environment in science education (Taylor & Fraser, 1991; Taylor et al., 1997). Taylor and Fraser (1991) established the factorial validity and reliability of CLES with a sample size of 494 in 13 schools; with Year 13 students in 42 science classes. Additionally, Aldridge et al. (2000) cross-validated the CLES in Australia and Taiwan with a sample of 1081 science students in 50 classrooms about their perceptions of the science learning environment in the classrooms. The study by Aldridge et al. (2000) supported the data analysis scale's internal consistency, reliability, factor structure, and ability to differentiate between classrooms.

Discussion

The three Pacific researchers appeared to be employing talanoa because of its cultural appropriateness to their participants and to the context of their research. This is aligned with Nabobo-Baba (2008), who emphasised the importance for Pacific researchers to use culturally appropriate framings and methodologies that recognise world views, cultural knowledge and epistemologies. Va or relationship

between the researchers and the participants is crucial to be maintained during the research with the Pacific people. The three Pacific researchers acknowledged the efficacy of using talanoa in maintaining warm relationships between them and their participants, and among the participants. It is evident that the nature of the talanoa that took place may be influenced by the 'va' of the researcher and the participants. The talanoa is more open and operated freely when the researcher knows the participants well and there has been connections prior to the talanoa. On the other hand, talanoa would be in a different layer if the participants are elderly people. The 'va' will be maintained by making sure the language used would be suitable and relevant to the participants' age groups. Anae (2010, 2016), Fa'avae (2018) and Muliaina (2018) believe the significance of relationality and negotiation of the relational space between researcher and research participants has been underlined as a fundamental aspect of Pacific research methodology. Anae (2010) emphasises the importance for researchers who are researching about, with, for the Pacific communities to value, cherish, nurture and acknowledge the 'va' or the relationships.

One of the challenges experienced by Havea during her talanoa research was that of engaging young people in the talanoa. Talanoa research involves negotiating the va relationship between the researcher and participant in which the voices of some may be initially silent or unheard (Fa'avae, 2018). In this relational space, Havea realised that young people were hesitant to contribute because they sometimes get told off by adults saying that they are 'kauitalanoa' which means that the young people are speaking while they are required to be silent.

Silence in the presence of adults is one element of the relationship between young people and their elders in some Pacific contexts (Farran, 2016). It is possible that this aspect of the va or relationship between young people and their elders may limit the extent to which talanoa can be engaged within a multi-generational group. Nevertheless, Havea found that she was able to draw the young people into the talanoa, with continued prompting and encouragement.

A second challenge is described by Tepora Wright who reflected that "I realised that I was holding back from offering my own views in the conversation, because I did not want to influence the thoughts of the participant and thereby perhaps influence my data" [quoted based on her fieldwork]. The apprehension with influencing the data is as she acknowledges, due to professional engagement in a field where concerns with verifiable data and evidence are paramount. However, objectivity in qualitative research is an acknowledged misnomer (Bowden & Green, 2010), and is a misplaced concern in talanoa research where valuing of the relational space (Anae, 2016) and reciprocal respect (Vaai, 2014) characterised by empathy (Farelly & Nabobo-Baba, 2012) are most important. The reciprocity of conversation, or the back-and-forth dialogue, acknowledges that participants are not merely a source of data to be picked and collected but equal participants in a mutually beneficial dialogue (Halapua, 2003).

A final point that can be drawn from the experiences of these emerging Pacific researchers is the fluidity with which talanoa can be engaged for diverse research purposes. Chand's research incorporates the use of talanoa research with the CLES survey tool to explore the perceptions of Fijian students studying science in secondary schools in New Zealand. On the other hand, Wright utilised talanoa to explore experiences and reflections of university staff and stakeholders within an educational policy setting to enable deep analysis of the relationship between agency and structure. Havea's research enabled nuanced application of different types of talanoa with her Tongan community, making use of Vaioleti's Talanoa typology (2011, 2013), and thus exploring the extent to which different types of talanoa can be pursued for different purposes. While there was the diversity of application, the embeddedness of talanoa within a culturally appropriate framing reflective of Pacific world views and cultural knowledge (Thaman, 2003; Nabobo-Baba, 2008) ensured that the research process honoured the participation of Pacific people.

Conclusion

This paper highlights the importance for us as Pacific researchers to contemplate our relational positionalities and to be able to grasp a multifaceted understanding about conducting a research by, for, and with Pacific people. To go back to do research by, for, with the community, and being identified as

members of Pacific diasporic communities in Aotearoa, we took into consideration our connections to our land and our people. We felt that it was our responsibility to ensure that we value, cherish, nurture and take care of the 'va' or the relationship between us and our research participants. Talanoa appeared to be the appropriate tool to maintain that trust and embrace harmonious relationships and respect between the researcher and participants. We felt that the authenticity of the data provided to us by our participants was attributed to the use of talanoa. We highlight in this paper that being open about the complexities associated with talanoa, based on our relational positionalities and the diverse contexts in the diaspora is necessary for Pacific indigenous early career researchers.

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e–talanoa as an online research method: extending vā–relations across spaces

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Abstract

Talanoa (Moana-centred orality) is a widely used Indigenous Pacific discursive approach within research contexts across the diaspora. In a globalised and technologically enhanced era, the online space continues to shape Moana (Oceania) peoples' talanoa engagement and communication. e–talanoa in this article is an extension of talanoa research engagement and practice. We unpack the contexts in which e–talanoa is negotiated and made sense, and employ talanoa–vā (relational sense-making and meaning-making) as a critical analytical framework for interrogating and unpacking the complexities associated with e–talanoa as a Moana–Pacific research praxis. e–talanoa considers our current post–covid research space and how Pacific researchers navigate their ethical vā–relations within the temporal–spatial and physical–online boundaries that govern meaningful research undertakings. Being open about the challenges enables further understanding of the dynamic and fluid, yet contextually grounded spaces in which e–talanoa as a method can be realised.

Keywords

digital tools and platforms, digital vā, e–talanoa, post–covid, vā–relational ethics

Introduction

Social and physical distancing continues to implicate our perceptions of post–covid relating (Enari & Fa'aea, 2020). The use of digital tools and platforms and the online space have implicated research-related interactions and processes within higher education. For some, the move to online interactions has alienated participants who do not have access to technologies, as well as restricted researchers' capacity to undertake meaningful research activities (Thomsen et al., 2021). Fifteen years since Vaioleti's (2006) conceptualisation of talanoa (Moana-centred orality and cultural practice) as a research method, our collaborative conceptualisation of e–talanoa is a response to the global pandemic and our desire to explore the role of digital tools and platforms in ensuring Indigenous Pacific realities are activated and protected. e–talanoa is a response to the globalised and technologically enhanced world where Pasifika or Pacific peoples' communal interactions and research engagements reflect their changing environment. Pasifika, as a category, was utilised by the Ministry of Education during the 1990s as a way to group the distinct Pacific migrants in Aotearoa-New Zealand (NZ) at the time (Samu, 2006). However, Pasifika is not a label in which all migrants from the Moana (Oceania or ocean) connect with, hence the interchangeable use of both Pasifika and Pacific in this article. Lopesi (2018), a feminist scholar of Samoan ancestry claims, "scholarship around Moana peoples online is currently so thin, and I do worry that we won't be able to keep up with [the] evolutions of our dynamic cultures" (p. 21). Thomsen et al. (2021) argue that talanoa is an established Pacific research methodology maintained by vā relatings and pedagogical praxis that is "intrinsic to how we understand our researcher and lecturer identity" (p. 151). Our primary aim in this article is to articulate the ongoing vā–relations and negotiations through talanoa research, developed across temporal–spatial and physical–online boundaries.

Our concern for the state of Indigenous Pacific research and its conditions of practice within COVID-19 brought us together. Collectively, our Pasifika or Pacific positionalities are shaped by our diverse reference points and contextual interconnections with land and people across the diaspora in Te Moananui-ā-Kiwa (Pacific Ocean). We are a group of early career researchers located across Hamilton and Auckland, NZ, and Brisbane, Australia. We share

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commonalities as either former or current high school teachers and now researchers in University settings. In terms of cultural specificities, David is of Tongan and Samoan ancestry and has an affinity to Niue, his place of birth. Lute (Ruth), a Tongan woman, was born and raised in NZ, now living in Brisbane with her Samoan husband and children. ʻElisapesi is a Tongan woman, born and raised in Tonga, and now living in Hamilton with her family. Dion is a New Zealand-born Samoan, raised in Australia and Samoa. Tepora is a Samoan woman, born and raised in Samoa, now completing her doctoral study in Hamilton. Alvin is of Indo-Fijian heritage, born and raised in Fiji and Head of Department at a secondary school in South Auckland. Our collective aspiration is to ensure talanoa research practice continues to grow and strengthen Pasifika or Pacific voices and lived experiences in the diaspora.

We position this collaboration as a postcolonial endeavour, embracing the decolonial agenda and inspirations endorsed within critical Indigenous research, seeking for empowerment, self-determination, and agency (Smith, 1999). The Calcutta-born Spivak (1988) is widely recognised as one of the most important postcolonial scholars of our time. Her work examined the effects of foreign and western domination on the former colonies of Britain and France. In her book, *Can the Subaltern Speak?* (Spivak, 1988), she questioned whether the subaltern, the marginalised and colonial populations excluded from the hierarchy of power by the imperial coloniser, can be represented? As marginalised communities within higher education, it is within this critical talanoa space that we as Pacific early career academics from diverse ancestry seek to find a collective agency to unfold and sense–make the in–between space within *e–* and talanoa.

The anglicising of talanoa using the prefix *e–* can look–sound–feel uncertain and vulnerable, and the evolution of Pacific languages in the diaspora is ongoing. According to Taumoefolau et al. (2002), "language can only be understood if more attention is paid to its relationships with the external world . . . [and] the way [it] represents reality in the mind" (p. 26). As Pasifika or Pacific communities adapt and integrate into their new environments across dominant western societies, cultural and spiritual continuity and survival are at the heart of their practices (Enari & Faʻaea, 2020; Faleolo, 2020b). Our implementation of related Indigenous Pacific concepts and approaches such as vā or va (relational space and interconnections), tā–vā (time and space theory of reality), and talanoa–vā (relational sense-making and meaning-making) provide ethical frames that govern e–talanoa's relevance and appropriateness for our Pasifika or Pacific communities residing in the diaspora. Although some Samoan scholars opt not use the faʻamamafa (heavy pronunciation) via the macron in their writing of va, it is a choice made by each based on their "education and beliefs" (Taualaulelei et al., 2015, p. 186) and upbringing. In this article, we note the interchangeable use and representation of both vā and va because it highlights the cultural, linguistic, and generational specificities within Polynesian ethnic groups in the diaspora. Symbolically, developing e–talanoa requires an appropriate re-orientation and re-configuration of what is deemed relevant practice in light of the continuity and thriving of our generations across diasporic contexts (Suaalii-Sauni, 2017; Thaman, 1995).

Vaai (2017) posits, "Relationality is in our blood. We came into being through relationships" (p. 17). From an ethico–relational ontology centred within the Moana, our intention is to briefly conceptualise e–talanoa that is appreciative of our current contextual realities and the challenges related to online research engagement and use of digital tools and platforms to maintain and care for vā–relating within the post–covid space. e–talanoa's becoming in the Moana requires an intimate consideration and negotiation of vā's responsibility and context within a holistic view that all entities in the world are connected (Vaai, 2017), weaved together through an ecology of Indigenous Pacific ways of being–knowing–seeing–feeling–doing (Johansson-Fua, 2022; Matapo & McFall-McCaffery, 2022). At the same time, from an Indigenous philosophy of worldedness lens which claims "one thing is constituted by all things in the world" (Mika, 2017, p. 34), this collaborative conceptualisation of e–talanoa as a research method can be attributed to "the working of the world on the self [and our collective selves]" (Mika, 2017, p. 28). Conceptualising e–talanoa in this article, therefore, involves articulating insights into the ways the method shaped our thinking and understanding and vice versa.

Naming a research method without articulating its whakapapa (genealogy or lineage) can have ethical implications on the people and knowledge involved (Sanga & Reynolds, 2017). Naming e–talanoa within this collaborative exploration acknowledges the talanoa research and methodological whakapapa as well as articulate how we contextualise talanoa engagement within the online space. At this point in time, we position e–talanoa as a method grounded in the talanoa research methodological tradition. We seek to unfold how research relationships and knowledge gathering and sharing are understood and negotiated as talanoa practice moves beyond the boundaries of physical presence into the online space, often perceived as unknown, unfamiliar, and somewhat vulnerable.

As we negotiate our relational positionalities and aspirations in this article, we embrace the label Moana–Pacific to highlight an ongoing space of decolonial struggle and negotiations (Lopesi & Tecun, 2020). Zimbabwean-born decolonial scholar, Ndlovu-Gatsheni (2021) affirms the world is an epistemic creation and that ontology is made of epistemology. This aligns with claims that under "Euro-American-centric modernity, epistemology was instrumentally and strategically deployed in accordance with the coloniser's model of the world, whereby Europe and North America were put at the centre" (Ndlovu-Gatsheni, 2021, p. 884). Indigenous Moana–Pacific knowledge (IMPK) shapes relational ontological becoming and transcends geographic boundaries not fixed nor confined to one geographic location. IMPK is grounded first in sacred and spiritual interconnections with whenua–fonua–fanua–vanua (land in Māori, Tongan, Samoan, and Fijian, respectively) within the Moana, and second in the fluid mobilities of our globally inspired communities residing in the diaspora.

Ignoring the grounding of knowledges and practices in their whakapapa can be deemed lazy and unethical. Samoan scholars Suaalii-Sauni (2017) and Tunufa'i (2016) state, articulating clearly the contexts in which a particular IMPK approach is framed, talking openly about the uncomfortableness linked to implementation and how we grapple with their use in research contexts will help steer a meaningful course for the next generation. Our desire is to unpack IMPK concepts in higher education research, shared by our leaders and scholars from the region (Hau'ofa, 1994; Meyer, 2001; Nabobo-Baba, 2008; Taufe'ulungaki, 2002; Tui Atua, 2005; Vaai, 2017; Wendt, 1982). Noting also that, this generative collaboration is a consequence of Faleolo's (2020a) efforts to employ e–talanoa in her work that captures Samoan and Tongan families' aspirations and mobilities across the diaspora.

Pacific–Oceania–Moana—articulating Moana research praxis

Looking from outside into the region often dominated how Moana–Pacific stories were interpreted and represented (Enari & Viliamu Jameson, 2021). Samoan scholar, Wendt (1982), conceptualised Oceania as an intensive and liberating agenda for Pacific people. Pacific–Oceania–Moana is positioned to highlight the complexities and specificities associated with our inherent ancestral and colonial histories within Te Moananui-ā-Kiwa. The Pacific has geo-political and socio-political connotations. References to Oceania and Moana invoke aspirations inspired by our Pacific elders to mobilise and operationalise Indigenous Pacific diversities and specificities (Hau'ofa, 1994; Wendt, 1982). Our reference to IMPK in this article is specifically framed from Tongan, Samoan, and Fijian perspectives.

While emerging Pacific scholars have turned to Moana and Oceania as an inspirational and inclusive identifier in an effort to take back their place and space in the diaspora (Lopesi, 2018), Pasifika or Pacific communities outside of the academe do not always connect with such names. Our responsibility is to remind and articulate our framing of IMPK. We position and relate e–talanoa as a Moana–Pacific research praxis, used to disrupt colonial framings, re-centre IMPK concepts and frameworks, and activate mindset shifts.

Tui Atua Tupua Tamasese Ta'isi Efi (2009) draws from the indigenous Samoan reference to disrupt western framings of Samoan knowledge and practices. Hawaiian scholar, Aluli Meyer (2001), makes references to Hawaiian epistemology and claims their understanding of the world compared to western views are different, and better comprehended in the way they "see, hear, taste, and smell the world differently" (p. 125). Such differences are neither simplistic, subtle nor imaginary, but are large and enduring (Meyer, 2001). Solomon Islands scholar Gegeo and Watson-Gegeo (2001) affirms the need for Native Pacific Island scholars to draw from their own epistemic frameworks rather than rely exclusively on the ways in which the coloniser makes sense of the world. Central to their claims are questions associated with epistemology based on:

> who can be a knower, what can be known, what constitutes knowledge, sources of evidence for constructing knowledge, what constitutes truth, how truth is to be verified, how evidence becomes truth, how valid inferences are to be drawn, the role of belief in evidence, and related issues. (Gegeo & Watson-Gegeo, 2001, p. 57)

Their questions enable an interrogation of the ways in which knowledge, truth, and belief are made sense. When engaging in e–talanoa practice, we unpack the ways in which knowledge, truth, and belief are extended and navigated across the in–person and shared online space.

Naming e–talanoa as a relevant method of research requires the grounding of Pacific talanoa conceptualisation within Moana–Pacific online practice during the post–covid context and space. Inspired by Tui Atua's (2005) call for Pacific research decluttering through clarity in how we frame and utilise ideas in academia, our employment of post–covid in this article places the concept within a post–truth condition. This enables us to re-orient and re-position post–covid not just as an afterthought of covid-19, but as a dynamic and critical intellectual space to re-think and re-conceptualise notions of truth, realities, relevance, and appropriateness, given the impacts of the global pandemic on our physical–online practices and the state and future possibilities of ethical vā–relations within higher education research. Post–covid as a concept and space through vā–relations, encourages speculative criticality that brings together past–present–future wonderings.

Etymology—talanoa, the hyphen (–), vā

The genealogy of talanoa can be traced back to predominantly Polynesian language and culture (Suaalii-Sauni & Fulu-Aiolupotea, 2014). Talanoa is a concept rooted in the Tongan, Samoan, Tuvaluan, and Fijian languages. Talanoa is made up of two ideas—tala (to talk, to tell, to discuss) and noa (common or ordinary, nothing, anything, something, an unknown), or purely imaginary or void (Churchward, 2015; Vaioleti, 2006). The noa space determines the condition of the tala—discussion and sharing and exchanging of ideas. The de–construction of tala and noa is not to remove but appreciate the richness and nuances in talanoa practice and engagement.

Jones and Jenkins (2008) developed the *working indigene–coloniser hyphen* as a way to symbolise the negotiation of intercultural differences between Māori and Pākehā in NZ. We employ the hyphen (–) to symbolise the intercultural sensibilities inherent within indigenous Pacific themselves, who are similar yet specifically distinct. The hyphen is symbolic of the intersections and the negotiations of ethnic diversities, coloniality specificities, connections (and disconnections) to fonua–fanua–vanua and online locales or spaces. Similarly, we embrace the hyphen (–) within Trans–Indigeneity as an Indigenous critical theory and praxis emphasising the subtleties, nuances, and complexities associated with the Indigenous–to–Indigenous engagement and knowledge–making practices (Allen, 2002). e–talanoa allows for a negotiation of the ways in

which talanoa and vā–relational ethics can shape and guide meaningful and respectful engagement and practice between Trans-Indigenous scholars of Tongan, Samoan, and Fijian ancestry. e–talanoa also allows for the unpacking of Pasifika or Pacific as settlers in NZ who continue to navigate the region, and make sense of what it means to be and become Pasifika or Pacific in relation to Tangata Whenua (Māori as people of the land) (Stewart, 2018).

From a Polynesian perspective, vā is a relational construct that represents one's sense-making of connections as well as disconnections with and between entities in the world (Fa'avae et al., 2021). Such relational intra/interconnections are fluid and interdependent based on the vā–relations between people–people, living–non-living, animate–inanimate, physical–spiritual, including in–person–online, in search of some form/s of balance, order, or harmony (Ka'ili, 2017; Māhina, 2017; Suaalii-Sauni, 2017). The interconnected and interdependent condition of vā–relationality is ethically spiritual and sacred, evident in the Samoan concepts—va tapuia (sacred space) and teu le va (building and nurturing social connections), and Tongan concepts veitapui (sacred space) and tauhi vā (building and nurturing social relations) practice (Anae, 2016; Fa'avae et al., 2021; Wright, 2022). Vā–relations provide the conditions within the noa space and consequently shape the types or forms of tala. As a governing life spirit, vā shapes the interconnections between people–people, people–ideas, place–people, temporal–spiritual, seen–unseen (Supplementary Figure 1).

From a Samoan perspective, va is a central organising principle of social relations and governs all "inter-personal, inter-group, and sacred–secular relations and is intimately connected to a Pasifika sense of self and identity" (Suaalii-Sauni, 2017, p. 163). Pacific scholars draw from tā–vā as a theoretical framework to understand reality, truth, and relationality (Ka'ili, 2017; Māhina, 2017; Refiti, 2017; Seve-Williams, 2017; Va'a, 2017). This means, the self and the collective are closely interconnected, and the reality of social relations is better realised when considering time, contexts, and generations across places and spaces. To capture e–talanoa's potentialities, it is the socio–spatial and socio–temporal relationships we seek to unfold in this article.

Talanoa research scholarship

The first formal mention of talanoa can be traced to the writings of Halapua (2002). Shortly after, Vaioleti (2003) presented the talanoa concept at the University of Waikato's Pacific Research Education Symposium as a developing research methodology (Tecun et al., 2018). Three years later, Vaioleti's (2006) seminal paper progressed talanoa as a methodological approach in formal research contexts. Pasifika researchers in NZ and Pacific academics based in NZ and the Pacific region began to apply talanoa in their gathering of descriptive data through their interactions within schools, universities, and community forums. Free-flow talanoa is a familiar style of Pacific communication that researchers would have incorporated into their research approaches, using acceptable mainstream terminology like narrative or semi-structured interviews, as required by the academic institutions at the time (Tiatia, 1998).

The talanoa approach is evident across a range of disciplines within several Melanesian and Polynesian academic circles (Mila-Schaaf, 2010). To date, the theorisation and development of talanoa have mostly been through masters and doctoral projects across the diaspora (Faleolo, 2020b; Latu, 2009). Talanoa continues to form the basis of newly named narrative approaches yet embraces the free-flow dialogue synonymous with the talanoa approach (Fa'avae et al., 2016; Suaalii-Sauni & Fulu-Aiolupotea, 2014). Even though talanoa has become a research method and methodology appreciated by Pasifika or Pacific researchers (Matapo & Enari, 2021; Thomsen et al., 2021), it is not an approach that fully encapsulates the diversity and vastness within Te Moananui-ā-Kiwa and its bodies of knowledges. To assume talanoa is the predominant Pacific approach not only perpetuates the privileging of the few in Polynesia over the many in the Moana, but can also ignore the in–depth, similar yet distinct specificities and ways of beings–knowings–seeings–feelings–doings inherent within Hau'ofa's (1994) sea of islands. Our unfolding of talanoa and the projections of vā–relations across the temporal–spatial and physical–online boundaries are grounded within an ethical responsibility prioritising principles of generosity and care (Fa'avae et al., 2022; Ka'ili, 2017).

When Faleolo (2020b) embarked on her doctoral study with multi-sited Samoan and Tongan families in Auckland NZ, and Brisbane Australia, she adopted the talanoa method to capture and honour the experiences and stories shared. The cultural ethics of talanoa practice helped minimise concerns related to the power imbalance in her position as the researcher, providing space for her participants to implement agency. What Faleolo (2020a) terms as e–talanoa was a direct response to the request of her participants, an extension of their existing talanoa relations using online forums. This methodological development provided flexibility, suitability, and ease for participants across temporal and spatial divide. e–talanoa prioritises vā–relations beyond the in–person, kanohi ki te kanohi (face to face, in person, in the flesh), by embracing the online space which continues to impact the way Pacific conduct research activities during the post–covid.

Over the last two decades, talanoa has become a widely used method of gathering what is widely understood within the western academe as narrative data from Pacific communities. Halapua (2003) explains the process of talanoa as being meaningful communication when built on vā between participants. Researchers who understand vā learn to unpack the talanoa approach in conjunction with tauhi vā (Latu, 2009) or teu le va (Anae, 2016; Wright, 2022).

Online space—communication and digital tools and platforms

The online space is defined as digital environments in which individuals and groups interact in non-physical ways (Saunders et al., 2011). Internet skill plus a "strong sense of internet efficacy" (Anderson, 2004, p. 36) allow users to adapt effectively to the requirements of engaging in online environments. We contextualise e–talanoa and explore the relational ethics of cultural and research engagement

online. While e–talanoa within the digital space enables technological access for certain groups within the community, it can reproduce inequities making many less able to participate in e–talanoa research. The digital vā, however, is a critical space that enables Pacific researchers to confront and negotiate encounters and research processes that can further marginalize particular groups of people (Enari & Matapo, 2020; Koya-Vaka'uta, 2017; Thomsen et al., 2021). Anae (2016) and Suaalii-Sauni (2017) position teu le va as well as tauhi vā (Faleolo, 2020b; Latu, 2009) as being important principles of ethical practice that seek to maintain collaborative interdependence, balance of power, and decision–making processes rooted in generosity and care. Enari and Matapo (2020), scholars of Samoan ancestry, explored the innovative use of the digital vā in relation to Pasifika university students' social connections in NZ and Australia. The digital vā was used to further extend Pasifika agendas, for example, Pasifika language maintenance and Samoan village meetings via Facebook messenger. Through these practices, Enari and Matapo (2020) proposed the digital vā as an indigenisation of the digital space.

Pacific researchers share their employment of digital tools and platforms when using talanoa as a data gathering method in their masters and doctoral projects (Faleolo, 2020a). Nasili Vaka'uta (2017), a Tongan theologian claims "talanoa is more than just talking to each other through an online network of that name" (p. 216). Talanoa's possibilities within the online space can be found in its capacity to bring together and connect Pasifika scholars across diverse disciplines in NZ, the Pacific and the world. e–talanoa provides an online space through digital tools and platforms that relationally connect those that might be otherwise temporally and spatially separated or alienated from one another (Enari & Matapo, 2020; Thomsen et al., 2021).

Online learning and engagement enabled access from remote locations in the Pacific. The University of the South Pacific's use of satellite communication and technology helped achieve distance learning given the geographic vastness of the region. Koya-Vaka'uta (2017), of Indo-Fijian and Samoan heritages, conceptualised digital vā as a context for interrogating "e–culture and cyber-identity form [as] a critical component of [Pacific youth's] sense of being and doing" (p. 61). She positioned vā to interrogate the state of relational connections and rules of engagement within cyberspaces. Facebook, Skype, and Zoom as digital tools and platforms not only enable communication across the diaspora; it has changed the way Pacific families understand their familial exchanges.

e–talanoa as method and talanoa–vā as critical relational analysis

To capture the potential possibilities of e–talanoa and honour the IMPK values and principles within it, we turn to talanoa–vā as an appropriate cultural framework (Fa'avae et al., 2021). Critical analysis through talanoa–vā as an Indigenous Pacific framework cares for what it means to teu and tauhi relational sense-making and meaning-making. Vaai and Casimira (2017) argue for a relational renaissance in the Pacific, opening up "conversation and critical thinking about the Pacific and its future" (p. 5), in particular, our "disconnection with the Pacific itulagi" (p. 5), a lifeworld centred on deep relationality. Talanoa–vā, coupled together by the hyphen, positions the sense-making and meaning-making of relationality as an ethical–ontological becoming across physical, spiritual, and sacred, including online spaces (Fa'avae et al., 2021; Matapo & McFall-McCaffery, 2022; Wolfgramm-Foliaki & Smith, 2020). Talanoa–vā, through an ethico–relational ontological positioning, provides a critical framework that enables negotiation as an ethical praxis, unpacking critical encounters across the metaphysical, spiritual, spatial, and temporal dimensions (Fa'avae et al., 2021). Through talanoa–vā, the intersections between the living and non–living and time–space are guided by an ethics of generosity and care (Supplementary Figure 1). Moreover, talanoa–vā allows the cross-examination of socio-political notions like power imbalance, marginalisation, oppression, including critical and social transformation as a function and condition of vā's ethical relatings (Anae, 2016; Wright, 2022).

Before coming together, we were already connected through our Pacific colleagues and workplace settings. Our collective desire is to advance IMPK, sharing what it means to conceptualise and employ e–talanoa in higher education. Coming together to generate this article helped us comprehend collaborative and ongoing talanoa using digital tools and platforms such as emails, Google Docs, LinkedIn, and Zoom.

Findings and themes discussed

As co-collaborators, our conceptualisations and critical reflections of e–talanoa engagement were captured on Google Docs, a digital tool designed to enable synchronous and asynchronous online writing and engagement. Eight open-ended questions guided our collaborative e–talanoa which were captured in a table format. We were then encouraged to add initial responses to the questions and through an iterative process of reflection and commenting on others' responses to their ideas within their section of the table in Google Docs.

Our findings are in response to a series of eight questions:

1. What were you thinking when you saw the term e–talanoa?
2. How have you utilised talanoa within online or virtual research spaces?
3. What digital technologies did you use to gather the data?
4. How did you analyse and make sense of the data?
5. How did you re-present the data?
6. What were the challenges associated with e–talanoa?
7. How did you grapple with and negotiate the challenges?
8. What do you want to share with other Pasifika or Pacific researchers about e–talanoa?

The findings highlight points of tension between what matters to each co-collaborator—Fa'avae, Faleolo, Havea, Enari, Wright, and Chand, and what is deemed viable, culturally appropriate, or ethically sound practice as Moana–Pacific researchers within our specific research contexts. We re-present the findings, arranged under three themes: (1) e–talanoa defined and its challenges; (2) negotiating e–talanoa virtual spaces; and (3) future implications for the continued use of e–talanoa. Concurrently, we discuss the findings with the relevant literature.

e–talanoa defined and its challenges

Among the six co-collaborators, e–talanoa is conceptualised as a projection or extension of vā–relations into the online space. Enari defined e–talanoa as a new way of performing an ancient practice in the digital space. Havea, Wright, & Fa'avae defined e–talanoa as a new way of re-thinking and conducting talanoa. Collectively, caution was noted in ensuring vā–ethical practice within in–person or in the flesh talanoa was maintained by researchers throughout their online research practice (Halapua, 2003; Ka'ili, 2017; Tunufa'i, 2016).

In question 1, the general response to when the co-collaborators saw the term e–talanoa was positive, with a slight sense of wonderment about its possibilities, or apprehension as to whether the change was ethical or not. e–talanoa provides an opportunity, flexibility, and freedom for Pacific researchers to explore not only what it may look like in specific research contexts but also how this can be defined within research projects. However, articulating the cultural and ethical relevance of each new methodological development we make in our work as Pacific researchers is critical (Suaalii-Sauni & Fulu-Aiolupotea, 2014). Our work is not our own but is shaped by those gone before us, keeping in mind the efforts of those who follow.

The challenges associated with e–talanoa ranged from ethical, technical, cultural, and emotional. Fa'avae et al. (2016) reflect on the vulnerabilities faced by Pacific researchers utilising talanoa as a research method across diverse research contexts. In this paper, Fa'avae highlighted the internal grappling he experienced with the concept of e–talanoa, and the implications of this recent talanoa methodological development within Moana–Pacific research contexts. During our group e–talanoa via Zoom and articulated also in the Google Docs, Fa'avae stated:

> When I first saw e–talanoa in Ruth's article, the first time in which it was named and published, I initially felt excited. But as I spent time looking at the hyphen and space in between the "e" and "talanoa", it brought forth an array of mixed feelings—of hope and anxiety. Is it ethically appropriate to position the "e" in front of talanoa? Does that mean the online space has more precedence over the talanoa conversation?

In response to questions about how and why the term e–talanoa was developed, Faleolo noted in the Google Docs:

> When I first penned the term e–talanoa on my ethics application, I was conveying the use of online forums to communicate with participants. I was wanting to get this ethically approved at the University of Queensland, fully acknowledged by the institution as a Pacific research method. I remember thinking about e–talanoa and the best way to explain the extended implementation of talanoa using the internet and electronic technologies via email, Face Time, private Facebook Messenger, Zoom, and Skype, helping to connect multi-sited peoples across vast spaces.

The concerns raised by Faleolo and Fa'avae can have ontological and epistemological implications and highlight the tensions between western academic demands and expectations versus honouring Moana–Pacific community vā–relational ethics. Those seeking to use e–talanoa are encouraged to articulate the challenges associated with progressing Pacific research methods and methodologies into and across research spaces and sites. Not only are we disrupting the conventional practices of dominant western-oriented research but re–shaping long-standing methods of knowledge-sharing that favour Eurocentric epistemes. In light of the challenges, we agree the priority is to grow our IMPK corpus of knowledge by articulating clearly and unpacking the specificities in IMPK methods and methodologies, as well as the ways they are utilised and operationalised across diverse disciplines, either uncomfortably, or in complex and nuanced ways (Lopesi & Tecun, 2020).

As a method, e–talanoa is strengthened when participants are familiar and can confidently use information technology and digital tools. The limited knowledge of information technology plus unstable internet access as well as varying broadband connections can impact the quality of free-flowing e–talanoa. e–talanoa can also expose the researcher's limited competency and inability to use technology and digital tools efficiently. Havea explained in the Google Docs that some features researchers might want to use during Zoom sessions, such as sharing a document, are not always effective due to a lack of knowledge about technology or poor internet connection. Enari echoes this challenge of using a research method that relies on technology:

> We normally physically engage with each other when we talanoa. The virtual space does not allow us to touch, feel and hold each other like . . . we do during a physical talanoa . . . . It is dependent on technology to work. All parties involved must be connected to technology otherwise e–talanoa does not work. This is not a problem in physical talanoa as physical talanoa can still take place without electricity.

While technology and virtual spaces provide opportunities, it is within these same spaces in which the implementation of e–talanoa can highlight researchers' natural anxieties. Concerns linked to the viability of e–talanoa as an appropriate way to engage Pacific people holistically within virtual spaces was raised (Enari & Matapo, 2020). Some of us felt uneasy about the quality of conversations during e–talanoa. In response to question 6, Havea noted in the Google Docs the differences in relation to vā māfana (a sense of warmth and positive emotion) usually experienced during in–person talanoa:

> Based on my experience, face-to-face talanoa is usually heart-warming. There is a vā māfana when you talanoa face-to-face with your participants. And this is when the talanoa comes to a stage where the participants share some experiences and become emotional, so we end up in tears. As a researcher, I did not experience that kind of vā māfana during e–talanoa.

Similarly, Chand responded to question 6 in the Google Docs by illustrating the lack of vā māfana associated with the physical distance between people during e–talanoa:

> The challenge with e–talanoa is that it's extra hard to gauge human warmth. Sometimes, it feels lonely and isolated when having e–talanoa. Technology can be an issue especially if the internet connection is poor. People can be talked over unintentionally as you may not know who wants to talk.

Generally, the six co-collaborators found it difficult to make sense of participants' body language and facial expressions during most online forums. Fa'avae responded to Chand's comment:

> The challenges you're suggesting Alvin seem to be concerns to do with relational ethics. There is something about bodies, proximity, and eye contact that contextualises and evokes rich talanoa. Sometimes we can read what a person is saying through their facial and body gestures. It's hard to do that when you're online. I struggle sometimes when I can't see people's faces in Zoom because they've turned their video off. There is a particular kind of distanced feeling; a sense of distance in space and beyond one's reach.

While considering the ethical relevance of physical proximity, Faleolo highlights valuing participants' preferences when choosing e–talanoa. She notes:

> This is an interesting insight, out and about doing Zoom. When listening to a speaker, I turn my screen off to not distract the person listening or speaking. In a recent Zoom e–talanoa I had with a multi-sited Tongan collective (NZ or Aust), a participant decided to go shopping, other participants and I in the discussion group were okay with this arrangement. The participant had muted but we could see her and the children walking around the shopping mall. So, whose perspective really matters in e–talanoa, the informant, researcher, or both? How do we ensure both the informant and researcher are empowered in the process?

Faleolo's reference to doing Zoom in an academic forum in comparison to her role as the chair of the meeting can have diverse implications on e–talanoa. Being present, engaged and listening, if not speaking or seen, is necessary. Being mindful of the intrinsic or extrinsic pressures on researchers is essential. What researchers may perceive as inappropriate may not be perceived in the same manner as their participants. Our anxieties about how we perform as researchers and grappling with doubts or fears about whether our methods or methodologies are ethically appropriate may not usually be understood by our participants. Nevertheless, these pressures and emotions are useful and articulating them can improve research practice for the next generation. Whose perspective really matters in e–talanoa is a question that requires careful negotiation. Clear articulation will also help to pave a way forward for researchers hoping to maximise the online space and employ e–talanoa as a relevant and valid approach during the current pandemic restrictions.

Negotiating e–talanoa virtual spaces

Negotiation enables the visibility and sharing of power dynamics within research. The quality of e–talanoa negotiation between researchers and participants depends on their willingness to tauhi vā and teu le va. For us, the socio-cultural and socio-spiritual aspects of talanoa were vital in our e–talanoa practice. The values of respect, reciprocity, humility, love, care, and generosity were identified as important elements within e–talanoa (Anae, 2016; Ka'ili, 2017). As Halapua (2003) points out, tauhi vā enables respectful communication during in–person talanoa.

To maintain online vā–relations, vā māfana in e–talanoa required us to turn to cultural protocols for instance—prayer, Pacific greetings, introductions, as well as the use of storying or storytelling to explain interconnections to one another and places. Wright, Chand, and Havea shared their e–talanoa routines, encompassing Pacific cultural protocols commonly used during in–person talanoa contexts. According to Wright, Chand, and Havea:

> I try as much as possible to authentically engage in and encourage preliminary conversation to give time for the participants to feel comfortable. I take time to acknowledge the participant's time and express sincere appreciation for their consent and willingness to participate and invite them to raise any questions. (Wright)

> e–talanoa was scheduled via email. A reminder was sent a day before the e–talanoa. Participants were asked if they are comfortable if the screen can be recorded. I greeted the participants before the beginning of e–talanoa discussions. We take turns to introduce ourselves and talk about our genealogy. (Chand)

> One of the approaches I tend to use in e–talanoa to create and maintain cultural connections and māfana warmth and spirit of the talanoa with my participants is starting it right. I followed Tongan protocols, doing a prayer first and acknowledge them in Tongan language and English if there are non-Tongan participants. I make sure that I say every person's name during the e–talanoa and get everyone involved and take turns to speak. (Havea)

Clear communication before, during, and after e–talanoa was emphasised by the co-collaborators. Implementing reciprocity whereby information is accessible and flows freely to prepare the virtual spaces for effective and meaningful conversations is important. Faleolo noted,

> following Samoan and Tongan protocols of setting the tone through prayer or cultural greetings and introductions or acknowledgements of our connections, especially at the first e–talanoa, and then finishing off with a word of thanks or prayer to close before signing off left a warmth or māfana that would allow for further free-flow communication and a less formal start to our next session.

Regardless of the technological or digital tool and platform used when implementing e–talanoa, there are simple but effective ways of bringing vā māfana to an e–talanoa forum, as outlined in the excerpts above. To enable vā māfana, Wright suggests the significance of the preliminary stage of the e–talanoa. For Havea, starting it right requires a prelude of social, cultural, and spiritual references. Similarly, Faleolo would use a similar procedure at the start and end of her e–talanoa session. Among the six co-collaborators, the cultural and spiritual protocols through greetings and connecting with participants should be followed to promote what Fa'avae refers to as unsettling the space and relationally grounding one's self prior to the formalities of the meeting proceeding.

Future implications for the continued use of e–talanoa

Pacific researchers require a sound understanding of ethical and socio-cultural principles to navigate meaningful online vā–relations through vā māfana and a good grasp of the communication services and online forums they and their participants can access together. Time allowances for setting-up the technology, pre-meeting communication, technical problem-shooting during e–talanoa, maintaining conversational engagement, retrieving recorded data, post-meeting communication, collaborating on analysis, and reflections about the process are all practical demands on researchers and their work. All six co-collaborators acknowledge their learning journey with regard to implementing e–talanoa in their Pacific research contexts.

Faleolo and Enari advocate that e–talanoa should not replace in–person talanoa, but should be looked at as another way of extending talanoa research practice:

> It is another means to perform face-to-face or in-person talanoa. But e–talanoa should not be used as a full replacement. I used both physical and e–talanoa. I too would do this interchangeably as this allows the benefits of both physical connection and isolated convenience.

Enari and Matapo (2020) emphasise the importance of both physical and online forms of connection for Pasifika learners during the global pandemic. This is because of the contextual surroundings that influence the knowledge-sharing processes. "[T]he relational vā becomes entangled in the digital vā, generating new modes for engagement and connection . . . indigenising the digital environment to embed cultural ways of being and knowing" (Enari &Matapo, 2020, p. 8). Both modes of communication—in–person talanoa and e–talanoa—are required in this pivotal time of re-engagement and re-connection across multi-sited Pacific collectives (Faleolo, 2020a). Online research interactions should not dismiss Pacific traditional values and practices that rely on nurturing generous, safe, and generative collective connections.

Havea recommended e–talanoa as supplementary to in–person talanoa, especially if there were unexpected events affecting the option of meeting physically in–person. Chand claims that e–talanoa is a method used to collect data with Pacific students familiar with technology. Even though Fa'avae acknowledges e–talanoa's possibilities during our Zoom session, he reminds the co-collaborators to story the practical challenges in which we grapple with e–talanoa in research engagement and practice, including the experiences that have a tendency to make us be–know–see–feel–do vulnerable.

Wright suggests how we might deal reflexively with these challenges and feelings of vulnerability, by documenting as much as we can about how we use e–talanoa, the challenges faced, and the lessons learnt. Similarly, Faleolo shares:

> as a Pasifika researcher, representing my people accurately is my worry and so I kept an ongoing journal that gave me room for reflexive practice. I continually reflect on what I was thinking, what I thought participants were saying, why I thought about these things, who they were in relation to me, and what was happening in their world and contexts at the time. It helped me fully understand what participants were saying when I revisited scripts at a later stage and dampen down my own noisy thoughts so that I could concentrate on what they were really saying to me.

Based on the co-collaborators' comments linked to authentically engaging in e–talanoa, Fa'avae raised the concern as to what constitutes authentic engagement? The idea of authenticity can often assume one proper way or true experience of doing talanoa as a research method. This further raises the question; is e–talanoa authentic talanoa? The matter of e–talanoa's validity takes into careful consideration contextual relevance and appropriateness and requires a collective and considered discussion to negotiate a way forward.

Further use of e–talanoa within the digital vā

The move to employ e–talanoa reflects our global pandemic realities. This validates the contextual relevance of e–talanoa as a research method within the post–covid space. The digital vā is a space of possibilities and enables the interrogation of e–culture and online identity projections through digital tools and platforms (Koya-Vaka'uta, 2017). Reliable e–talanoa practice within the digital vā context relies on vā–relational ethics. This means that articulating and realising e–talanoa's possibilities by–for–with Pacific in this article relies on our collective and shared vā–relational sense-making and meaning-making. The digital vā space has the potential to empower subaltern or marginalised voices and critical practice in western-oriented higher education (Fa'avae et al., 2022; Spivak, 1988). e–talanoa as a research method portrays the challenges, negotiations, and significance of vā–relations projected across time–space and physical–online boundaries.

IMPK–centric ethico–relational ontology grounds e–talanoa's post–covid relational becoming within the Moana (Matapo & McFall-McCaffery, 2022; Wolfgramm-Foliaki & Smith, 2020). To capture the ways in which e–talanoa can be utilised as a Moana–Pacific research praxis relies on open discussion about the challenges

involved in enacting ethical vā–relations based on generosity and care (Enari & Matapo, 2020). This is central to understanding the kinds of talanoa engagement and practice accessible both physically in–person and online, and the responsibilities of digital tools and platforms in enacting vā's ethical projections and extensions across and between people, places, and spaces. The quality of e–talanoa engagement and practice depend on the relational ethics of vā māfana interactions, the associated human–warmth embodied, often experienced through teu le va and and tauhi vā (Anae, 2016; Halapua, 2003).

Talanoa–vā as a process of critical analysis has provided a framework for understanding the complex layers and nuanced meanings embedded in unpacking the intersections between *e–* and talanoa as well as the diverse understandings of connections between the six co-collaborators in this article. The epistemic struggle associated with the anglicising of talanoa with the prefix *e–* calls to relevance the hyphen as a critical space for negotiating vā's responsibilities within the shared space of relationality (Supplementary Figure 1). Naming e–talanoa as online research engagement has inspired and empowered the co-collaborators to articulate talanoa's online and post-covid possibilities in the diaspora. e–talanoa is symbolic of the evolving nature of IMPK and practices that acknowledge the diverse locales and places in which Pacific people now reside (Faleolo, 2020a; Lopesi & Tecun, 2020). Vā–relations helped frame the understanding of the intimate yet intricate space in–between the ethics of talanoa grounded on generosity and care which are meaningful across in–person–online research engagement (Enari & Fa'aea, 2020).

Conclusion

e–talanoa within the digital vā context provides an extension to in–person talanoa research discourse and scholarship. Although much of the scholarship has focused on physical in–person talanoa, the online space continues to shape talanoa engagement and practice. Rather than ignore the relevance of the online space and digital technology, given today's global pandemic challenges, we highlight the potentialities of the e–talanoa method as supplementary to extending and projecting vā–relationality and data gathering in ways that ensure teu or tauhi maintains the mana and agency of Pasifika or Pacific people. While e–talanoa is an extension of discursive in–person talanoa, its responsibility as identified by the co-collaborators is to sustain ethical conditions of socio-spatial and socio-temporal shared interactions.

Authors' note

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Supplemental Material

Supplemental material for this article is available online.

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(Journal article 4 out of 4)

Fijian Indian students' perceptions towards group work in New Zealand classrooms

ALVIN CHAND

KEY POINTS

- Ethnic-minority students in the education sector often face challenges while studying in New Zealand.
- Group work is an active encounter that invites Fijian Indian students to draw on their cultural experiences to make sense of new knowledge.
- Seeking regular feedback from students can help teachers adapt collaborative teaching approaches in culturally sustaining ways.
- Supporting Fijian Indian students to work collaboratively means investing time assisting them to become active group contributors who feel valued and connected to the purpose of the work.
- Fijian Indian students like working in groups as it creates space for them to share ideas, learn from one another, and build confidence. However, group work must have a clear purpose, an obvious structure, and involve tasks that are well scaffolded.

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A wide research base in general Pacific education literature supports active learning activities that encourage students to work collaboratively. Many schools engage Pacific students in group-based learning together with other pedagogies to increase their achievement. Despite this, the education of Pacific origin students in Aotearoa New Zealand is not delivering equitable results and requires revision. Fijian Indian students are a relatively unexplored population within the Pacific education umbrella, and attention to their learning is not well represented in literature. This research used talanoa, a Pacific research method, to explore the perception of Fijian Indian students regarding group work. The findings revealed that students perceived both benefits and limitations related to engagement in collaborative learning. This discussion of group work plays a part in addressing New Zealand's education system's inequities for Pacific students, and it encourages teachers to consider what effective group work means for Fijian Indian students from the lived experiences of the students themselves.

Introduction

Meeting the needs of an increasingly diverse student population remains a challenge for many teachers in Aotearoa. Numerous recent studies identified the experiences of ethnic minority students in the New Zealand education sector, and indicate many groups face challenges while studying in New Zealand (Butcher et al., 2006; Milne, 2013). These challenges can be because of reasons such as teachers' limited knowledge of the learning needs and cultural values of specific ethnic groups, unsatisfactory learning situations in schools, and lack of required learning support (Butcher & McGrath, 2004). This study sought to identify the perceptions of Fijian Indian students as they engaged in group work in classrooms, in order to illuminate how learning from the experiences of a specific group of students can inform group-based effective pedagogy.

Background of Fijian Indians in New Zealand

Fiji was ceded to the British in 1874, and Sir Arthur Gordon became the first Fiji Governor-General (Kelly, 1992). To develop the economy, in 1880, Fijian products and its tropical climate were promoted in an exhibition in Melbourne, Australia, to lure large companies to invest. After the exhibition, the directors of Colonial Sugar Refining Company (CSR) of Sydney announced the extension of its operation to Fiji (Gillion, 1958). Gordon's major concerns were preserving traditional Fijian culture and protecting indigenous Fijians from the influences of wage labour and the plantation system (Derrick, 1950). Consequently, he turned to India for a cheap and reliable source of labour and recruited labourers under the indentured labourer system (*girmit*). The recruiters in India used many tactics, such as giving false hope of large amounts of money in Fiji and pretending Fiji was not far from India. It is estimated that about 60,000 Indians came to Fiji during this period.

At the end of the *girmit*, the CSR initiated a small farmer cane cultivation scheme. As a result, plantations were divided into 10–12 acres and were offered to labourers for cultivation. The contract bound the lessee to plant sugarcane and supply the cane to the company. As the scheme grew, each village formed small groups, and immigrants who came as individuals from India became large families (Jayawardena, 1975). This situation provided Fijian Indians with a hard but sustainable life for a long period.

In 2000, many farmers lost their farms because their leases were not renewed. This resulted in Fijian Indians looking for alternative ways to make a living. Many migrated to bigger towns and cities within Fiji, and some migrated to New Zealand, Australia, Canada, or the USA. This migration contributed to a decrease in the estimated number of people of Indian descent living in Fiji (Fiji Bureau of Statistics, 2022). The number of Fijian Indians living in New Zealand has tripled between 2006 and 2018 (Statistics

NZ, 2022). The Fiji Girmit Foundation of New Zealand estimates that at least 90,000 Fijian Indians now live here (Tan, 2021).

Although Fijian Indians are distinct due to this history, education research in New Zealand has generally homogenised Fijian Indian students as part of a general Pacific population in New Zealand. Research shows that Pacific students like working in groups when constructing new knowledge (Chu et al., 2013) and many schools use this pedagogy in the classrooms to teach Pacific students. However, little is known about Fijian Indian students' perceptions of learning in groups, or how effective it is for these students.

In order to partially address these knowledge gaps, this study offers insight into what Fijian Indian students think about learning in groups and how it helps them construct new knowledge in New Zealand classrooms. It also highlights some challenges these students face when constructing knowledge in a group setting. This study provides New Zealand teachers with suggestions for enhancing group learning experiences for Fijian Indian students.

Knowledge construction via group work

Group work is a type of active learning that encourages students to work together in a collaborative learning environment. It also promotes the development of social and leadership skills. Active learning involves activities that encourage students to participate in learning, enhancing critical thinking (Lumpkin et al., 2015). The finding from Lumpkin et al.'s (2015) study shows that, when students reflect upon, write about, and discuss what they are learning, it deepens their understanding of the subject matter. Similarly, Millis (2010) states that active learning can lead to deep learning, critical thinking, and genuine paradigm shifts in students' thinking when directed by an effective teacher. One way students can be actively involved in learning is via group work.

Taylor and Lucas (1997) used a teaching intervention to enhance preservice science teachers' learning via group work in Fiji, involving both iTaukei or indigenous Fijian and Indian Fijian students. This programme emphasised discussion and negotiation of knowledge to help students understand scientific concepts based on constructivist theory. The result indicated that neither ethnic group (iTaukei and Fijian Indian students) felt disadvantaged by the group work and their achievement rate increased. Both ethnic groups found group work enjoyable and beneficial (Taylor and Lucas, 1997).

While there are many advantages of learning in groups, there are also some disadvantages (Burke, 2011). The construction of knowledge cannot be entirely a social activity as students have different learning styles (Jacobi, 2011). Some students enjoy more passive learning styles, while others are more active and enjoy constructing knowledge in a collaborative environment. Therefore, teachers must be mindful of students' preferred learning styles when teaching. Nonetheless, much learning is achieved socially in New Zealand classrooms and often features group work.

The success of any group depends on how well the teacher aligns, plans for, and organises the learning activities (Johnson, 2009). According to Johnson, group work can benefit the group members when constructing knowledge. However, group work can be ineffective if students are not supported or the necessary skills for working collaboratively are lacking. According to Bell (2010), teacher instruction is very important to make group work an effective strategy to engage students in learning and to develop social skills. Furthermore, Bell (2010) states that teachers need to consider multiple aspects such as the knowledge level of group members, type of activities, group structure, students' voices, and teacher instruction when deciding to use group work as a pedagogy.

Thus far, this subsection has advocated for group work and the importance of knowing the learners' views regarding group work. A key element for the success of group work is listening to students' views on how they want groups to work. Investigating this element is the subject of this study.

Research setting

The research took place in eight different secondary schools in New Zealand. The data used in this article are part of the wider research of a PhD study. All schools involved in the research were state-run, co-educational, and located on the North Island. Two hundred and forty-eight Fijian Indian secondary school students from 13 to 18 years (Years 9–13) were invited to participate in this research. Students were either migrant students from Fiji or New Zealand-born students of Fijian Indian descent. Ninety-six responded with a willingness to participate. Forty-two talanoa sessions were held across different schools, usually involving two or three students in each talanoa session. Talanoa can be defined as conversation, a talk, or an exchange of ideas or thinking, whether formal or informal, which is often used when researching Pacific peoples (Vaioleto, 2006).

Data analysis

Data obtained via talanoa were analysed using thematic analysis. Thematic analysis is a method for identifying, analysing, and reporting patterns (themes) within

data (Braun & Clarke, 2006) and is flexible and able to be modified to suit the circumstances ((Riger & Sigurvinsdottir, 2015). This research followed Clark's (2016) thematic analysis steps for analysing data from the talanoa sessions: reading and making sense of the data; transcribing verbal data; searching for themes; refining themes; and writing a report that uses the identified themes to answer the research question which is to explore the perceptions of Fijian Indian students regarding group work.

What do Fijian Indian students have to say about group work?

The findings indicated that Fijian Indian students in this research generally like working in groups because the practice supports them in consolidating their new learning. The results also highlight that students get assurance from their peers about their understanding of the new knowledge they are studying. Furthermore, students mentioned that they like sharing ideas with peers as it helps them clarify misconceptions and, at the same time, they are able to socialise. The findings show that the benefit of group work is both cognitive development and its benefits to emotional wellbeing.

> I enjoy working in groups to get the other person's perspective of the topic under discussion. I also get a chance to clear up doubts if I don't understand and at the same time [I'm] able to talk to my mates.

Students also said they often prefer to ask their peers if they do not understand something rather than the teacher.

> I prefer to clear my confusion with my peers than the teachers. This helps the teacher to concentrate on another important thing.

The above excerpt shows that students feel responsible for other students' learning by clarifying doubts in the group setting rather than with the teacher. They may be thinking that group activity frees up teachers to do other important activities, or they do not want to get unnecessary attention since they may be insecure. Another reason may be that Fijian Indian students did not want to bring undue attention to themselves in class. This may be because they feel embarrassed when asking questions in front of a class.

> Sometimes it is also the confidence to ask a question to the teacher in front of our colleagues [which] can be a bit embarrassing.

The above excerpts show that asking questions with peers helps students to feel safe. They spoke of sharing ideas as a way to help them construct knowledge together because they can relate to each other personally. Fijian Indian students are usually in the minority in their class, and it may be that they do not want to be judged or stereotyped. The findings reveal that Fijian Indian students prefer to ask their peers for help rather than their teachers. One of the reasons given by some students was that they did not want to get unnecessary attention in class or sometimes lacked confidence.

Importance of relationships among peers during group work

Students mentioned that relationships with peers play an important role during group work. They said that they feel comfortable asking questions in class if they have a good relationship with their peers.

> We feel confident discussing ideas because we know them and relate to each other. However, we don't like always working in a group if we are not familiar with the students. The success of the group discussion is dependent on the relationship with other group members.
>
> It is not easy to work in groups if we do not know each other well.

Here is what students have to say about why they feel safe asking their peers rather than the teacher:

> Researcher: So what makes you relate to each other personally?
>
> We respect and understand each other's language and culture. I know the background of my colleagues, which makes me connect with them.

Students also mentioned that peers could explain to them in a familiar context during group work.

> My friends can also explain to me using a familiar context or the things I can relate to.

The above excerpts show that these students prefer to have concepts explained in contexts that reflect their world views. It appears that, during group work, students are able to make connections between ideas and worldviews. Furthermore, it seems that students can conceptualise and relate the concepts to their everyday lives while working in groups. Group work becomes an avenue for Fijian Indian students to draw on their cultural experiences to share them with others in the process of making sense of and constructing new knowledge.

Where groups do not work

The findings reveal that students are not able to take the full benefit of the group activities when the task is too difficult for them. They said teachers should scaffold the task during the group activities. In addition, students mentioned that the design of the activities plays a major role in the success of group work.

> When the teachers poorly design the activity, it leads to confusion and often, I go off task and, as a result, do not learn much.

Students said that teachers should think about what each member has to do during the group work. They

do not like doing all the work alone. There should be equal distribution of responsibilities among the group's members.

> If group members don't contribute equally to the activities. When the group members don't contribute equally towards a project or the task, I have to do everything. I might prefer doing this on my own than in a group.

The above excerpts show students' frustration with working in a group and the importance of the fair distribution of work during group activities. They also show the vital role of teachers in monitoring the group work and rectifying the issues faced by the group members.

Another reason students do not like working in groups is when teachers give them tasks to complete without clear guidance. Students mentioned that they want to work in groups where the tasks are designed well, and clear guidelines are given for what needs to be done.

> We want to work in groups if the tasks given have a time limit and groups are structured so that each member knows what they are supposed to do or say.
>
> Researcher: How does structured group work help you?
>
> So that we don't go off task, most of the time, I have seen teachers put us in groups to discuss specific topics and sit at the table and look at their laptops. We waste our time and get off track.

The above excerpt highlights the importance of organising group activities that suit Fijian Indian students' learning needs. It shows that students can judge which teachers use group work as a time filler in the class. Furthermore, these findings indicate that the Fijian Indian students who participated in the research did not want to waste time in class. It seems that Fijian Indian students want to make the best use of group work time, working towards clear objectives within a broader teacher-facilitated environment.

In summary, this research found that Fijian Indians are confident in asking questions in the group discussion rather than in the whole class. They also mentioned that they do not like working in groups when group activities are poorly designed or where they do not have a good relationship with other group members. However, students mentioned that effective work groups are structured where every member contributes, they have good relationships with each other, the work has clear objectives with a timeframe, and success criteria are clear.

Making sense of the findings

This research indicates that Fijian Indian students like working in groups. Moreover, students feel safe in small-group discussions and are not afraid to voice their concerns or enter into meaningful discussions with their peers. Students enjoy working in groups to get reassurance from their peers about their understanding of the concepts. Furthermore, students also said that it provides an opportunity to contextualise the concepts under discussion. Studies with Māori students also confirmed similar results that students are often more comfortable getting assurance from their peers about their understanding of the concepts than their teachers (Bishop, 2019). Many of the Fijian Indian students involved in this study felt that sharing their understanding with their peers boosts their morale with respect to what they have learnt, which gives them confidence and assurance regarding the new ideas under investigation as well as creating a space conducive to constructing new knowledge related to their life experiences.

Importantly, this study reveals that group work provides Fijian Indian students a **वातावरण** (whatawaran) to have a conversation with their peers. **वातावरण** is a Hindi word that translates to a space or environment where people can make connections with each other. It shares some similarities with the concept of "vā" important to many indigenous Pacific cultures. Vā describes the relational space between people and places, which is tended to within social interactions (Reynolds, 2017; Te Kete Ipurangi, 2022). The concept of **वातावरण** and the study's findings also align with the theory of social constructivism, which highlights that students create new knowledge through social interactions (Vygotsky et al., 1978).

According to Fijian Indian students, this **वातावरण** space is important because it helps them clarify their understanding of the concepts under investigation, or surface misconceptions, and brings about the potential for relating the topics under discussion to their life experiences. Fijian Indian students often come to class already familiar with constructing knowledge in groups, as this is common practice in their culture. Group work that is set up well creates a culturally safe environment that generates **वातावरण** space for knowledge construction, in which students can query and be curious. Group work engenders an element of cultural confidence, connection, and being able to contextualise their learning in regard to their personal experiences.

However, it is the teaching pedagogy that surrounds group work, not group work in and of itself, that is culturally sustaining for Fijian Indian students. In talanoa sessions, many students spoke of times when group work did not support their learning or confidence. They indicated that little learning occurs when the task is too difficult, such as when it is not scaffolded enough or is poorly designed. Stories like these were disappointing, given that Fijian Indian students generally like working in groups, but negative experiences can put them off.

Their concerns echo other research into non-Fijian Indian students' experiences of group work, where task difficulty, purpose, and set up were found to influence how much students believed they were able to learn (Monk-Turner & Payne, 2005).

Overall, group work holds the potential to enable the sharing and building of knowledge in ways that create room for personal and cultural experiences. Although Fijian Indian students may find learning in a group setting comfortable, it is always important for educators to plan group work well and gauge students' perceptions regarding group work within their specific contexts. Designing the group work based on the students' feedback can positively impact students' ability to learn. The Fijian Indian students spoken to in this study mentioned that they appreciated a clear purpose, an obvious structure, and tasks that are well scaffolded. Done well, the learning environment created during group work provides Fijian Indian students with the space where they can co-construct ideas that they are able to relate to their worldviews.

According to talanoa with Fijian Indian students in this study, teachers need to seek regular feedback from their students regarding how they want to work in groups and be willing to make the necessary changes to their planning and pedagogy in order to enhance learning.

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