

SUSTAINABILITY AWARENESS AMONG UNDERGRADUATE AND POSTGRADUATE INTERNATIONAL STUDENTS IN AUCKLAND

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ABSTRACT

This study investigates the application of sustainable practices by international students in the tertiary sector in Auckland, New Zealand and their knowledge of sustainability principles, with a specific focus on undergraduate and postgraduate level students. The hypothesis tested in this investigation is that there is a difference in the level of understanding of sustainability between undergraduates and postgraduates. A considerable number of international students arrived in New Zealand in the year 2023 and will be joining the workforce shortly. Auckland, as a multicultural city, offers a unique setting for observing the intersection of diverse cultural influences on sustainable behaviour. Although research has been conducted regarding sustainability and education, it has been observed that research based on the levels of education and its implications for understanding of sustainability is lacking. This creates a research gap in the area of study.

As a primary research instrument, a questionnaire was used to gather information on both the awareness of sustainability and the ability to apply it of international students in Auckland. A quantitative data analysis including Pearson's Chi-square and Fisher's Correlation Coefficient tests was conducted to identify the differences between the undergraduate and postgraduate levels. The findings reveal key factors influencing the differential application of sustainability knowledge, including cultural backgrounds, academic levels, and the practicality of sustainability practices in Auckland. No significant difference in knowledge and application of sustainability between the two levels of study was identified. This indicates the need for disciplined specific approaches to enhance sustainability practices in Auckland.

Keywords: Circular economy, Food-energy-environment trilemma, Subjective norm, Sustainability and inner transformation, Triple bottom line.

INTRODUCTION

This study aims to determine whether there is a difference between the level of education of students in relation to the application of sustainability in New Zealand among international students in the tertiary education sector. Despite facing competition from other countries, New Zealand's education industry remains robust, contributing significantly to the GDP. Therefore, international students can be seen as crucial for New Zealand's sustainable development goals, aligning with the government's commitment to the Triple Bottom Line (TBL) approach—which emphasises planet, people, and profit.

There is a noted gap in sustainability education among tertiary institutions for international students in New Zealand, highlighting the need for a stronger pedagogical emphasis on sustainability in curriculum and teaching methods. Therefore, it is important to define how a transformational change could be introduced to reduce this gap in the tertiary education sector in New Zealand.

The concept of sustainable development is based on an ongoing learning process rather than a static implementation of predetermined values and behaviours. This approach emphasises that educators in New Zealand must possess the capabilities needed for advancing sustainability, such as critical reflection and problem-solving, in order to teach and engage learners in constructing sustainable practices rather than just learning about them. Recently, there has been growing attention to the concept of 'inner transformation' in sustainability education, highlighting the importance of personal and mindfulness-based approaches in fostering a reflective and sustainable society. In 2009, a survey was conducted by the New Zealand National Environment Education (NZNEE) consisting of 1,300 industry professionals and eight case studies from leading firms. The results of this survey showed that 75% of organisations are required to share knowledge about the corporate environment and sustainability goals, and 65% would prefer a job candidate who is

sensitive to environmental issues and sustainability (Jim Wu et al., 2010). DV investment (2003) identified that 56% of investors are planning to increase their allocations to Environmental, Social, and Governance (ESG) investments by 2024. Further, by 2030, 24 million new “jobs” will be created, by shifting to a greener economy (UNO, n.d.). Hence adequate emphasis must be given to guiding international tertiary students in order to inculcate better sustainable circular economic practices (Sustainable Development Goals, n.d.).

In December 2020, a climate emergency was declared in New Zealand after it experienced extreme catastrophic weather events that directly impacted its primary industries and the socio-cultural and economic wellbeing of the country. In response, the government of New Zealand has mapped out a path to net zero emissions by 2050 with a climate emergency plan developing and adopting, *Te Tāruke-ā-Tāwhiri: Auckland's Climate Plan* (Climate Connect Aotearoa, 2023). With the impact of Cyclone Gabrielle in January 2023, climate change impacts were felt very strongly in Tamaki Makaurau, Auckland, and across New Zealand (Climate Connect Aotearoa, 2023). This resulted in the Auckland region's insurance losses, which are estimated at \$1.66 billion, nearly six times the total loss of climate damage in 2022 (Climate Connect Aotearoa, 2023).

Tangata whenua, the Māori community in New Zealand, have a strong focus on sustaining the flora and fauna of the country. Based on the Māori paradigm, there is an intricate, holistic and interconnected cosmological explanation about the natural world (Mika et al., 2022). Accordingly, it is the responsibility of atua (departmental gods) to sustain the wellbeing of flora and fauna; and the relationships between humans and ecosystems as a reciprocal relationship comprising manaaki whenua (caring for the land) and manaaki tangata (caring for people) (Mika et al., 2022). With such an emphasis on caring for the land and its people by Māori, all immigrant students in the tertiary sector must be made aware of the importance of sustainability in New Zealand.

As previously discussed, there are two primary areas of focus regarding sustainability in New Zealand. Firstly, the impact of recent natural disasters has highlighted the need for resilience and environmental stewardship. Secondly, the Māori community places significant emphasis on the interconnectedness of people (tangata), flora, and fauna in New Zealand. These considerations underscore the importance of raising awareness among international tertiary students about the necessity of protecting and promoting sustainability initiatives in the country. Given that Auckland is the commercial capital of New Zealand and more susceptible to contributing to environmental hazards, it is crucial to consider the impact of international tertiary students on sustainable initiatives in the country.

The research objectives of this study are to identify the application and knowledge of sustainability amongst international tertiary students at the undergraduate and postgraduate levels, and thereafter to propose recommendations if a gap is identified between the knowledge and application between the two groups. In addition to the cognitive understanding of sustainability, this article identifies the importance of effective engagement and action-oriented learning that leads to meaningful change. It also discusses how Integrating sustainability into education requires a shift towards transformative pedagogies that extend beyond imparting knowledge to fostering deeper understanding, empathy, and actionable insights among learners. This approach is crucial for addressing local challenges and nurturing a sustainable future for international tertiary students in New Zealand. It is also important to address the practical significance of the education and curriculum for tertiary-level students in New Zealand.

LITERATURE REVIEW

International student education in the tertiary sector in New Zealand faces strong competition from countries like the US, the UK, Canada, and Australia. The education and training industry is amongst the 10 best industries in New Zealand (Stats NZ, 2020). The actions, attitudes, and behaviour of these students are expected to have a considerable influence on the sustainable future of New Zealand. The contribution of this stakeholder group to a greener New Zealand cannot be ignored. The government of New Zealand remains committed to international education, and it wants to support sustainable, resilient providers who are committed to understanding the Triple Bottom Line (TBL) which is based on the impact on the 3 P's (planet, people, and profit). To protect the TBL, it is important that high sustainability values are developed in these students in New Zealand (Think New, n. d).

The most recent catastrophic climate disaster in the country was Cyclone Gabrielle in January 2023. The overall economic impact of this cyclone was substantial, with a multi-billion-dollar loss to the economy of the country, maybe as much as \$13 billion (Stevenson, 2023). This kind of impact on the TBL cannot be ignored. Therefore, necessary measures that should be initiated to encourage tertiary international students to address sustainability should be adopted.

The business community has demanded the integration of sustainability-related issues into business management curricula, and the academic community has also endeavoured to facilitate such a shift into the system. Within the last few decades, business schools that offer business and society-related courses increased from 34% in 2001 to 63% in 2007 (Jim Wu et al., 2010). This is due to the paramount need that exists for business organisations to focus not only on profitability but also on sustainability. In this context, it is interesting to analyse whether the educational level of tertiary international students in New Zealand would adequately impact their application and commitment to sustaining the environment.

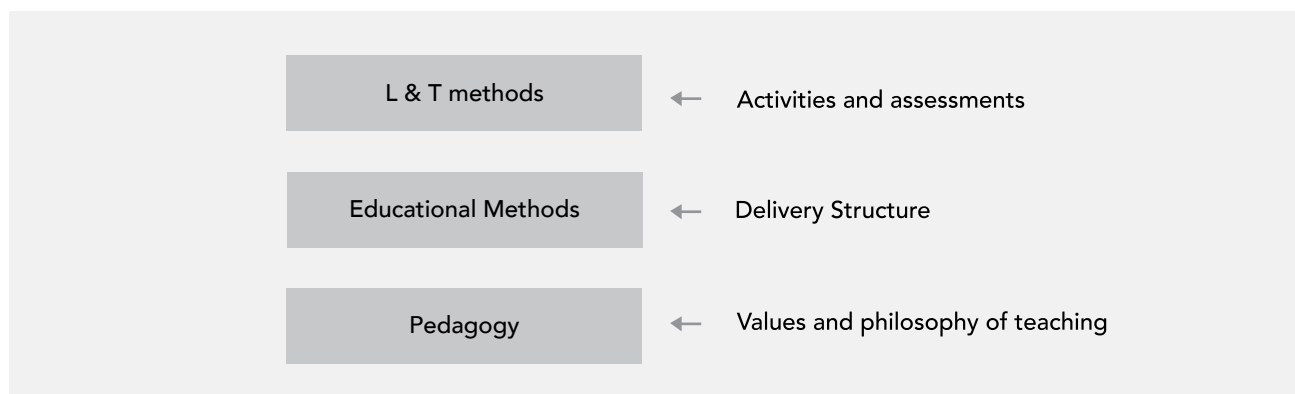
As one of such measures to enhance sustainability, circular economic and sustainable practices in the day-to-day lives of students should be emphasised through education. Simple measures initiated by adopting circular economic practices such as reducing waste in industries by reusing and recycling, can contribute significantly to reducing global warming. There are many lesser-known contributors to reduction of climate change. Reducing food waste and material waste in the fashion industry are two of them. It is believed that if global food waste were a country, it would be the third largest greenhouse gas emitter, behind China and the U.S. The carbon footprint of this wasted food is about 3.3 billion tons of Carbon Dioxide (CO₂) (USAD U.S. Department of Agriculture, 2022).

According to Ronen and Kerret (2020), students should be an integral part of generating effective solutions for sustainability. As an example, students can be encouraged to think of practical solutions by answering the question of how and where they can buy sustainable products. How can such sustainable product usage be implemented? Further to providing role modelling and conducting brainstorming, students can present best practices such as “cradle to cradle”, where at the end of a product’s life, it can be truly recycled following nature’s cycle with each item being recycled before it returns to the earth. This could become, directly or indirectly, a completely safe non-toxic and biodegradable nutrient. Furthermore, students could adopt pro-environmental solutions such as going to stores that lend clothes or to thrift stores rather than buying items new and discarding them. In addition to these sustainable initiatives by students, working with a common goal towards sustainability in finding solutions is also identified as a way of promoting students’ creativity, raising their curiosity and motivating them practically.

Although most tertiary educational establishments include sustainability in their curricula as a pivotal step, the quality of the curriculum and learning and teaching experiences are more important for ensuring that sustainability in education is a worthwhile endeavour. Therefore, sustainability in education is a part of learning about problems, complexities, and critical thinking that ought to be integrated into all degree programmes in New Zealand. In such instances, it is imperative to dig into the existing ‘pedagogical’ gaps in the existing sustainability education literature in New Zealand. A 2011 survey of academics across 20 universities in Australia (including 2,458 continuing staff, 1,818 limited-term contract staff, and 622 sessional staff) found that 37.3% of academic staff (Sandri, 2022) had not undertaken any specific teacher training. Those that had, may not have received adequate learning pedagogy in their teacher training. This could have resulted in not emphasising sustainability in the tertiary educational pedagogy. This indicates that a considerable proportion of tertiary academic teaching staff have not received adequate teacher training specific to sustainability (Sandri, 2022).

In view of this situation, some suggested improvement to reduce the gaps in the education models in New Zealand, the Pedagogy on Educational Practices, Iceberg Metaphor and the Conceptual Model on Scaffolding to Sustainability can be used. Figure 1 illustrates how important it is to inculcate sustainability into the value systems of education in New Zealand. The pedagogy of building sustainability as a value for the tertiary sector of education is the corner stone of a society consisting of individuals who will respect and conserve the environment and sustain it for future generations. If the pedagogy is strong with the values of sustainability, the educational approach will be built on the same values.

Figure 1: Illustrating Pedagogy on Educational Practices (Iceberg Metaphor)



Note: Adapted from Sandri (2022)

Development of sustainable practices in education is a ‘learning process’, rather than a ‘rolling out’ act. Figure 1 illustrates how a set of pre-determined behaviours, values, assumptions, and a philosophy of teaching placed at the very bottom of the iceberg can flow to the top to influence the Learning and Teaching (L&T) methods. This emphasises the need for the staff to be geared with capabilities for sustainability teaching, such as critical reflection, praxis, and problem-solving, where learners are actively constructing rather than merely learning about sustainability. Based on this Pedagogy on Educational Practices, the Iceberg Metaphor is an educator’s context-specific pedagogy to address problems on sustainability in which education should aim to address climate change, social inequality, and the food-energy-environment trilemma which are complex social issues.

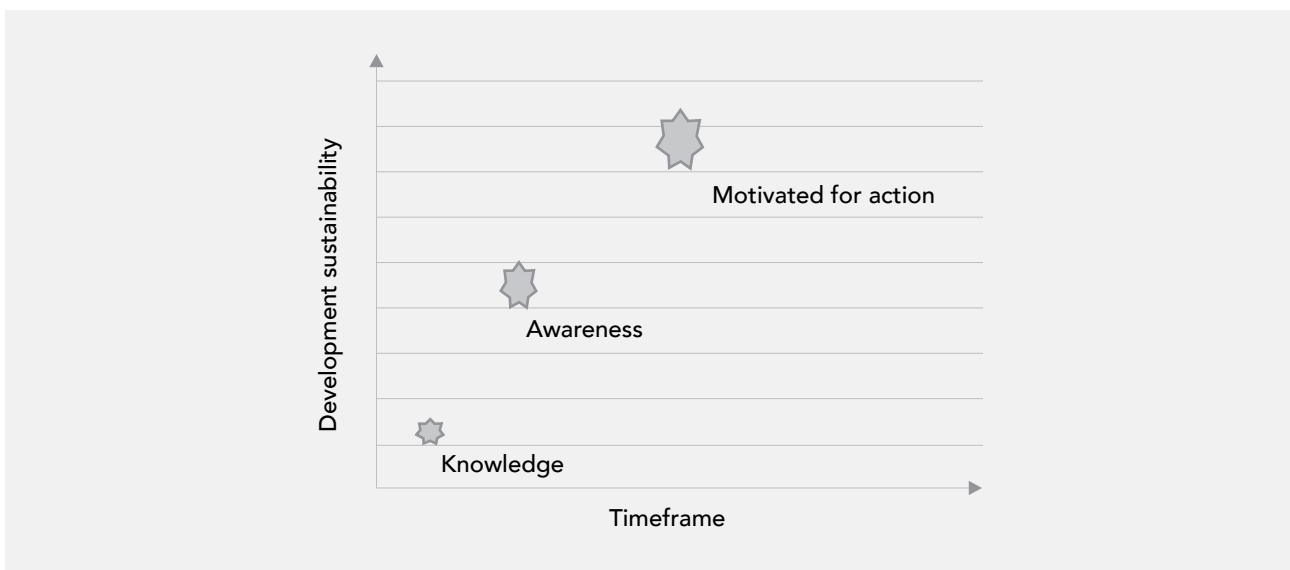
Wamsler (2019) stated that more holistic pedagogical practices are the need of the day, as illustrated in Figure 1. Challenges to sustainability in education are one of the strongest initiators of approaches for sustainable development. Achieving Sustainable Development Goals (SDGs) will need the implementation of the pedagogies and approaches to catalyse the necessary changes rather than carrying out 'business as usual'. To minimise the current gaps, the concept of the inner or 'personal transformation' has been a recently highlighted term for receiving growth and attention in sustainability, science, and education.

Based on the concept of personal transformation, mindfulness-based contemplative teaching approaches have begun to be a new way of addressing socio-ecological challenges and creating a more reflective, compassionate, just, and sustainable society. Therefore, although mindfulness-based, contemplative teaching approaches are increasingly gaining mainstream acceptance in education, they have received only limited attention from researchers (Wamsler, 2019). The inner transformation of the educator and the learner is yet to be connected to education for sustainability. This connection will enable the pedagogy, which is inclusive of values, assumptions and the philosophy of teaching, to achieve the required sustainability and inner transformation of the learners and the educators.

According to Sammalisto et al. (2016), learning about sustainability and global concerns and acting on them is not solely a cognitive matter but must involve an affective understanding. It has been identified that knowledge by itself will not result in changes in awareness and actions concerning sustainability. Therefore, educational institutions must aim to develop deeper circular learning patterns with a pedagogy, where the knowledge is reflected upon and leads to action. Consequently, sustainability knowledge can be defined as knowledge required for understanding and awareness of the need for sustainability as a basis for action.

Sammalisto et al. (2016) further identified that action on sustainability takes time, and it progresses through certain stages as illustrated in Figure 2. Hence, action on sustainability will not take place immediately. However, it was found that the "knowledge gap" is not proportionate to the "commitment gap" in sustainability. It is further evident that the wider concept of sustainability in discipline-specific courses is better than generic "awareness" courses. The former can make a difference in the attitudes scaffolding to actions of the students. Integrating sustainability themes and providing adequate authority to act upon the requirements can be more effective in learning and teaching sustainability.

Figure 2: Conceptual Model on Scaffolding to Sustainability



Note: Adapted from Sammalisto et al. (2016)

According to Felgendreher and Lofgren (2018), since 1990 many global universities have considered international initiatives such as the UN Decade of Education for Sustainable Development (ESD), 2005–2014 (UNESCO 2015), and the Declaration of University Leaders for a Sustainable Future (ULSF, 2015). These initiatives focus on planned behaviour on sustainability. Many of these initiatives have been translated into normal strategies and day-to-day activities for lecturing on environmental or sustainable development issues in courses and curricula. Most sustainable initiatives at universities are being undertaken as day-to-day lessons based on the curriculum with limited emphasis on relating explicitly to the concept of ESD. A useful framework for defining the ESD outcome that this study set out to measure is the theory of planned behaviour. The theory of planned behaviour has three factors that influence one actual behaviour: attitudes to a behaviour, perceived behaviour, and the control and actual behaviour of subjective norms. Behavioural attitudes are specific behaviours that can be either positive or negative. Perceived behaviour is how easy or difficult it is to perform the behaviour. Subjective norms are

perceived social pressures. It has been identified that individuals believe in the most approved actions in society, based on subjective norms. Hence, a subjective norm will have a better influence on individuals' perceptions of social norms in society, and this can guide them as to how to behave in a specific situation. A social norm can be addressed as a collective perception of the expected action. As social norms have an influence on subjective norms, these in turn influence the decision on how to behave in relation to sustainability. Empirical studies have identified that subjective norms are correlated with the way individuals intend to behave in many situations. This could be the way that education should be focused in order to involve tertiary students to be active in sustainability programmes and initiatives in New Zealand.

Considering all the above facts, leadership also has a key role in initiating radical innovation, resulting in fast-track initiatives on sustainability from students and staff. Innovative and transformational leadership values and philosophy also need to be enriched with new tools and approaches such as networking and management systems for integrating sustainability into education (Kilkis & Kilkis, 2017). Learners who absorb the sustainability culture can become sustainability leaders in the future. They need to develop systems thinking competencies with the ability to think outside the box to be geared to overcome sustainability challenges, in order to overcome goal conflicts between social, economic and environmental aspects (Filho et al., 2020).

The intent of this study was to determine whether there is a difference between undergraduate and postgraduate students, in their knowledge and application on sustainability in New Zealand. It has been found that little research has been undertaken in this specific area, which indicates that there is a research gap.

RESEARCH METHODOLOGY

This section outlines the research design that was adopted in this research project to gather primary data from international tertiary learners in New Zealand. The research design consists of descriptive and experimental research methods. According to Chetty (2020), descriptive research is very popular in areas such as education, nutrition and epidemiology. Two sample groups were set up to collect data from two different tertiary education providers for international students in Auckland. Group 1 (G1) consisted of undergraduate learners, and group 2 (G2), consisted of postgraduate learners.

The convenience sampling method was used to collect data. This sampling method is appropriate when obtaining people's perceptions and attitudes (Qualtrics, n.d.). G1 and G2 samples were mutually exclusive and collectively exhaustive, which enabled a better comparison to ensure that important aspects or factors associated with the problem were addressed appropriately (HR World, 2021). All members of the sample were studying for a business management qualification in New Zealand as an international student in one of the tertiary education institutes in Auckland. The potential participants were invited to participate in this research through emails and posters.

These two groups were provided with a questionnaire consisting of 13 questions. These questions addressed four main areas. Section one of the questionnaire had two questions to screen the interviewees to be specifically international students enrolled in either undergraduate or postgraduate studies in New Zealand. The questions in section two included Likert and dichotomous questions focused on identifying how familiar the term sustainability was amongst the two groups. Section three of the questionnaire was focused on identifying if the learners had already been involved in sustainability initiatives in New Zealand based on their cognitive dissonance. Section four of the questionnaire was based on identifying if the learner's behaviour in relation to sustainability was influenced by subjective norms.

The questions in the questionnaire were constructed to obtain the required information from the participants. A pilot test was conducted on the questionnaire to identify if the questionnaire contained potentially confusing questions for the interviewees, i.e. double-barrelled questions (asking about two different issues, while only allowing a single answer), or loaded questions (that inherently contains an assumption). Biased and confusing long questions were removed from the questionnaire. This process was helpful in obtaining a reliable and valid data set. The questionnaire did not consist of open-ended probing questions, allowing the participants to be more comfortable with questions which involved less time to answer. A statistical test such as a C-test, Chi-square and Fisher test was conducted to detect the significant differences between the two groups at 0.05 level of significance.

RESULTS, ANALYSIS AND DISCUSSION

Participant Demographics

The undergraduate group (G1) comprised 15% female and 85% male participants. This group consisted of learners from India, Nepal, Indonesia, Qatar and China. The average age for this group was 21, consisting of learners ranging from 19 to 25 years of age. The postgraduate group (G2) comprised 41% males, 44% females and 14% who did not state their gender. This group consisted of learners from China, Sri Lanka, India, Philippines, Vietnam, Argentina, Thailand and Fiji. The average age for this group was 30, and learners ranged from 21 to 52 years of age.

The outcome of the four areas of the questionnaire is discussed in the following section.

Screening Questions

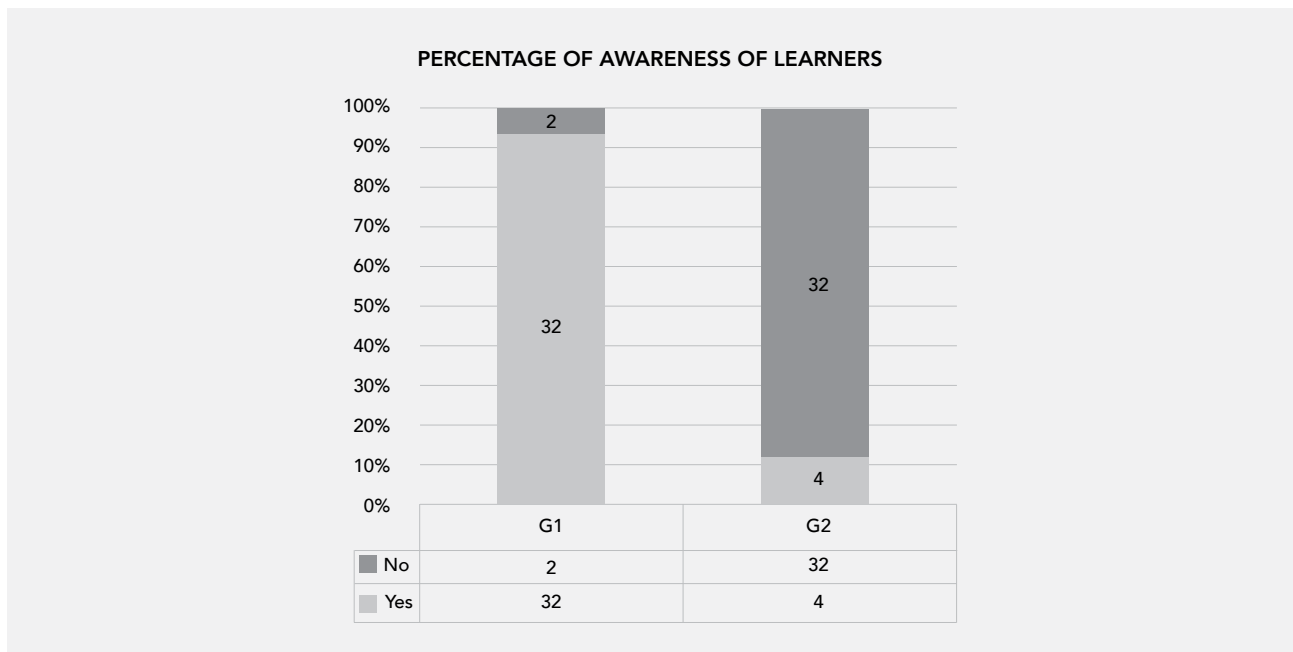
The purpose of the first screening question was to eliminate any participants from the two samples who were not undertaking a course in the tertiary education sector in New Zealand. The second screening question focused on identifying whether the participants were following an undergraduate or a postgraduate course in New Zealand. After screening, G1 and G2 comprised 34 and 36 learners respectively.

Familiarity with Sustainability

A third ranking question included in the questionnaire aimed to obtain information on participants' familiarity with the words innovation, supply chain, sustainability, and investment. For this question the mean, standard deviation (SD), and sample error (SE) were calculated to obtain the P value at 0.05 significance level to identify whether there was a significant difference between G1 and G2. The P value obtained for familiarity with the word sustainability between G1 and G2 was 3.69. This indicates that familiarity with the word sustainability differs considerably between the two groups. The undergraduates were more familiar with the other three words in the question than the word sustainability. The postgraduate students were more familiar with the word sustainability than the other three words. This indicates that there is a clear difference between the two groups in familiarity with the word sustainability. The P values obtained for the familiarity with the words innovation, investment and supply chain, are significantly less compared with the P values obtained for sustainability, i.e. 0.94, 2.3 and 0.0001 respectively. This indicates that the difference in familiarity with these three words was not significantly different within in the two groups G1 and G2, unlike the word sustainability.

The fourth question aimed to determine whether the two tertiary education providers had communicated about sustainability practices in New Zealand to the participants of the two groups. In G1, 32 students answered yes, and in G2, only four students answered 'yes', as Illustrated in Figure 3. The tertiary institute where the undergraduates were studying had communicated the importance of sustainability to their students far more than had the postgraduate tertiary institute (P= 6.94). This indicates the high discrepancy in awareness of sustainability between the two groups in tertiary education. This suggests that there is no consistency in communicating the importance of sustainability to learners in tertiary education in Auckland, New Zealand. However, the New Zealand education strategy for international tertiary students emphasises the importance of sustainability. As stated in the New Zealand 2022-2030 International Education Strategy, the government wants to create a new future for international education that is sustainable, resilient, and diversified (Think New, n.d.). Further, the Māori paradigm emphasises caring for the land and caring for people (Mika et al., 2022).

Figure 3: Sustainability Awareness of Learners at Tertiary Institutes

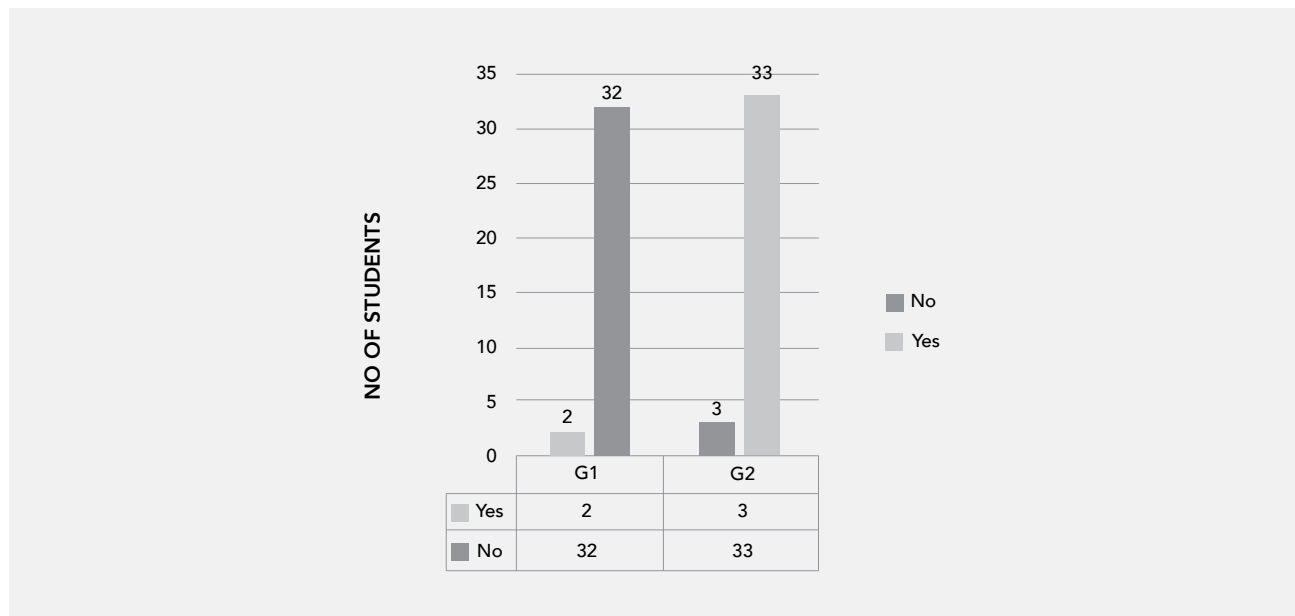


Impact on Cognitive Dissonance Behaviour on Sustainability.

The responses to the fifth question were based on whether the participants had been involved in environmental or community work during their stay in New Zealand. In G1, two students answered 'yes', and in G2, three students answered 'yes' for this question, as illustrated in Figure 4. This indicates that learners of both G1 and G2 are not very committed to being involved in sustainability projects based on their cognitive dissonance (P= 0.003793). The next two questions, the

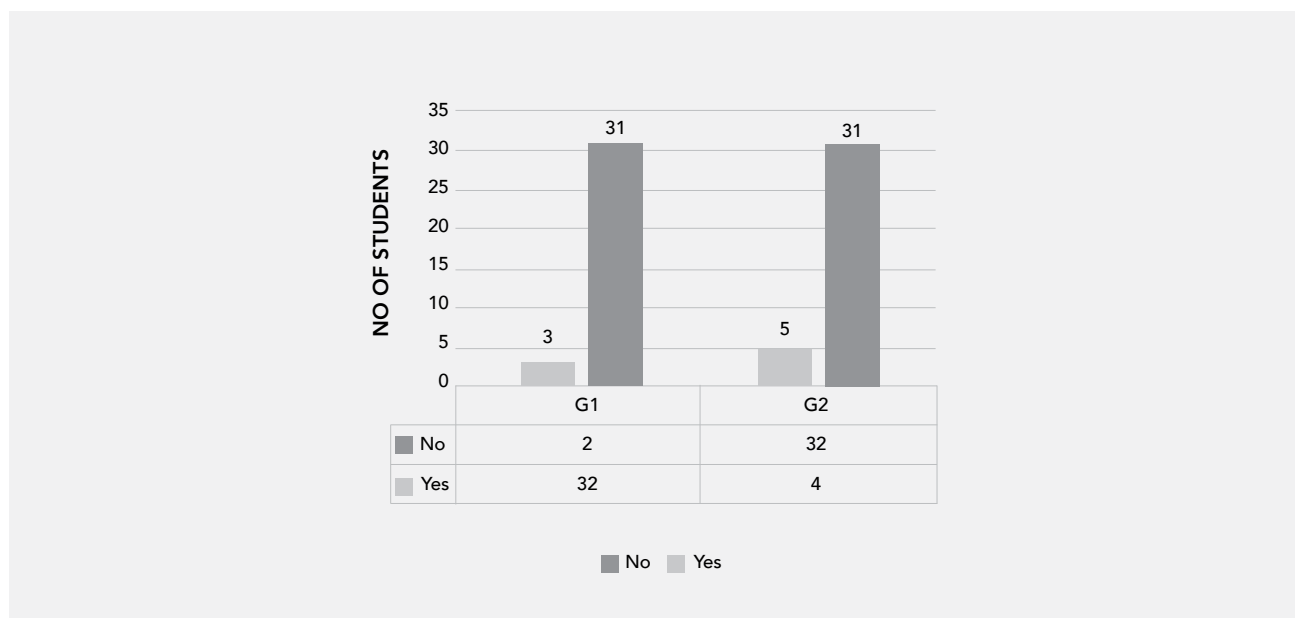
sixth and seventh, were relevant only to the interviewees who answered 'yes' to this question because the probing questions were relevant only to the six interviewees who answered 'yes'. These two questions were based on identifying how they came to know about the sustainability initiatives that they were involved in, and whether it was from the tertiary institute they studied at. There were no responses to these two questions by the 6 relevant interviewees.

Figure 4: Involvement in Sustainability Initiatives in New Zealand



The eighth question aimed to identify the willingness of the participants to be involved if they were given the opportunity to participate in a project to make the environment and the community a better place in Auckland, New Zealand. Both groups responded in a similar manner. There were only three students from G1 and five from G2 answering 'yes' for this question. ($P=0.003793$.) This indicates that there is no significant difference between the two groups on the willingness to participate in a project on sustainability as illustrated in Figure 5.

Figure 5: Willingness to Get Involved in Sustainability Initiatives in New Zealand



The ninth question was on how many hours students thought they could allocate, once in three months, if they were to get involved in a sustainability initiative. The total number of hours on average for the participants of G1 was 10.5, and for G2 it was 11.6 hours. $P=0.8269$ value indicates that there is not a significant difference between the two groups in willingness to allocate time to sustainability initiatives.

Impact on the Subjective Norm

The tenth question was based on inquiring how important the students think it is to act today, to sustain the environment in New Zealand. There was little difference between the two groups where 82% of G1 and 72% of G2 answered that it was very important, which indicates that the two sample groups do understand the importance of engaging in activities and initiatives on sustainability in New Zealand. According to Sammalisto et al. (2016), and based on Figure 2, it is important that action be taken to transform this understanding and knowledge on the subjective norm into action.

The eleventh question asked to what extent the participants thought they had to get involved in making the community and the environment a better place in New Zealand. In G1 73%, and in G2 70% answered to a great extent. This indicates that 27% of G1 and 30% of G2 do not feel that it is every individual's duty and commitment to contribute to the betterment of the community and environment in New Zealand. Both groups G1 and G2 had an almost similar outcome. This indicates that different levels in education do not result in a different approach to commitment to sustainability.

According to information gained from questions about the willingness of the learners to participate in sustainable activities (how many hours they can allow for activities, how important they think it is to act today on sustainable activities, and to what extent the learners think they have to get involved), it appears that there is no significant difference between the two groups G1 and G2. However, with the question relating to the awareness of the term sustainability, there was a difference between G1 and G2. This suggests that awareness of sustainability may not be an indicator for the tertiary students to apply themselves to sustainability activities based on the cognitive dissonance theory. This confirms that the pedagogy of teaching should consist of a strong base including sustainability as a value and a philosophy of teaching for the tertiary sector of education (Sandri, 2022). This concept can be included in the learning outcomes of the assessments that are designed for the learners so that the learners and the educators are exposed to sustainability and inner transformation. Then sustainability can become a subjective norm amongst international tertiary level students. This approach can lead to best practices in learners such as "cradle to cradle" and recycling initiatives. These initiatives will contribute to New Zealand's goal of reducing 2017's biogenic methane emissions by 10 per cent by 2030 (Climate Change Response (Zero Carbon) Amendment Act, 2019).

The twelfth question was based on the accuracy of putting rubbish in the appropriate waste bins at their residences. Eighty-five per cent of G1 and 80% of G2 indicated that they always put rubbish into the appropriate waste bins accurately. However, 15% in G1 and 20% in G2 indicated that they put their rubbish in the appropriate waste bins sometimes accurately or not at all accurately. It is important that these 15% and 20% of learners be directed to act in the always accurately group to obtain a 100% success rate. Both groups G1 and G2 have an almost similar outcome indicating that different levels in education do not result in a different approach to commitment to sustainability based on subjective norms.

The thirteenth question asked participants to state whether they carried a reusable shopping bag to do their shopping. Only 62% of G1 and 86% of G2 did always carry a reusable bag for their shopping. Based on the results of these two questions, it seems that subjective norm can provide better results in achieving a national goal of emitting zero greenhouse gases (except biogenic methane) by 2050 in New Zealand (Ministry of Environment, 2021).

Statistical analysis

To statistically analyse the above figures in questions ten, eleven, twelve and thirteen, we conducted a Pearson's Chi-square test and obtained P values for the four questions. Based on these values Table 1 indicates that there is no difference in the commitment and application of sustainability practices between the two groups, i.e. undergraduate (G1) and postgraduate students (G2).

Table 1: Pearson Chi-square Test Results

DESCRIPTION	X	DF	P VALUE
How important it is to act today	1.544	2	0.462
To what extent they have to get involved	0.343	2	0.842
Accuracy of rubbish disposal	5.537	2	0.062
Carrying a reusable shopping bag	3.281	2	0.194

Note: DF = Degree of Freedom

Due to the small sample sizes associated with this research, with 34 and 36 participants for G1 and G2 respectively, Fisher's Exact Test was also conducted to reconfirm the P values in Table 1. As indicated in Table 2, all four P values were less than 1.96 which indicates that there is no significant difference between the two groups in their commitment to sustainability based on their level of education.

Table 2: Fisher’s Exact Test Results

DESCRIPTION	X	DF	P VALUE
How important it is to act today	1.544	2	0.564
To what extent they have to get involved	0.343	2	0.865
Accuracy of rubbish disposal	5.537	2	0.069
Carrying a reusable shopping bag	3.281	2	0.224

Note: DF = Degree of Freedom

With the above P values calculated, it was found that there is no significant difference between the learners’ behaviour on sustainability based on cognitive dissonance and subjective norms. Hence, as explained by the Pedagogy on Educational Practices (Iceberg Metaphor), it is important to develop sustainable practices in education as a learning process rather than a rolling out act. Therefore the very bottom of the iceberg can flow to the top to the Learning and Teaching (L&T) methods which can develop more dedicated learners of sustainability (Sandri, 2022). Also, the conceptual model of scaffolding to sustainability indicates that these sustainability initiatives take time to deliver results (Sammalisto et al., 2016). Therefore, it is important that initiatives be taken to implement the Pedagogy on Educational Practices without further delay.

It was also found that there has been very limited research carried out to analyse the difference between the undergraduate and postgraduate learners’ cognitive dissonance behaviour and the subjective norm behaviour in relation to sustainability. Hence this area of study can be further explored in wider geographical locations.

Delimitations

The sample sizes should have been larger to represent better the population of tertiary learners in Auckland New Zealand. The geographical areas to represent the population should have been from different areas of the country to obtain a more accurate inference. The research instrument, i.e. the questionnaire, should have had some open-ended questions to probe more fully into the participants’ commitment to sustainability.

CONCLUSION

This research indicates that while there is a difference in the awareness of sustainability between undergraduate and postgraduate international students in Auckland, New Zealand, their level of involvement in sustainability initiatives remains relatively consistent. This suggests that the application of sustainability is not inherently tied to the level of education but may be influenced by other factors.

The analysis underscores a conspicuous void in scholarly investigations within this area of study, delineating a pronounced research gap awaiting exploration. By integrating sustainability principles into pedagogy, fostering contemplative teaching practices, embracing circular economic principles, conducting further research, offering discipline-specific courses, and advocating for a human-centred curriculum, international tertiary educational institutions in New Zealand can play a pivotal role in cultivating a generation of socially and environmentally responsible Kiwi citizens.

RECOMMENDATIONS

- a) **Deeper Integration of Sustainability in Pedagogy with Strategic Leadership for Sustainability:** Tertiary educational institutions in New Zealand should prioritise the development of circular learning patterns centred around the values and philosophy of sustainability. Learning outcomes should be structured to facilitate the translation of sustainability knowledge into actionable practices. A generation of environmentally conscious tertiary international students and innovative and transformational leaders in sustainability should be developed in New Zealand.
- b) **Promotion of Contemplative Teaching:** Implementing contemplative teaching methodologies can facilitate a shift in the collective perception and behaviour of tertiary students towards sustainability. By encouraging inner transformation, students are more likely to adopt sustainable practices in their daily lives.
- c) **Embrace Cradle to Cradle Principles:** Tertiary educational institutions in New Zealand should actively promote sustainable best practices, such as the “cradle to cradle” approach and circular economic principles. These initiatives not only reduce environmental impact but also instil a mindset of resource conservation and regeneration among tertiary level international students.
- d) **Further Research and Education Strategy:** The New Zealand education strategy for international tertiary students and

the Māori paradigm underscore the importance of sustainability. Therefore, additional research is warranted to explore the nuances of sustainability knowledge and application among international undergraduate and postgraduate students. This will help identify specific areas for improvement and inform targeted educational interventions.

- e) **Introduction of Discipline-Specific Courses:** Addressing the observed gap between knowledge and commitment to sustainability requires a shift towards discipline-specific courses rather than generic awareness programmes. Tailoring education to the unique needs and interests of students within their respective fields of study can foster deeper engagement and tangible action in relation to sustainability.
- f) **Advocacy for a Human-Centred Curriculum:** Academic communities should advocate for a paradigm shift in business curricula, moving away from an organisation-centred worldview towards a human-centred approach. By aligning educational content with the values and priorities of individuals, subjective norms on sustainability can be transformed into actionable behaviours, ultimately leading to a more sustainable future for New Zealand.
- g) **Incorporating appropriate models** - The Pedagogy on Educational Practices, Iceberg Metaphor, and the Conceptual Model on Scaffolding to Sustainability should be incorporated into teaching.

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